THREE ESSAYS IN OPEN ECONOMY MACROECONOMICS AND ECONOMIC DEVELOPMENT

by

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To my family, especially my grandfather who passed away last year

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Table of Contents

List of Tables

List of Figures

Abstract

This dissertation focuses on issues related to economic globalization and its implications for the domestic economy. The first two chapters pertain to international financial integration, while the last chapter studies the impact of interprovincial migration in China as a result of industrialization.

The first chapter develops a dynamic stochastic general equilibrium model that accounts for the asymmetric cyclical features of fiscal policy between developed and emerging market countries. Sovereign borrowing with a default option implies that creditors require a higher risk premium when countries experience a sequence of negative shocks and accumulate debt, thereby deterring risk sharing and intertemporal consumption smoothness. The default option is shown to be the key driver for procyclical government consumption and transfer payments observed in emerging market countries, suggesting that sovereign default has significant effects on risk sharing and the behavior of fiscal policy.

The second chapter explores how international financial integration provides risk sharing opportunities, paying particular attention to the diverse theoretical predictions for the consumption path responding to various types of income shocks. The results suggest that there is less than full consumption risk sharing overall, while OECD countries are insured better against predictable changes in transitory income. I also show that financial integration improves consumption risk sharing on the whole. The results support the hypothesis that financial integration leads to an even larger adjustment in consumption in response to a permanent shock

to income growth. This can explain the higher relative volatility of consumption growth in the 1990s in emerging market countries.

The last chapter examines the impacts of interprovincial migration at different educational levels on the creation and distribution of human capital in China. The observed external economies and diseconomies of gross outflow migration on new human capital investment are consistent with the mechanism of migration-oriented investment/disinvestment in higher education at source provinces. This positive externality eclipses the negative one at the national level. Moreover, the effects of net outflow migration on new human capital investment, based on the changes in relative labor supply, mitigate direct brain drain by both encouraging and discouraging school enrollments at various levels.

Chapter I

Introduction

This dissertation consists of three independent articles related to the effects of economic globalization. Economic globalization in this context goes beyond the development of extensive trade links. The expansion of the international capital market is another important pillar of economic globalization, which in turn, I will argue, introduces a dynamic that affects the very foundations of domestic economies.

The first two articles of this dissertation pertain to international financial integration and its macroeconomic implications. International financial integration has advanced dramatically in the last several decades following the initial steps toward the integration of goods and services trade. Many countries, including those classified under the labels "emerging market" and "developing" liberalized their capital account transactions; and as a consequence we have observed a surge in the cross-border holdings of financial assets. However, the international financial market is severely constrained by various types of incompleteness. Therefore, frictionless market models are often poor approximations of actual market dynamics. Moreover, since international financial markets occasionally become unstable, some policymakers are skeptical about their ability to fully rely on these markets during economic downturns. Chapter II, "Sovereign Risk and Procyclical Fiscal Policy in Emerging Market Economies" proposes a theoretical model focusing on this incompleteness—namely, the existence of the default option, which explains procyclical government consumption and transfer payments in emerging market countries. Chapter III, “Financial Integration and Consumption Risk Sharing” is an empirical attempt to answer the question: Does international financial integration improve consumption risk sharing? In particular, it focuses on the stochastic properties of the income process and the different theoretical predictions for the consumption path responding to various types of income shocks under perfect risk sharing.

Shifting focus from the international financial market, Chapter IV studies an aspect of the transition and development of the Chinese economy. China has undergone tremendous change in its transformation to a “world factory” during the last several decades, particularly in its urban areas in the coastal region. Rapid industrialization has enlarged disparities in income between coastal and inland provinces as well as between urban and rural areas. Together with the deregulation of the household/residential registration system, this widening inequality creates a strong economic incentive for migration from poorer provinces to richer provinces. “The Effects of Interprovincial Migration on Human Capital Formation in China” investigates how this surge in interprovincial migration affects the incentive to invest in formal schooling in China. We infer how migration affects national and regional economic growth through altering human capital formation by studying the impacts of migration at different educational levels on the creation and distribution of human capital in the source provinces.

Chapter II

Sovereign Risk and Procyclical Fiscal Policy in Emerging Market Economies

Abstract

This paper develops a dynamic stochastic general equilibrium model that accounts for the differences in the cyclical features of fiscal policy between developed and emerging market countries, and in particular procyclical government consumption and transfer payments in emerging market countries. I develop a small open economy model with a sovereign government that has access to international credit markets with the default option. The government maximizes public utility by adjusting (i) its asset position in the international capital market, (ii) government consumption, and (iii) transfer payments to households. Government consumption is defined as the sum of a public goods component that is directly beneficial to households, and a hidden transfer payment component. These hidden transfers appear in national accounts as government consumption, however, I argue they behave more as transfers. The government finds this hidden transfer payment component useful as it is more flexible over the cycle than the standard institutionalized transfer programs like social security. The option to default implies that creditors require a higher risk premium when the sovereign government experiences a sequence of negative shocks and accumulates debt, thereby deterring risk sharing and intertemporal consumption smoothing. The model is solved numerically and calibrated to two cases: the Mexican and the US economies. It replicates the differences in the fiscal policy over the business

cycle in emerging market and developed countries. The default option is shown to be the key driver for the asymmetries observed in the data, suggesting that sovereign default has significant effects on risk sharing and the behavior of fiscal policy.

II.1 Introduction

Empirical evidence indicates a sharp contrast in the cyclical patterns of fiscal policies[1] between developed and developing countries. Talvi and Végh (2005) and Riascos and Végh (2004) have documented that the contemporaneous correlations between government consumption and GDP are positive in developing countries, while they are near zero in G7 countries. Since changing the tax rates requires legislative procedures and the government often encounters a mass objection when it plans to raise the tax rates, it is quite reasonable to consider that tax rates are more subject to inertia[2] than government spending in the business cycle frequency. Therefore, the observed cyclicality of government consumption implies that the fiscal policy tends to be procyclical in developing countries and less so or acyclical in developed countries. This procyclical fiscal policy stance in developing countries is puzzling, in the sense that it is consistent with neither the Keynesian model nor Barro's tax-smoothing model—the models typically used by economists to understand the optimal fiscal policy over the business cycle. Standard Keynesian model claims that expansionary fiscal policy is a useful tool to mitigate recession through multiplier effect, and so supports countercyclical fiscal policy.

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[1] Throughout this paper, a procyclical fiscal policy involves higher (lower) government spending and lower (higher) tax rates in good (bad) times, while a countercyclical fiscal policy involves lower (higher) government spending and higher (lower) tax rates in good (bad) times, in keeping with Kaminsky, Reinhart, and Végh (2004).

[2] It is quite difficult to consistently discuss the business cycle property of general tax rates due to data restrictions. However, anecdotally speaking, some governments conduct tax cuts (e.g., Japan in 1998), whereas other governments raise the tax rates (e.g., Argentina in the late 1990s and early 2000s) during recession. There are abundant examples of governments in developing countries, which increase the tax rates during recession. This implies that the fiscal policy might be more procyclical than suggested by government consumption data.

Tax-smoothing model with distortionary tax backs up acyclical fiscal policy by asserting that the government should not adjust fiscal policy stance over business cycle.

There are two classes of models in the literature that explain this puzzling procyclical behavior of the fiscal policy in developing countries. The first class consists of the political economy models represented by Talvi and Végh (2005) which owe their results to the asymmetric assumption that running a fiscal surplus during a boom is more costly than running a fiscal deficit during a period of recession because of the political pressures to increase fiscal spending. The second class is based on the incompleteness of the international capital market. Aizenman, Gavin, and Hausmann (2000) have proposed a two-period model, studying the patterns of the optimal tax rate and borrowing characterized by costly tax collection and endogenous country risk. Moreover, Riascos and Végh (2004) have argued that the puzzle can be explained by the exogenous market incompleteness in developing countries, assuming that G7 countries have access to contingent bonds and developing countries have access to only one-period, risk-free bonds. While Riascos and Végh (2004) were the first to study the procyclical fiscal policy in developing countries by applying a dynamic stochastic general equilibrium model, their model fails to predict the greater procyclicality that private consumption undergoes as compared to government consumption in both developed and developing countries. This will be introduced in the next section.

This paper addresses puzzling cyclical features of the fiscal policy in emerging market countries and their sharp contrast with those in developed countries. A dynamic stochastic general equilibrium model is developed to study the interaction among transfer payment, government consumption, and sovereign borrowing with the default option by a rational and benevolent government. This model is an extension of Arellano (2006); it explicitly describes a government's stance in determining government consumption and transfer payment over the business cycle. Government consumption is defined as the sum of a public goods component that is directly beneficial to households and a hidden transfer payment component. These hidden transfers, inspired by a public project that was recently implemented in Argentina, appear in national accounts as government consumption, but I argue that they behave more as transfers. The government finds this hidden transfer payment component useful for smoothing private consumption as it is more flexible over the cycle than standard institutionalized transfer programs like social security. A benevolent government has access to the international capital market where it can trade one-period bonds with the default option. Since sovereign debts are not enforceable due to sovereign immunity and the lack of an international proxy for the domestic bankruptcy court, the sovereign government's option to default on its debts plays a critical role in their pricing. The government, understanding the advantages and disadvantages of exercising this default option, decides to exercise it in optimal situations. As the utility of households is over private consumption and the public goods component of government consumption, equating these marginal utilities leads to both of them to being procyclical at equilibrium due to imperfect insurance under an incomplete capital market; this is analogous to the result of procyclical private consumption in a standard small open economy model (e.g., Mendoza (1991)). On the other hand, were it not for the default option, transfer payments and the hidden transfer payment component of government consumption should have been countercyclical, since a benevolent government tries to smoothen private consumption by increasing (decreasing) transfers and hidden transfers during a recession (boom). Nevertheless, such attempts are constrained by endogenous risk premia.

