경제학박사학위논문

What determines each nation's share in world GDP

: Comparison with determinants of per capita GDP growth

with focus on exchange rate and repatriated profit

세계GDP에서 각 국 비중의 결정요인

: 환율과 이윤유출을 중심으로 1인당소득 결정요인과 비교

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Abstract

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This dissertation revisits the question of what determines economic growth in the phenomenon of catching up, forging ahead, and lagging behind of nations, with a new focus on the comparison of the determinants of each nation's share in world GDP and per capita income. These two indicators are complementary. The latter represents a people's standard of living and the former represents economic size (power) of a nation. The grand hypothesis is that determinants of these two different aspects of economic growth are markedly different. This dissertation shows that conventional growth variables are not statistically significant in GDP share equation, but they must be transformed into shares, such as the share of a country in world population or human capital. More importantly, this dissertation shows that although the undervaluation of currency of each nation may promote the growth in per capita income, it tends to reduce each nation's share in world GDP because undervaluation depreciates GDP of a country measured at market exchange rate. This dissertation also finds the variables of institutional quality, openness, and foreign capital inflows are often significant in growth of per capita income, but not in GDP share equations. Specifically, the dissertation runs a regression of each nation's share in world GDP as a dependent variable with explanatory variables, such as exchange rate undervaluation, export share in world export, foreign capital inflow share in global capital inflow, as well as other

conventional growth variables in world share forms, and finds those determinants reflecting rivalry and relative performance are statistically associated with GDP share change.

Having verified the new determinants of each nation's share in world GDP, this dissertation investigates the effect of various foreign capital flows, including repatriated profits. A motivation for this question is a hypothesis that developing countries tend to face slower economic growth because they consistently encounter more outbound capital flows in general, in the form of interests payments and dividends, than new inbound capital flows, and the effect of such flows might depend upon the indigenous capability of each nation, such as absorption capacity, level of human or technological capabilities. Then, empirical analyses verify the above hypothesis. The dissertation finds that although hosting more foreign capital is good for economic growth, repatriated profit tends to be negatively related to economic growth in the South, and foreign capital inflow and repatriated profit have different effects on economic growth based on the development level of countries, with certain threshold values identified in terms of level of per capita income, advanced human capital, and number of patents. Moreover, this dissertation finds that this threshold is much higher than that of FDI in which the host developing countries obtain the positive effect from FDI. This result implies reverse financial flow out of developing countries in the form of repatriated profit and not that financial flow itself may be one of the important causes of the growth problems in the South.

Keywords: economic growth; foreign capital; GDP share; income level; repatriated profits; undervaluation; middle-income trap.

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Chapter1. Introduction

I. Motivation

Economic growth refers to the increase in the output or productive capacity of a nation. In economics, the economic growth of a nation has long been measured by change in gross domestic product (GDP) per capita based on the conventional belief that economics refer to the constant increase of individual utility, and individual welfare is very well represented by GDP per capita. GDP per capita in real terms is a simple and convenient measure for the level of welfare of people in a national economy. However, in economics, the national economic size is important, in addition to welfare of people. Although Adam Smith and other classical economists were substantially interested in economic size and its relative size to neighbor countries as national competitiveness, modern economics has given little attention to economic size or power, but GDP per capita growth rate has long been the only measure for economic growth. A few studies have investigated the economic influences of economic size (Alesina et al., 2005). A large economy has many advantages: it facilitates the economies of scale in the production of public goods and becomes less subject to aggression or imperfectly correlated external shocks. Moreover, a large country can better internalize externalities across the country and benefits from redistribution policy (Bolton et al., 1997). In addition, the positive externalities in the accumulation of capital (Voigländer and Voth, 2006), human capital (Lucas, 2002), and of knowledge and technology (Galor and Weil, 2000) are the benefits of large economy size. Product quality also increases with market size (Berry and Waldfogel, 2010). Cost of large size exists, including administrative and congestion costs from heterogeneity within the borders of the country. Nonetheless, the size of GDP as the measure of the economic size and power of the country, whether

benefit or cost, is an important indicator. This dissertation attempts to focus on economic size and investigate the determinants of national economic power, which has gained little attention in modern economics.

In addition to economic size, rivalry in the global economy and relative performance are the other important issues in economic growth. Global economy is becoming more inter-dependent, and no country's economy can be explained without referring to others. From 1990 to 2012, the GDP has increased from USD 22.2 trillion to USD 71.7 trillion. The growth rate per annum in current USD terms is approximately 5.5%. At the same time, the growth of international interchange is much faster. Global foreign direct investment (FDI) inflows surged to USD 1.35 trillion or 6.5 times more than USD 207 billion in 1990 (UNCTAD, 2013). Export of goods and services also shows drastic increases in the same period. In 1990, export of goods and services was only USD 4.4 trillion or 20% of global GDP (UNCTAD, 2013). After two decades, the amount grew to USD 22.4 trillion or 31% of global GDP. Both indices showed faster annual growth rates of approximately 8.9% and 7.7%. Likewise, the world economy shows that inter-dependency among nations is intensifying not only in capital flows, trade of goods, and services, but also everywhere else. In the era of globalization, economic growth in one country is not fully explained by a closed economic model. Economic performance of one country should be evaluated in comparison with that of other competitor countries. In addition, economic activities of countries all over the world influence each other. Therefore, economic size converted in each nation's share in world GDP can be a good measure to represent economic growth from the perspective of the nation and a complement to GDP per capita growth rate. An investigation on each nation's share in world GDP is not less important than that on the individual's welfare of each nation. The change in the share of each nation in world GDP has many realistic examples to better explain more directly or more intuitively. Export-led growth strategy

by exchange rate undervaluation policy, middle income trap phenomenon, or deteriorate growth, the growth strategy depend on foreign capital. The growth production distribution and resource rivalry problems are also part of the examples. Using both the conventional and new variables, such as GDP per capita growth rate and each nation's share in GDP together, to obtain rich knowledge on the economic growth of nation is possible.

This dissertation starts with the characteristics of the economic growth of the nation in the global era, and the necessity to find an alternative measure beyond the GDP per capita and its growth rate. The next section of this dissertation scrutinizes each nation's share in world GDP with the required conditions that an alternative measure should satisfy the economic size, relative performance in economic growth, and rivalry among nations. Section 3 proposes the hypotheses. Section 4 introduces the data and methodology of the study. The final chapter concludes the study.

II. Why consider the economic size and its share in world GDP: How are they different from GDP per capita?

What is growth in economics? What is the purpose of economics? Adam Smith, the father of economics, answered these questions in his novel masterpiece, "Wealth of Nations" on the two objects of economics.

> Political economy… proposed two distinct objects; first, to provide a plentiful revenue or subsistence for the people... and, secondly, to supply the state or commonwealth with a revenue sufficient for the public services. It proposes to enrich both the people and the sovereign (Smith, 1776).

According to Smith (1776), the first object of economics is the permanent increase in

GDP per capita, on which modern growth economists have long focused. An absolute increase in the level of GDP per each person directly implies the expansion of the consumption basket and better quality of life. By contrast, the wealth of nations, which is the second object, is rarely considered. However, Adam Smith and many classical economists have been concerned with wealth of nations until mid-20th century. The trend analyzing GDP per capita only in economics began with the development of microeconomics and the micro-foundations on macroeconomics after the 1960s. What economists should attempt to find is not only the approach to improve the lives and welfare of people, but also the method to enhance the economic strength of a country.

While the world is moving into an era of unparalleled and unprecedented globalization in history, it is also commonly witnessed that a government of each nation employs every possible means to dominate the international economic transactions in which a firm or an industry of a nation, or a nation itself is involved. In this manner, the conventional growth equation expressed by the GDP per capita growth rate is insufficient to solve the growth story of a nation perfectly in the global era although it may be unanimous that the final aim of economics is a permanent increase in the welfare of every person. Moreover, GDP per capita in the equation is the simple value of GDP divided by the population. GDP is the direct output of aggregated production from national resources. Distribution of national products to people is another matter. How to increase and distribute the national output to improve the welfare of the members of the economy are totally different matters. Therefore, I suggest that an approach to the national unit GDP is the most immediate measure on cross-country growth analysis, and the size of economy and GDP per capita growth rate should be considered.

The economic size itself is also important. The size of the economy can be varied endogenously because it is not confined to the geographical size of a country. Many studies focus on the benefits of economic size on the economic growth. Economic

size has many benefits (Alesina et al., 2005). One benefit of a large economic size is the economies of scale in the production of public goods. Second, a large country is less subject to an aggression or imperfectly correlated external shocks. Third, a large country can better internalize externalities across its borders. Fourth, a large country also benefits from redistribution policy (Bolton et al., 1997). Fifth, the positive externalities in the accumulation of capital (Voigländer and Voth, 2006), human capital (Lucas, 2002), and knowledge and technology (Galor and Weil, 2000) are the benefits of large economic size. These mechanisms, which are based on historical evidence from the industrial revolution in England (Wrigley et al., 1989), are verified theoretically. Finally, the product quality also increases with market size (Berry and Waldfogel, 2010). The costs of size, including administrative and congestion costs from heterogeneity within the borders of the country exist. The size of the economy influences the economic performance whether benefit or costs. Therefore, the size of GDP, as the measure of the economic size and power of the country, is an important indicator and relates to the welfare of people of a country.

In the history of economics, one of the main topics that gained the attention and clarified by classical economists is national competitiveness. Along with this topic, finding the continuous and stable increase in economic power, that is, economic growth and the effective policy that the government can implement are the main concerns. Growth in economic size is regarded as the enhancement of national competitiveness, and to promote growth is the responsibility of the government.

The national competitiveness of a country in the international arena is not explained by its GDP per capita, but by the GDP size. The size of the economy denotes national competitiveness, that is, economic power. A frequently used term in the global economy like G7 (Group of 7), G20 (Group of 20), or BRICs (Brazil, Russia, India, and China) indicate the group of powerful leading countries among developed or emerging

countries. Table 1 shows a list of G20 major economies in the last column, whereas the second and third columns show the Top 20 countries with the highest level of per capita income largest economies, respectively. At a glance, countries included in the list of Top 20 GDP per capita and G20 are not the same, such as the United States and United Kingdom. By contrast, countries in the list of Top 20 largest economy and G20 mostly overlap, including a permanent guest for G20, Spain, and among EU members, only Switzerland is among the list of Top 20 countries with the largest economy. Collectively, G20 countries or economies account for approximately 85% of world GDP, 75% of world trade, and two-thirds of the world population (G20, 2014). Therefore, from the perspective of a nation in the global era, GDP size can be a measure of economic power.

Table 1: G20 economies and major countries by income level and size of economy

Rank	GDP per capita (in 2005 USD)	GDP (in current USD)	G20 major economies
1	Monaco	US	Argentina
2	Liechtenstein	Japan	Australia
3	Luxembourg	China	Brazil
4	Bermuda	Germany	Canada
5	Norway	UK	China
6	Channel Islands	France	France
7	Iceland	Italy	Germany
8	Switzerland	Spain	India
9	Qatar	Canada	Indonesia
10	Ireland	Brazil	Italy
11	Denmark	Russia	Japan
12	San Marino	India	Korea
13	US	Mexico	Mexico
14	Sweden	Korea	Russia
15	Netherlands	Australia	Saudi Arabia
16	Finland	Netherlands	South Africa
17	UK	Turkey	Turkey
18	Isle of Man	Belgium	UK
19	Austria	Switzerland	US
20	Belgium	Sweden	EU

Notes: 1. Ranked by the averages from 2005 to 2009.
2. G20s are listed in alphabetical order.

In related social sciences, economy size has long been considered as economic power. In diplomatic science, politics, or international affairs, GDP or its share in world GDP has received substantial attention as the primary indicator, and its variation with other main indicators has been a main topic of study. For example, the economic power measured by economic size considered in the National Power equation as one of the five key variables (Cline, 1975). The economic power of one country always interacts not only with other competitive economic powers, but also with its own and other domestic politics, foreign affairs, and other social factors. Economics usually ignores this interaction (Acemoglu et al., 2012), whereas other social sciences lack the rigorous methodology of economics. Hence, analyzing the issue of economic power using the well-developed methodology in economics or statistics is necessary. A research on the interaction among nations is an important issue to be investigated.

Economic power of nations measured by the size of nominal GDP has an important meaning in economics because not only does it reflect the actual international transactions in global economy, but it is also one of the two major objects that gain the attention of classical economists. As the primary output of aggregated production of a country, GDP in current terms and GDP per capita in constant terms should be analyzed to explain the growth of a country. Moreover, GDP size itself has an effect on the welfare of people, GDP per capita, and not merely as the numerator. For these reasons, GDP itself is worth studying. However, the size of GDP alone cannot provide a full explanation regarding many growth phenomena of nations. Relative performance of economic growth and rivalry among nations are the other important aspects of the growth of nations.

From the perspective of economics of catch-up and the reality of the competitive global economy, the absolute value of GDP per capita or GDP is unsuitable to describe the catching-up, leapfrogging, and falling-behind phenomena among nations.

A relative economic performance to that of competitors is rather an accurate criterion of assessment. Suppose one country attempts to boost its growth rate by investing more on capital, which can lead to the higher GDP per capita level. However, suppose the neighbor country also invests the same amount of money in proportion to its GDP size as well? The growth equation informs us that GDP per capita growth rates of both two countries increase although the difference of their economic power is unchanged when all other conditions are equal, *ceteris paribus*, because none of the two countries invested more than the other. Not 'Do more,' but 'Do more than' determines the relative performance in economic growth. Philipp von Hörnigk (1684) thought that the power and affluence of a country do not depend on the abundance or security of its own power and affluence; principally, power and affluence depend on the relative possession, in which the neighbor countries have more or less. Kennedy (1987) also asserted that as far as the global system is concerned, the power of a nation, including economic power and military strength, is always a relative norm. Therefore, the wealth and power of a nation should be considered relatively. By considering the rise or decline of the relative economic performance among competitor countries, the catching-up story of a nation or the growth stagnation, such as the middle income trap, can be explained.

In international transaction, such as foreign capital investment, the concept of relative performance is precise to grasp the economic phenomenon. Foreign direct investment (FDI) is an investment reflecting a long-term interest and control by a resident entity in one country or by an enterprise resident in a country other than homeland of the foreign direct investor (UNCTAD, 2007). FDI implies that the capital transaction including initial investment, reinvestment, and intra-company loans is eventually the interaction between the home and host countries, such that the effect of FDI leads to various kinds of consequences among the countries involved. The effect of FDI on economic growth of the host country has been widely studied via both

theoretical and empirical analyses. Generally, the shared view is that FDI enhances the economic growth of the host countries via the transfer of new technologies and know-how, human capital, integration into global economy, and increased competition. However, studies conclude that FDI affects the host country negatively. Given the lack of consensus concerning the effect of FDI on the economic growth of the host country, an investigation on the relative growth outcome between the investor and host countries can be a good alternative criterion to evaluate the effect of FDI. Even if the effect of FDI is positive on the economic growth of the host country, stating that FDI is good for the recipient country is difficult. The benefits of an investor country are relatively larger than the host country because the investor country could obtain more economic power. This situation can be aggravated in long-term transactions. Increasing FDI stock naturally leads to the larger amount of profit repatriation to home country, such that the share of economic fruits from existing FDI stock for investor could be larger than that for the investee. These consequences are all matters of relative performance.

The third feature of the growth of nations in the global economy is the rivalry among nations. As if economics begin with the scarcity problem, the international competition for scarce resources is widely observed. A rival resource possessed by one country prevents the simultaneous possession by other countries. Resource, such as capital, human capital, energy resources, rare earth elements, and so on has the characteristic of rivalry. Concentrated FDI toward China relatively dried out FDI toward developing countries, such as those in Africa, because global competition is intensifying and the gross amount of international capital is limited (Dupasquier et al,, 2006; UNCTAD, 2007). The issue of rivalry among nations is not confined to resources alone. Economic behavior can be involved. Does a certain economic behavior, which may be beneficial for a country be harmful to other countries at the same time? This concept is distinct from negative externality or spillover. The rivalry of economic behavior stems

from the limitation in expanding the boundary of certain economic system or market, as well as internal competition. Cline (1982, 2010), Balassa (1988), and Spence (2011) introduce the interesting situation in global economy, that is, the adding-up problem or fallacy of composition. It refers to the situation that as more developing countries enter into the market with similar goods, the relative prices of these goods would be lower, making this market less profitable (Spence, 2011). This irony for developing countries originates from the rivalry in size or limited expansion speed of the market in the global space, and thus competition intensifies.

I argue that economic power, relative performance, and rivalry should reflect in an alternative measure. Then, I propose the 'Each nation's share in world GDP (GDP share)' as a more suitable variable, satisfying the important properties of real global economy. GDP per capita or its growth rate in conventional economic growth equation is analyzed under the i.i.d. assumption, that GDP per capita of each country is determined independently unless a certain explanatory variable is included. However, countries worldwide are so closely interlinked that the analysis method for a relative economic performance is necessary, and each nation's share in world GDP could be the alternative measure. In the intensifying global era, the inter-dependency assumption is inappropriate. Other social sciences, such as diplomatic politics, have substantial interests on the dynamics among nations by using the share variables despite the lack of effective scientific methods. GDP share and other economics-related share variables are expected to be useful for many economic phenomena. Hence, economic analysis based on GDP share in the perspective of the economics of catch-up is meaningful.

The economic size and each nation's share in world GDP is measured in current US dollar term. GDP per capita and its growth rate are widely used in constant terms of USD or PPP to represent the purchasing power and welfare of each nation. By

contrary, the market size or economic power is measured at the current prices in USD considering the transactional perspective and international comparability among nations. Welfare is determined in constant terms; yet, the international transaction works in the current international currency. Measuring in current USD shows that the exchange rate undervaluation policy phenomenon, which encourages exports by suppressing the domestic factor prices, can enhance the GDP per capita growth rate in real term (Rodrik, 2008). However, the economy size or economic power measured by GDP or GDP share at the current prices in USD is not proportionately increased. For example, if a country depreciates its currency by 10% and expands its economy by 10%, then its economy does not grow at current prices in USD. This circumstance can be evaluated as an invalid growth strategy.

Figures 1A to 1D illustrate the various patterns of the level of GDP per capita in constant term and the share of each nation among several country groups or region in world GDP. Figure 1A specifically shows the patterns of Korea and Taiwan, which are the most successful catching up countries globally after World War II. The level of GDP per capita of these two countries has continuously increased since 1960, except during the Asian crisis in late 1990s and the global financial crisis in 2008. Contrary to their remarkable growth performances in real GDP per capita, Taiwan and Korea have exhibited unimpressive share in world GDP. In particular, the share of Taiwan attained its zenith in late 1990s and has steadily lost its GDP share since 2000. Meanwhile, the share of Korea in world GDP also displays a similar pattern, except that it has fluctuated in a large band between 1.5% and 2%. In this event, these two remarkable latecomers, whose growth engines are cooling down, are no longer considered catching up countries. Successful catching up countries, namely, Brazil, India, and China, are presented in Figure 1B. These countries, which are the members of the so-called BRICs, are making a considerable up-curve not only in the GDP per capita, but also in the share in world

GDP since 2000. Ahead of the curve, China has incomparable growth in GDP per capita and expansion in GDP share. Figure 1C indicates the fall of the two largest countries, namely, the United States of America and Japan. The GDP per capita of these countries is increasing; yet, the two nations are continuously losing their relative economic power. The falling behind of Japan has been evidently observed in its GDP share during the 'lost two decades'. By contrary, the power of the United States still overwhelms all other countries with the fact that it owns the quarter share in world GDP. Meanwhile, the patterns of two variables from selected countries in the least developed continent, Africa, are specified in Figure 1D. Nigeria and Algeria have the largest population and area in Africa, respectively. Mauritius is one of the richest countries among African countries. In terms of GDP per capita, only Mauritius, a successful small economy in Africa, indicates growth. However, in terms of GDP share, all three countries have never shown any remarkable growth. In fact, none of these countries has ever accounted for even 0.6% share in world GDP since 1960.

Figure 1A: Pattern of the GDP per capita and the share of Korea and Taiwan in world GDP

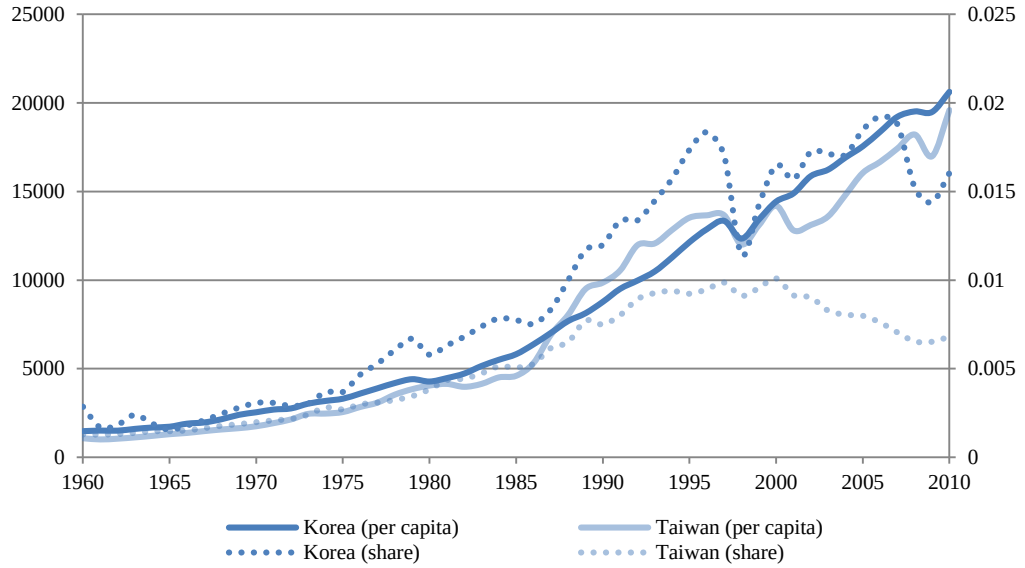


Figure 1B: Pattern of the GDP per capita and the share of Brazil, China, and India in world GDP

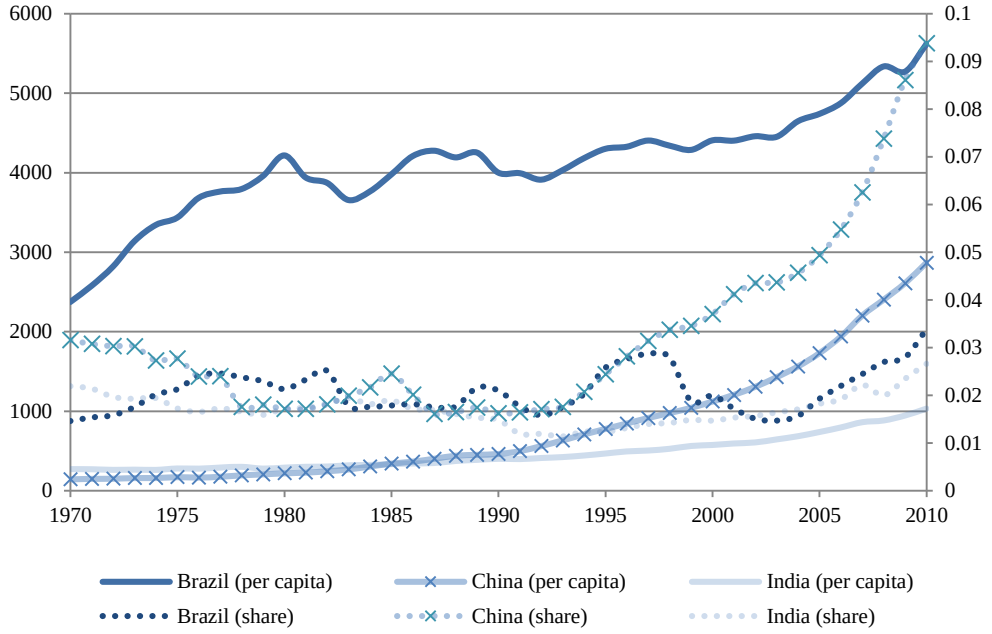


Figure 1C: Pattern of the GDP per capita and the share of U.S. and Japan in world GDP

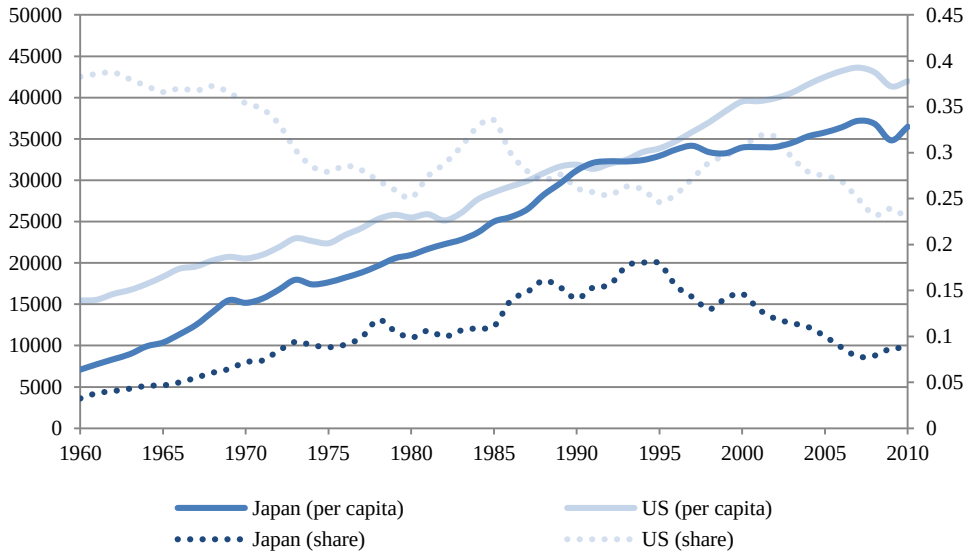
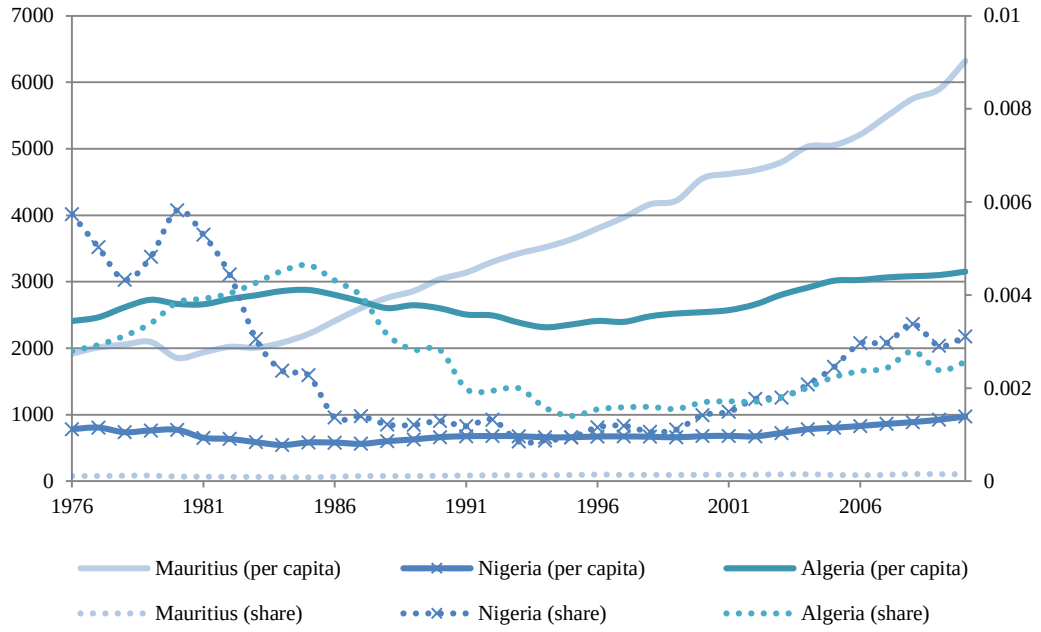


Figure 1D: Pattern of the GDP per capita and the share of African countries (Mauritius, Nigeria, and Algeria) in world GDP



Each nation's share in world GDP has excellent explanation ability not only in a conceptual framework. Several economic phenomena prove that the variations of country's share in world GDP explains the current economic situation of a nation much better, more directly, or more intuitively compared with GDP per capita growth rate. One of the examples is the growth strategy led by export promotion using the artificial exchange rate undervaluation. Rodrik (2008) noted that the exchange undervaluation policy significantly enhances the GDP per capita growth rate as the second best policy in developing countries. However, such a policy does not guarantee the growth in GDP share. The export promotion by an artificial exchange rate undervaluation intends to suppress a relative real wage and other factor costs of compelling the export prices to be competitive in the global market. Hence, a country cannot expand its economic power by this bleeding competition policy. In a low-value added industry in which developing countries can readily enter, the undervaluation policy is the only and easiest means to

promote the exports of goods. Accordingly, as suggested by Spence (2011), this market in the global economy becomes less profitable, and a country that implements this undervaluation policy has no growth in GDP share. Such situation can be directly witnessed by tracking the change of GDP share. Without upgrading the status of a country in the value chain, the positive change of GDP share is not warranted by the exchange rate undervaluation policy.

Similar logic can be applied to the middle income country trap phenomenon. The middle income country trap is the stagnation of countries with no economic growth to high-income country level (ADB, 2011). In terms of GDP per capita growth rate, the middle-income country trap is the stagnation situation in which a middle-income country is stuck at low growth rates after the short periods of high growth. However, the threshold of low GDP per capita growth rates is uneasily defined, inducing the exact characterization of the stagnation or falling down of GDP share. Figure 1 indicates that the level of GDP per capita generally increases in the long term and its growth rate is positive in most periods. The data clearly reveal that the stagnation of Brazilian share in world GDP has long fallen into the middle income trap. As shown in the cases of middle income trap countries, the positive growth in GDP per capita does not guarantee catch-up; faster growth than forerunners or competitors is necessary (Lee, 2013). This phenomenon is directly expressed by the loss or stagnation of GDP share.

An immiserizing growth or a similar economic phenomenon in low-income developing countries is another example of the abovementioned explanation ability of each country's share in world GDP. Immiserizing growth refers to the worsening growth in which the deterioration in terms of trade, which imposes a loss of real income, outweighs the growth gain in real income (Bhagwati, 1968). In some cases, even if they have not attained the deterioration in terms of trade, low-income developing countries enter the world economy by boosting the primary industry or low-value added

manufacturing industry in which the income elasticity of global demand is relatively low. In this event, the economic growth of these countries cannot be significantly rapid compared with that of the developed countries, whose major industries are high-value added manufacturing or knowledge-based industries, in which the elasticity of global demand is relatively high and the marginal production is increasing. These countries can experience positive growth in their GDP per capita, but can lose their GDP share in the global economy at the same time.

The growth that highly depends on foreign capital, in which the GDP share and positive GDP per capita growth rate can simultaneously decrease, is another instance of the abovementioned explanation ability of a country's share in world GDP. The effect of foreign capital is different from that with the investment raised from domestic capital because in the former condition, profit can be repatriated. In this event, growth benefits can be offset by the payment for borrowed money. Numerous studies suggest that FDI certainly enhances economic growth especially in developing countries (Aitken and Harrison, 1999; Djankov and Hoekman, 2000; Kathuria, 2000; Hu and Jefferson, 2002; Lopez-Cordova, 2003; Herzer, 2012). Recent studies indicate that the effect of FDI is quite ambiguous depending on the domestic conditions of the host country (OECD, 2002; Forte and Moura, 2013). One hard fact that explains this situation is that foreign investment is generally beneficial for an investor. Hence, the effect of FDI on the GDP share of the investor country is favorable unless the benefits for the host country are sufficiently large. Other than the effects of foreign capital on GDP share, the influence of economic power on the benefit of foreign capital (then eventually on the host country's GDP share) is also observed. The Chinese government has actively engaged multinational firms in technology transfer to Chinese firms and joint venture negotiations by means of its enormous market size and bargaining power (Lee et al, 2011). This successful 'trading the market for technology' strategy proves that

the market size or economic power is a relevant issue in catch-up among nations in the global economy.

Apart from the GDP variable in share in world GDP form, other variables in share of gross world form can also be adopted in thoroughly explaining several economic circumstances. As globalization intensifies, the competition in resources escalates worldwide. The government mainly focuses on the allotment of resource, energy resource, and capital; the resource share of each government partially determines national competitiveness.

In brief, analyzing actual economic phenomena from the perspective of a nation is more useful than analyzing them from the perspective of an individual welfare. In this section, the per capita GDP and its growth rate are further explored to acquire a better description of the catching up mechanisms of nations in the global era. The missing aspects of the GDP per capita and its growth rate in global economy are supplemented by proposing the each nation's share in world GDP and by examining its excellence in explaining the economic size and power, relative economic performance, and rivalry of a country among nations. However, it is not in a vein of the criticism that the alternative indicator including human development is more appropriate indicator than the GDP per capita or its growth rate. The author's perspective is that with acknowledging the usefulness of the GDP per capita and its growth rate in describing and analyzing some economic phenomena, proposing each nation's share in world GDP that can be an inter-complement to the GDP per capita and its growth rate, but can also shed light on other economic issues. In the next chapter, the possibility of empirically analyzing each nation's share in world GDP (e.g., the GDP per capita growth rate in growth equation) to obtain the scientific methods for the relations of each nation's share in world GDP and other determinants in share form is investigated.

III. Hypotheses of dissertation

The each nation's share in world GDP and its necessity in investigating global economy from the perspective of economic power of nations are introduced in the previous section of this chapter. Three main hypotheses are proposed regarding this new variable. These hypotheses are examined with theoretical and empirical approaches that are explained in the latter part of the dissertation. The first hypothesis of this dissertation is that the determinants of each nation's share in world GDP are different from those of GDP per capita growth rate. As discussed in the previous section, each nation's share in world GDP that is calculated at current prices in USD units aims to measure the prosperity of sovereignty against other nations, whereas the GDP per capita that is gauged at the constant USD unit endeavors to measure the welfare of individual people. The two indicators have close relation; yet, their determinants and exact dynamics vary. Each nation's share in world GDP reflects the economic size, relative performance, and rivalry of such country in economic activities. Thus, it may be not determined by one country's own economic growth determinant. Chapter 2 proves this hypothesis.

In this manner, the primary determinants of each nation's share in world GDP can be assumed as the relative performance in GDP per capita growth rate, relative growth in population, and exchange rate undervaluation. Moreover, the fundamental determinants of each nation's GDP share can be inferred as the growth determinants in share form considering the properties of relative performance and rivalry, in which the GDP per capita growth rate is determined by the initial level of GDP per capita, population growth rate, fixed capital formation rate, human capital accumulation rate, and other determinants of a nation. Foreign capital inflows, openness, and institution are also considered major determinants of economic growth. Several researchers argued that opening the economy to global market and constructing good institutions are relatively

more important than other determinants such as policies. Lee and Kim (2009) find that these factors are all important in a different manner for diverse income groups of countries. Similarly, openness and institution can show different relations with each nation's share in world GDP, unlike the positive relations with GDP per capita. North (1998) and Rodrik et al. (2004) discussed that inappropriate institution can retard economic development without good policy prescriptions. Institution has a positive relation with economic growth in low-income developing countries. However, it might not guarantee a faster growth, that is, a GDP share expansion, without appropriate policies. In this manner, even if opening the economy to the global market is positively associated with GDP per capita growth, as literature has suggested, a policy itself does not directly lead to the expansion of GDP share. A nation's endeavor of exporting its own product more in the global market might determine its change of GDP share. Foreign capital inflows, such as FDI inflows, are positively and generally associated with GDP per capita growth, yet they do not directly determine the expansion of GDP share. However, inducing more foreign capital inflow shares in world capital flows determines the expansion of GDP because these determinants basically have the aspect of rivalry; share form determinants reflect this. Based on the above analyses, the second hypothesis of this dissertation is that the determinants of GDP share are the typical variables in share form, exchange rate undervaluation, export share in world export, and foreign capital inflows share in world capital flows. In particular, the typical determinants are first statistically associated with GDP share when they are all in share form. Second, the exchange rate undervaluation is positively associated with GDP per capita growth in developing countries, but is negatively associated with GDP share change. Third, openness is also positively associated with GDP per capita growth rate; yet instead of openness, export share in world export is positively associated with GDP share change. Last, the foreign capital inflow ratio to GDP (i.e., FDI ratio to GDP) is

positively associated with GDP per capita growth, and its share in world capital flows is positively associated with GDP share change. However, institution is positively associated with GDP per capita growth but not with GDP share change because it is non-rivalry. This second hypothesis is also explored with both theoretical and empirical analysis, as presented in Chapter 2.

Chapter 3 of this dissertation focuses on the effect of financial flows and repatriated profit with the consideration of the development level of host country. As the most globalized economic resource, capital is a very competitive factor among all countries and its influence is not confined to the host country, but is extended to the investor country. More foreign capital inflows can be advantageous for the economic growth of the host country in terms of GDP per capita. Similarly, such inflows may also benefit the economic growth of the investor country. The economic growth of the host country is determined not only by the amount of foreign capital inflows, but also by the relative amount of the repatriated profit. Therefore, the third hypothesis of this study is that the repatriated profit ratio to GDP is negatively related with economic growth in GDP per capita. However, because of the level of indigenous capabilities of the host country, the negative effect of the repatriated profit is different from that in developed and developing countries. In general, the utilization benefit of foreign capital stock is large enough to offset the negative effect of the repatriated profit in developed host countries, whereas not in developing countries. In Chapter 3, the third main hypothesis is empirically analyzed.

IV. Data and Methodology

This study uses the country-panel dataset, which includes 211 countries and

covers the period of 1960 to 2009, to provide empirical evidence. The long-term growth effect is investigated by considering 5 years as one period. Hence, a total of 10 periods are included in the dataset. This dataset is basically the unbalanced cross-country panel due to some missing data in certain period for some countries. The majority of the data for GDPs (at current prices in USD and constant 2005 USD terms), population, fixed capital formation, trade, population, and inflation are obtained from the World Development Indicators (WDI) of the World Bank. Financial data, such as the foreign direct investment, portfolio investment, bank liabilities, repatriated profit, and received profit, are acquired from the International Financial Statistic (IFS) of the International Monetary Fund. The database of the National Statistics, Republic of China (Taiwan) is referred to for the data on Taiwan. The education-related variables are obtained from the United Nations Educational, Scientific, and Cultural Organization and Barro and Lee (2013) database. The exchange rate and index of undervaluation are calculated with the method of Rodrik (2008) using data from the Penn data table. The patent data are obtained from the World Intellectual Property Organization (WIPO) and US Patent and Trademark Office (USPTO). The institution variables are gathered from the Polity IV Project of Jaggers and Marshall (2000). Among the variables in this database, the executive constraint, democracy, and autocracy are used in the estimation. For a robust verification, the rule of law index, which is acquired from the International Country Risk Guide published by the Political Risk Services, is applied in the investigation.

For the estimation, this study adopted the panel fixed and panel random effect models to control the country-specific shocks; the most efficient model is chosen with the Hausman test. Period dummies are also included in the estimation models to capture period-specific shocks. These panel approaches are the most frequently used and reliable estimation methods in panel studies. However, potential problems, such as potential endogeneity, omitted variable bias, and measurement errors in the data, may be realized

in using these dynamic panel approaches. Accordingly, these potential problems are corrected by applying a system-GMM estimation model, which was developed by Arellano and Bover (1995) and Blundell and Bond (1998), for a robustness check. Subsequently, the specifications of this system-GMM estimation model are evaluated by applying three criteria. The first criterion is the Hansen over-identification test, followed by the test for the second order serial correlation (AR2) of the residuals in the first differenced equation. The third criterion checks whether the number of groups exceeds the number of instruments after a finite sample correction is applied to the two-step covariance matrix derived by Windmeijer (2005).

V. Chapter conclusion

The economic growth of a nation does not refer to its growth in the global era. International interdependency intensifies among nations as economic transaction becomes omni-directional all over the world. Durlauf et al. (2005) specified that the open economy aspects among countries are generally neglected in the literature on the growth of economies. A generic Solow model or growth equation, such as Barro equation, in empirical studies is a closed economy model that all other important growth determinants are assumed to be independent and identically distributed. Therefore, an empirical growth equation that considers not only the domestic economy of countries, but also the international flows of goods, capital, knowledge, and other factors must be developed. Some studies have attempted to partly acknowledge these international interaction aspects as important determinants in theoretical analysis (Barro et al, 1995) and empirical studies (Howitt, 2000; Eaton and Kortum, 2001).

This chapter addresses the growth issue of nations, notably the catching up,

forging ahead, and falling behind phenomena, which are the three dynamics of economic growth of nations, by suggesting an alternative approach. Existing studies failed to address these issues by focusing only on the GDP per capita or its growth rate in a basically closed economy model. This study emphasizes that the economic size of nation, relativity economic growth performance, and rivalry against competitor nations must be considered in the growth dynamics of nations. This study also demonstrates that the each nation's share in world GDP can be an alternative measure. The economic power of a nation, which is measured as the economy size, has received wide attention not only from some modern economists, but also from the majority of the classical economists, including Adam Smith. The economic size, as a national competitiveness, was one of the major concerns of the traditional economists. A relative economic performance to competitors is an important property for explaining the catching-up or middle income trap story of a nation. In addition to relativity, the international competition for scarce resources also matters when economics begins with the scarcity problem. The each nation's share in world GDP, which is an excellent conceptual framework that reflect the abovementioned properties, can explain considerable economic phenomena much better, more directly, or more intuitively in many cases, such as export-led growth strategy with the exchange rate undervaluation policy, middle income trap phenomenon, or deteriorate growth. The growth strategy depends on foreign capital, growth fruit distribution problem, and resource competition problems. Conjointly investigating both GDP per capita and each nation's share in world GDP contributes to the thorough understanding of the economic growth of a nation.

Chapter2. What determines each nation's share in world GDP

I. Introduction: Production function and the basic growth equation in econometrics

Each nation's share in world GDP or other macroeconomic variables in share form are not new variables in economics. Such variables have often been used in some studies to measure long-term world equilibrium in consideration of other countries. For example, Engel and Rogers (2006) suggest that the US current account deficit is determined by the present value of the future GDP share of the US in world GDP. Engel and Rogers (2006) assume that the future US GDP growth would outperform that of other countries, and that the variation of the US share in world GDP is an accurate indicator. However, the current dissertation asserts that each nation's share in world GDP is expected to be used as a dependent variable. Hence, we need to identify the determinants of each nation's share in world GDP and explore its production relation with other macro variables in share form, which reflects economic size, relative performance, and rivalry. Therefore, I first examine the conventional production function in empirical growth studies to derive the most appropriate equation before following similar demonstration methods.