I consider two models: (i) an emerging market economy, whose government has a default option and (ii) a developed economy, whose government can trade one-period bonds at the world risk-free interest rate, derived by shutting down the endogenous default option. These two models are solved numerically and calibrated to two cases: the Mexican and the US economies. The emerging market model, when calibrated to the Mexican economy, replicates the procyclical features of government consumption and transfer payments, as observed in the data. On the other hand, the developed country model, when calibrated to the US economy, shows a countercyclical transfer payment that is consistent with the data for the US and other developed countries. The default option is shown to be the key driver for the asymmetries observed in the data, suggesting that sovereign default has significant effects on risk sharing and the behavior of the fiscal policy.

The remainder of this paper is organized as follows. The next section describes the business cycle properties of government consumption and transfer payments for both developed and emerging market countries. Section 3 reviews the aims of government consumption. The model economy is presented in section 4, and its recursive equilibrium is discussed in section 5. Section 6 describes numerical solution and calibration of the model, and sections 7 and 8 discuss the simulation results for the cases of the Mexican and US economies. The sensitivity analyses of the simulation are shown in section 9. Finally, the conclusion is presented in section 10.

II.2 Empirical Evidence

This section reviews and analyzes the business cycle properties of private consumption, government consumption, and transfer payments in developed and developing countries. I focus on those volatilities that are measured by standard deviations and those comovements which are measured by the correlations of the Hodrick-Prescott filtered variables in accordance with the vast business cycle literature. I employ annual data from International Finance Statistics (IFS) and the World Development Indicators (WDI) for national account statistics, including GDP, private consumption, and government consumption. Further, I utilize data from Government Finance Statistics (GFS) for government expenditure statistics. The logarithm of each series are ran through the Hodrick-Prescott filter with a smoothing parameter of 100. The sample period is from 1972 to 2004[3].

Table 2.1 summarizes the volatilities and correlations of the cyclical components of real GDP, real private consumption, and real government consumption in OECD and developing countries[4]. In developing and emerging market countries, national account statistics are more volatile than in OECD countries; further, such tendencies are clearer for government consumption than private consumption. While real GDP is 3.0 (2.5) times more volatile in developing countries (emerging market countries) than in G7 countries, real private consumption and government consumption are 3.9 (2.9) times and 4.5 (3.8) times more volatile in developing countries (emerging market countries) than in G7 countries on average, respectively. Further, while real private consumption and government consumption are only 7% and 28% more volatile than real GDP in OECD countries, respectively, they are 55% (30%) and 164% (143%) more volatile in developing countries (emerging market countries). Higher relative fluctuations in real private consumption vis-à-vis real GDP suggest a failure of consumption risk sharing in developing and emerging market countries. Moreover, sharp fluctuations in government consumption in developing countries and emerging market countries imply that these governments are not endowed with steady revenue sources and are subject to major obstacles and constraints in balancing government purchases over the business cycle.

With regard to cyclicality, while the correlation between real GDP and private consumption is positive in OECD countries (0.76), developing countries (0.58), and emerging market countries (0.64), the correlation between real GDP and government consumption shows a striking contrast across country categories. While government consumption is acyclical in G7

[3] For some countries, the sample period is shorter due to data availability. The results did not change drastically when I limited the sample period to after the 1990s.
[4] Individual country data are reported in the Table 2.5.

countries (–0.06) and less procyclical in other OECD countries (0.26), it is more procyclical—albeit to a lesser extent than private consumption—in developing countries (0.35) and emerging market countries (0.43). Further, the comparison between emerging market countries, which are considered to have fairly limited but more access to the international capital market, and other developing countries is suggestive. The correlation between government consumption and GDP in emerging market countries (0.43) is even higher than that in other developing countries (0.31). These results suggest that there is a mechanism that is peculiar to emerging market countries that promotes procyclical government consumption.

Table 2.1 also shows the volatility and cyclicality of transfer payments from government expenditure statistics for OECD and emerging market countries[5]. A surprisingly interesting finding is the sharp contrast in the cyclicality of transfer payments between developed and emerging market countries. As generally expected, current transfers are countercyclical in developed countries (average correlation with GDP is –0.21 in G7 countries and –0.17 in other OECD countries). Moreover, transfers to households, which are one item of current transfers, are more countercyclical (average correlation with GDP is –0.51 in G7 countries and –0.25 in other OECD countries). On the other hand, these items are procyclical in emerging market countries, as shown by their correlations with GDP of 0.20 and 0.30, respectively. These findings are particularly striking since transfer payments should naturally expand during recession when a greater percentage of the population experiences financial difficulties. Transfer payments are also

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[5] Tables 2.6.a and 2.6.b report all the statistics of government expenditure for individual countries. Statistics for developed countries are consistent with Lane (2003), which studies the cyclical behavior of the fiscal policy in OECD countries. It should be noted that, apart from the methodological difference in collecting national account statistics and government finance statistics, government expenditure is broader than government consumption in that it includes transfer payments, interest payments, and other spending items. While the expenditure on goods and services is acyclical in developed countries (correlation with GDP is 0.02 in OECD countries), it is procyclical in emerging market countries (correlation with GDP is 0.42); these observations are consistent with the business cycle properties found by the national account statistics (Table 2.1).

far more volatile in emerging market countries than in OECD countries, and their relative volatility vis-à-vis GDP is much higher in emerging market countries than in OECD countries. These sharp differences might imply that emerging market countries are subject to tight fiscal budget constraints during recession when the governments otherwise would have wanted to pay out more transfer payments.

Next, I empirically explore the creditworthiness premium on the cyclicality of government consumption. One of the important barriers separating OECD countries from emerging market and other developing countries is the recognition in the market, which is embodied as creditworthiness. Therefore, I use information on sovereign debt ratings to see if it is true that government consumption is sensitive to those ratings. As for sovereign debt ratings, I employ foreign currency long-term sovereign ratings history assigned by Standard & Poor's.

First, I estimate the effects of improvement in the creditworthiness on the cyclicality of government consumption. I specifically estimate that

$$\begin{aligned} GC_{i,t} &= \alpha_0 + \alpha_1 GDP_{i,t} + \alpha_2 RATING_{i,t} + \alpha_3 (GDP_{i,t} * RATING_{i,t}) \\ &\quad + \alpha_4 COMMODITY\ PRICE_t + u_{i,t}, \end{aligned} \tag{1}$$

where GC, GDP, and COMMODITY PRICE denote the real government consumption, real GDP, and prices of petroleum and wheat[6], respectively. The subscripts i and t denote the country and year, respectively. I assign numerical values for RATING—twenty-one integers as RATING with a higher number for better creditworthiness (i.e., AAA = 20, AA += 19,..., SD = 0), as the ratings of Standard & Poor's are ranked in twenty-one categories from AAA to SD (selected default). Table 2.2 reports the estimates of OLS, the random effects model, and the fixed effects model. The results indicate that countries tend to spend less procyclically on government consumption

[6] Two kinds of commodity prices are included as exogenous control variables, since those prices potentially affect government expenditure size as well as GDP. The regression results are robust with or without these commodity prices.

with an improvement in creditworthiness, as shown by the significantly negative α_3.

I then estimate the following equation, which allows the cyclicality of government consumption to differ among the rating categories,

$$\begin{aligned} GC_{i,t} &= \beta_0 + \beta_1 GDP_{i,t} + \beta_2 RATING\ DUMMY_{i,t} \\ &\quad + \beta_3 (GDP_{i,t} * RATING\ DUMMY_{i,t}) + \beta_4 COMMODITY\ PRICE_t + v_{i,t}, \end{aligned} \tag{2}$$

where RATINGDUMMY denotes eight dummy variables for each of the rating categories (i.e., AAA, AA,..., SD).[7] The estimates of OLS, the random effects model, and the fixed effects model in Table 2.2 show that a country tends to spend more procyclically on government consumption with deteriorations of its creditworthiness, while countries with the highest ratings (i.e., AAA and AA) record acyclical government consumption. The estimated creditworthiness premia on the cyclicality of government consumption (β_3s) are monotonically larger for lower rating categories for the most part. Furthermore, the estimated creditworthiness premium for default countries, which are naturally considered to be excluded from the international capital market, is much lower than the premia for low ratings such as CC, CCC, and B. This might suggest that if there is no substantial and systematic difference in the levels of political distortion between the default countries and the countries with the lowest ratings, the accessibility to the international capital market plays an important role in explaining the procyclical fiscal policy of emerging market countries.

The empirical findings, which I will explain by the model and simulations in subsequent sections, can be summarized by the following four stylized facts.

Stylized Fact #1: Government consumption is extremely volatile when compared with GDP and private consumption in developing and emerging market countries, which is not necessarily the case in developed countries.

[7] AAA is the default category.

Stylized Fact #2: Government consumption is procyclical in developing and emerging market countries, while it is acyclical or less procyclical in developed countries.

Stylized Fact #3: Government consumption is less procyclical than private consumption in developing and emerging market countries.

Stylized Fact #4: Transfer payments tend to be highly volatile and procyclical in emerging market countries, while they are countercyclical in developed countries.

II.3 Government Consumption Revisited

In this section, I review the characteristics of government consumption and argue that it has two components that do not have the same aims, and may thus behave differently over the business cycle. Those components are the important elements of the model economy introduced in next section.