Two approaches can be considered for deriving the share form production relation. One approach is by starting from the conventional economic growth framework and the other is by finding the production relation that satisfies the basic conditions of the economic production function such as the Cobb-Douglas function. The first approach follows the neoclassical ideas for growth, which started from the Cobb-Douglas production function (Cobb and Douglas, 1928; Douglas, 1976) and the Solow-

Ramsey and Ramsey-Cass-Koopmans methods. For the empirical growth study, Barro (1991) proposed a baseline of growth regression equation and Mankiw et al. (1992) established a close connection between the theory of the augmented Solow model, the Cobb-Douglas production function assumption, and empirical evidence. Deriving the relation of GDP share and other variables in share form from neoclassical literature is performed based on the assumption that the production relation of input factors in empirical studies is the Cobb-Douglas form. However, the neoclassical production function has long been criticized for lacking sound theoretical foundation and having insurmountable aggregation problems (Shaikh, 1974; Simon, 1979). Despite its fictitiousness, economists use the neoclassical production function with standard justifications or *clichés* (Felipe et al., 2003), such as instrumentalism (Ferguson, 1971), parable reasons (Samuelson, 1961; 1962), and the idea that there is no other choice (Barro and Sala-i-Martin, 1995; Jones, 1998). This inconvenient fact tells economists that the production function is merely a representative relationship unlike the laws of physics or mathematical formulas. The longstanding debate on the production function cannot address a fundamental limitation of the production function, but the share form production relationship can be used as an alternative manner of thinking to shed light on the nation's catch-up issues. The necessity of the GDP share discussed previously followed by empirical good-fitting are the start of exploring a new way of thinking. In the following section, I derive the each nation's share of the world GDP by adding economic size, relative economic performance, and rivalry among nations. The hypotheses in Chapter 2 are derived in Section III based on Section II. The GDP share change equation is derived in Section IV, and the determinants of GDP share are examined through empirical econometric analysis. Section V concludes the chapter.

II. Three steps to generate the equation for GDP share change

From the perspective of conventional growth empirical studies, the first step is deriving the real GDP growth equation and the nominal GDP (economic size) growth equation. The relativity of the economic growth performance is then reflected in the nominal GDP equations on several assumptions. Finally, the possibility of the share form production relation is demonstrated by checking the expected directions, signs, and significance of each explanatory variable from regression results and the goodness-of-fit of model, which is compared with those from the conventional equation and the previously derived equations.

1. Nominal GDP growth equation

To describe the dynamics of nominal GDP growth, I start from the generic one-sector growth model. For country i at time t, let $Y_{i,t}$ denote output, $L_{i,t}$ and the labor population is assumed to follow $L_{i,t} = L_{i,0}e^{n_i t}$, where the population growth rate n_i is constant, and $A_{i,t}$ is the efficiency level per worker with $A_{i,t} = A_{i,0}e^{g_i t}$. Labor-augmenting technology growth rate g_i is constant. The output per efficiency unit of labor input and the output per labor unit can be rendered as $y^E_{i,t} = \frac{Y_{i,t}}{A_{i,t}L_{i,t}}$ and $y_{i,t} = \frac{Y_{i,t}}{L_{i,t}}$, respectively.

A first-order approximation in the generic growth model is rendered as:

$$\log y^E_{i,t} = \left(1 - e^{-\lambda_i t}\right)\log y^E_{i,\infty} + e^{-\lambda_i t}\log y^E_{i,0} \qquad (1)$$

where $y^{E}_{i,\infty}$ is the steady-state value of the unobservable $y^{E}_{i,t}$, that is, $\lim_{t\to\infty} y^{E}_{i,t} = y^{E}_{i,\infty}$. Parameter λ_i measures the constant rate of convergence of $y^{E}_{i,t}$ to its steady-state value and relies on the other parameters of the model.

Given that $y^{E}_{i,t}$ is unobservable, this variable cannot be used in the regression model. Therefore, the following equation is used to describe Equation (1) in terms of the observable variable $y_{i,t}$

$$\log y_{i,t} - g_i t - \log A_{i,0} = \left(1 - e^{-\lambda_i t}\right) \log y^{E}_{i,\infty} + e^{-\lambda_i t}(\log y_{i,0} - \log A_{i,0}) \qquad (2)$$

Then, since our concern is the dynamic of real GDP or $Y_{i,t}$, adding the labor population terms yields

$$\log Y_{i,t} - g_i t - \log A_{i,0} - n_i t - \log L_{i,0} \qquad (3)$$
$$= \left(1 - e^{-\lambda_i t}\right) \log y^{E}_{i,\infty} + e^{-\lambda_i t}(\log Y_{i,0} - \log A_{i,0} - \log L_{i,0})$$

Equation (3) provides the basis for describing the dynamics of real GDP growth. Let Γ_i be the growth rate of real GDP between 0 and t, hence,

$$\Gamma_i = t^{-1}(\log Y_{i,t} - \log Y_{i,0}) \qquad (4)$$

Subtracting $\log Y_{i,0}$ from both sides of (3) and dividing by t yields

$$\Gamma_i = g_i + n_i + \beta_i(\log Y_{i,0} - \log y^{E}_{i,\infty} - \log A_{i,0} - \log L_{i,0}) \qquad (5)$$

where

$$\beta_i = -t^{-1}\left(1 - e^{-\lambda_i t}\right) \tag{6}$$

A random error term is added for the cross-country growth regression to obtain the following equation:

$$\Gamma_i = g_i + n_i + \beta_i\left(\log Y_{i,0} - \log y^{E}_{i,\infty} - \log A_{i,0} - \log L_{i,0}\right) + v_i \tag{7}$$

However, we still cannot observe $\log y^{E}_{i,\infty}$, and $\log A_{i,0}$. Mankiw, Romer, and Weil (1992) suggest a linear growth regression model in observable variables by using the three-factor Cobb-Douglas production function

$$Y_{i,t} = K^{\alpha}_{i,t} H^{\varphi}_{i,t} (A_{i,t} L_{i,t})^{1-\alpha-\varphi} \tag{8}$$

where $K_{i,t}$ and $H_{i,t}$ denote physical capital and human capital, respectively. By using this specific production function, Mankiw et al. (1992) calculated the steady-state value of $y^{E}_{i,\infty}$ using the physical capital and human capital accumulation equations following a generic Solow model. Unobservable technology term $\log A_{i,0}$ is assumed to reflect technology and country-specific properties. Thus, $\log A_{i,0}$ is assumed to vary randomly across countries. Based on the method of Mankiw et al. (1992) and using the additional assumptions that the rates of technological progress and the λ_i parameters are constant across countries, a generic representation of the real GDP regression is rendered as

$$\Gamma_i = \beta \log Y_{i,0} + \Psi X_i + \Pi Z_i + \varepsilon_i \tag{9}$$

where Z_i includes additional growth determinants beyond Solow's original model, X_i

contains a constant, $\log(n_i + g + \delta)$, $\log s_{K,i}$, and $\log s_{H,i}$, the constraints of parameters are relieved, and heterogeneity is predicted in the steady-state growth term g_i, n_i, initial technology term $A_{i,0}$, and initial population term $L_{i,0}$, which are assumed as constant across countries. That is,

$$g_i + n_i - \beta_i\left(\log A_{i,0} + \log L_{i,0}\right) = g + n - \beta(\log A + \log L) + \Pi Z_i - \beta e_i \quad (10)$$

$$\varepsilon_i = v_i - \beta e_i \quad (11)$$

Parameter δ in Equation (9) denotes the depreciation rate of physical capital, $s_{K,i}$ is the accumulation rate of physical capital, and $s_{H,i}$ is the accumulation rate of human capital.

We now derive the nominal GDP growth regression from (2). For country i at time t, let $P_{i,t}$ denote the price level assumed to be independent of real gross output $Y_{i,t}$, and follow $P_{i,t} = P_{i,0}e^{\pi_i t}$ where the inflation is constant. We can then write the output per capita as

$$y^E_{i,t} = \frac{P_{i,t}Y_{i,t}}{P_{i,t}A_{i,t}L_{i,t}} \quad (12)$$

and Equation (2) can be written as

$$\log P_{i,t}Y_{i,t} - g_i t - \log A_{i,0} - n_i t - \log L_{i,0} - \pi_i t - \log P_{i,0}) \quad (13)$$
$$= \left(1 - e^{-\lambda_i t}\right)\log y^E_{i,\infty} + e^{-\lambda_i t}(\log P_{i,0}Y_{i,0} - \log A_{i,0} - \log L_{i,0} - \log P_{i,0})$$

We can write the description of the dynamics of the nominal GDP using Equations (4), (6), and (13):

$$\acute{\Gamma}_i = g_i + n_i + \pi_i + \beta_i\left(\log P_{i,0}Y_{i,0} - \log y^{E}_{i,\infty} - \log A_{i,0} - \log L_{i,0} - \log P_{i,0}\right) + v_i \quad (14)$$

Using similar assumptions used in deriving the real GDP growth regression, Equation (14) can be rewritten as

$$\acute{\Gamma}_i = \beta \log P_{i,0}Y_{i,0} + \Psi X_i + \Pi Z_i + \eta\pi_i + \varepsilon_i \quad (15)$$

where X_i contains a constant, $\log(n_i + g + \delta)$, $\log s_{K,i}$, and $\log s_{H,i}$, and

$$g_i + n_i + \pi_i - \beta_i\left(\log A_{i,0} + \log L_{i,0} + \log P_{i,0}\right) \quad (16)$$
$$= g + n + \pi - \beta(\log A + \log L + \log P) + \Pi Z_i + \eta\pi_i - \beta e_i$$

Equation (15) is the baseline of the nominal GDP growth regression or the economic power growth regression.

2. Relative growth performance equations

To describe the relative economic growth dynamics, world growth performance should be measured in relation to the growth determinants of the world unit. However, this process faces the insurmountable aggregation problem similar to that between micro production functions of firms and the macro aggregate production function. World economy output and input can be the sum of the respective outputs and inputs of all nations, but the world economy production function, in which the world output is a function of the world input, cannot be the same function for all nations. If the identicalness of functions is assumed, the estimated values of parameters in Equation

(15) should remain unchanged between country level and world level so that the equation reflects no relativity. In other words, if the growth rate of real GDP per capita or nominal GDP is decomposed into world growth rate and the difference between the GDP of a country and of the world, the following equation is derived:

$$\gamma = \gamma^{w} + \beta(\gamma - \gamma^{w}) \tag{17}$$

where β should be 1 in the assumption of identicalness of country production function and world production function. If β is not 1, the dynamics of relative economic performance are distinguished from the linear dynamics of economic growth in Equations (9) and (15). Similarly, the right side of the equation, which comprises the input variables, is decomposed into two terms and investigates the relativity by comparing the values of parameters. Thereafter, one can easily derive the deviation form to describe the production relation between the relative economic growth performance and the relative amount of input as

$$\begin{aligned} \acute{\Gamma}_i - \acute{\Gamma}^{w} = {} & \beta(\log P_{i,0}Y_{i,0} - \log P_0^{w}Y_0^{w}) + \Psi(X_i - X^{w}) + \Pi(Z_i - Z^{w}) \\ & + \eta(\pi_i - \pi^{w}) + \varepsilon_i \end{aligned} \tag{18}$$

where w in superscript denotes the variable of the world and a small open economy is assumed, that is,

$$\operatorname{cov}\left(\gamma_i, \gamma^{w} \,\middle|\, \gamma_j = \bar{\gamma}_j\right) = 0 \tag{19}$$

where γ_i denotes the GDP per capita growth rate of country i, and γ^{w} denotes the average world GDP per capita growth rate.

Let us assume through the relative purchasing power parity is

$$\dot{e}_i \approx (\pi_i - \pi^w) \tag{20}$$

where $\dot{e}_i$ is the movement of exchange rate for country i.

Therefore, Equation (18) can be rewritten as the relative GDP growth equation:

$$\acute{\Gamma}_i - \acute{\Gamma}^w = \beta(\log P_{i,0}Y_{i,0} - \log P_0^w Y_0^w) + \Psi(X_i - X^w) + \Pi(Z_i - Z^w) + \eta\dot{e}_i + \varepsilon_i \tag{21}$$

Equation (21) implies that the relative GDP growth is determined by the initial relative GDP level, relative abundance in basic growth determinants such as population and investment, relative abundance in additional determinants, and the variation in exchange rate.

For empirical proof, the country-panel dataset includes 211 countries and covers the period from 1960 to 2009. To investigate the long-term growth effect, five years is taken as one period, so that 10 periods are included in the dataset. This dataset is an unbalanced cross-country panel because of some missing data in certain periods for some countries. The data on GDP related variables, fixed capital investment, trade, population, and inflation are obtained from the World Development Indicators (WDI) of the World Bank (WB). Finance data such as those of foreign direct investments are from the International Financial Statistics (IFS) of the International Monetary Fund (IMF). Education-related variables are obtained from the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the Barro and Lee database. Exchange rates and the index of undervaluation are calculated through the method proposed by Rodrik (2008) using data from Penn data table. Patent data are obtained from the World Intellectual Property Organization (WIPO) and the US Patent and Trademark Office (USPTO). This data description is consistent with the empirical approach of the rest of

this dissertation.

Table 2-1 shows the estimation results of Equations (15) and (21) using generic Solow variables, namely, initial income level, population growth rate, investment rate, and human capital. Column (1) presents the benchmark result from the generic GDP per capita growth equation. The estimations produced the expected results based on previous literature. Initial GDP per capita shows that the convergence of growth and population growth rate is negatively significant on GDP per capita growth rate, whereas fixed capital and human capital accumulation rates are positively significant on growth. Column (2) presents the estimation result of Equation (15) without the additional variable set Z_i. This result is consistent with existing literature and our intuition that the results of initial GDP, fixed capital, and human capital remain similar. By contrast, population growth rate is positively significant on GDP growth rate. This result is might indicate that the positive effect of population growth on GDP and its negative effect on GDP per capita are mixed. The difference between the values of parameters from columns (1) and (2), which is the difference in unity between 0.4004 and 0.6012, supports this explanation. The result of inflation (2) is the mixed result of the positive effect of higher price level on GDP and the negative effect of inflation on GDP. The mathematically derived Equation (15) indicates a positive relation between inflation and GDP because assumption *ceteris paribus* does not hold in empirical analysis, but the negative effect of inflation on GDP (Bruno and Easterly, 1998; Motley, 1998) overwhelms its positive effect. Moreover, if the government of a country has the policy means to manipulate the exchange rate valuation or if the one-price law does not hold, the exchange rate undervaluation effect can also occur. In this condition, the left side of Equation (20) can be interpreted as the exchange rate undervaluation, that is,

$$\dot{e}_i - \dot{r}_i \approx (\pi_i - \pi^w) \tag{22}$$

where r_i denotes the real exchange rate for country i.

Column (3) presents the estimation result of Equation (21). The table shows that the values of parameters and significance are varied between columns (2) and (3). Notably, relative human capital accumulation rate is insignificant on relative GDP growth rate, contrary to the positive significance of human capital accumulation rate on GDP growth rate. This difference is possible in case human capital is not linear to the GDP growth. Following the measurement method, the results of education on GDP per capita growth rate from other studies are quite confusing (Sachs and Warner, 1995; Caselli et al., 1996; Barro and Lee, 2013). The result shown in column (3) implies that the dynamics of the relative growth may be different with that of the absolute growth.

Table 2-1: Estimation results from GDP growth equation and relative GDP growth equation

	(1)	(2)		(3)
Dependent variable	GDP per capita growth rate	GDP growth rate	Dependent variable	Relative GDP growth rate
Initial GDP (per capita for column (1))	-0.0525 (-12.59)***	-0.0656 (-17.59)***	Relative initial GDP	-0.0798 (-15.36)***
Population growth rate	-0.4004 (-2.34)**	0.6012 (2.16)***	Relative population growth rate	0.7277 (2.92)***
Fixed capital investment rate	0.0411 (10.33)***	0.0652 (7.82)***	Relative fixed capital investment rate	0.0453 (6.09)***
Human capital accumulation rate (Tertiary enrolment rate)	0.0189 (7.65)***	0.0711 (11.25)***	Relative human capital accumulation rate (Tertiary enrolment rate)	0.0048 (0.92)
Inflation		-0.0338 (-5.58)***	Relative inflation	-0.0401 (-7.49)***
Period dummies	No	No	Period dummies	No
Number of obs.	923	939	Number of obs.	939
Number of countries	174	175	Number of countries	175
R^2	0.002	0.033	R^2	0.006

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.

However, the empirical approach used in the estimation of Equation (21) using cross-country panel data has several limitations. Time dummies, which are widely used in panel analysis to control time-specific shocks, cannot be used in this model because of the deviation structure. Given that the fixed effect panel estimation considers both variables of world and period dummies in Equation (21) as time-specific shocks, the regression results in Equation (21) does not differ with that of Equation (15). Therefore, time-specific shock and the property of relativity to the world GDP cannot be decomposed because of the model structure.

Moreover, rivalry among nations is not reflected in this model. This problem may be solved by inserting the variables which reflect the property of rivalry in the Equation (21). However, even if rivalry exists and we try to insert the variables with this property, the parsimony problem would still occur because of the rival's variables over one nation's economy. The top five trade partners in 2013 of a small open economy country like Korea are China, US, Japan, Hong Kong, and Singapore. Hence, the variations in these five countries have a strong influence on Korea. Is it then possible to input all the macro variables of these countries in the Korean GDP growth equation? Given the limitation on the number of observations, it is impossible to consider the rivalry and rivalry properties in a generic equation such as Equation (15) or (21). Therefore, this dissertation suggests using the share form and its production relation as a practical measure for solving the parsimony problem.

3. The each nation's share in world GDP

Before generating the GDP share change equation through the empirical

approach, I first propose the each nation's share in world GDP. The each nation's share in world GDP of country i at time t is defined as

$$SY_{i,t} = \frac{GDP_{i,t}}{\sum GDP_{j,t}} = \frac{P_{i,t}Y_{i,t}}{\sum P_{j,t}Y_{j,t}} \tag{23}$$

where $P_{i,t}$ is the price level, $Y_{i,t}$ is the real GDP, and $GDP_{i,t}$ is the nominal GDP. The change of GDP share is the difference of GDP share between the previous period and this period, which can be rewritten as the function of the relative GDP growth rate or the function of the relative GDP per capita, the relative population growth rate, and the exchange rate undervaluation by definition and log differentiation, that is

$$\Delta SY_{i,t} = SY_{i,t} - SY_{i,t-1} = f\left(\acute{\Gamma}_i - \acute{\Gamma}^w\right) = g(\gamma_{i,t} - \gamma_t^w,\ n_{i,t} - n_t^w, \dot{e}_i - \dot{r}_i) \tag{24}$$

The new proxy, GDP share, is the function of relative variables and can measure relative economic growth performance. GDP share measures economic size growth because it is also the function of nominal GDP growth rate. GDP share also reflects the rivalry and rivalry aspects among countries through its share form. Therefore, no small open economy assumption needed since it is now directly reflected in the denominator. Table 2-2 shows the descriptive figures of GDP share in percent unit. The US has the quarter share in world GDP, whereas Tuvalu has the smallest portion in world GDP based on the dataset from 2005 to 2009. The median value of GDP share is 0.033% for Algeria, and the mean value is 0.502% between South Africa and Iran. These figures show that the GDP shares of nations are right-skewed and that several powerful nations account for most of the world GDP.

Table 2-2: GDP share description (average of 2005 to 2009)

Percentiles	GDP share (%)	Country
Min	4.70E-05	Tuvalu
5%	9.20E-04	Samoa
Q1(25%)	0.007	Rwanda
Q2(50%)	0.033	Jordan
Q3(75%)	0.244	Algeria
Mean	0.502	South Africa, Iran
95%	2.414	Brazil
Max	25.306	US

GDP share is related to the expected sign and significance in estimation. Table 2-3 presents the results of Equation (24). Column (1) of table 2-3 shows that the growth of GDP share, which is defined by the change of GDP share in each period, is negatively correlated with initial GDP share but positively correlated with the relative GDP growth rate. When the relative GDP growth rate is decomposed into three variables in equation (24), GDP share growth is positively correlated with the relative GDP per capita growth rate but negatively correlated with the exchange rate undervaluation, whereas the relative population growth rate loses its significance. This insignificance of the relative population growth rate may be attributed to period dummies, which could not be included in Table 2-1 and the competition effect, in which population growth produces different effects at home and abroad.

Table 2-3: Estimation results of GDP share change in equation (24)

	(1)	(2)
Dependent variable	ΔGDP share	ΔGDP share
Initial GDP share	-0.3537	-0.3650
	(-20.60)***	(-21.39)***
Relative GDP growth rate	0.0116	
	(6.83)***	
Relative GDP per capita growth rate		0.0081
		(2.17)**
Relative population growth rate		-0.0022
		(-0.13)
Exchange rate undervaluation		-0.0009
		(-2.16)**
Period dummies	included	included
Number of obs.	1411	1034
Number of countries	204	178
R^2	0.122	0.066
Hausman Test	340.41(0.000)	403.19(0.000)

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.

III. Literature and Hypotheses: Determinants of each nation's share in world GDP

1. Typical determinants in share form

In this chapter, I attempt to prove the two main hypotheses proposed in the introduction. The first main hypothesis is that the determinants of each nation's share in

world GDP are different from those of GDP per capita growth rate. The second main hypothesis is that the primary determinants of each nation's share in world GDP are the relative performance in GDP per capita growth rate, the relative growth in population, and the exchange rate undervaluation. Hence, the fundamental determinants of each nation's GDP share are the growth determinants in share form and exchange rate undervaluation. This chapter also presents other determinants of GDP share that reflect relative performance and rivalry. In addition to the exchange rate undervaluation, export share in world export and foreign capital inflow share in world capital inflow are proposed as the determinants of GDP share change. Institution is not included as new determinant.

The each nation's share in world GDP, which is calculated in current dollar unit, measures the prosperity of sovereign economies with the relativity of performance and rivalry among nations. Therefore, GDP share may be not determined by the economic growth determinants of a country, which are used in generic GDP per capita growth rate equations. What, then, determines each nation's share in world GDP? The GDP share of each nation, which is calculated in terms of current dollar, is composed of the nation's GDP per capita in real terms, price level, and population. Therefore, the growth of each nation's GDP share would be determined by the relative growth in GDP per capita in real terms, the relative inflation or real exchange rate variation, and the relative growth in population. Following the equation, the relative growth in GDP per capita in real terms is expected to be positive, real exchange rate variation is expected to be either positive or negative, and the relative growth in population is expected to be positive, under the assumption that these three determinants are mutually independent of one another.