In the standard system of national accounts (SNA) statistics, government final consumption expenditure is defined as all government current expenditures for the purchases of goods and services, including compensation for employees. Thus, it excludes transfer payments such as social security payments and unemployment benefits, which are all counted as minus tax. For example, government consumption covers broad areas of public goods such as defense, security service, judicial system, roadways, and education. The question then is how can I understand the benefits of those public goods for households and the government's motivation to provide them by fiscal spending? The most natural and direct explanation is that they are preferred by households and thus increase public utility. The government provides them, rather than allowing them to be privately provided through market mechanisms, due to their so-called non-preclusion and/or non-rivalrousness characteristics.

In addition, economists have pointed out another potential motivation for the government to consume goods and services; this dates back to Keynes's famous metaphor known as "hole-digging-filling."

If the Treasury were to fill old bottles with banknotes, bury them at suitable depths in disused coalmines which are then filled up to the surface with town rubbish, and leave it to private enterprises on well-tried principles of laissez-faire to dig the notes up again (the right to do so being obtained, of course, by tendering for leases of the note-bearing territory), there need be no more unemployment and, with the help of the repercussions, the real income of the community, and its capital wealth also, would probably become a good deal greater than it actually is. It would, indeed, be more sensible to build houses and the like; but, if there are political and practical difficulties in the way of this, the above would be better than nothing.

This metaphor argues that during recession, government spending might be beneficial to the economy through the multiplier effect, even if the goods and services purchased are not directly preferred by households. It would, of course, be advisable for the government to spend wisely on goods and services that are more preferred by households than less preferred. However, as is often the case, political, social, and practical reasons prevent the government from doing so. In this case, the government may rationally spend on less preferred goods and services as the second best option.

Furthermore, a public project recently implemented in Argentina shows a related but slightly different motivation for the government to spend on government consumption. The Argentine government launched the Head of Household Project in 2002 as a measure to alleviate the impact of increasing unemployment due to a severe economic crisis. A stipend of 150 Argentine pesos[8] per month is provided to the unemployed heads of households in exchange for participating in four hours of work in community services, minor construction, repair, expansion, maintenance or remodeling of schools, health facilities, basic sanitation facilities, small roads and bridges, culverts and canals, community kitchens and centers, tourist centers, low-cost

[8] This is approximately US $50 from the nominal exchange rate at that time.

housing, and, on a pilot basis, some productive activities. While the services provided in this project seem to be useful, the jobs would not have been offered if the country was not faced with a severe economic crisis and the resultant high unemployment. The primary purpose of providing these services or purchase of labor is then a social safety net, and the direct benefits for households' utility or producers' convenience are only of secondary importance.

This discussion justifies my claim that government consumption can be defined as the sum of (i) a public goods component that is directly beneficial to households and (ii) a hidden transfer payment component that is less or not beneficial to households, but provided as a social safety net. These hidden transfers appear in national accounts as government consumption, but I argue that they behave more as transfers in that they induce private consumption by relaxing household budget constraints. The government finds this hidden transfer payment component of government consumption useful for smoothing private consumption as they are more flexible over the cycle than standard, institutionalized transfer programs such as social security, which is counted as a transfer payment. While huge efforts are required to alter the transfer payment schemes due to political, legislative, and other institutional reasons, the government may be able to discretionarily adjust government consumption over the business cycle.

II.4 The Model Economy

I consider a benevolent sovereign government's problem in a small open endowment economy. The sovereign government has access to the international capital market where it can buy and sell one-period discount bonds at contingent prices with the default option. The risk-neutral competitive foreign creditors take into account how likely it is that this option will be exercised when creditors offer discounted prices of bonds. When the sovereign government exercises the default option, the international capital market penalizes it by temporally excluding it from any transactions. The economy also temporally loses a fixed proportion of endowments after the default. This can be justified by several channels, including the disruption of the local banking system, which often has a large exposure to government bonds, and an adverse impact on international arrangements such as trade linkage after default (Rose (2005)). On the other hand, households do not have access to the international capital market in this model economy. This appears to be too strong an assumption considering the fact that many local banks and firms recently succeeded in raising funds in the international capital market. However, it will be more convincing when I think of the fact that credit ratings for firms and households in emerging markets tend to be constrained by the sovereign ceiling. Thus, their funding costs are higher than the interest rate charged on the sovereign government in most of the cases in emerging market countries.

In this model, government expenditure is defined in simple and general terms as constituting government consumption (g) and transfer payments (e^{TR}). Further, government consumption is defined as a public goods component (g^{PG}) and a hidden transfer payment component (g^{TR}), following the discussion in section 3. While this public goods component is directly beneficial to the households' welfare, the hidden transfer payment component does not directly affect the households' welfare. Nevertheless, the government has an incentive to provide these hidden transfer payments particularly during recession, since it is useful as a social safety net relaxing the budget constraint of households. In this sense, the hidden transfer payment component behaves more as transfer payments. The government finds this hidden transfer payment component of government consumption useful as it is flexible over the cycle, while the government is subject to legislative, institutional, practical, and other frictions when it attempts to adjust transfer payment schemes.

The government is rational and benevolent in this model economy. Therefore, it optimally decides whether to repay or default on debts, taking into consideration the advantages and disadvantages of exercising the default option, chooses an asset position in the international capital market, and then determines the levels of transfer payments, the public goods component, and the hidden transfer payment component of government consumption for each period, in order to maximize social utility.

Households are identical and their preferences are over private consumption and the public goods component of government consumption. The expected infinite lifetime social utility is given by

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c_t, g_t^{PG}) \tag{3}$$

where $0 < \beta < 1$ is the period discount factor, c_t and g_t^{PG} denote the aggregate private consumption and the public goods component of government consumption in period t, respectively, and $u(\cdot)$ is the period utility function that is strictly concave and increasing and satisfies the Inada conditions. Every period, households receive an endowment of single nonstorable goods. The endowed income at period t (y_t) is stochastic, drawn from a compact set Y conditionally on the previous period realization (y_{t-1}) with a probability distribution function $f(y_t|y_{t-1})$, following the Markov process. A time invariant income tax rate (τ) is levied on the endowment, and households receive transfer payments and the hidden transfer payment component of government consumption in a lump sum manner that relaxes the budget constraint of the households. Thus, the aggregated budget constraint of the households is given by

$$c_t \leq (1-\tau)y_t + e_t^{TR} + g_t^{TR}, \tag{4}$$

and the equality always holds in optimal conditions. The amount of private consumption (c_t) is determined passively for households by the realized endowment shock and the government's decision on transfer payments and hidden transfer payments.

The sovereign government, not the households, conducts business transactions with creditors in the international capital market. The international capital market is incomplete in the sense that the sovereign government and creditors trade only one-period discount bonds at an endogenous contingent price (q). The creditors are risk neutral and behave competitively with perfect information on the economy's endowment and asset position. The creditors are not subject to any funding constraints, and thus, they lend and borrow as much as necessary at the world risk-free interest rate (r). The sovereign government has an option to default on the contract[9] when the asset position is negative (i.e., the sovereign government borrows in the international capital market). The decision to repay or default is endogenously made as the optimal choice by the sovereign government based on the information pertaining to endowment shock, current asset position, and the pluses and minuses of default. Thus, the expected default probability in the next period (δ) depends on the asset position in the next period (B′) and the current endowment shock that holds information on the endowment shock in the next period ($\delta = \delta(y, B')$). For an arbitrary level of the asset position of the sovereign government in the next period, the zero profit condition of the competitive creditors, who regard the discount price of bonds and default probability given, implies

$$\phi = qB' - \frac{1-\delta}{1+r}B' = 0. \tag{5}$$

For a negative asset position ($B' < 0$), the creditors are subject to a potentially positive endogenous default risk. Since the creditors take into account this default risk when they offer the price of discount bonds, this also depends both on the endowment shock and on the size of the bonds being issued ($q = q(y, B')$). Thus, the zero profit condition is reduced to

$$q(y, B') = \frac{1-\delta(y, B')}{1+r}. \tag{6}$$

[9] The option of partial payment is excluded.

For the positive asset position ($B' \geq 0$), the probability of the default is zero[10], and thus, the price of the discount bonds collapses to the opportunity cost of the creditors ($q = \frac{1}{1+r}$). Since $0 \leq \delta \leq 1$, the zero profit condition implies that the bond prices lie in the closed interval $[0, (1 + r)^{-1}]$. The country-specific interest rate that the sovereign government faces in the international capital market (r^c) is expressed as

$$r^c = \frac{1 - q(y, B')}{q(y, B')}. \qquad (7)$$

When the sovereign government defaults on the contract, the existing debts are wiped out and the government loses access to the international capital market for a stochastic number of periods. During this penalty phase, contrary to the normal phase, the economy is in financial autarky, and the government loses the opportunities to conduct intertemporal saving and dissaving and also suffers from a reduction of endowment by a fixed proportion ($\lambda \leq 1$). The sovereign government has an exogenous constant probability (θ) to re-enter the international capital market while it is in the penalty phase.

The government's objective is to maximize the expected infinite lifetime social utility. The sovereign government can buy and sell one-period bonds at contingent prices in the international capital market, by which it tries to conduct optimal intertemporal saving and dissaving for the economy. Since sovereign debts are not enforceable, the sovereign government makes a decision regarding whether to repay the existing debts or default when the existing asset position is negative, based on the existing asset position, realized endowment shock, and advantages and disadvantages of defaulting. Furthermore, the sovereign government determines a new asset position (B') when it decides not to default, and hence continues to have access to the international capital market. The government also levies a time invariant tax rate (τ) on the

[10] The competitive creditors are assumed to always obey the contracts.

endowment, and tax revenue minus net payment to the creditors will be spent on transfer payments to households (e^{TR}) and government consumption (g). Government consumption is defined as the sum of (i) a public goods component (g^{PG}) that is directly beneficial to households' welfare and (ii) a hidden transfer payment component (g^{TR}) that is not directly beneficial to households' welfare, but provided as a social safety net. The government has the authority to determine the amount of budgetary resources that will be allocated to transfer payments, the public goods component, and the hidden transfer payment component of government consumption. Since the sovereign government can be involved in the intertemporal saving and borrowing in the international capital market during the normal phase, it tries to smooth private consumption and the public goods component of government consumption by optimally choosing the asset position in the next period, transfer payments, and the hidden transfer payment component of government consumption. However, attempts at consumption smoothness are constrained by the market incompleteness, particularly the endogenous risk premium derived from the default option.