If the growth of one country is faster than the world average growth, its share in world GDP expands. The growth of one nation's population share of the world

population is a double-edged sword for the real GDP per capita growth and the GDP share change. The generic growth model shows that population growth is negatively correlated with GDP per capita growth rate. However, the equation indicates that faster population growth has a positive effect on GDP share. Therefore, the growth result of the population share on GDP share is determined based on these two opposite effects. This effect can vary based on the development level and the size of country because the size effect of population is relatively larger for large economies and developing countries that have just initiated the economic growth.

Rodrik (2008) suggests that exchange rate undervaluation promotes economic growth in real GDP per capita terms as a second best policy in the context of the economic distortions and market failures in developing countries. However, this policy damages the GDP share in current terms because the exporting competitiveness and real GDP per capita growth are stemmed from artificial devaluation of domestic factor prices. Therefore, we hypothesize that unlike in the case of GDP per capita growth rate in real term, exchange rate undervaluation is negatively correlated with the growth of GDP share.

Based on growth economics, we can expect that the growth of GDP per capita is determined by conventional growth determinants, such as the initial level of GDP per capita, population growth rate, fixed capital formation rate, human capital accumulation rate, and other determinants. Therefore, we can infer that the growth of GDP share is determined by the relative level of initial GDP per capita, the relative growth of population, fixed capital, human capital, other determinants, and exchange rate undervaluation. When these determinants are converted into share forms due to the law of parsimony, econometrical reasons, and the property of rivalry, the growth of GDP share in world GDP is determined by the initial GDP share, investment share, human capital accumulation share, population share growth, and exchange rate undervaluation.

2. Other determinants that reflect relative performance and rivalry: Export share, foreign capital share, and undervaluation

As discussed in the previous subsection, the typical determinants of GDP per capita growth in share form are expected to be the new determinants of GDP share change. Similarly, the determinants of GDP per capita growth in other studies can also be the new determinants of GDP share change when they are all expressed in share forms. Three main determinants for economic development can be found in literature, namely, geography, institutions, and openness to global market and foreign capital. Geography is a country-specific and fixed aspect, whereas the other two are suggested for development because they vary with time, along with the country's effort to construct institutions, open the market, and adoption of foreign capital. The Washington Consensus (Williamson, 1994) prescribes policies for international integration focusing on the three aforementioned determinants. Several empirical studies have found a positive correlation between openness and economic growth (Dollar, 1992; Sachs and Warner, 1995; Frankel and Romer, 1999; Yanikkaya, 2003). By contrast, some studies have found that openness is not robust as a determinant of economic growth (Rodriguez and Rodrik, 2001; Vamvakidis, 2002). Adopting foreign capital is also a recommended policy, especially for less developed countries where capital is insufficient compared to the abundance of low-wage labor. By opening the economy to global capital, host developing countries can raise capital for initiating economic take-off and learn advanced technology and know-how from developed countries. Therefore, neo-classical economists and the Washington Consensus naturally advocate the policy prescription for least-developed countries to open the market and adopt foreign capital. However, merely

adopting foreign capital does not guarantee a positive effect for economic growth, unlike what the simplicity of the theoretical idea suggests. Furthermore, many empirical studies have shown the real consequences of foreign investment to the economic growth of the host country. However, these studies also show mixed results (Borensztein et al., 1998; Mohnen, 2001; OECD, 2002; Alfaro et al., 2004; Asheghian, 2004; Ozturk, 2007; Forte et al., 2013).

Several studies have suggested that opening the economy to global market and foreign capital do not guarantee economic growth, the Washington Consensus failed, and recent literature attributes this failure to the absence of a good institution (Knack & Keefer, 1995). Therefore, this new stream of research has provided a theoretical foundation for an augmented Washington Consensus that institution is the key to successful development in many developing countries. Although the debate on whether institution is a superior determinant still exists (institution supremacy view), institution matters for economic growth (Acemoglu, Johnson, & Robinson 2001, 2002; Rodrik et al., 2004), especially in lower-income countries (Lee and Kim, 2009).

Despite persisting debates on the topic, openness, foreign capital, and institution are positively associated with economic growth in general. However, we cannot expect the same correlations with GDP share change because the key of GDP share determinants is relative performance and rivalry, as shown in typical determinants in share form. For example, openness only measures how the economy of one country is opened to world economy using the relative size of export and import to the country's GDP. However, such measurement is not enough to expand one country's economic size in relation to the world economy. This goal would be accomplished by exporting more products to the global market because trade is basically the area of competition. The export share of one country in world export can capture its relative performance in export and competition in the world trade market. Therefore, one additional sub-

hypothesis of the second main hypothesis is that the share in world export of a country is positively associated with GDP share change.

Exchange rate undervaluation, which is the GDP share determinant derived in the previous section, fundamentally reflects rivalry among nations. Undervaluation of real exchange rate is an economic strategy that promotes export by pushing down factor and product prices while economy size is also devalued. This variable also basically reflects rivalry among nations.

The properties of international capital flows are also in line with export share and exchange rate undervaluation. As a very fast moving production factor, international capital flows should be considered in a global context and not from each host country's domestic perspective. Some properties of capital flow have aroused concerns in applied econometrics in growth studies, namely, inter-dependency, relative consequence, and rivalry. The annual inflows of global FDI surged to 1.35 trillion US dollars in 2013, which was 6.5 times more than 207 billion in 1990 (UNCTAD, 2013). With its enormous scale, capital has become the most interdependent production factor in the global era, and its effect on the economic growth of countries is not confined to only the capital of the host country. Therefore, economic performance based on foreign capital should be evaluated in relative terms among related countries. Even if foreign investment to the host country has positive effects on economic growth, we cannot easily say that inducing foreign investment is good for the receiving country, given that the benefits for an investing country is relatively larger so that the investing country could get more economic power. As economics starts with problem of scarcity, the international competition for capital has been widely witnessed. In the 2000s, the concentration FDI toward China relatively dried out the FDI toward the least developed countries such as African countries because the global competition was intensifying and the gross amount of international capital was limited (Dupasquier et al., 2006; UNCTAD,

2007). This competition can be one way to explain the relative economic performance by foreign capital among nations. These conditions should be reflected in growth econometric analysis and can be measured by the "foreign capital flow share in the world gross capital flow" variable. This variable refers to how much capital is induced by a host country among the newly available capital across the world. Moreover, in the analysis of capital flow share in growth econometric studies, it is more appropriate that the dependent variable, which is the GDP variable, and other variables are expressed in share form. This approach will enable us to examine the growth of the GDP share of a country in terms of the variation of capital inflow share that reflects the country's interdependence, relative performance, and rivalry with other nations. Therefore, another additional hypothesis of the second main hypothesis is that inducing more foreign capital inflows share in global capital flows instead of more foreign capital inflow ratio to GDP is positively associated with the growth of the host country's share in world GDP. A developing country that hosted foreign capital can achieve a positive growth in GDP per capita, but the growth of GDP share of such country can be stagnated if it couldn't attain a faster growth from foreign capital compared with other investor or competitor countries. Given that capital in the global market is a very competitive and finite economic resource, obtaining relatively more direct capital indicates the reduction of capital investment for other countries, which positively affects a country's economic size expansion.

Unlike export share, foreign capital inflow share and exchange rate undervaluation, institution is not expected to be a determinant of GDP share change because it is not a competitive resource among nations. The institution variables used in many studies and the present dissertation, such as democracy, autocracy, executive constraint, and rule of law, are not finite. These variables are not scarce resources that countries have to compete for.

IV. GDP share change equation: Estimation results

1. Baseline and Different Determinants of GDP share and GDP per capita growth rate

As discussed in Section II, the parsimony problem can be solved through cross-country analysis with a small number of observations by converting other growth determinants into share form. GDP share and other share variables reflect the relative performance and rivalry altogether. Time dummies can be added in the regression. Under the linear relation assumption used to apply linear square estimation, the GDP share change equation can be written as

$$\Delta SY_{i,t} = \beta SY_{i,t-1} + \Psi_1 SK_{i,t} + \Psi_2 \Delta SP_{i,t} + \Psi_3 \Delta SE_{i,t} + \Pi Z_i + \varepsilon_i \qquad (25)$$

where SY, SK, SP, and SE denote GDP share, investment share, population share, and human capital share, respectively, and Z_i includes the additional explanatory variables such as the exchange rate undervaluation.

Table 2-4a presents the estimation results of Equation (25) using the fixed effect or random effect panel models to control country-specific effects. Period dummies to capture time-specific shocks are also added in this model. To prove the first main hypothesis that the determinants of GDP share in current terms are different from those of GDP per capita in constant terms, columns (1)-(6) show the results of the generic growth equation in the same dataset. Columns (7)-(12) in the same table show the regression results of GDP share change on generic growth determinants for GDP per capita growth. The regression of the GDP share change on generic Solow growth

determinants for real GDP per capita indicates that the regressors cannot adequately explain the change of GDP share. Comparing columns (7)-(12) with columns (1)-(6), we note that the first main hypothesis, which states that the determinants of GDP share in current terms are different from those of GDP per capita in constant terms, is correct. Fixed capital investment rate somewhat explains the change of GDP share, but the p-value suggests that the fixed capital investment share explains the change better. These results hold when countries are divided into developed and developing countries and are estimated separately.

What, then, are the determinants of GDP share? Table 2-4b answers this question. The panel fixed effect and random effect estimations of GDP share change models are run using all country samples, developed country sample, and developing country sample, respectively. The results are presented in Equation (5). The dependent variable in these estimations is the growth of each nation's share in world GDP. GDP share change is the difference or percentage point change of GDP share between the present period and the previous period. Other explanatory variables are also expressed in share forms to reflect interdependency, relativity, and rivalry. The Hausman test prefers panel fixed effect estimators with period dummies.

Column (1) in table 2-4b shows the result of typical determinants in share form for all countries, whereas columns (2) and (3) present the classified results based on income level groups. Table 2-4b indicates that the share forms of generic Solow variables show the expected sign and significance. The growth of GDP share of a country tends to be smaller when the initial GDP share is higher. This result is coincidental to the fact that a country with high income tends to have a low GDP per capita growth rate. By contrast, the effect of population share growth on GDP share growth is positive in the GDP share change equation, whereas the effect of population growth rate on GDP per capita growth rate is negative in columns (1)-(6) in Table 2-4a.

This result is attributed to the definition of GDP and the mixed effect that a larger population has both a positive effect on nominal GDP and a negative effect on real GDP per capita. The positive sign of mixed results suggest that population growth can negatively affect the level of GDP per capita, but benefit GDP. Therefore, the demographic effect can reflect both individual welfare and national economic size. When the countries are divided into two income groups, the positive growth effect of population share growth is observed only in developing countries. This result suggests that the negative effect of population growth on GDP per capita is larger in developed countries than in developing countries.

Fixed capital investment in share form is positively significant in the GDP share change equation. Human capital share growth is also positively significant and measured by a country's relative abundance of human capital in terms of secondary and tertiary education levels.

Exchange rate undervaluation is negatively significant in all models. Rodrik (2008) suggests that the exchange rate undervaluation policy as the second-best policy enhances the economic growth in GDP per capita of developing countries, as shown in column (3) of Table 2-4a. However, this policy sacrifices economic size for a little increase in per capita income because export competitiveness is derived from devaluating domestic factor prices.

A set of generic Solow growth determinants converted in share form is well-fitted for empirical estimation with the fixed effects and several sub-sample groups and presents a reasonable outcome. Columns (4)-(6) additionally include export share and institution variables to investigate whether the other main determinants of GDP per capita growth in share form can explain the GDP share change. By including export share in world export, I test three different proxies of institution, namely, autocracy, democracy, and executive constraint from Polity IV. Export share in world export shows

a positive significance with GDP share change, whereas the results of other typical determinants in share form and undervaluation remain robustly unchanged and the three types of institutions are insignificant. This finding shows that export share measures the properties of rivalry among nations, but openness (Table 2-4a) and institutions (Table 2-4b) do not capture the competition among nations. Therefore, only export share is associated with GDP share change, as shown by exchange rate undervaluation and other typical determinants in share form.

Column (7) refers to the exchange rate undervaluation in relation to export. Undervaluation and export share consistently show negative significance and positive significance on GDP share change in the baseline estimation, respectively. However, the explanation of transmission channels of this relationship remains unclear. Thus, interaction term is included, and the estimation result suggests that the relation between undervaluation and export share is very clear, and that export share positively affects GDP share growth when this relationship is controlled. In other words, relatively more export is beneficial for the growth of economic power when it is not achieved through the undervaluation policy. Merely promoting export through the undervaluation policy is harmful for economic share growth.

Finally, the foreign capital inflows are included in share form. Foreign capital inflow includes FDI, portfolio investments, and other investments, such as bank liabilities. Share form represents the rivalry surrounding global capital investments. Countries with more foreign capital inflow shares host larger amounts of capital within the limit of the total global capital flows within a given period. The estimation result indicated in columns (8) to (11) shows that it is positively significant to GDP share change, while the results of the basic determinants remain unchanged. Column (12) in Table 2-4a suggests that hosting more foreign capital inflow ratio to GDP is not statically associated with the GDP share change. However, inducing more foreign

capital than other countries determines GDP share change. Column (11) shows several types of foreign investments as well as FDI inflow and bank liabilities (BL) shares, which are highly and positively associated with GDP share change. Inducing more FDI compared to the host country's economic size is not strongly associated with economic growth in terms of GDP per capita growth rate. However, inducing more FDI compared to other competitive countries is highly associated with GDP share change. Moreover, portfolio inflow share is negatively associated with GDP share change.

Table 2-4a: Estimation results – Different Determinants between GDP share and GDP per capita

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	All countries	Developed countries	Developing countries	All countries			All countries					
Dependent variable	GDP per capita growth rate (in constant 2005 USD)						ΔGDP share (in current dollar)					
Initial income	-0.0579	-0.0278	-0.0684	-0.0559	-0.0535	-0.0575	0.0001	0.0000	0.0008	0.0001	0.0001	0.0009
	(-12.45)***	(-2.87)***	(-12.50)***	(-10.80)***	(-10.42)***	(-10.52)***	(0.34)	(-0.03)	(2.31)**	(0.53)	(0.49)	(0.63)
Population growth rate	-0.4510	-0.5933	-0.4753	-0.1947	-0.2348	0.0250	-0.0015	0.0031	-0.0013	-0.0055	-0.0045	0.0181
	(-2.41)**	(-1.72)*	(-2.15)**	(-1.01)**	(-1.21)	(0.13)	(-0.10)	(0.06)	(-0.09)	(-0.29)	(-0.23)	(0.38)
Fixed capital investment rate (% of GDP)	0.0414	0.0401	0.0441	0.0337	0.0335	0.0429	0.0011	0.0061	0.0005	0.0015	0.0015	0.0018
	(9.48)***	(3.61)***	(9.05)***	(6.94)***	(6.85)***	(7.96)***	(2.45)**	(2.43)**	(1.68)*	(2.47)**	(2.48)**	(1.36)
Human capital accumulation rate (Tertiary enrolment rate)	0.0162	0.0090	0.0161	0.0155	0.0161	0.0157	-0.0003	-0.0009	0.0005	-0.0004	-0.0004	-0.0013
	(5.45)***	(1.43)	(4.63)***	(3.58)***	(3.69)***	(3.72)***	(-1.11)	(-0.93)	(1.51)	(-1.25)	(-1.26)	(-1.25)
Exchange rate undervaluation	0.0057	0.0125	0.0107	0.0085	0.0067	0.0028	-0.0002	-0.0019	0.0001	-0.0002	-0.0002	-0.0002
	(1.39)	(1.14)	(2.26)**	(1.96)*	(1.54)	(0.58)	(-0.57)	(-0.76)	(0.36)	(-0.41)	(-0.41)	(-0.18)
Openness (% of GDP)				0.0085	0.0003					0.0000	0.0000	
				(3.39)***	(3.32)***					(-0.56)	(-0.54)	
Foreign capital inflows (% of GDP)						0.0295						0.0016
						(1.90)*						(0.40)
				Autocracy	Executive constraint	Democracy				Autocracy	Executive constraint	Democracy
Institution				0.0019	-0.0013	-0.0006				0.0000	0.0000	-0.0001
				(3.02)***	(-1.39)	(-1.08)				(0.25)	(-0.03)	(-0.39)
Period dummies	included	Included	included	included	included	included	included	included	included	included	included	included
Number of obs.	758	224	534	650	650	541	751	224	527	643	643	540
Number of countries	162	45	117	144	144	134	162	45	117	144	144	134
R^2	0.000	0.045	0.140	0.000	0.000	0.000	0.010	0.045	0.000	0.013	0.012	0.014

Hausman Test	137.48 (0.00)	21.57 (0.00)	105.74 (0.00)	115.79 (0.00)	109.73 (0.00)	97.48 (0.00)	2.21 (0.997)	6.84 (0.81)	23.39 (0.01)	2.33 (0.995)	2.19 (0.999)	2.87 (0.998)

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.
3. A country of which GDP per capita exceeds 12,616 USD in 2012 is classified as a developed country. Otherwise, the country is classified as a developing country based on World Bank classification.
4. Models (7)-(12) are Random effect models that follow the Hausman test, whereas the rest are fixed effect models.

Table 2-4b: Estimation results of GDP share change equation – Determinants of GDP share change

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	All countries	Developed countries	Developing countries	All countries							
Dependent variable	ΔGDP share										
Initial GDP share	-0.6904	-0.7031	-0.8299	-0.7009	-0.7010	-0.7010	-0.7143	-0.7609	-0.7494	-0.7710	-0.8765
	(-81.90)***	(-45.71)***	(-38.21)***	(-77.21)***	(-77.22)***	(-77.23)***	(-81.03)***	(-54.67)***	(-71.7)***	(-52.28)***	(-43.24)***
Δpopulation share	0.7735	0.2041	0.7967	0.7842	0.7847	0.7835	0.5744	0.6799	0.2437	0.1141	1.9364
	(7.01)***	(0.26)	(13.73)***	(6.04)***	(6.04)***	(6.04)***	(4.54)***	(1.67)*	(0.76)	(0.42)	(4.99)***
Investment share	0.6030	0.6169	0.4969	0.5784	0.5783	0.5782	0.5363	0.5144	0.5476	0.5285	0.5622
	(65.29)***	(39.04)***	(43.57)***	(53.38)***	(53.40)***	(53.39)***	(45.99)***	(42.84)***	(55.20)***	(61.09)***	(49.25)***
ΔHuman capital Power	0.0420	0.0497	0.0272	0.0424	0.0424	0.0423	0.0460	0.1146	0.1129	0.0797	0.0574
(Tertiary)	(3.32)***	(2.20)**	(2.40)**	(3.15)***	(3.15)***	(3.14)***	(3.58)***	(5.90)***	(7.88)***	(5.49)***	(2.66)***
Exchange rate undervaluation	-0.0005	-0.0023	-0.0005	-0.0007	-0.0007	-0.0007	0.0000		-0.0013	-0.0012	
	(-2.74)***	(-2.06)**	(-5.17)***	(-2.99)***	(-2.99)***	(-2.99)***	(0.04)		(-4.52)***	(-4.97)***	
Export share				0.0858	0.0862	0.0864	0.1206	0.0357			
(in world export)				(5.87)***	(5.88)***	(5.90)***	(8.23)***	(1.70)*			
Export share*Exchange rate Undervaluation							-0.1077 (-7.70)***				

Foreign capital inflow								0.0290	0.0250	0.0445	
(share in world FCI)								(4.29)***	(5.30)***	(5.83)***	
FDI inflow											0.1543
(share in world FCI)											(3.33)***
PI inflow											-0.0624
(share in world FCI)											(-3.57)***
BL inflow											0.0878
(share in world FCI)											(5.97)***
				Autocracy	Democracy			Executive constraint			
Institution				0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000
				(0.02)	(-0.27)	(-0.39)	(0.32)	(0.83)	(0.69)	(1.58)	(0.71)
Period dummies	included	included	included	included	included	included	included	included	included	included	included
Number of obs.	846	289	557	708	708	708	708	648	541	451	561
Number of countries	140	46	94	128	128	128	128	124	122	122	124
R^2	0.485	0.504	0.436	0.527	0.513	0.513	0.481	0.417	0.341	0.049	0.187
Hausman Test	625.83	213.76	176.13	531.02	530.89	530.84	543.04	463.59	446.25	300.36	376.08
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.
3. A country of which GDP per capita exceeds 12,616 USD in 2012 is classified as a developed country. Otherwise, the country is classified as developing country based on World Bank classification.

The GDP share change equation in the Appendix is tested by using several combinations of countries according to the level of openness or trade shares in world trading. The each nation's share in world GDP is the concept for reflecting the rivalry and relative performance, and thus, it is unnatural to analyze this variable unless the economy is open to the world economy. Identifying a closed or self-sufficient country is difficult in the modern world economy as even North Korea heavily relies on China or Russia. Nevertheless, for robust check, the present study tests the GDP share change equation by excluding countries that are less open to the world economy according to their openness (trade ratio to GDP) or trade share in the global market. The two additional robustness evaluations indicate that the main findings above remained robustly unchanged. Estimation results are reported in the appendix.

2. Robust check – Share variables in Barro equation

Share form variables, including GDP and other growth determinants, that represent relativity and rivalry are derived in Section II-2. For robust check, these variables are included in the generic Barro equation to verify whether they capture missed properties for explaining the GDP per capita growth rate in the conventional equation or they just replaced existing determinants. First, the correlations are checked between generic Solow growth determinants and new share form growth determinants (Appendix: Table 1). Given that the highest correlation is merely 0.240 between the initial GDP per capita and initial GDP share, none of the relations among the existing and new variables is suspected the collinearity. Therefore, this finding suggests that the growth determinants in share form imply more than generic determinant capture. The significance of share form variables is also confirmed through their estimation results in

GDP per capita growth rate equation in Table 2-5. Share form growth determinants, i.e., initial GDP share, population share growth, fixed capital investment share, and human capital share growth, in the tertiary level are sequentially included one by one in the generic GDP per capita growth rate equation in the first five columns and collated in the last column.