II.5 Recursive Equilibrium

In this section, I define and characterize recursive equilibrium. For any given state characterized by the current existing asset position and realized endowment shock (s = (B, y)), the policy function of the government (B', e^{TR}, g^{PG}, g^{TR}, and decisions on repaying and defaulting), the price function for bonds (q), and the policy function of households (c) jointly and recursively determine the equilibrium.

The households' problem is static. Each period they are informed of their period budget constraint, observing the realized endowment shock (y_t), transfer payments to households (e^{TR}), and the hidden transfer payment component of government consumption (g^{TR}), the households optimally spend all their resources as private consumption (c), since the single good of this economy is nonstorable. It should be noted that households do not have access to the international capital market and thus cannot save or dissave intertemporally.

Foreign creditors are assumed to be risk neutral and competitive with complete information on the endowment shock and size of the bonds offered by the sovereign government. The creditors buy and sell as many bonds as requested by the sovereign government as long as the expected gross return in the next period is equal to 1 + r, where r is the exogenously given risk-free world interest rate. Therefore, they always meet the demand for bonds by the sovereign government at the price of

$$q(y, B') = \frac{1-\delta(y, B')}{1+r}. \tag{8}$$

The sovereign government is benevolent in that its objective is to maximize the expected infinite lifetime social utility. For this objective, given the values of the asset position carried over from the previous period and the realized endowment shock, the government decides whether to follow the contracts with the creditors or default, chooses an asset position in the next period taking the bond price schedule given in the normal phase, and then determines the transfer payments, public goods component, and hidden transfer payment component of the government consumption for every period. With regard to the choice between transfer payments and hidden transfer payments, whose aims are compatible, I impose an exogenous restriction ($g^{TR} = \frac{1-\omega}{\omega} e^{TR}$) for simplicity[11]. When the sovereign government decides to default, all the existing debts are wiped out, thereby exempting the government from repaying the debts. In return, the government will be in the penalty phase, during which it is not allowed to access the

[11] Considering that the hidden transfer payment component of government consumption is potentially more flexible than transfer payments by nature, as discussed in section 3, it would have been more appropriate to model it such that hidden transfer payments record more volatility and countercyclicality. However, I choose this simple restriction to avoid imposing an arbitrary restriction.

international capital market and also suffers from a reduction in endowment of a fixed proportion (λ) for stochastic periods. In this penalty phase, the government optimally determines transfer payments, the public goods component, and the hidden transfer payment component of government consumption following the same exogenous restriction ($g^{TR} = \frac{1-\omega}{\omega} e^{TR}$), confronted with the endowment shock. The probability of moving back to the normal phase and restoring its access to the international capital market over the next period is, for the sovereign government, exogenously fixed to θ (≥0).

When the sovereign government is in the normal phase, the budgetary source of providing transfer payments and government consumption is two-fold, namely, the imposition of a time-invariant tax rate on endowment and borrowing from foreign creditors. I assume that only the government can transform one unit of endowment into one unit of public goods without incurring any costs. Then, the budget constraints of households and the government at period t in the normal phase are

$$(1-\tau)y_t + e_t^{TR} + g_t^{TR} \geq c_t \quad \text{(households)} \tag{9}$$

$$\tau y_t \geq e_t^{TR} + g_t^{PG} + g_t^{TR} - B_t + q(B_{t+1}, y_t)B_{t+1} \quad \text{(government);} \tag{10}$$

therefore, the resource constraint of the economy in the normal phase is

$$y_t \geq c_t + g_t^{PG} - B_t + q(B_{t+1}, y_t)B_{t+1} \; . \tag{11}$$

To exclude the possibility of a negative value of a hidden transfer payment component of government consumption, I also state the following condition

$$g_t^{TR} \geq 0. \tag{12}$$

When the government is in the penalty phase, it does not have access to the international capital market. Therefore, the budgetary source of providing transfer payments and government consumption is only the imposition of a time-invariant tax rate on endowment that is reduced by a fixed proportion (λ). Thus, the budget constraint of households and the government at period t in the penalty phase is

$$(1-\tau)(1-\lambda)y_t + e_t^{TR} + g_t^{TR} \geq c_t \quad \text{(households)} \tag{13}$$

$$\tau(1-\lambda)y_t \geq e_t^{TR} + g_t^{PG} + g_t^{TR} \quad \text{(government);} \tag{14}$$

and then, the resource constraint of the economy in the penalty phase is

$$(1-\lambda)y_t \geq c_t + g_t^{PG}. \tag{15}$$

As is the case in the normal phase, the non-negative hidden transfer payment component condition is given as

$$g_t^{TR} \geq 0. \tag{16}$$

For a given level of the existing asset position and endowment shock in this period, equating the marginal utilities of private consumption and the public goods component of government consumption pins down the optimal set of private consumption and public goods component (c_t^*, g_t^{PG*}) for each arbitrary level of the asset position in the next period. In other words, I have

$$u_1(c_t^*, g_t^{PG*}) = u_2(c_t^*, g_t^{PG*}) \tag{17}$$

where c_t^* and g_t^{PG*} satisfy

$$c_t^* + g_t^{PG*} = y_t + B_t - qB_{t+1} \quad \text{(in the normal phase)} \tag{18}$$

$$c_t^* + g_t^{PG*} = (1-\lambda)y_t \quad \text{(in the penalty phase).} \tag{19}$$

Note that for a low tax rate (τ) relative to the volatility of the endowment shock, the government may find it optimal to set the sum of transfer payments and hidden transfer payments at a negative value. It might also be optimal for the government to save in the international capital market when an extremely good shock hits the economy. Subsequently, the government chooses a zero hidden transfer component of government consumption ($g_t^{TR*} = 0$) and negative transfer payments to households ($e_t^{TR*} < 0$). The negative transfer payments can be interpreted as lump sum tax.

Let $v^0(B, y)$ be the value function of the government for a given state s = (B, y) in the normal phase. Each period the government decides whether to follow the contracts or to renege on the debt after being informed of the current state. Then, the function $v^0(B,y)$ satisfies the condition

$$v^0(B, y) = \max \{v^c(B, y), v^d(y)\} \tag{20}$$

where $v^c(B, y)$ denotes the value function when the government decides to follow the contracts, and $v^d(y)$ denotes the value function when it decides to default on debts. The value of obeying the contracts is given as follows:

$$\begin{aligned} v^c(B, y) = & \max_{B', e^{TR}, g^{TR}, g^{PG}} \{u(c, g^{PG} \mid y) + \beta \int_{y'} v^0(B', y') f(y' \mid y) dy'\} \\ \text{s.t.} \quad & c + g^{PG} \leq y + B - qB', \\ & g^{TR} = \frac{1-\omega}{\omega} e^{TR} > 0 \ \text{ or } g^{TR} = 0. \end{aligned} \tag{21}$$

The value of default is expressed as

$$\begin{aligned} v^d(y) = & \max_{e^{TR}, g^{TR}, g^{PG}} \{u(c, g^{PG} \mid y) + \beta \int_{y'} [\theta v^0(0, y') + (1-\theta) v^d(y')] f(y' \mid y) dy'\} \\ \text{s.t.} \quad & c + g^{PG} \leq (1-\lambda) y, \\ & g^{TR} = \frac{1-\omega}{\omega} e^{TR} > 0 \text{ or } g^{TR} = 0. \end{aligned} \tag{22}$$

Since the objective of the sovereign government is to maximize the expected infinite lifetime social utility, it tries to maintain the smoothness of the private consumption and the public goods component of government consumption by borrowing during recessions and saving during booms. If the international capital market were complete, consumption would be perfectly smoothed, and transfer payments and hidden transfer payments would be countercyclical. However, such an attempt is severely constrained by the endogenous risk premia derived from the default option. The more the endogenous default risk premia prevents the sovereign government from borrowing when a bad shock hits the economy, the less successful is the government in smoothing private consumption and the public goods component, and the less countercyclical are the transfer payments and the hidden transfer payment component. When the size and procyclicality of the public goods component are larger and greater than being offset by the size and countercyclicality of hidden transfer payments, government consumption—defined as the sum of these two components—is procyclical, but less so than private consumption. This is also true when even hidden transfer payments are procyclical, albeit less so than the public goods component.

II.6 Numerical Solution and Calibration

The model is solved numerically in order to quantitatively evaluate its prediction for the cyclical properties of transfer payments and government consumption. The point to be focused on is whether endogenous risk premia on sovereign borrowing derived from the default option can explain the observed sharp contrasts in the cyclicalities of government consumption and transfer payments in the emerging market and developed countries. For this purpose, I consider two models: (i) the emerging market country model, whose government has the default option and (ii) the developed country model, whose government can trade one-period bonds at the world risk-free interest rate[12] derived by shutting down the endogenous default option. These two models are solved numerically and calibrated to two cases: the Mexican and the US economies.

The emerging market country model is solved by the value function iteration method that allows for the endogeneity of the bond price vector. More specifically, the income space and asset space are discretized and the initial guess for the bond prices (q^0) is set to the one

[12] In order to rule out the Ponzi scheme, I impose minimum convex portfolio adjustment costs in the quadratic form for nonzero net asset positions (See Schmitt-Grohé and Uribe (2003)).

associated with the risk-free world interest rate for all the states. Then, the value function of obeying the contracts (v^c) and defaulting on the debts (v^d) are computed, and thus the value function in the normal phase is found to be $v^0 = \max(v^c,v^d)$. This also indicates the expected default probability during the next period in each state, and hence, the zero profit condition of the creditors will generate an equilibrium state contingent bond price vector (q^1). Then, q^0 is updated to q^1 and the process is repeated until the convergence criterion is met.

In the numerical solutions, the standard constant relative risk aversion (CRRA) instantaneous utility function is employed,

$$u(c_t, g_t^{PG}) = \frac{x_t^{1-\gamma}}{1-\gamma}, \tag{23}$$

where x_t is the consumption aggregator of private consumption, and the public goods component of government consumption is defined as

$$x_t = (c_t)^{\alpha} (g_t^{PG})^{(1-\alpha)}. \tag{24}$$

The Cobb-Douglas specification is chosen for the substitution between the private consumption and a public goods component, since the fraction of the total consumption that is allocated for private consumption remains stable over time in the data. These functional forms of the utility of households guarantee that $\operatorname{cov}(c_t^*, g_t^{PG*}) = 1$ always holds at equilibrium.

The parameters of the two cases are summarized in Table 2.3. They are either calibrated to the Mexican and US economies or set in accordance with relevant previous literature. It should be noted that the income loss during the penalty phase and the probability of re-entry into the market are not applicable to the developed country model, in which the sovereign government's default option has been canceled to ensure that it can always save and dissave at the risk-free world interest rate. With regard to the stochastic income process, I consider a transitory shock to income represented by the AR(1) income process, which is standard in the literature. The AR(1) coefficient is estimated based on the following specification:

$$y_t = \mu_y + \rho_y (y_{t-1} - \mu_y) + \varepsilon_{yt} \\ \text{where } \varepsilon_{yt} \sim N(0, \sigma_y^2), \tag{25}$$

based on the Mexican logarithmic real GDP data (ρ_y = 0.955)[13]. The standard deviation of innovation in the income process is calibrated such that the Hodrick-Prescott filtered income volatility derived in the simulation approximately matches the standard deviations of the cyclical component of the real GDP in Mexico and US reported in Table 2.1 (σ_y = 3.52 for the Mexican economy case and σ_y = 2.00 for the US economy case). The time-invariant income tax rate (τ) is set to 0.231 for the Mexican economy case and 0.294 for the US economy case in order to match the average public sector revenue GDP ratio in the data taken from government statistics of those countries. The world risk-free interest rate is chosen as 0.04 (4%), which is analogous to the US annual real interest rate, that is standard in the previous literature (e.g., Mendoza (1991)). The income loss during the penalty phase (λ) is set at 0.02 (2%) following Chuhan and Sturzenegger (2003), who estimate the impact of the default decision on growth and income in the succeeding years. The probability of re-entry into the international capital market during the penalty phase after exercising a default option (θ) is set as 0.22, which implies that the sovereign government is expected to be excluded from market access for 4.5 years. This is consistent with the average number of years required until resumption after default in the 1980s and 1990s reported in Gelos, Sahay, and Sandleris (2004)[14]. The relative risk aversion (γ) of 2.0 is a standard value in the real business cycle literature. The time preference discount factor (β) is set to 0.955, which is

[13] The estimate for US data also shows a highly persistent AR(1) coefficient, the value of which is close to that of Mexico.

[14] Here, access is defined as the issuance of public or publicly guaranteed bonds or syndicated loans. Further, the year of default is defined as the year in which the sovereign government defaulted on foreign-currency debts according to Standard & Poor's. This default definition is a broad one (i.e., defaults on interest payments only, and so-called strategic defaults are often counted as sovereign defaults) and may result in a downward bias in the estimation of the probability of re-entry. A substantial number of default countries in their sample have gained re-access to the market within a year.

equivalent to 0.989 in the quarterly base calibration. This value is slightly lower than that in standard real business cycle literature (e.g., Buckus, Kehoe, and Kydland (1992)) and that implied by the real interest rate ($\frac{1}{1+r}$); however, this value is much higher than that adopted in related literature such as Arellano (2005) and Aguiar and Gopinath (2006). I need impatient households in order to ensure that the government borrows in average at equilibrium without building buffer stocks. The weight on private consumption in the Cobb-Douglas consumption aggregator (α) is calibrated to 0.9 for both cases so that the simulation result of the average private consumption-income ratio (c/y) matches the ratio of the sum of private consumption and private investment to the GDP for Mexico (0.90) and the US (0.85). Moreover, the parameter regarding exogenous restriction on transfer payments and hidden transfer payments (ω) is calibrated to 0.39 for the case of the Mexican economy and 0.68 for that of the US economy so that the transfer payment income ratio (e^{TR}/y) derived in simulations matches the ratio of current transfer (subsidies and other current transfer) to the GDP observed in the Mexican (0.05) and US (0.12) data.

II.7 Simulation: Mexican Economy Case

The results of the simulation, shown in Table 2.4.a (Mexican Economy Case), are the average of 1,000 simulations each for a length of 100 periods[15]. I simulate both the emerging market country model, whose government has a default option, and the developed country model, whose government can trade one-period bonds at the world risk-free interest rate without the default option. The simulated data are treated consistently with the data. Since the emerging market country model does not predict the price of the bonds during the periods in the penalty

[15] In order to rule out any effect of the initial values (income and asset position), I simulated the model for 1,100 periods and extracted the last 100 periods in each of the runs.

phase, the standard deviation of the spread is computed for periods excluding those periods.

The emerging market country model, when calibrated to the Mexican economy, succeeds in replicating the observed cyclical pattern of government consumption and transfer payments (Table 2.4.a). Although defaulting is a rare event that occurs only 0.01 times every 100 years, endogenous default premia deeply affect the equilibrium, particularly the cyclical patterns of transfer payments (correl(y,e^{TR})), the hidden transfer payment component of government consumption (correl(y, g^{TR})), and therefore, the government consumption (correl(y,g)), which are the main points of focus in this quantitative analysis.

As is the case with a standard small open economy model without endogenous risk premia (e.g., Mendoza (1991)), private consumption is highly procyclical in this model, as indicated by a positive and close to unity correlation between the income and private consumption (correl(y,c) = 0.99). With regard to government consumption, the correlation between the income and the public goods component is in complete concord with that of private consumption (correl(y,g^{PG}) = correl(y,c) = 0.99), consistent with the analysis in section 6. The correlation between the income and the hidden transfer payment component is positive, albeit smaller than that between the income and the public goods component (correl(y,g^{PG}) = 0.99 > correl(y,g^{TR}) = 0.52 > 0). This generates a positive but lower correlation between income and government consumption as compared to that between income and private consumption (correl(y,c) = 0.99 > correl(y,g) = 0.88 > 0), as observed in the data. Moreover, the correlation between income and transfer payments is positive and identical to that between income and a hidden transfer payment component (correl(y,e^{TR}) = correl(y,g^{TR}) = 0.52). On the whole, the simulation results of the emerging market country model with endogenous default premia succeed in replicating the observed cyclical patterns of government consumption and transfer payments in Mexico and other emerging market countries.

The main anomaly in the simulation results is the volatilities of transfer payments and government consumption, which are due to very small standard deviation of the spread. The simulation results (std(g^{TR}) = 3.38 and std(g) = 3.04) fail to reproduce the observed high volatilities of transfer payments and government consumption. This is because the sovereign government is less involved in risky borrowing with a positive default probability in the next period. As shown in Figure 2.1, the bond price schedule $(q(y, B'), B')$ is steep near the thresholds for risky borrowing. Therefore, the sovereign government faces a much higher risk premia when it borrows more beyond these thresholds, deterring an involvement in risky borrowings in the equilibrium condition. This leads to less volatile and presumably more procyclical transfer payments and government consumption than the data.

It is noteworthy that the procyclicalities of transfer payments and hidden transfer payments are derived from the fact that borrowing for consumption smoothness is severely constrained by endogenous default risk premia. Were it not for the default option and associated risk premia, the sovereign government would have wanted to borrow and transfer more when an adverse income shock was realized. However, the option to default implies that creditors require higher risk premia when the sovereign government experiences a sequence of negative shocks and accumulates debt. This is particularly true when the penalties for the default are relatively small and so the sovereign government has more incentive to default[16]. As a result, risk sharing and intertemporal consumption smoothing are substantially deterred. To support this point, I simulate the developed country model without the default option calibrating to the Mexican economy as a case study. The simulation results for this case study are in sharp contrast with those of the emerging market country model, in that they reveal countercyclical transfer payments and acyclical government consumption. The cyclical features of the fiscal policy in the

[16] This point will be discussed in detail in section II.9.

simulation result of the developed country model are not compatible with those observed in the data for Mexico and other emerging market countries. They rather resemble the data for the US and other developed countries, except for higher volatilities of macro variables, which stems from a more volatile income process.

II.8 Simulation: US Economy Case

Table 2.4.b shows the simulation results of both the developed country model and the emerging market country model for the case that is calibrated to the US economy. I follow the same procedure and method as that used in the case of the Mexican economy; the only difference can be found in the setting of the parameters. The developed country model, in which the sovereign government has access to one-period bonds at the constant world risk-free real interest rate, shows clear differences with respect to the emerging market country model.