Table 2-5: Estimation results of share variables in Barro equation – Robust check

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	GDP per capita growth rate					
Initial GDP per capita	-0.0450	-0.0424	-0.0472	-0.0474	-0.0441	-0.0471
	(-11.29)***	(-10.42)***	(-11.75)***	(-11.69)***	(-12.06)***	(-12.44)***
Population growth rate	-0.3526	-0.3245	-0.2362	-0.3314	-0.3625	-0.2122
	(-2.18)**	(-2.00)**	(-1.43)	(-2.05)**	(-2.30)**	(-1.32)
Fixed capital investment rate	0.0387 (10.24)***	0.0372 (9.74)***	0.0377 (9.99)***	0.0372 (9.80)***	0.0420 (11.32)***	0.0384 (10.22)***
Human capital accumulation rate (Tertiary enrolment rate)	0.0125 (3.65)***	0.0133 (3.89)***	0.0113 (3.32)***	0.0121 (3.55)***	0.0150 (4.48)***	0.0144 (4.31)***
initial GDP share		-0.2434				-0.4062
		(-1.87)*				(-2.72)***
Δpopulation share			-6.8598			-6.3541
			(-3.24)***			(-3.22)***
Investment share				0.4019		0.3895
				(2.87)***		(2.92)***
ΔHuman capital share					0.1564	-0.2098
(Tertiary)					(0.72)	(-0.93)
Period dummies	included	included	included	included	included	included
Number of obs.	923	912	923	922	808	801
Number of countries	174	173	174	174	139	139
R^2	0.008	0.011	0.007	0.008	0.014	0.013
Hausman Test	115.19 (0.00)	98.49 (0.00)	124.02 (0.00)	122.48 (0.00)	119.32 (0.00)	125.87 (0.00)

Note:

1. The t-value is in parentheses.

2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.

Table 2-5 presents the meanings of growth determinants in share form in explaining GDP per capita growth rate. The initial GDP per capita and the initial GDP share explain the negative relation of the initial GDP with the GDP per capita growth rate. In other words, a country with lower initial income level and a relatively small economic power country has a tendency to grow faster. This is similar to the case of fixed capital investment. Accumulation rate and relative investment share are vital for the GDP per capita growth rate. However, the population share growth rather than just population growth rate is negatively significant in the per capita income growth rate. Therefore, a relatively fast population increase can hurt individual's welfare. By contrast, higher human capital accumulation rate in tertiary education level results in higher GDP per capita growth rate, as the relative human capital share growth remains insignificant. These results are similarly confirmed in the last column when all variables are included simultaneously.

3. Robust check – System GMM

The GDP share change equation was estimated by using the system-GMM estimation to address small sample bias, omitted variables bias, and endogeneity problems (Arellano and Bover, 1995; Blundell and Bond, 1998). The GDP share change equation uses a lagged value of dependent variable, i.e., initial GDP share, as one of the regressors given that generic growth equation of GDP per capita has a lagged value of dependent variable in the right hand of the equation. Endogeneity is inherent in this dynamic panel structure among the regressors. If these problems might be severe, the estimation results in fixed effect model could be unreliable. To correct for potential endogeneity, omitted variable bias, and measurement error, the system-GMM estimation

was conducted and confirmed. The resulting pattern of estimated coefficients and significances in Table 2-6 is in line with the results presented above, which is reassuring.

In summary, all results reported above suggest that the plausibility of analyzing the catch-up among nations in the global era by using the GDP share change equation. This equation indicates the relationship between each nation's share in world GDP and other growth determinants in share form. All explanatory variables in the right side of the GDP share change equation show the expected sign and significance of growth determinants. In addition, these results are robust, as they are not affected by estimation methods and models.

Table 2-6: Estimation results from System GMM analysis – Robust check

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All countries	Developed countries	Developing countries	All countries			
Dependent variable	ΔGDP share						
initial GDP share	-0.8442	-0.7161	-0.5077	-0.7428	-0.7377	-0.7365	-0.9048
	(-25.51)***	(-34.48)***	(-10.00)***	(-25.58)***	(-27.58)***	(-28.49)***	(-43.01)***
Δpopulation share	1.8570	0.1342	0.5113	0.5207	0.6350	0.6333	-1.1847
	(3.10)***	(0.12)	(2.88)***	(2.85)***	(3.40)***	(3.20)***	(-1.06)
Investment share	0.5950	0.6108	0.3842	0.5417	0.5390	0.5374	0.5211
	(10.42)***	(7.95)***	(9.23)***	(8.04)***	(8.18)***	(8.22)***	(18.86)***
ΔHuman capital Power	0.0818	0.0980	0.1682	0.0796	0.0820	0.0829	0.1093
(Tertiary)	(1.87)*	(3.17)***	(2.69)***	(3.85)***	(4.14)***	(4.33)***	(4.57)***
Exchange rate undervaluation	-0.0024	-0.0052	-0.0017	-0.0053	-0.0047	-0.0045	-0.0031
	(-2.12)***	(-2.20)**	(-2.13)**	(-5.57)***	(-4.30)***	(-4.12)***	(-2.77)***
Export share				0.2316	0.2334	0.2342	
(in world export)				(3.69)***	(3.62)***	(3.54)***	
Foreign capital inflow							0.0729
(share in world FCI)							(2.65)***
				Autocracy	Executive constraint	Democracy	Autocracy
Institution				-0.0005	0.0004	0.0001	-0.0002
				(-1.48)	(0.90)	(0.40)	(-1.12)
Period dummies	included	included	included	included	included	included	included
Number of obs.	846	289	557	708	708	708	451
Number of countries	140	46	94	128	128	128	122
AR(2) test	0.619	0.134	0.951	0.202	0.426	0.255	0.372
Hansen test	0.952	0.998	0.189	0.391	0.802	0.448	0.266

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.
3. A country with a GDP per capita exceeding 12,616 USD in 2012 is classified as a developed country and as a developing country otherwise based on the World Bank classification.
4. P-values are presented for AR(2) and Hansen tests.
5. A two-step system GMM is conducted with Windmeijer finite-sample correction for analysis. The number of groups exceeds the number of instruments.

V. Chapter conclusion

This study examines each nation's share in the world GDP as the dependent variable in the production equation. The other determinants that reflect economic power, relative economic performance, and rivalry among nations are in share form. The real GDP growth equation and nominal GDP growth equations are derived from the conventional production function in the empirical growth study. The relativity of the economic growth performance is reflected in the nominal GDP equations based on several assumptions. The possibility of the share form production relation was confirmed. All results present the expected directions, signs, and significances of each growth determinant in share form. The goodness-of-fit of the model is unaffected by the estimation methods and different model combinations.

Table 2-7 summarizes the main findings of GDP share determinants. Among the typical determinants in share form, the initial GDP share is negatively associated with GDP share change, whereas population share change, fixed capital investment share, and human capital share changes are positively associated with GDP share change. Among other major determinants, such as exchange rate undervaluation, openness or export, foreign capital inflow, and institution, only "institution" is statistically insignificant with GDP share change, as it does not compete with other nations. Exchange rate undervaluation, export share in world export, and foreign capital inflow share in world capital inflow are statistically significant with GDP share change as they indicate relativity and rivalry aspects among nations.

In conclusion, with acknowledging the importance of the GDP per capita growth rate for individual's welfare in generic growth equations, each nation's share in world GDP should be proposed as an inter-complement to the GDP per capita and its growth rate. They can shed light on other economic issues as great economists in history

have addressed on these two major objects of economics, namely the people's welfare and the national wealth.

Table 2-7: Summary of determinants

Determinants \ Dependent var.		Per capita GDP (real)	GDP share (current)
Typical determinants	Initial level	Initial income: (-)	Initial GDP share: (-)
	Population	Population growth rate: (-)	Population share change: **(+)**
	Fixed capital	Fixed capital investment rate: **(+)**	Fixed capital investment share: **(+)**
	Human capital	Human capital investment rate: **(+)**	Human capital share change: **(+)**
	Exchange rate undervaluation	**(+)** for developing countries	(-)
Other determinants (Rivalry)	Openness or export	Openness: **(+)**	Openness: (.) Export share: **(+)**
	Foreign capital inflow	Foreign capital inflow (% of GDP): **(+)**	Foreign capital inflow (% of GDP): (.) Foreign capital inflow share: **(+)**
Institution (Non-Rivalry)	Institution (Executive constraint, Democracy, Autocracy)	**(+)** or (.)	(.)

Chapter3. Effects of foreign capital flows and repatriated profits in developed and developing countries

I. Introduction

Despite of the initiatives of opening up the domestic economy for international integration and of adopting foreign capital employed by several developing countries to usher development, there has been raised a question that why this rapid growth is not sustainable except a small number of countries (Rodrik, 2008). Many developing countries, especially middle-income countries, have demonstrated growth spurts over limited periods. However, only a few countries, such as Korea and Taiwan, managed to sustain the growth over a long period. The condition in which middle income countries face stunted growth is called the “middle income country trap” (Yusuf and Nabeshima, 2009; World Bank, 2010; 2012; ADB, 2011; Lin, 2012; Lee, 2013). Some studies (Reinert, 2007; Spence, 2012) explain a mechanism in which developing countries fail to sustain long-term economic growth in the global export market. As the Washington Consensus (Williamson, 1990) suggests, market-based liberalization policies, such as economic opening in trade and investment, can initiate the economic development among poor countries through the exploitation of their comparative advantages of low wage and abundant labor supply. However, when these countries rise to middle-income status, almost all nations face development slowdown in the trade market as they become stuck between lower-wage manufactures and high technology innovators. This condition eradicates their comparative advantages as wage rates become too high to compete with global low-manufacturing product market latecomers, whereas their technological capabilities are still not as advanced to compete with the forerunners in

global high value-added product market (Lee, 2013). The present study aims to investigate this condition in the global capital market. The study raises the question: Is there any downward pressure on economic growth of developing countries by the mechanism of foreign capital flows?

The effects of foreign capital on host countries persist for a long time. Adopting foreign capital can initially benefit economic growth, however, this practice entails that repatriated profit can negatively impact on the host country in the long run. Thus, evaluating foreign capital through fragmented foreign capital inflows is inappropriate. Moreover, in terms of absolute net amount of money, whether hosting developing countries are really net investees remains doubtful. If a country repays a return on foreign investment much more than the amount of investment newly received, then this country is not a genuine host of global capital in net amount term. In addition, foreign capital affects the host country as well as the investor country. Therefore, although a developing country hosting foreign capital can begin positive growth in GDP per capita, but it can be stagnated once the country fails to develop because of repatriated profit. The "middle income country trap" can be explained by the logic of economic growth slowdown in relative terms. This study examines the different long-term effects on economic growth of the host country surrounding foreign capital and demonstrates. In addition, the study presents how crossing the binding constraint for middle income country in the perspective of global financial market is the host country's own effort on fostering indigenous capabilities, as Lee and Kim (2009) demonstrates in their empirical study.

This chapter is organized as follows. Section II presents the literature review on foreign capital and its growth effects on the host country, and the hypotheses of this chapter. Section III discusses the methodologies and data descriptions. Section IV presents estimation results. Finally, Section V concludes the chapter with a summary of the key findings.

II. Literature review and hypothesis: Foreign capital and economic growth

The accumulation of capital is one of the two crucial and major production factors. Raising and maintaining capital investment are essential in initiating the economic take-off especially for least developed countries where capital is insufficient compared to the abundance of low-wage labor. Therefore, economics naturally advocates that least developed countries should open their domestic markets and adopt foreign capital. However, realizing the positive consequences of hosting foreign capital is not as simple in practice. Numerous studies have examined the effects of foreign investment to the host country's economic growth. Various theoretical possibilities account for the effects of foreign investment, especially foreign direct investment, in contributing to the economic growth of the host county through several channels (OECD, 2002; Ram and Zhang, 2002). Foreign investment can accelerate the host countries' economic growth by (1) facilitating integration into global market, (2) transferring advanced technology and knowledge, (3) enhancing human capital formation, (4) increasing competition in the host country, (5) augmenting domestic savings and investment, and (6) restructuring domestic firms. However, foreign capital can also hamper the host countries' growth through similar channels simultaneously through (1) intense competition, (2) repatriating more profits than what new foreign capital brings in, (3) not promoting the export of host country but taking host country's domestic market, (4) causing distortions in policies and social structures, and thus, (5) increasing foreign dependency. Given the diverse channels existing in theoretical studies, the effects of foreign investment to the host country should be assessed by empirical studies.

Empirically, some studies indicate foreign investment accelerates economic growth of host country on the one hand, and refutes the development according to

negative, insignificant, or mixed results on the other hand. Some studies (Ozturk, 2007; Forte et al., 2013) survey literatures and try to explain this ambiguity in empirical results through a lack of considerations of the host country's domestic conditions, such as indigenous capabilities, financial institution, openness degree, and regulatory environments for investment (Mohnen, 2001; OECD, 2002; Asheghian, 2004). Therefore, the recent consensus moves on an analysis that is relative to the host country's domestic conditions, and this approach appears to be persuasive.

However, several limitations still remain in literature. The following should be considered to comprehend the effects of foreign capital inflow to the host country. First, each type of foreign investment is separately analyzed in literature. Foreign direct investment (FDI) is examined in the majority of foreign capital-related studies because long term investment is generally regarded as good investment, whereas other types of investment, such as portfolio investments and bank liabilities, are denigrated as bad investments. Contrary to the predominantly negative view on other types of foreign investments, only a few studies have examined the effects of foreign portfolio investments and bank liabilities on the host country's growth (Durham, 2003; 2004). FDI and other investments can result in benefits or drawbacks to the host country, depending on the appropriate policy (Evans, 2002). Moreover, the conceptual difference between FDI and portfolio investments is the investor's control or lack of over the investment, while the practical classification criterion merely determines whether the investor has over 10% voting power or not (IMF, 2009). Therefore, no clear dividing criterion among types of foreign investment is available, such that analyzing several types of foreign capital inflow simultaneously remains ideal to examining closely the effects of foreign capital.

Most studies focused on the short-term perspective of new foreign investment inflows, and only a few considered the long-term effects of existing foreign capital stock.

The effect of foreign capital is not confined in a single year during the initial investment or the following years after. Instead its accumulated stock affects the host country's economy for a considerable period. The adoption of foreign capital naturally entails repatriated profit for a prolonged period. Economic performance can result in several consequences depending on the profit distribution across related nations. Although the host country obtains immense foreign investment and achieves economic growth, if the repayment to investors, who are mostly from advanced countries, is relatively larger than the return, then the host country's economy can crumble compared to investor country's economy.

Singer (1950) points out the possibility of this unfavorable consequence in primary industry of underdeveloped countries. In this sense, the conclusions in many literatures that foreign investment, notably FDI, is beneficial for host country's economic growth would be nullified by entailing repatriated profit. In addition, negative effects of repatriated profit can be troublesome for developing countries. Under the conditions of having weak domestic conditions and low absorptive capabilities, host countries gain nothing or obtain low benefits from foreign investments (Borensztein et al., 1998). Hence, adopting foreign capital during the economic take-off of least developed countries can backfire in the future when they reach the level of middle income.

The developing country, which has to acquire foreign capital for initiating economic growth, faces two options for overcoming unavoidable and negative profit outflow. One option is to induce more foreign capital than repaid profit. The other is to enhance benefits from foreign capital flows and stocks. However, this study finds that both of these options are not easy for most developing countries. That is why the middle income country trap is so common, despite successfully initiating economic take-off early.

Figures 3-1(a) to (h) show the time-series of net foreign capital flows, net FDI inflows, and repatriated profit in selected host countries. The first four figures are of developed countries or countries that overcame middle income country trap or seem to be breaking through it. The other four countries are in middle income country trap for a long time. A common pattern easily noticed among eight countries is that regardless of country income level, foreign capital flow is very fluctuating, whereas repatriated profit increases along a gradual and steady trend. Meanwhile, a distinct pattern between the two groups is that successful countries generally induce more foreign capital flow than repatriated profit and their inducing capital tends to increase with volatility. By contrast, countries in the middle income country trap generally repay profits more than inducing money except during some short boom periods, and there is no clear upward trend in foreign capital inflow. Brazil and South Africa, which are BRICS members, have hosted considerable amount of foreign capital over repatriated profit, and their recent patterns resemble the developed countries' situation in the new millennium. However, their sustainability is still not guaranteed, and these patterns can be just an extension of up-and-downs in the past.

Repatriated profit or income debit according to IMF's term has been examined only in a few empirical literatures, and it was the proxy of a decline of capital accumulation or profit leakage (Seabra and Flach, 2005), foreign dependency (Rubinson, 1977), or existing foreign capital stock (Chase-Dunn, 1975; Rubinson, 1977). Although these proxies represent conceptually different aspects, they are expressed as one variable. Notionally, repatriated profit can be interpreted as a negative determinant on economic growth by income leaking from the economy, which can be converted to production factor in the next period. In the perspective of distribution of national production in a certain period, repatriated profit links GDP and gross national income (GNI). In the view of the dynamics of national production of a host country, repatriated profit is an

important determinant for sustained growth by impeding the formation of fixed capital in the long run.

Repatriated profit is related not only to the concept of profit leakage, but also to foreign capital stock in practical data. As repatriated profit increases, foreign capital stock accumulates, as shown in equation (1). Including repatriated profit for the estimation of growth effect in the growth equation gives a compounding result as literatures showed.

$$P = rK^f \tag{1}$$

The effect of repatriated profit in growth equation leads to a misleading conclusion on repatriated profit (Seabra and Flach, 2005), foreign capital stock (Chase-Dunn, 1975; Rubinson, 1977), or foreign dependency (Rubinson, 1977), when using the data of the balance of payments, *per se*. However, decomposing these distinct aspects compounded in one variable is not simple. Therefore, this study semi-decomposes this factor by adding an interaction term between repatriated profit and indigenous capability variables of a host country. This step demonstrates the hypothesis that the only solution for overcoming the disadvantage of adopting foreign capital is for the host country to foster its indigenous capability to enhance foreign capital. In other words, the production function of economy can be written as a function of augmented foreign capital stock, $A \cdot K^f$, repatriated profit, P, and other growth determinants as shown in equation (2). The first determinant is expected to be positive for production. The second one is negative. Lastly, foreign capital stock is substituted by using equation (1) and deriving equation (3). The production of economy is a function of repatriated profit and its interaction term with indigenous capabilities of the host country.

$$Y = F\left(A \cdot K^f, P; L, K, \dots\right) \tag{2}$$

$$Y = F(\frac{A}{r} \cdot P, P; L, K, \dots) \quad (3)$$

In this way, we can first estimates the difference of the compounding effect of repatriated profit and foreign capital stock in developed and developing host countries. Then, we also separately estimate the effect from repatriated profit and the effect from augmented foreign capital stock in one equation by using interaction term, and compare the different dynamics of their effects in developed and developing host countries.

This chapter examines the effects of foreign capital and repatriated profit for economic growth of host country according to the development level due to the difference in the indigenous capabilities of host countries for utilizing the foreign capital. Therefore, this chapter will prove the third hypothesis of dissertation that the utilization benefit of foreign capital stock is larger than the negative effect of repatriated profit in developed countries, while that is generally not in developing countries. This reason supports the dynamics of global capital market of why growth stagnation is prevalent in middle income countries. However, even in the same developing country group, it is expected that as the levels of indigenous capabilities, such as human capital, are higher, utilization benefit increases.

Figure 3-1a: USA – Developed country and the world's largest investor

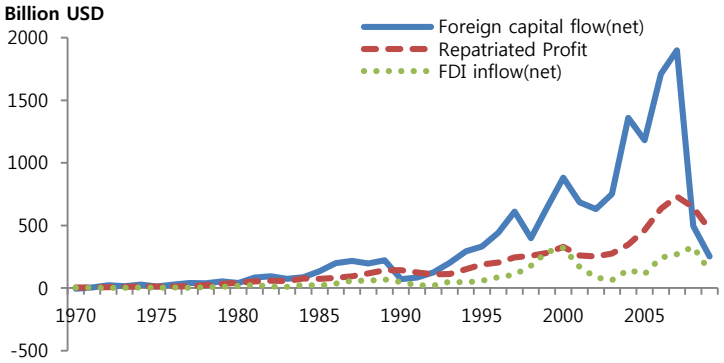


Figure 3-1b: Korea – Successfully overcame middle income country trap

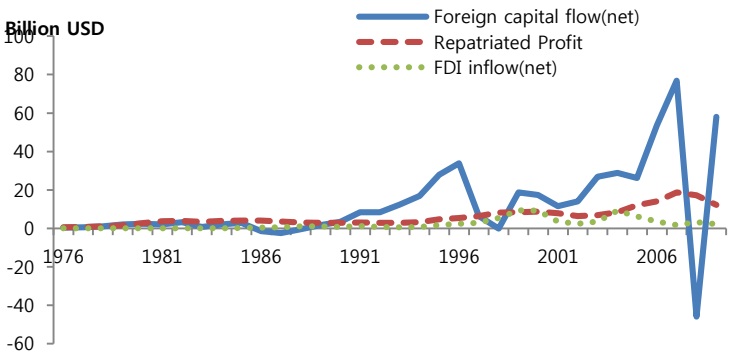


Figure 3-1c: Ireland – Developed country but heavily relied on foreign capital

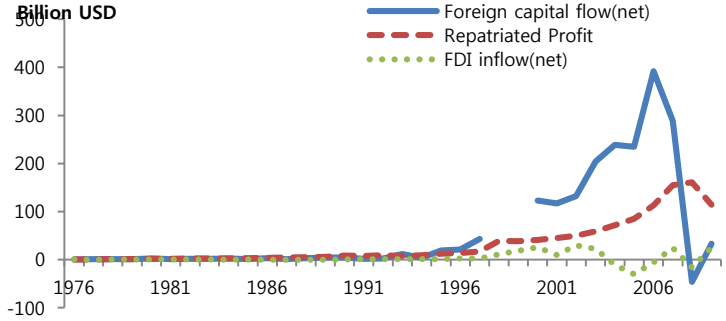


Figure 3-1d: China – Will it overcome middle income country trap?