The developed country model succeeds in predicting the countercyclical transfer payments (correl(y,e^{TR}) = –0.73), as observed in the data for the US and other developed countries. The simulation results indicate highly countercyclical transfer payments as compared with the data for current transfers in the US and other developed countries. One factor explaining this over-prediction of countercyclicality of transfer payments is the frictionless access to the international capital market, which might not be the case in practice. Another potential factor affecting the over-prediction of countercyclical transfer payments is that the model is not equipped with friction for adjusting transfer payments. As discussed in section 3, the government may find it easier to adjust the hidden transfer payment component of government consumption over the business cycle in practice, given the institutional burden of altering the institutionalized transfer payments scheme, which might make transfer payments less countercyclical in the data. Moreover, it is more suitable to compare the simulation results to the data of the transfer to households, whose values are closer to the simulation results for the case of the US (Table 2.1). Although the transfer to households is a major component of current transfer, it includes other items such as transfer to other levels of national government, which is not necessarily appropriate for modeling as transfer payments.

One anomaly in the simulation result of this developed country model, when calibrated to the US economy, is that it generates a highly procyclical government consumption (correl(y,g) = 0.86). While the simulation results show government consumption as being less procyclical than private consumption (correl(y,c) = 0.99), the data indicates a much smaller procyclicality in the US and other developed countries. One reason for this drawback is that the size of the hidden transfer payment component is relatively small when these parameter settings are calibrated to the US economy. The government spends large part of money for the social safety net needs as transfer payment, and little is left for hidden transfer payment component. Moreover, the second factor for the over-prediction of countercyclicality of transfer payments is also relevant here. If the government faces some friction in adjusting transfer payments, it might want to utilize hidden transfers more frequently in the business cycle. However, the model is not equipped with such friction for the sake of simplicity. This is the reason why the simulation results represent highly countercyclical transfer payments and highly procyclical government consumption for the case calibrated to the US economy.

The sharp differences between the developed country model and the emerging market country model, when both of the models are calibrated to the US economy, highlight the fact that it is the default option, and not the volatile income process, which results in procyclical transfer payments. When calibrated to the US and Mexican economies, the simulation results of the emerging market country model show similar patterns of fiscal policy cyclicality, even though the Mexican case exhibits more volatilities in the macro variables derived by the higher standard deviations of innovation.

I here sum up the simulation results for two models—the emerging market country model and the developed country model—are discussed in sections 7 and 8. These models are calibrated to two cases: the Mexican and the US economies. When numerically solved and calibrated to the Mexican economy, the emerging market country model with a benevolent government's default option on its debts succeeds in replicating the cyclical patterns of private consumption, government consumption, and transfer payments, while it fails to mimic the high volatilities of transfer payments and government consumption. Moreover, I consider the developed country model by shutting down the default option, in which the sovereign government has access to one-period bonds at the constant world risk-free real interest rate. The simulation result for this developed country model, when calibrated to the US economy, shows countercyclical transfer payments that are compatible with the data for the US and other developed countries. It is shown that the default option is responsible for the asymmetries observed in the data, suggesting that sovereign default has significant effects on risk sharing and the behavior of fiscal policy.

II.9 Sensitivity Analysis

With regard to the sensitivity analyses, I change certain parameters such as risk aversion, probability of re-entry into the market, and output loss during the penalty phase for the Mexican economy case of the emerging market country model (Table 2.4.a).

The relationship between the degree of risk averseness and accessibility to the sovereign borrowings, and therefore the cyclicalities of transfer payments and hidden transfer payments, may not be monotone. When the economy possesses higher risk averseness, the government values its access to the international capital market to a much greater extent; therefore, it will want to engage in risky borrowings for a given level of bond price schedule slope ($\frac{\partial q(y, B')}{\partial B'}$) to a lesser extent. In other words, for a risk-averse economy, the government is less likely to expand borrowings beyond the threshold of risk-free borrowing during bad times; therefore, it is likely to record more procyclical transfer payments and hidden transfer payments (higher correl(y,e^{TR}) and correl(y,g^{TR})). However, the bond price is determined endogenously in this model. The creditors understand that the government in a more risk-averse economy values its access to the international capital market to a greater extent, and is therefore willing to pay a higher cost of debt repayments before defaulting. Therefore, the zero profit condition leads to a broader range of risk-free borrowings and a flatter slope of bond price schedule, which makes it less expensive for the government to be involved in borrowings. Thus, the government in a more risk-averse economy is likely to record a higher maximum debt income ratio and less procyclical transfer payments and hidden transfer payments (lower correl(y,e^{TR}) and correl(y,g^{TR})) due to a broader range of risk-free borrowings and a flatter slope of bond price schedule, ceteris paribus. These two contradictory effects result in a theoretical ambiguity with respect to the changes in the cyclicalities of transfer payments and hidden transfer payments for different parameter values of risk averseness. When the risk averseness is high ($\gamma = 3.0$), it is found that the threshold income debt ratio for risk-free borrowing with the worst income shock increases from 10.65% in the benchmark case to 11.18%. The implication of this result is that a higher importance of the international capital market due to higher risk averseness leads to a wider range of risk-free borrowings and flatter bond price schedules for risky borrowings, thus relaxing the borrowing constraint. A sovereign government succeeds in smoothing consumption to a greater degree through both risk-free and risky borrowings, and therefore, a slightly lower private consumption volatility is observed in the higher risk aversion case. Better functioning of the international capital market affects the cyclical patterns of transfer payments and government consumption such that it generates acyclical transfer payments (correl(y,e^{TR}) = 0.04) and less procyclical government consumption (correl(y,g) = 0.70). For a lower risk averseness ($\gamma = 1.1$), the results are the opposite in the sense that there are higher procyclicalities of transfer payments and government consumption with a less functioning international capital market.

A lower probability of re-entry ($\theta = 0.1$) and a higher output loss during the penalty phase ($\lambda = 0.04$) directly increase the cost of the default, allowing the sovereign government to borrow more on an average. The creditors, perceiving lower default incentives, offer lower risk premia for any arbitrary amount of debts, which leads to higher standard deviations of transfer payments and hidden transfer payments. However, those volatilities do not fully account for the high volatilities observed in the data. Moreover, better functioning of the international capital market leads to somewhat less procyclical transfer payments, hidden transfer payments, and government consumption.

II.10 Conclusion

This paper develops a dynamic stochastic general equilibrium model that accounts for the asymmetric cyclical features of the fiscal policy between developed and emerging market countries. The paper makes three important contributions.

At the outset, four stylized facts regarding the volatility and cyclicality of government consumption and transfer payments are documented. First, government consumption is extremely volatile as compared to the GDP and private consumption in emerging market countries, which is not necessarily the case in developed countries. Second, government consumption is procyclical in emerging market countries, while it is acyclical or less procyclical in developed countries. Third, government consumption is less procyclical than private consumption in emerging market countries. Fourth, transfer payments tend to be highly volatile and procyclical in emerging market countries, while they are countercyclical in developed countries. From among these findings, procyclical transfer payments in emerging market countries are surprising and noteworthy in view of their aims and functions. Of particular interest are the sharp differences in the cyclical patterns of government consumption and transfer payments between developed and emerging market countries. Simple regressions also support the impact of the creditworthiness premia on the cyclicality of the fiscal policy.

Second, the novelty of this paper partly lies in the manner in which government consumption is characterized. I investigate the aims of government consumption and claim that government consumption can be divided into (i) a public goods component that is directly beneficial to households and (ii) a hidden transfer payment component that is less or not beneficial to households; rather, it is provided as a social safety net. These hidden transfers, inspired by a public project recently implemented in Argentina, appear in national accounts as government consumption; however, I argue that they behave more as transfers in that they induce private consumption by relaxing the budget constraints of households. The government finds these hidden transfer payments useful for smoothing private consumption since they are more flexible over the cycle than standard, institutionalized transfer programs like social security.

Third, the models explain how imperfections in the international capital market, namely the default option, affect the fiscal policy over the business cycle. Although I do not rule out the validity of an explanation for procyclical fiscal policy based on political distortion, the results of this paper are not derived from any distorted government policies. In the model, the sovereign government is assumed to be rational and benevolent in the sense that its objective is to maximize the expected infinite lifetime of the households' utility. I consider two models: (i) the emerging market country model, whose government has a default option and (ii) the developed country model, whose government can trade one-period bonds at the world risk-free interest rate. These two models are able to replicate the differences in government consumption and transfer payments over the business cycle in emerging markets and developed countries. The default option is shown to be responsible for the asymmetries observed in the data, suggesting that sovereign default has significant effects on risk sharing and the behavior of the fiscal policy.

Table 2.1: Summary Statistics for Business Cycle of National Account and Government Expenditure

Category/Country	Standard Deviation (%)									Contemporaneous Correlations with Y			
	National Account					Government Expenditure				National Account		Government Expenditure	
	Y	PC (relative to Y)		GC (relative to Y)		Current Transfer (relative to Y)		*of which* Transfer to Households (relative to Y)		PC	GC	Current Transfer	*of which* Transfer to Households
OECD Countries	2.18	2.32	(1.07)	2.74	(1.28)	6.40	(2.86)	5.33	(2.44)	0.76	0.16	-0.18	-0.32
of which G7 Countries	1.87	1.91	(1.03)	2.55	(1.33)	4.37	(2.65)	3.13	(1.90)	0.83	-0.06	-0.21	-0.51
USA	1.98	1.71	(0.86)	2.00	(1.01)	3.09	(1.56)	2.27	(1.14)	0.92	0.12	-0.44	-0.76
of which other OECD Countries	2.32	2.50	(1.09)	2.82	(1.26)	7.29	(3.09)	6.18	(2.78)	0.73	0.26	-0.17	-0.25
Developing Countries	5.60	7.49	(1.55)	11.34	(2.64)	n.a.	n.a.	n.a.	n.a.	0.58	0.35	n.a.	n.a.
of which Emerging Market Countries	4.63	5.49	(1.30)	9.60	(2.43)	17.75	(4.27)	11.18	(2.66)	0.64	0.43	0.20	0.30
Mexico	3.53	4.38	(1.24)	8.42	(2.39)	24.18	(6.86)	n.a.	n.a.	0.80	0.70	0.38	n.a.
of which Other Developing Countries	5.95	8.21	(1.64)	11.96	(2.72)	n.a.	n.a.	n.a.	n.a.	0.55	0.31	n.a.	n.a.

1/ Statistics are converted to real term, taken logarithm, and detrended by Hodrick-Prescott filter with smoothing parameter of 100.
2/ Variables are: Y, real GDP; PC, real private consumption; GC, real government consumption.
3/ For country classification and coverage, see the appendix tables which list the result for individual countries.
4/ The numbers in parenthesis (relative to Y) do not match the ones calculated in this table due to the difference in the coverage between national account and government expenditure statistics.
5/ Some OECD member countries, which joined OECD after the 1990s and/or are typically classified as emerging market countries (i.e. Turkey, Mexico, Czech, Hungary, Poland, Korea and Slovakia), are included in the developing countries.
6/ We include Argentina, Brazil, Bulgaria, Chile, China, Colombia, Cote D'Ivore, Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Hungary, Indonesia, Malaysia, Mexico, Morocco, Nigeria, Panama, Pakistan, Peru, Philippines, Poland, Russia, Korea, South Africa, Thailand, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, Vietnam, which are all included in the JP Morgan's EMBI global sovereign spread, in the emerging market countries.

Table 2.2: Estimated Creditworthiness Premia on the Cyclicality of Government Consumption

$GC_{i,t} = \alpha_0 + \alpha_1 GDP_{i,t} + \alpha_2 RATING_{i,t} + \alpha_3(GDP_{i,t}*RATING_{i,t}) + \alpha_4$ COMMODITY $PRICE_t + u_{i,t}$

	Government Consumption (GC)		
	OLS	Random Effects	Fixed Effects
GDP (α_1)	1.516 *** (0.134)	1.525 *** (0.137)	1.379 *** (0.145)
GDP * RATING (α_3)	-0.069 *** (0.010)	-0.072 *** (0.010)	-0.069 *** (0.011)
R-squared	0.154	0.140	0.044
Number of Observations	1121	1121	1121

$GC_{i,t} = \beta_0 + \beta_1 GDP_{i,t} + \beta_2\ RATINGDUMMY_{i,t} + \beta_3\ (GDP_{i,t}*RATINGDUMMY_{i,t}) + \beta_4$ COMMODITY $PRICE_t + v_{i,t}$

	Government Consumption (GC)		
	OLS	Random Effects	Fixed Effects
GDP (β_1)	0.142 (0.140)	0.099 (0.139)	0.018 (0.142)
AA DUMMY * GDP (β_{3AA})	0.033 (0.237)	0.043 (0.235)	0.094 (0.238)
A DUMMY * GDP (β_{3A})	0.281 (0.206)	0.322 (0.209)	0.376 * (0.214)
BBB DUMMY * GDP (β_{3BBB})	0.675 *** (0.203)	0.617 *** (0.207)	0.542 ** (0.214)
BB DUMMY * GDP (β_{3BB})	0.609 *** (0.183)	0.601 *** (0.183)	0.605 *** (0.187)
B DUMMY * GDP (β_{3B})	1.157 *** (0.189)	1.247 *** (0.195)	1.367 *** (0.205)
CCC DUMMY * GDP (β_{3CCC})	0.441 (0.418)	0.530 (0.451)	0.390 (0.501)
CC DUMMY * GDP (β_{3CC})	5.255 *** (1.998)	7.446 *** (2.025)	8.088 *** (2.072)
SD DUMMY * GDP (β_{3SD})	0.517 (0.458)	0.568 (0.446)	0.657 (0.451)
R-squared	0.163	0.164	0.082
Number of Observations	1121	1121	1121

1/ RATING is numerical values for S&P ratings in twenty one integers (i.e. AAA=20, AA+=19,..., SD=0)
2/ RATINGDUMMY is based on S&P ratings, and AAA is the default one.
3/ *, **, *** statistically significant at 10%, 5%, 1% level.
4/ Standard Errors are in parentheses.

Table 2.3: Parameter Values

income process		
AR(1) coefficient	$\rho_y = 0.955$	estimated by Mexican real GDP
standard deviation of innovation		
Mexican Economy Case	$\sigma_y = 3.52$	calibrated so that HP filtered income volatility derived in simulations matches the Mexican data
US Economy Case	$\sigma_y = 2.00$	calibrated so that HP filtered income volatility derived in simulations matches the US data
income tax rate		
Mexican Economy Case	τ=0.231	public sector total revenue/GDP for Mexico
US Economy Case	τ=0.294	public sector total revenue/GDP for US
world risk free interest rate	r=0.04	US annual interest rate
income loss during the penalty phase	λ=0.02	Chuhan and Sturzenegger (2003)
not applicable to Developed Country Model		
probability of reentry to the market	θ=0.22	Gelos, Sahay and Sandleris (2004)
not applicable to Developed Country Model		
relative risk aversion	γ=2.0	standard value in the real business cycle literatures
time preference discount factor	β=0.955	assume slightly impatient household to induce borrowings in equilibrium
weight on private consumption in the consumption aggregator		
Mexican Economy Case	α=0.9	calibrated so that c/y matches the data ((Consumption+Investment)/GDP=0.9) for Mexico
US Economy Case	α=0.9	calibrated so that c/y matches the data ((Consumption+Investment)/GDP=0.85) for US
restriction on transfer payment and hidden transfer payment component		
Mexican Economy Case	ω=0.39	calibrated so that e^{tr}/y matches data (Subsidies & Oth. Curr. Transf./GDP=0.05) for Mexico
US Economy Case	ω=0.68	calibrated so that e^{tr}/y matches data (Subsidies & Oth. Curr. Transf./GDP=0.12) for US

Table 2.4.a: Simulation Results/Mexican Economy Case

benchmark parameters: ρ_y=0.955, σ_y=3.52, τ=0.231, r=0.04, θ=0.22, λ=0.02, γ=2.0, β=0.955, α=0.9, ω=0.39

	data (Mexico) 1/	emerging market country average	emerging market country model	developed country model	high risk averseness	low risk averseness	low probability of reentry	high output loss
default option			yes	no	yes	yes	yes	yes
					γ=3.0	γ=1.1	θ=0.1	λ=0.04
std(y)	3.53	4.63	3.53	3.52	3.53	3.53	3.53	3.53
std(c)	4.38	5.49	3.32	2.65	3.08	3.53	3.32	3.33
std(g^{PG})	-	-	3.32	2.65	3.08	3.53	3.32	3.33
std(g^{TR})	-	-	3.38	5.38	3.33	4.05	3.70	3.87
std(g)	8.42	9.60	3.04	1.13	2.44	3.65	3.10	3.16
std(e^{TR})	24.18	17.75	3.38	5.38	3.33	4.05	3.70	3.87
std(spread) 2/	2.59	-	0.01	-	0.00	0.01	0.00	0.00
correl(y,c)	0.80	0.64	0.99	0.99	0.99	1.00	0.99	0.99
correl(y,g^{PG})	-	-	0.99	0.99	0.99	1.00	0.99	0.99
correl(y,g^{TR})	-	-	0.52	-0.82	0.04	0.83	0.44	0.42
correl(y,g)	0.70	0.43	0.88	-0.09	0.70	0.95	0.85	0.84
correl(y,e^{TR})	0.38	0.20	0.52	-0.82	0.04	0.83	0.44	0.42
default probability (per 100 years)	-	-	0.01	-	0.00	0.01	0.01	0.01
mean debt/income ratio (%)	25.55	-	0.85	78.69	-12.66	5.77	5.36	6.35
maximum debt/income ratio (%)	63.21	-	7.71	143.67	4.59	8.14	14.58	16.04
maximum spread (%)	12.25	-	0.02	-	0.02	0.02	0.01	0.02
mean spread (%)	6.39	-	0.00	-	0.00	0.01	0.00	0.00
threshold debt income ratio (lowest income) (%)	-	-	10.65	-	11.18	9.90	21.04	22.53

1/ Standard deviations and correlations of the Mexican data are from Table 2.1. Mean debt/income ratio and maximum debt/income ratio are calculated as total public and publicly guaranteed external debt GNI ratio from Global Development Finance (The World Bank). Standard deviation, maximum and mean spread in data are based on EMBI sovereign spread for Mexico in 1992-2000. I compute the average spread for each year, and calculate the statistics respectively.

2/ Spreads are not detrended, since the model does not predict bonds prices and spreads during penalty phase. I treat the data in the same way as the simulation result to keep consistency. However, taking Hodrick-Prescott filter does not change the standard deviation of the spreads in the data much.