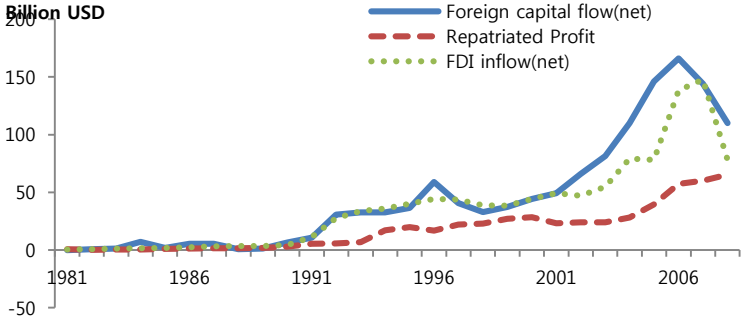


Figure 3-1e: Argentina – Middle income country trap

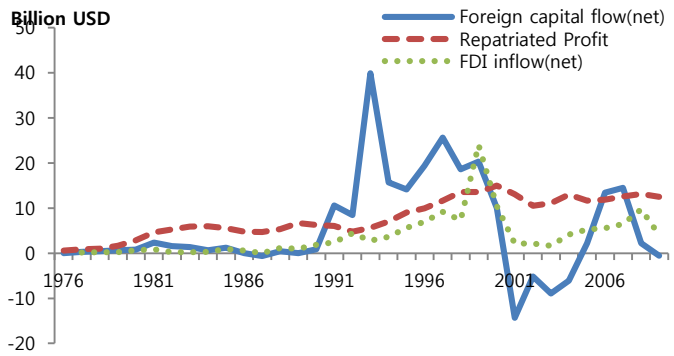


Figure 3-1f: Bolivia – Middle income country trap

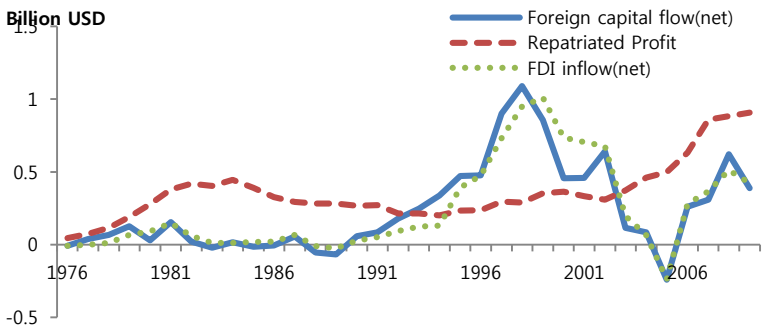


Figure 3-1g: South Africa – Middle income country trap, but emerging BRICs country

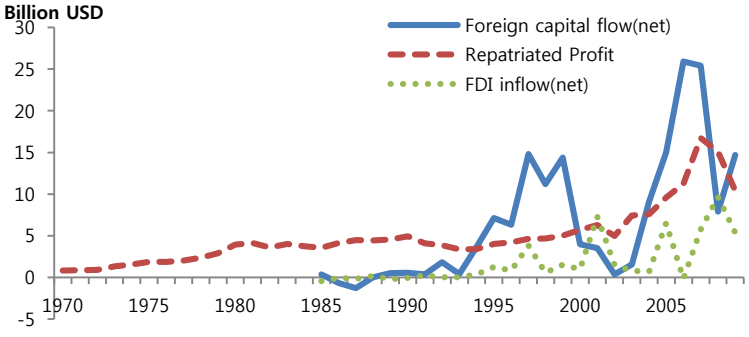
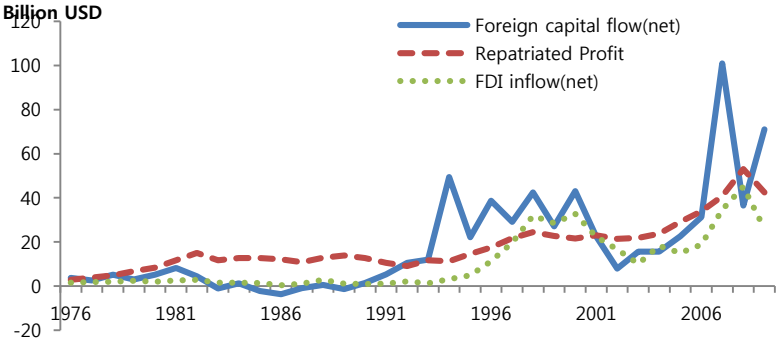


Figure 3-1h: Brazil – Middle income country trap, but large emerging BRICs country



III. Methodology and Data

1. Estimation methodology

The baseline specification for estimating the growth effects of foreign capital flows on GDP per capita growth rate follows a generic Solow model and the Barro equation

$$\text{growth}_{it} = \beta \log \text{RGDPCH}_{i,t-1} + \Psi X_{it} + \Pi Z_{it} + \mu_i + \mu_t + \varepsilon_{it} \qquad (4)$$

where the dependent variable is growth rate in real GDP per capita, $\text{RGDPCH}_{i,t-1}$ is the initial GDP per capita, X_{it} is a set of conventional control variables, such as population growth rate and capital accumulation rate, Z_{it} is a set of additional growth determinants that are foreign capital flows related variables, μ_i is a full set of country dummies, and μ_t is a full set of period dummies. Specifically, Z_{it} includes FDI, PI, bank liabilities, repatriated profit, received profit, and several combinations of five variables.

The first estimation method used to analyze the determinants of GDP per capita is the panel fixed effect model or the panel random effect model. The method controls the country-specific shocks. Period dummies are also added in the equations to capture period-specific shocks. The more suitable model is chosen by the Hausman test. Although the panel approaches are the most frequently used and reliable estimation methods in the recent panel studies, there are still potential problems. These problems include endogeneity, omitted variable bias, and measurements error. A system-GMM estimation developed by Arellano and Bover (1995) and Blundell and Bond (1998) is applied to two equations for a robustness check to correct these potential problems. The results with the panel fixed effect model and the panel random effect model are then

compared. To evaluate the system-GMM estimation model specifications, the criteria include Hansen over-identification test, and test for second order serial correlation (AR2) of the residuals in the first differenced equation. The AR(2) test provides additional checks on the specification of the model and on the legitimacy of instrumental variables in the differenced equation. Lastly, whether the number of groups exceeds the number of instruments is verified after a finite sample correction is applied to the two-step covariance matrix derived by Windmeijer (2005).

2. Data sources and data description

The dataset used in this chapter covers a maximum of 211 countries and 6 five-year periods from 1980-1984 through 2005-2009. By income level, 67 developed countries are classified as high income countries by the classification of the World Bank, whereas 143 developing countries are defined as middle or low income countries. The details on the data sources and explanations are provided in the Appendix. Although the International Monetary Fund (IMF) provides financial data before 1980, many countries are missing in the earlier periods before 1980. Globalization of the world economy has been intensifying since 1980s, and international capital transactions are increasingly involved in developed and developing countries in the post-1980 era of globalization. Therefore, the analysis starting from 1980 seems to be accurate for estimating the relationship of foreign capital and the economic growth of the host country.

Most data for GDPs (in constant 2005 US dollar terms), such as population and fixed capital formation, are obtained from the World Development Indicators (WDI) of the World Bank. Data on Taiwan were derived from the database of the National Statistics in the Republic of China (Taiwan). Education variables, such as secondary and

tertiary enrollment rates, are obtained from Barro and Lee (1996, 2000). The data for patent application in US office are from the World Intellectual Property Organization. Institution variables are from Jaggers and Marshall's (2000) Polity IV Project.

All financial data are obtained from the Balance of Payments (BOP) of the IMF following the sixth manual. The variables in this dissertation include the primary income debits and credits (income debit and credits in fifth BOP manual), net incurrence of liabilities by direct investments, portfolio investments, and bank loans. Since the main interest of this chapter is the influence of foreign capital in host countries, financial flows surrounding the host countries by the foreign investors are noted.

Contrary to the literatures that focused on new foreign capital net inflows only, this study comprehensively deals with the primary income debits belonging to foreign investors that are inevitably accompanied with existing foreign investment stock. Primary income covers two types of transactions between residents and nonresidents. These transactions are those involving compensation of employees, which is paid to foreign nonresident workers, and those involving investment income payments on external financial liabilities (IMF, 2009). In other words, the latter type of transaction is the repatriated profit to foreign investors corresponding to the existing investment. Over 95% of primary income is the repatriated profit, which is different from foreign capital disinvestment. Disinvestment means a complete withdrawal that is captured in the financial account.

As the methodology and data of BOP improve, primary income account becomes more accurate and provides sophisticated sub-categories, such as functional category of financial assets and liabilities (direct investment, portfolio investment, and bank loans). However, a trade-off exists between the high quality of data in the recent period and the inconsistency problem with data in earlier period since it is hard work to correspond the chunk data from the earlier period to the recent sub-categories. Therefore,

this chapter presents the constructed database that covers the longest periods in the globalization era while using the upper category. Since the main interest of this chapter is the negative effect of repatriated profit and its influence on the middle income country trap, the functional type to which repatriated profit accrues makes no difference in conclusion.

Table 3-1 presents some descriptive figures of financial variables according to the level of development of the countries. P-values of several T-tests suggest that all the financial variables are considerably different. The relative amount of new foreign capital inflows is larger for developed countries than developing countries without distinction of functional types. In addition, the relative amount of repatriated profit to the host country's GDP is larger in developed countries than in developing countries. Interestingly, net foreign capital inflows, which refer to the difference between foreign capital inflow to host country and repatriated profit from host country, are larger in developed countries. What was worse, this figure is considered as deficit in developing countries. In other words, developing countries, on the average, are actually lenders and not borrowers who host foreign capital.

Table 3-1: Data Description between developed and developing countries

	Developed countries Mean (μ0)	Developing countries Mean (μ1)	Difference (μ0-μ1)	H0: μ0-μ1=0
Direct Inv. (a) (% of GDP)	5.56	2.68	2.87	0.003***
Portfolio Inv. (b) (% of GDP)	5.30	0.26	5.04	0.000***
Bank Liabilities (c) (% of GDP)	3.76	0.49	3.27	0.000***
Foreign capital inflow (d=a+b+c) (% of GDP)	14.16	3.17	10.98	0.000***
Repatriated profit (e) (% of GDP)	9.58	4.84	4.74	0.000***
Net foreign capital inflow (f=d-e) (% of GDP)	5.07	-1.73	6.80	0.000***
Received profit (g) (% of GDP)	8.27	2.67	5.60	0.002***

***, **, and * in the cells indicate the levels of significance at 1%, 5%, and 10% respectively.

Table 3-2 presents the differences between foreign capital inflow share in the world capital flows and repatriated profit share by country groups classified by income level. The figures confirm the trend that developing countries are more likely to repay investors than to be newly invested. As the income level of country group is higher, all capital flow shares are larger. Developed countries show largest capital flow shares. However, the deficit gap between new foreign capital and repatriated profit shares of the entire world is widest in the upper middle income countries whether China, which has the largest capital shares in this group, is excluded or not.

Table 3-2: Mean values of foreign capital inflow and repatriated profit shares

	Foreign capital inflows (%, share in world capital flows)	Repatriated profit (%, share in world capital flows)
Developed countries	1.687	1.245
Upper middle income countries	0.118	0.215
Upper middle income countries (except China)	0.099	0.212
Lower middle income countries	0.018	0.036
Lower income countries	0.002	0.006

IV. Estimation results

1. Estimation results of all countries

First, the panel fixed and random effect estimations are calculated. Then, the preferred estimator is selected between the consistent and efficient estimators. The results of the Hausman test suggest that the panel fixed effect estimations are preferred

to random effect estimations in all regressions. Panel fixed effect estimations are used to control for omitted variables that are assumed to be country-specific, but identical over time. Period dummies are included to control for period-specific variables that are unobserved and omitted.

Although the initial dataset covers 211 countries and are all included to generate regression variables, such as GDP share in world GDP, unreliable observations are excluded following the commonly used rule that the balance of payments is regarded as invalid when the errors and omissions exceed 5% of the sum of imports and exports. Given that the credible compilation of financial statistics is extremely difficult for low income countries, the exclusion rule should be applied for robustness of estimations results. Therefore, while observations of low income countries are excluded, a maximum of 135 countries remain.

Table 3-3a presents the result of Equation (4), GDP per capita growth rate equation, in all countries. The first regression in Table 3-3a yields a negatively significant coefficient with repatriated profit, that is, -0.0948, while foreign capital inflows are insignificant. When net foreign capital inflow is estimated in column (2), which is the different of foreign capital inflow and repatriated profit, the result is insignificant. Lastly the foreign capital inflows are classified into three types of foreign capital and are regressed with repatriated profit in columns (3) and (4). Only FDI inflow is positively significant among three types of foreign capital inflow, and repatriated profit is still negatively significant with the similar value of coefficient, -0.1105. All regressions in Table 3-3a, the estimation results of received profit, which is a benefit in return from the investment of the host country abroad, are positively significant.

As discussed in section II, the repatriated profit in practical data may represent not only profit leakage or deterrence of capital accumulation, but also the amount of existing foreign capital stock. A dollar increase in repatriated profit can be realized

through either a dollar increase in profit leakage in interest and dividend, or by an increase in foreign capital stock. Therefore, if the positive effect of existing foreign capital stock on economic growth is larger than the negative effect of repatriated profit leakage, then the estimation result of these variables can turn out to be positive. Therefore, this variable was semi-decomposed by using interaction terms with the host country's indigenous capabilities such as the level of income per capita, technological capability, and human capital.

Lee and Kim (2009) find in their empirical study that binding constraints for economic growth in developing countries are technological development and higher education. The level of technological capability of host country is measured by the number of U.S. patent applications per million people, while human capital in higher level is measured by tertiary education enrollment rate according to Lee and Kim (2009). Per capita income of the host country is measured in constant 2005 USD. Interaction terms between repatriated profit and these indigenous capabilities of the host country are three alternative variables of the change in augmented foreign capital stock to represent how a host country beneficially utilizes foreign capital stock. By contrast, when interaction terms are included, the repatriated profit captures a genuine profit leakage or a decline in capital accumulation.

The results of columns (5) to (10) in Table 3-3a suggest that the hypothesis is correct. Repatriated profit is negatively significant for economic growth in terms of GDP per capita growth rate. Moreover, the host country's indigenous capabilities to facilitate the utilization of foreign capital is positively significant whether these are measured by the level of per capita GDP, the number of patent per million people, or tertiary education level. Countries that have high levels of indigenous capabilities to utilize of foreign capital can overcome the side effects of more repatriated profit leakage and the deterrence of capital accumulation in host countries because of foreign capital.

2. Estimation results of developed countries

When all countries are regressed as a whole, different factors cannot affect growth differently according to the income level of countries. Hence, the sample countries are divided into two groups, namely, developed and developing countries. The results of each country group suggest that the effects of foreign capital, especially repatriated profit, are different according to the income level of countries.

Table 3-3b presents the panel fixed effect estimation results of the GDP per capita growth rate equation in developed countries. First, the baseline equation is run with only the FDI variable to check whether my dataset gives a similar result with the literatures. Column (1) of Table 3-3b yields a highly significant coefficient of FDI, 0.1287. Columns (2) to (4) show the results in developed countries by using the same combination of variables with columns (1) to (3) in Table 3-3a. Interestingly, for developed countries, foreign capital inflow (column 2) and net foreign capital inflow (column 3) are positively significant, while repatriated profit is insignificant (columns 2 and 4). When foreign capital inflow is divided into three types, only FDI inflow is positively significant like the result of Table 3-3a, and repatriated profit is still insignificant. These results suggest that for developed countries, inducing more foreign capital inflow, notably FDI inflow, is beneficial for economic growth in GDP per capita, while repatriated profit does not matter much for economic growth. The coefficients of received profit of the host developed countries are consistently positive significance. In column (6), the robustness of results in developed countries is checked by excluding large economies. These robustness tests are for verifying whether the estimation results are seriously changed by large country outliers. However, the results are unchanged as FDI inflow is strongly positive and repatriated profit is insignificant.

The insignificant result of repatriated profit in developed countries is somewhat

awkward. However, this result can occur because developed countries have high level of indigenous capabilities to utilize of foreign capital adequate to overwhelm the side effect. Therefore, the insignificant results of repatriated profit in columns (2) and (4) to (6) are merely compounding results between these two different effects for economic growth. To verify this explanation, interaction terms between repatriated profit and three different proxies are included in the equation separately as shown in columns (7) to (9). The results suggest that even for developed countries, the repatriated profit is negatively significant for economic growth in terms of GDP per capita growth rate when the indigenous capabilities to facilitate the utilization of foreign capital of the host country are controlled. In addition, these controlled capabilities are positively significant for economic growth whether they are measured by the per capita GDP, the number of patent per million people, or tertiary education level.

Finally, the results of received profit suggest an interesting and consistent implication. While its effect is still positive for economic growth in terms of GDP per capita growth rate in developed host countries, its interaction terms with host countries' indigenous capabilities reveal negative correlations with economic growth. This result symmetrically suggests that for a country that has relatively higher indigenous capabilities, investing more capital abroad rather than to domestic economy may be not desirable for economic growth since the capital should have been utilized more effectively in the home country.

3. Estimation results of developing countries

Table 3-3c presents the estimation results of GDP per capita growth rate in developing countries. The Hausman test suggests the panel fixed effect estimation

model is preferred in all regression models. Contrary to the case of developed countries, the FDI inflow of GDP is statistically insignificant in some models. However, many literatures (Borensztein et al., 1998; Xu, 2000; World Bank, 2001; OECD, 2002) report the effect of FDI can differ according to the host developing country's absorptive capabilities, such as human capital, income level, technological capabilities, and institutions. Then, by controlling the technological capability, the dataset reveals a consistent result with that in literature. The FDI inflow of GDP in the host developing country with high technological capability is positively associated with economic growth (columns 1 and 2 in Table 3-3c). Column (3) in Table 3-3c suggests that foreign capital inflow is positively associated with GDP per capita growth rate, but repatriated profit is negatively associated. Column (4) presents that relatively more foreign capital inflow than repatriated profit is positively significant for economic growth. Next, the regression using three types of foreign capital inflows and the results in column (5) suggest that repatriated profit shows a highly negative significance. Meanwhile FDI and portfolio inflows of GDP are positively associated with GDP per capita in developing countries. This result indicates that the disadvantages on portfolio investment such as its volatility, is exaggerated (Evans, 2002). Portfolio investment can satisfy the need of the developing country for capital by providing abundant liquidity in the long term. Columns (6) to (8) represent the estimation results with interaction terms, openness, and institutions as implemented in developed countries. The data indicate consistent results even among the developing countries. If a host country has indigenous capability to facilitate learning advanced knowledge and technology directly or indirectly from foreign capital, this country can better alleviate the side effect of repatriated profit. Openness and institutions do not affect the main findings.

Table 3-3a: Estimation results of GDP per capita growth rate in all countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable					GDP per capita growth rate					
Initial income	-0.0556	-0.0563	-0.0546	-0.0556	-0.0568	-0.0565	-0.0553	-0.0565	-0.0570	-0.0696
	(-12.74)***	(-12.87)***	(-12.48)***	(-12.66)***	(-12.43)***	(-12.36)***	(-12.21)***	(-12.35)***	(-12.48)***	(-12.74)***
Population growth rate	-0.3271	-0.3443	-0.2982	-0.2675	-0.2589	-0.2774	-0.2642	-0.2768	-0.2746	-0.0333
	(-2.09)**	(-2.20)**	(-1.87)*	(-1.67)*	(-1.59)	(-1.70)*	(-1.61)	(-1.69)*	(-1.68)*	(-0.14)
Fixed capital investment	0.0554	0.0555	0.0543	0.0528	0.0550	0.0531	0.0500	0.0532	0.0529	0.0510
	(11.23)***	(11.19)***	(10.97)***	(10.58)***	(10.19)***	(9.96)***	(9.38)***	(9.98)***	(9.99)***	(7.83)***
Human capital accumulation	-0.0048	-0.0041	-0.0047	-0.0049	-0.0056	-0.0058	-0.0067	-0.0058	-0.0056	-0.0044
(Secondary enrolment rate)	(-1.19)	(-1.01)	(-1.16)	(-1.20)	(-1.36)	(-1.41)	(-1.60)	(-1.40)	(-1.37)	(-0.92)
Openness				0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
(% of GDP)				(2.02)**	(1.55)	(1.67)*	(1.96)**	(1.64)	(1.75)*	(1.65)*
Foreign capital inflow	0.0132									
(% of GDP)	(1.36)									
Net foreign capital inflow		0.0150								
(% of GDP)		(1.56)								
FDI inflow			0.0935	0.0779	0.0816	0.0864	0.0758	0.0852	0.0873	0.0820
(% of GDP)			(2.47)**	(2.02)**	(2.08)**	(2.17)**	(1.92)*	(2.14)**	(2.20)**	(1.42)
PI inflow			-0.0001	0.0064	-0.0013	0.0000	0.0192	0.0002	-0.0029	0.0496
(% of GDP)			(-0.00)	(0.15)	(-0.03)	(0.00)	(0.37)	(0.00)	(-0.06)	(1.06)
BL inflow			-0.0007	-0.0010	-0.0089	-0.0066	-0.0028	-0.0067	-0.0061	-0.0026
(% of GDP)			(-0.06)	(-0.09)	(-0.64)	(-0.48)	(-0.21)	(-0.49)	(-0.44)	(-0.17)
Repatriated profit	-0.0948		-0.1105	-0.1223	-0.7736	-0.2218	-0.1390	-0.2203	-0.2237	-1.1039
(% of GDP)	(-2.56)**		(-2.93)***	(-3.22)***	(-3.25)***	(-3.28)***	(-3.40)***	(-3.26)***	(-3.32)***	(-3.43)***
Indigenous capabilities					per capita GDP	Higher education	patents per million	Higher education	Higher education	per capita GDP
Repatriated Profit*Indigenous capabilities					0.0861	0.0771	0.0010	0.0766	0.0780	0.1238
					(2.75)***	(1.73)*	(1.49)	(1.72)*	(1.75)*	(2.98)***
Received profit	0.1187	0.0414	0.1314	0.1404	0.5504	0.1902	0.1623	0.1893	0.1935	0.6874
(% of GDP)	(3.05)***	(2.37)**	(3.35)***	(3.57)***	(2.39)**	(2.51)**	(3.85)***	(2.50)**	(2.56)**	(1.96)*
Received profit*Indigenous					-0.0574	-0.0430	-0.0012	-0.0424	-0.0458	-0.0708

capabilities										
					(-1.94)*	(-0.88)	(-1.79)*	(-0.86)	(-0.93)	(-1.63)
					Executive constraint	Executive constraint	Executive constraint	Democracy	Autocracy	Rule of law
Institution					0.0002	0.0002	0.0002	0.0002	0.0002	0.0018
					(1.54)	(1.69)*	(1.67)*	(1.59)	(2.13)**	(2.26)**
Period dummies	included	included	included	included	included	included	included	included	included	included
Number of obs.	599	599	599	599	571	571	571	571	571	427
Number of countries	129	129	129	129	123	123	123	123	123	110
R^2	0.006	0.006	0.007	0.008	0.010	0.009	0.009	0.009	0.009	0.005
Hausman Test	64.34	19.61	106.20	144.98	134.32	133.86	138.45	132.87	135.23	103.57
	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.
3. Observations in which the errors and omissions exceed 5% of the sum of imports and exports are excluded for reliability.

Table 3-3b: Estimation results of GDP per capita growth rate in developed countries

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	GDP per capita growth rate								
	All developed countries				All developed countries except USA	GDP share < 0.01	All developed countries		
Initial income	-0.0585	-0.0573	-0.0565	-0.0512	-0.0509	-0.0684	-0.0374	-0.0418	-0.0394
	(-6.01)***	(-5.65)***	(-5.64)***	(-5.63)***	(-5.52)***	(-4.33)***	(-3.97)***	(-4.08)***	(-3.90)***
Population growth rate	-0.5758	-0.9894	-1.0056	-0.6491	-0.6557	-0.4068	-0.6891	-0.6164	-0.6199
	(-2.89)***	(-4.30)***	(-4.44)***	(-3.06)***	(-3.04)***	(-1.45)	(-3.18)***	(-2.59)**	(-2.74)***
Fixed capital investment	0.0375	0.0752	0.0764	0.0586	0.0588	0.0509	0.0556	0.0515	0.0568
	(4.39)***	(8.39)***	(8.65)***	(6.73)***	(6.63)***	(4.31)***	(5.45)***	(5.08)***	(5.52)***
Human capital accumulation	0.0069	-0.0013	-0.0012	0.0069	0.0073	0.0142	0.0016	-0.0020	0.0038
(Secondary enrolment rate)	(0.73)	(-0.13)	(-0.13)	(0.79)	(0.81)	(1.21)	(0.18)	(-0.15)	(0.43)
Openness or Trade							0.0004	0.0004	0.0003
(% of GDP)							(3.03)***	(3.27)***	(2.68)***
Foreign capital inflow		0.0183							
(% of GDP)		(1.99)**							
Net foreign capital inflow			0.0194						
(% of GDP)			(2.38)**						
FDI inflow	0.1287			0.1218	0.1217	0.1180	0.1055	-0.0211	0.0784
(% of GDP)	(6.94)***			(6.32)***	(6.20)***	(5.06)***	(3.64)***	(-0.40)	(3.30)***
PI inflow				-0.0416	-0.0413	-0.0669	-0.0313	-0.0211	-0.0443
(% of GDP)				(-1.14)	(-1.11)	(-1.39)	(-0.66)	(-1.16)	(-0.92)
BL inflow				-0.0039	-0.0042	-0.0121	0.0036	0.0072	0.0005
(% of GDP)				(-0.44)	(-0.46)	(-1.10)	(0.30)	(0.60)	(0.04)
Repatriated profit		0.0171		-0.0772	-0.0785	-0.0517	-2.1251	-0.6953	-0.0583
(% of GDP)		(0.25)		(-1.24)	(-1.25)	(-0.66)	(-1.71)*	(-2.40)**	(-0.61)
Indigenous capabilities							per capita	Higher	patents per

							GDP	education	million
Repatriated Profit*Indigenous capabilities							0.2112 (1.69)*	0.3116 (2.51)**	0.0003 (0.51)
Received profit (% of GDP)		0.0486 (0.76)	0.0840 (3.82)***	0.1240 (2.13)**	0.1250 (2.11)**	0.1042 (1.43)	2.3413 (1.99)**	0.9387 (3.38)***	0.1221 (1.46)
Received profit*Indigenous capabilities							-0.2291 (-1.93)*	-0.4142 (-3.27)***	-0.0005 (-0.88)
Institution							Executive constraint 0.0011 (0.45)	Executive constraint 0.0004 (0.15)	Executive constraint 0.0015 (0.63)
Period dummies	included	included	included	included	included	included	included	included	included
Number of obs.	203	189	189	189	183	127	164	158	164
Number of countries	45	43	43	43	42	33	36	34	36
R^2	0.280	0.262	0.264	0.310	0.315	0.260	0.338	0.187	0.322
Hausman Test	61.03(0.00)	91.80(0.00)	91.87(0.00)	106.04(0.00)	92.10(0.00)	73.32(0.00)	43.86(0.00)	52.73(0.00)	63.45(0.00)

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.

Table 3-3c: Estimation results of GDP per capita growth rate in developing countries

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	GDP per capita growth rate All developing countries										
Initial income	-0.0574	-0.0610	-0.0548	-0.0557	-0.0541	-0.0579	-0.0560	-0.0560	-0.0573	-0.0508	-0.0573
	(-10.43)***	(-11.16)***	(-9.94)***	(-10.05)***	(-9.82)***	(-9.94)***	(-9.91)***	(-9.67)***	(-9.40)***	(-8.81)***	(-10.27)***
Population growth rate	-0.0393	-0.0174	0.0521	-0.0010	0.0555	0.1108	0.1045	0.0636	0.1369	0.2361	0.1544
	(-0.18)	(-0.08)	(0.24)	(-0.00)	(0.25)	(0.50)	(0.47)	(0.29)	(0.60)	(0.29)	(0.70)
Fixed capital investment	0.0505	0.0495	0.0543	0.0540	0.0539	0.0505	0.0493	0.0503	0.0463	0.0519	0.0531
	(8.76)***	(8.76)***	(8.89)***	(8.77)***	(8.81)***	(7.91)***	(7.76)***	(7.80)***	(7.11)***	(7.80)***	(8.53)***
Human capital accumulation (Secondary enrolment rate)	-0.0036	-0.0049	-0.0069	-0.0052	-0.0076	-0.0078	-0.0086	-0.0082	-0.0040	-0.0105	-0.0097
	(-0.66)	(-0.90)	(-1.25)	(-0.94)	(-1.38)	(-1.40)	(-1.55)	(-1.46)	(-0.67)	(-1.75)*	(-1.72)*
Openness or Trade (% of GDP)						0.0002	0.0002	0.0001	0.0001		0.0001
						(1.78)*	(1.86)*	(1.32)	(0.70)		(1.65)*
Foreign capital inflow (% of GDP)			0.0374								
			(2.09)**								
Net foreign capital inflow (% of GDP)				0.0454							
				(2.62)***							
FDI inflow (% of GDP)	0.0411	-0.0308			0.0820	0.0989	0.1088	0.0682	-0.6008	-0.1873	-0.2132
	(0.99)	(-0.69)			(1.62)	(1.87)*	(2.03)**	(1.30)	(-1.60)	(-0.90)	(-1.11)
Indigenous capabilities		Technology (log of patents)							per capita GDP	Education (secondary)	Education (secondary)
FDI(% of GDP)*Indigenous capabilities		0.0867							0.1056	0.1193	0.1080
		(3.86)***							(2.05)**	(1.73)*	(1.67)*
PI inflow (% of GDP)					0.2477	0.2576	0.2389	0.2606		0.2448	0.2401
					(2.31)**	(2.21)**	(2.05)**	(2.22)**		(2.27)**	(2.25)**

BL inflow					0.0102	-0.0024	0.0021	0.0036		0.0950	0.0007
(% of GDP)					(0.48)	(-0.11)	(0.10)	(0.17)		(1.80)*	(0.03)
Repatriated profit			-0.1404		-0.1494	-1.1263	-0.3512	-0.1707	-1.1476	-0.2999	-0.2815
(% of GDP)			(-3.01)***		(-3.16)***	(-2.56)**	(-3.86)***	(-3.50)***	(-2.73)***	(-3.11)***	(-2.98)***
Indigenous capabilities						per capita GDP	Higher education (Tertiary)	patents per million	per capita GDP	Higher education (Tertiary)	Higher education (Tertiary)
Repatriated profit *Indigenous capabilities						0.1289	0.1535	0.0184	0.1409	0.1167	0.1103
						(2.20)**	(2.39)**	(1.11)	(2.61)***	(1.73)*	(1.68)*
Received Profit			0.1604	0.0689	0.1688	0.0966	0.1533	0.1735	0.0111	0.1606	0.1454
(% of GDP)			(3.18)***	(2.39)**	(3.32)***	(1.49)	(2.90)***	(3.31)***	(0.28)	(3.01)***	(2.79)***
						Executive constraint	Executive constraint	Executive constraint	Executive constraint		
Institution						0.0002	0.0002	0.0002	0.0001		
						(1.44)	(1.71)*	(1.54)	(0.88)		
Period dummies	included	included	included	included	included	included	included	included	included	included	included
Number of obs.	421	421	405	405	405	397	397	397	383	375	404
Number of countries	90	90	89	89	89	87	87	87	88	89	89
R^2	0.053	0.055	0.051	0.053	0.054	0.067	0.062	0.056	0.083	0.064	0.057
Hausman Test	122.48	132.72	99.79	32.49	167.78	73.86	160.32	84.56	59.41	66.79	88.12
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.
3. Observations in which the errors and omissions exceed 5% of the sum of imports and exports are excluded for reliability in developing countries.

4. Threshold study

Based on the estimated coefficients in Table 3-3c, the thresholds where the utilization benefits of foreign capital offset the disadvantage of repatriated profit can be calculated in terms of per capita GDP, number of patent application per million people and completion rate in tertiary education as Borensztein et al. (1998). As calculated from column (6) in Table 3-3c, the threshold of real per capita GDP where two opposite effects are balanced is USD 6,232 in constant 2005 term. From 2005 to 2009, the average income levels of developed and developing countries are USD 28,052 and USD 2,927, respectively. The average income of upper middle income countries group, USD 5,260, is slightly less than the threshold. All 41 developed countries in the sample exceed the threshold. However, only 9 among 103 developing countries exceeded the threshold. These nine countries all belong to upper middle income countries. Therefore, the overall coefficient of repatriated profit is calculated according to different income groups as shown in Figure 3-2a. Only the developed country group has a positive coefficient, which means that developed countries obtain more benefit from foreign capital stock than repatriated profit they pay to the investor.

The threshold of higher education level calculated from column (7) in Table 3c is 8.85% of population above age 15 who completed tertiary schooling. From 2005 to 2009, 23 out of 38 developed countries satisfied the threshold ratio of higher education completion, but only 13 out of 80 developing countries satisfied the same threshold ratio. The average rate of completion in tertiary schooling in developed countries is 11.6%, whereas the average rates of completion in developing and upper middle income countries are 4.6% and 6.7%, respectively. Figure 3-2b shows that the developed country group has a positive coefficient in overall repatriated profit in terms of human capital.

Finally, the threshold of technological capability measured by the number of patents per million people is 9.3 patents. In the recent period of the data, 2005–2009, only 3 among 99 developing countries, namely, Malaysia, Antigua and Barbuda, and Bulgaria, and 33 out of 41 developed countries applied more patents than the threshold. Like the two previous proxies, only the developed country group exceeds the threshold, such that the repatriated profit has a positive relation with economic growth (Figure 3-3c). When the results of three proxies of indigenous capabilities of host country are comprehensively interpreted, no country in all proxies simultaneously satisfies the minimal requirements to utilize foreign capital efficiently among developing countries. These results suggest the difficulty of sustainable growth in developing countries and the prevalence of the middle income country trap.

Borensztein et al. (1998) find the positive effect of FDI on the economic growth in 69 developing countries from 1970 to 1989. However, this finding holds only when the host country has a minimum threshold stock of human capital measured by average years of male secondary schooling. Although the minimum threshold varies according to the estimation models, approximately half of 69 developing countries exceed the minimum threshold of human capital. Following the method of their study, interaction terms are added between FDI inflow and human capital proxy measured in secondary schooling enrollment rate, as well as per capita GDP for comparability with the estimations. Although Borensztein et al. (1998) used the average schooling years in secondary education level as the proxy of human capital, this study uses secondary enrollment rate in completion as tertiary enrollment rate is used for binding constraint of developing countries. Despite the difference in proxies, the main findings of the threshold in which the positive effect of foreign capital stock offsets the negative effect of repatriated profit have remained unchanged, whereas the threshold in which the effect of FDI becomes positive as found in the study of Borensztein et al. (1998). Columns (9)

to (11) in Table 3-3c show the estimation results of threshold.

As more regressors are simultaneously included in the equation, a practical limitation is that the sample size is excessively reduced. Therefore, various combinations are attempted as well as the removal of control variables that seem to be insignificant or do not relate to the main interest in retaining many observations. In column (9), the two thresholds are calculated by per capita GDP as the indigenous capability of host developing country. Although the FDI threshold in terms of per capita GDP is USD 296 in constant 2005 term, the repatriated profit threshold is USD 3,440 in constant 2005 term, which is higher than FDI threshold. This result is consistent with the intuition that the minimum requirement of indigenous capability to obtain more benefits from foreign capital stock to offset the negative effect of repatriated profit should be higher than that for merely gaining benefits from FDI. Comparing the repatriated profit threshold from column (7), the repatriated profit threshold from column (9) is lower although the coefficients of repatriated profit and its interaction term with indigenous capability are slightly modified. This change may be caused by the different combination of regressors and observations, and the fact that a little difference in coefficient of logarithm variable can make a larger difference in the initial unit. Even if this difference in exact level of threshold is ignored, the main finding remains unchanged, and that the repatriated profit threshold is higher than the FDI threshold. The estimation results using human capital variables in columns (11) and (12) robustly support this finding. The average FDI threshold of columns (11) and (12) is the 5.0% completion rate in secondary schooling attained in a population of 15 years old and older, whereas the average repatriated profit threshold is the 12.0% completion rate in tertiary schooling, which is higher level of human capital.

Figure 3-2a: Threshold in terms of per capita GDP

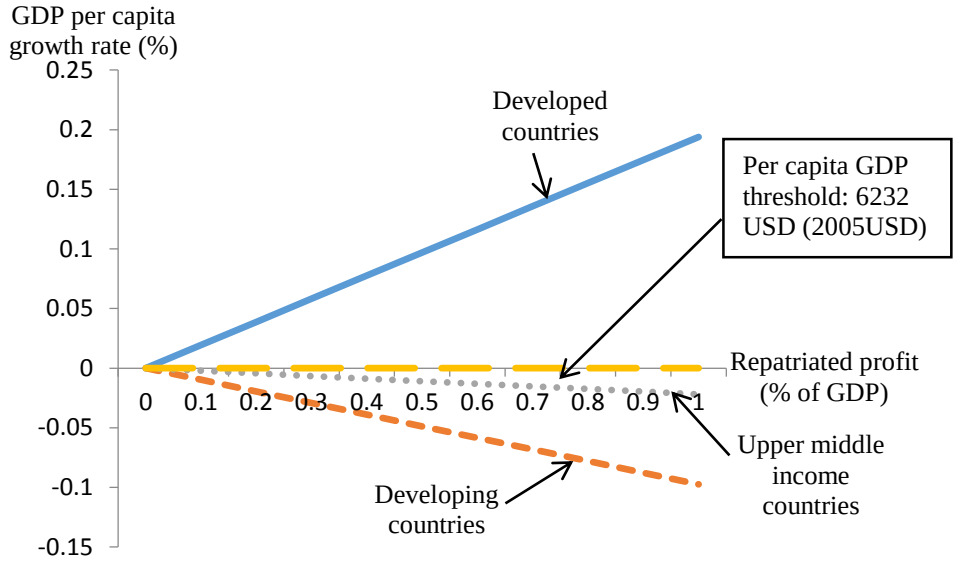


Figure 3-2b: Threshold in terms of higher education (Tertiary)

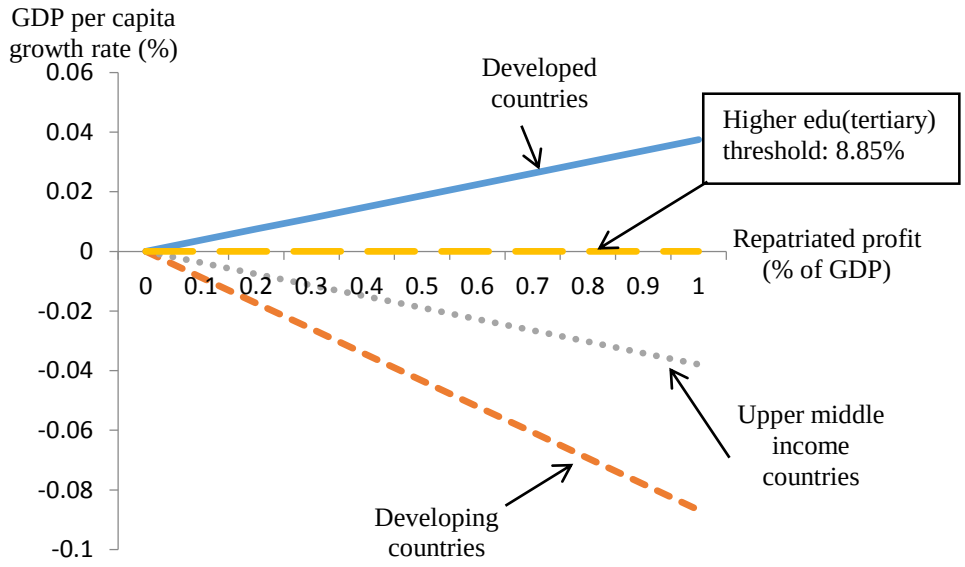
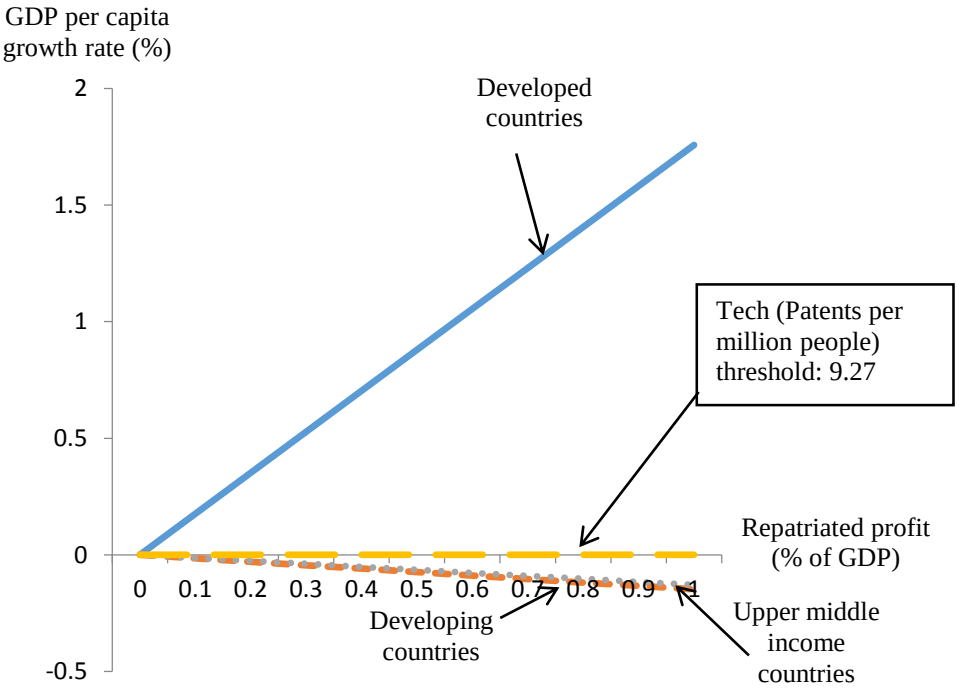


Figure 3-2c: Threshold in terms of patents per million people



5. System-GMM estimation results – Robustness check

For robustness checks, the study adopts the system-GMM estimation, which deals with the problems of endogenous explanatory and time-varying omitted variables. The system-GMM estimation is one alternative to deal with endogeneity problems among explanatory variables in a dynamic panel. Table 3-4 reinforces that the main findings above are not nullified even under the assumptions that potential endogeneity and omitted variables biases are possible. When the explanatory variables are allowed to be endogenous, the main results of estimated coefficients and their significances are consistent with the results of the robust panel fixed-effect estimations.

Table 3-4: System-GMM estimation results of GDP per capita growth rate equation

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	GDP per capita growth rate						
	All countries	All developed countries			All developing countries		
Initial income	-0.0128	-0.0284	-0.0115	-0.0127	-0.0163	-0.0100	-0.0102
	(-2.61)***	(-2.57)**	(-0.79)	(-1.09)	(-2.50)**	(-1.76)*	(-2.17)**
Population growth rate	-2.0334	-0.5886	-0.9583	-0.9189	0.4023	-0.1779	-0.0469
	(-3.15)***	(-2.70)***	(-1.40)	(-3.98)***	(0.57)	(-0.31)	(-0.14)
Fixed capital investment	0.1078	0.0341	0.0821	0.0508	0.0652	0.0511	0.0488
	(2.39)**	(1.93)*	(2.49)**	(2.72)***	(5.00)***	(3.35)***	(3.97)***
Human capital accumulation	-0.0121	-0.0051	-0.0148	0.0013	0.0128	0.0067	0.0094
(Secondary enrolment rate)	(-0.86)	(-0.58)	(-0.91)	(0.17)	(1.00)	(0.60)	(1.34)
Foreign capital inflow		0.0216	0.0594	0.0256	0.0418	0.0365	0.0073
(% of GDP)		(2.12)**	(0.86)	(1.81)*	(0.86)	(1.20)	(0.43)
Net foreign capital inflow	0.0661						
(% of GDP)	(2.63)***						
Repatriated profit		-3.3012	-1.2705	-0.2691	-1.8403	-0.3783	-0.0923
(% of GDP)		(-2.26)**	(-2.08)**	(-2.12)**	(-3.90)**	(-2.60)***	(-1.79)*
Indigenous capabilities		per capita GDP	Higher education	patents per million	per capita GDP	Higher education	patents per million
Repatriated Profit*Indigenous capabilities		0.3220	0.4459	0.0022	0.2233	0.1529	0.0490
		(2.31)**	(1.75)*	(1.72)*	(3.73)***	(1.69)*	(1.73)*
Received profit	0.2220	3.2292	1.4845	0.3018	0.0559	0.1567	0.0535
(% of GDP)	(2.42)**	(1.94)*	(1.96)**	(2.58)***	(1.59)	(1.59)	(0.80)
Received profit*Indigenous capabilities		-0.3126	-0.5278	-0.0022			
		(-1.91)*	(-1.63)	(-1.42)			
Executive constraint		0.0019	-0.0006	0.0002	0.0014	0.0008	0.0012
(1–7)		(0.96)	(-0.59)	(0.16)	(1.91)*	(1.88)*	(2.10)**
Period dummies		included	included	included	included	included	included
Number of obs.	599	181	181	180	397	397	397
Number of countries	129	37	37	37	87	87	87
AR(2) test	0.041	0.146	0.177	0.173	0.236	0.049	0.103
Hansen test	0.103	0.828	0.427	0.859	0.275	0.364	0.264

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.
3. World Bank classifies a country with GDP per capita exceeding USD 12,616 in 2012 as a developed country, and a developing country, if otherwise.
4. P-values are presented for AR(2) and Hansen tests.
5. In all analysis, two-step system GMM is conducted with Windmeijer finite-sample correction, and the number of groups exceeds the number of instruments.

V. Policy implications and conclusion

This chapter investigates the different effects of foreign capital flows according to the development level of host countries to provide an account of the recent issue on why sustainable growth in developing country is scarcely observed and why most developing countries fall into the middle income country trap. Using the panel fixed or random effect estimations and system-GMM estimations, this dissertation finds robustly the effects of foreign capital flows and repatriated profit in the economic growth of the host country.

The main findings of this chapter are as follows. First, hosting more foreign capital than repatriated profit is positively associated with economic growth. However, in most developing countries, the amount of profit repaid to the investors from developed countries is greater than the amount of investment newly received. Second, foreign capital inflow and repatriated profit have different effects on economic growth according to the development level of countries since the repatriated profit in practical data represents not only a decline of capital accumulation but also an existing foreign capital stock. Foreign capital inflow generally has a positive impact on economic growth in GDP per capita growth rate. However, new foreign capital inflow to developing host countries fluctuates across many destinations. For developed countries, repatriated profit has no impact on GDP per capita growth rate. For developing countries, repatriated profit has negative impact on economic growth. However, when the three kinds of interaction terms that measure indigenous capabilities of a host country are included, repatriated profit consistently has a negative effect on economic growth regardless of the income level of countries. According to the three proxies of indigenous capabilities, the thresholds of repatriated profit are calculated in which its negative effect is balanced with the positive utilization of foreign capital stock. These values are all in between the

average level of developed countries and the average level of upper middle income countries. Moreover, these thresholds are higher than the FDI threshold, in which the FDI effect on the host country becomes positive. This result is consistent with the intuition that the minimum requirement of indigenous capability in repatriated profit threshold should be higher than that in FDI threshold.

Foreign capital is necessary to initiate the economic growth of a developing country. Opening the financial market and adopting the foreign capital may facilitate the economic catch-up for a while to a certain income level. However, sustainable growth is not guaranteed (Lee, 2013). The benefit obtained from foreign capital depends on domestic conditions. While the indigenous efforts of the host country determine the long-term influence of foreign capital, the low absorbability problem or low profit problem widely exists in most developing countries. The negative effect of repatriated profit obtained from foreign capital is relatively high compared with the positive effect because the utilization ability on foreign capital is low in developing countries. The debate on the effect of foreign capital on economic growth is omitted in this dissertation.

Regardless of the existence, the direction, or the strength of effects of the foreign capital on economic growth of host countries, the negative effect of repatriated profit inevitably exists. Therefore, one important issue for the policy maker to attract foreign capital is to be aware of the consistently negative effects of repatriated profit in the long term, which naturally follows the foreign capital investment. Repatriated profit is larger than foreign capital inflow in most developing countries. Given the situation, most industries in developing countries are in primary, resource-related, or low value-added manufacturing industry that have low profit margin. These situations are attributed to immediate capital flight to other better locations when the comparative advantage of the former host country vanishes. For most middle-income countries, capital flight occurs when real wage rises faster than productivity in labor-intensive

industries.

However, to control the amount of repatriated profit by policies of host country is not easy. Therefore, to avoid this unfavorable consequence, the only way is to overcome the binding constraints (technological capability) of the middle income country by conducting its own R&D efforts and utilizing foreign capital (Lee, 2013). By doing so, a host country can obtain not only more benefits than the repatriated profit in a long run, but also new foreign capital inflow consistently. For example, the governments of Korea and Taiwan, which are successful countries in East Asia, have implemented many sophisticated policies, such as sequential opening or liberalization of market to global economy, selective opening to FDI, and indigenous effects to build the capabilities of domestic firms (Amsden, 1989; Wade, 1990, 2004).

Today, China is upgrading its economy to be innovation and knowledge-based one. China is using the Korean or Taiwanese strategies, but also utilizing Chinese features, such as forward engineering, acquisition of advanced technology and brands by international M&A, and parallel learning from FDI to promote indigenous firms (Jin et al., 2008; Lee et al., 2011). The enormous size of the Chinese economy and its market enable the country to utilize this feature as bargaining power (Mu and Lee, 2005). The policy makers from other countries that do not have adequate bargaining powers to gain advantage over foreign investors should design more sophisticated strategies and policies to maximize the benefits from foreign capital and detour the growth stagnation after a sweet, but short period of development.

Chapter4. Summary and Concluding Remarks

This dissertation has examined the economic growth of a nation by focusing not only on GDP per capita growth, but also on each nation's share in world GDP. These two indicators are complementary. The latter represents standard of living of people, whereas the former stands for economic size (power) of a nation. The main hypothesis claims that the determinants of these two different aspects of economic growth are different.

The first chapter addressed the growth issue of nations by suggesting an alternative method of approach, namely each nation's share in world GDP. GDP per capita and its growth rate are good measures of individual's welfare, which has been regarded as the only one objective of economics. However, classical economist including Adam Smith stated the economic size of nation and its relative size to neighbor countries are also important objectives of economics. Economic size as a gauge of economic power or national competitiveness is one of the major concerns of classical economists. Moreover, in the era of globalization, economic growth of one country is not fully explained by a closed economy model. The economic performance of one country should be evaluated in comparison with that of other competitor countries. In addition, economic activities of countries influence each other. Therefore, each nation's share in world GDP can be a good measure for representing economic growth in the perspective of a nation and a complement to GDP per capita growth rate.

The second chapter investigated the determinants of each nation's share in world GDP as a dependent variable in the production equation. The determinants of GDP share are different with those of GDP per capita. Moreover, the change of GDP share is determined by the typical determinants in share form, such as the initial level of GDP share, the change of population share in world population, fixed capital investment

share in world fixed capital investment, and the change of human capital share in world human capital. Specifically, the initial level of GDP share is negatively associated with GDP share change, while the population share change, fixed capital investment share, and human capital share change are positively associated with GDP share change.

In addition to these determinants, this paper explored the effects of openness, real exchange rate undervaluation, foreign capital inflows, and institution for GDP share change. Exchange rate undervaluation is negatively associated with GDP share change in contrast with the positive relation between undervaluation and GDP per capita growth rate of a developing country. In case of openness, foreign capital inflows, and institution showed different relations between GDP share and GDP per capita growth rate. While openness, foreign capital inflows, and institution are positively associated with GDP per capita growth rate, none of them is statistically related with GDP share change.

To expand GDP share, export share in world export and foreign capital inflow share in world foreign capital inflows matter, but not openness and foreign capital inflows. Export share, foreign capital inflows share, and exchange rate undervaluation are associated with the change in GDP share. Although the former three determinants reflect non-rivalry, the latter four determinants reflect the rivalry in global economy and relative performance among competitor nations. The regression results of GDP share change on these new determinants present the expected directions, signs and significances, and the goodness-of-fit of model without being affected by the estimation methods or various combinations of models.

The third chapter addressed the issues on foreign capital inflows and profit flows. The effects of repatriated profit are different in developed and developing countries. For both income level groups, hosting more foreign capital than repatriated profit is positively associated with economic growth, but in most developing countries, the amount of profit repaid to the investors from developed countries is greater than the

amount of investment newly received. In addition, even the amount of foreign capital inflow and repatriated profit are same, they have different effects on economic growth according to the development level of countries since repatriated profit in practical data represents not only a decline of capital accumulation but also an existing foreign capital stock. For developed countries, repatriated profit has a positive effect on GDP per capita growth because the repatriated profit exceeds the threshold measured by per capita GDP, higher education, or patents per million. For developing countries, repatriated profit has a negative effect on economic growth because most developing countries do not cross the threshold.

By comparing with the FDI threshold in which the effect of FDI in host developing country becomes positive, I find that the repatriated profit threshold is much higher than the FDI threshold. This result is consistent with the intuition that the minimum level of indigenous capability to obtain more advantages from foreign capital stock to offset the disadvantages of repatriated profit should be far higher than merely gaining benefits from FDI. This finding explains the growth stagnation of developing countries from the perspective of foreign capital inflows and repatriated profit. Although the utilization benefits generally overwhelm the negative effect of repatriated profit in developed countries, downward pressure from the negative effect of repatriated profit is larger in developing countries, such that the middle-income country trap is prevalent. Therefore, this study recommends that the solution to escape the trap is to foster indigenous capabilities.

The contributions of this dissertation are as follow. First, this dissertation stresses the necessity of each nation's share in world GDP. GDP share is an important indicator and a complement to GDP per capita in economic growth. Second, this dissertation presents that the determinants of GDP share are different from those of GDP per capita growth rate. These determinants include exchange rate undervaluation, export

share in world export, and foreign capital inflows in global capital flows, and the typical determinants in share form such as population share. Openness and institution cannot explain the change of GDP share. Third, this dissertation proves that the magnitude of negative effect of repatriated profit is determined by the host country's level of indigenous capabilities. In developed countries, the utilization benefit of foreign capital stock is large enough to offset the negative effect, which is not true for developing countries. Finally, this dissertation reemphasizes that the only solution to break the binding constraints (technological capability and human capital) is by conducting own R&D efforts and utilizing foreign capital (Lee, 2013) since it is not easy to intervene in the amount of repatriated profit by policy. This path was taken by Japan, Korea, Taiwan (Amsden, 1989; Wade, 1990, 2004), and China is now following this path (Mu and Lee, 2005; Jin et al., 2008; Lee et al 2011).

This dissertation has some limitations that are not fully addressed. In chapter 2, more determinants, which are different in GDP share and GDP per capita growth rate, should be addressed. Finding new determinants is not simple to do, and thus, remains as future research work. Moreover, a sophisticated theoretical or mathematical approach is need for GDP share change equation. When the GDP share change equation is based on theoretical or mathematical and empirical approaches, and the findings are more persuasive. In addition, finding new determinants and investigating a growth transmission channel can be done with more robust and scientific methods. In chapter 3, future work should analyze repatriated profit classified by types of foreign capital. Due to the lack of data, the present dissertation could not deal with this analysis. As the different types of foreign capital influence growth effects variedly, the effect of repatriated profit can be distinguished based on its type.

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Appendix: Data sources and Explanation

GDP per capita in real term: GDP per capita in constant year 2005 in U.S. dollars. Source: World Bank, World Development Indicators, except for on Taiwan, which were calculated using the database of the National Statistics, Republic of China, http://www.stat.gov.tw.

GDP: GDP in current U.S. dollars. World Bank, World Development Indicators, except for on Taiwan, which were calculated using the database of the National Statistics, Republic of China, http://www.stat.gov.tw.

Population: Total population. Source: World Bank, World Development Indicators, except for data on Taiwan, which were obtained from the National Statistics, Republic of China, http://www.stat.gov.tw.

Fixed capital formation: Gross fixed capital formation as percentage of GDP. Source: World Bank, World Development Indicators, except for data on Taiwan, which were obtained from the National Statistics, Republic of China, http://www.stat.gov.tw.

Secondary and Tertiary education attainment rate: The gross secondary or tertiary schooling completion ratio is the percentage of complete secondary or tertiary schooling attained in population 15 and over. Source: Barro and Lee database, http://www.barrolee.com.

Patents: Number of U.S. patents application. Source: World Intellectual Property Organization, http://www.wipo.int/ipstats/en/general_info.html

FDI inflow: Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. Source: International Monetary Fund, International Financial Statistics, http://elibrary-data.imf.org, except for data on Taiwan, which were obtained from the National Statistics, Republic of China,

http://www.stat.gov.tw.

Portfolio investment inflow: Portfolio investment includes net inflows from equity securities and debt securities other than those recorded as direct investment and including shares, stocks, depository receipts, and direct purchases of shares in local stock markets by foreign investors. Source: International Monetary Fund, Balance of Payments and International Investment Position Statistics, http://elibrary-data.imf.org, except for data on Taiwan, which were obtained from the National Statistics, Republic of China, http://www.stat.gov.tw.

Bank liabilities inflow: Bank liabilities are the net inflows of bank loans from aboard including use of IMF credit and loans from the IMF. It is the major class of other investment category in balance of payments. Source: International Monetary Fund, Balance of Payments and International Investment Position Statistics, http://elibrary-data.imf.org, except for data on Taiwan, which were obtained from the National Statistics, Republic of China, http://www.stat.gov.tw.

Repatriated profit: Repatriated profit refers to investment income (payments on direct investment, portfolio investment, other investments), most part of income debit or primary income debit. Source: International Monetary Fund, Balance of Payments and International Investment Position Statistics, http://elibrary-data.imf.org, except for data on Taiwan, which were obtained from the National Statistics, Republic of China, http://www.stat.gov.tw.

Received profit: Received profit refers to investment income (receipts on direct investment, portfolio investment, other investments, and receipts on reserve assets), most part of income credit or primary income receipts. Source: International Monetary Fund, Balance of Payments and International Investment Position Statistics, http://elibrary-data.imf.org, except for data on Taiwan, which were obtained from the National Statistics, Republic of China, http://www.stat.gov.tw.

Appendix table 1 : Correlations

	Initial GDP per capita	Population growth rate	Fixed capital investment rate	Human capital accumulation rate	Initial GDP share	population share growth	Investment share	Human capital share growth
Initial GDP per capita	1.000							
Population growth rate	-0.364	1.000						
Fixed capital investment rate	0.268	-0.134	1.000					
Human capital accumulation rate	0.701	-0.500	0.244	1.000				
Initial GDP share	0.240	-0.130	0.015	0.243	1.000			
population share growth	-0.260	0.237	-0.100	-0.232	-0.356	1.000		
Investment share	0.289	-0.153	0.061	0.251	0.960	-0.420	1.000	
Human capital share growth	-0.109	0.035	0.051	-0.069	-0.469	-0.024	-0.364	1.000

Appendix table 2: Some statistics of variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
GDP per capital growth rate	1327	0.019	0.033	-0.283	0.239
log of initial income	1327	7.840	1.592	4.537	11.730
population growth rate	1878	0.019	0.015	-0.040	0.156
log of fixed capital accumulation rate	1311	3.021	0.360	0.926	4.464
log of secondary enrollment ratio	1440	2.294	0.972	0	4.260
log of tertiary enrollment ratio	1440	1.184	0.785	0	3.311
GDP share change	1402	-0.0004	0.359	-5.010	3.845
initial GDP share	1413	0.601	2.742	0.000	38.181
Population share change	1878	0.00001	0.048	-0.616	0.648
investment share	1292	0.698	2.722	0.0003	31.383
Secondary human capital share change	1284	-0.020	0.297	-6.246	0.862
Tertiary human capital share change	1296	0.00001	0.367	-5.239	3.225
Undervaluation	1357	0.013	0.482	-2.878	3.007

Appendix table 3: Robustness check for GDP share change equation – Open economies

	(1) All countries	(2) All countries (trade>10%)	(3) All countries (trade share>0.01%)	(4) All countries (trade share>0.05%)	(5) All countries (trade share>0.1%)
Dependent variable			ΔGDP share		
initial GDP share	-0.6904	-0.6888	-0.6906	-0.6921	-0.6938
	(-81.90)***	(-81.57)***	(-78.10)***	(-67.53)***	(-59.47)***
Δpopulation share	0.7735	1.1217	0.7672	0.7108	0.6512
	(7.01)***	(6.95)***	(6.60)***	(5.13)***	(4.04)***
Investment share	0.6030	0.6044	0.6030	0.6026	0.6025
	(65.29)***	(65.36)***	(62.25)***	(53.77)***	(47.35)***
ΔHuman capital share	0.0420	0.0438	0.0421	0.0422	0.0422
(Tertiary)	(3.32)***	(3.46)***	(3.17)***	(2.75)***	(2.42)**
Exchange rate undervaluation	-0.0005	-0.0005	-0.0006	-0.0009	-0.0013
	(-2.74)***	(-2.49)**	(-2.73)***	(-2.91)***	(-3.03)***
Period dummies	included	included	included	included	included
Number of obs.	846	836	773	584	458
Number of countries	140	139	131	104	86
R^2	0.485	0.486	0.485	0.486	0.487
Hausman Test	625.83(0.00)	617.75(0.00)	570.79(0.00)	429.19(0.00)	335.57(0.00)

Note:
1. The t-value is in parentheses.
2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively.
3. All models are panel fixed effect model according to Hausman test.

국문초록

세계GDP에서 각 국 비중의 결정요인

: 환율과 이윤유출을 중심으로 1인당소득 결정요인과 비교

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박준기

본 논문은 세계GDP에서 각 국의 비중(GDP 비중)과 1인당 소득의 결정요인을 비교하는 새로운 시각을 통하여 국가의 추격, 추월, 추락 등 다양한 경제성장현상의 결정요인을 재조명하였다. 1인당 소득은 개개인의 삶의 질을 반영하는 반면, GDP비중은 국가의 경제규모 및 경제력을 나타낸다는 점에서 상호보완적이다. 본 논문의 주 가설은 경제성장을 나타내는 1인당 소득과 GDP비중의 결정요인이 다르다는 것이다. 본 논문은 1인당 소득을 결정짓는 전통적인 성장결정요인들이 GDP비중에는 통계적으로 유의하지 않은 반면, 그것들을 세계인구대비 비중, 세계자본대비 비중과 같은 비중변수들로 표현하였을 때 유의함을 보였다. 나아가 자국통화의 평가절하, 제도의 질적 수준, 개방도, 외국자본 등이 1인당 소득에는 긍정적일 수 있지만, GDP비중에는 그렇지 않을 수 있음을 보였다. 반면,

GDP비중 변화에는 자국통화의 평가절하, 전세계 수출에서의 비중, 전세계 자본흐름에서 외국자본유치비중과 같이 글로벌 경합성과 경제성장의 상대적 성과를 반영한 변수들이 통계적으로 유의함을 보였다.

한편, 본 논문에서는 다양한 해외자본의 흐름 중 이윤유출흐름에 주목하여 경제성장에의 효과를 분석하였다. 본 연구에서 수립, 증명한 가설은 일반적으로 개도국에서는 신규로 유치한 외국자본보다 더 많은 양의 이윤이 꾸준히 국외로 유출되어 경제성장의 속도가 저하된다는 것과, 이러한 성장효과는 투자유치국의 내재적 역량, 즉 흡수역량이나 인적자본 수준 및 기술역량 수준에 따라 상이하다는 것이다. 이에 본 논문에서는 외국자본의 신규유입이 많을수록 경제성장에 긍정적이고 이윤유출흐름이 커질수록 경제성장에 부정적이지만, 그 효과의 크기는 투자유치국의 발전수준, 즉 1인당 소득, 고등인적자본, 인구당 특허수로 측정한 수준에 따라 달라짐을 발견하였다. 또한 개도국에서 이윤유출흐름의 부정적 효과가 상쇄되는 최소 기준점이 외국인직접투자가 경제성장에 양의 효과를 갖기 시작하는 최소 기준점보다 훨씬 높은 수준임을 밝혔다. 이는 외국자본유입뿐만 아니라 이윤유출과 같은 자본유출이 개도국의 경제성장을 설명하는 중요한 결정요인임을 시사한다.

주요어: 경제성장, 외국자본, GDP비중, 소득수준, 이윤유출, 평가절하, 중진국 함정.

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