Table 2.4.b: Simulation Results/US Economy Case

benchmark parameters: ρ_y=0.955, σ_y=2.00, τ=0.294, r=0.04, θ=0.22, λ=0.02, γ=2.0, β=0.955, α=0.9, ω=0.68

	data (US) 1/	OECD country average	developed country model	emerging market country model
default option			no	yes
std(y)	1.98	1.87	1.98	1.98
std(c)	1.71	1.91	1.46	1.94
std(g^{PG})	-	-	1.46	1.94
std(g^{TR})	-	-	1.20	2.02
std(g)	2.00	2.55	0.75	1.93
std(e^{TR})	3.09	4.37	1.20	2.02
std(spread) 2/	-	-	-	0.01
correl(y,c)	0.92	0.83	0.99	1.00
correl(y,g^{PG})	-	-	0.99	1.00
correl(y,g^{TR})	-	-	-0.73	0.85
correl(y,g)	0.12	-0.06	0.86	0.97
correl(y,e^{TR})	-0.44	-0.21	-0.73	0.85
default probability (per 100 years)	-	-	-	0.01
mean debt/income ratio (%)	-	-	90.44	6.27
maximum debt/income ratio (%)	-	-	126.46	8.34
maximum spread (%)	-	-	-	0.02
mean spread (%)	-	-	-	0.01
threshold debt income ratio (lowest income) (%)	-	-	-	9.26

1/ Standard deviations and correlations of the US data are from Table 2.1.
2/ Spreads are not detrended, since the model does not predict bonds prices and spreads during penalty phase.

Figure 2.1: Bond Price Schedule

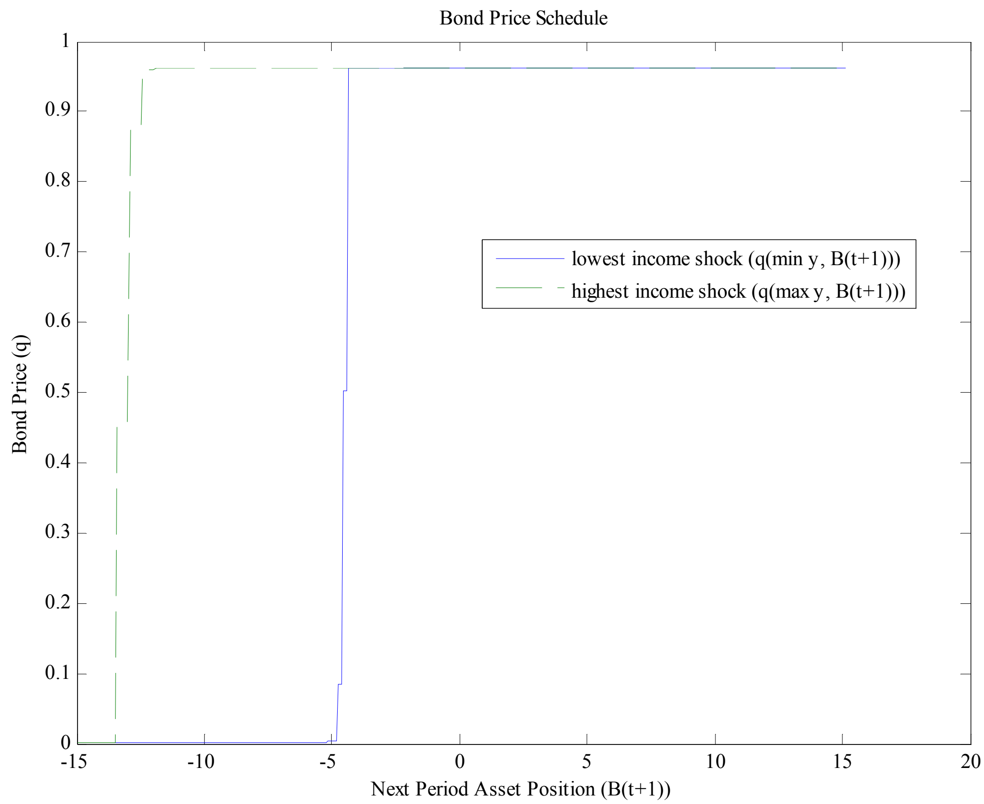

Table 2.5: (Appendix) Volatilities and Correlations of GDP, Private Consumption and Government Consumption

Country/Region (number of country)	Standard Deviation(%)					Contemporaneous Correlations			Sample Period	Source
	Y	PC (relative to Y)		GC (relative to Y)		Y, PC	Y, GC	PC, GC		
G7 Countries (7)										
Canada	2.19	2.04	(0.93)	3.87	(1.77)	0.83	-0.49	-0.36	1972-2004	IFS
France	1.44	1.43	(0.99)	1.18	(0.82)	0.86	-0.28	-0.05	1972-2003	WDI
Germany	1.87	1.98	(1.06)	1.31	(0.70)	0.85	0.26	0.35	1972-2003	WDI
Italy	1.56	1.92	(1.23)	1.67	(1.07)	0.80	0.26	0.38	1972-2003	WDI
Japan	1.92	1.97	(1.02)	4.89	(2.54)	0.64	-0.11	-0.53	1972-2004	IFS
United Kingdom	2.14	2.35	(1.10)	2.94	(1.37)	0.92	-0.20	-0.12	1972-2004	IFS
United States	1.98	1.71	(0.86)	2.00	(1.01)	0.92	0.12	0.35	1972-2004	IFS
G7 Countries Average	**1.87**	**1.91**	**(1.03)**	**2.55**	**(1.33)**	**0.83**	**-0.06**	**0.00**		
Other OECD Countries (16)										
Australia	1.65	0.93	(0.57)	2.73	(1.66)	0.46	-0.03	0.44	1972-2004	IFS
Austria	1.40	1.37	(0.98)	1.63	(1.16)	0.82	0.28	0.42	1972-2003	WDI
Belgium	1.55	1.63	(1.05)	1.31	(0.84)	0.78	0.26	0.44	1972-2003	WDI
Denmark	1.87	2.29	(1.23)	2.06	(1.10)	0.77	-0.11	-0.08	1972-2004	IFS
Finland	3.58	3.46	(0.97)	2.01	(0.56)	0.94	0.49	0.62	1972-2003	WDI
Greece	2.64	2.82	(1.07)	2.84	(1.07)	0.80	0.15	0.07	1972-2003	WDI
Iceland	2.80	3.96	(1.41)	3.80	(1.36)	0.78	0.74	0.58	1972-2004	IFS
Ireland	2.55	3.34	(1.31)	3.56	(1.39)	0.71	0.28	0.10	1972-2002	WDI
Luxembourg	3.34	2.14	(0.64)	2.30	(0.69)	0.59	0.54	0.69	1972-2003	WDI
Netherlands	1.72	2.43	(1.41)	1.30	(0.75)	0.88	0.18	0.33	1972-2002	WDI
New Zealand	2.40	2.40	(1.00)	4.40	(1.83)	0.72	0.28	0.34	1972-2004	IFS
Norway	1.95	3.80	(1.95)	3.46	(1.77)	0.55	0.14	0.67	1972-2004	IFS
Portugal	3.23	3.49	(1.08)	2.96	(0.92)	0.57	0.62	0.73	1972-2002	WDI
Spain	2.33	2.85	(1.22)	2.40	(1.03)	0.94	0.70	0.84	1972-2003	WDI
Sweden	1.97	2.01	(1.02)	2.50	(1.27)	0.63	-0.28	-0.20	1972-2004	IFS
Switzerland	2.12	1.10	(0.52)	5.92	(2.80)	0.74	-0.13	0.02	1972-2004	IFS
Other OECD Countries Average	**2.32**	**2.50**	**(1.09)**	**2.82**	**(1.26)**	**0.73**	**0.26**	**0.38**		
Average OECD countries	**2.18**	**2.32**	**(1.07)**	**2.74**	**(1.28)**	**0.76**	**0.16**	**0.26**		
East Asia (11)										
Cambodia	1.94	7.05	(3.63)	27.97	(14.41)	0.29	-0.05	-0.91	1988-2004	IFS
China	3.38	3.39	(1.00)	4.93	(1.46)	0.80	0.40	0.46	1972-2003	WDI
Hong Kong, China	3.37	3.86	(1.15)	4.09	(1.21)	0.65	0.07	0.40	1972-2004	IFS
Indonesia	4.06	5.37	(1.32)	9.86	(2.43)	0.56	0.59	0.23	1972-2004	IFS
Korea, Rep.	3.27	3.76	(1.15)	4.70	(1.44)	0.57	0.20	0.31	1972-2004	IFS
Macao, China	7.35	2.05	(0.28)	6.21	(0.85)	0.14	-0.26	0.23	1982-2004	IFS
Malaysia	4.07	5.39	(1.33)	7.68	(1.89)	0.75	0.27	0.69	1972-2004	IFS
Philippines	3.97	2.70	(0.68)	8.85	(2.23)	0.79	0.76	0.53	1972-2004	IFS
Singapore	3.63	3.16	(0.87)	7.23	(1.99)	0.36	-0.12	-0.39	1972-2004	IFS
Thailand	4.91	4.22	(0.86)	5.93	(1.21)	0.94	0.35	0.45	1972-2004	IFS
Vietnam	1.52	3.14	(2.06)	8.57	(5.63)	0.72	0.90	0.64	1990-2004	IFS
East Asia Average	**3.77**	**4.01**	**(1.30)**	**8.73**	**(3.16)**	**0.60**	**0.28**	**0.24**		
South Asia (7)										
Bangladesh	1.32	4.36	(3.31)	16.35	(12.42)	0.20	0.02	-0.34	1972-2004	WDI
Bhutan	2.51	11.45	(4.56)	9.82	(3.91)	0.38	-0.15	-0.37	1980-2000	IFS
India	2.12	2.40	(1.13)	5.46	(2.57)	0.63	0.53	0.44	1972-2003	IFS
Nepal	1.97	1.96	(0.99)	7.15	(3.63)	0.58	0.19	-0.16	1975-2004	IFS
Pakistan	1.42	2.57	(1.81)	8.12	(5.72)	0.33	0.36	-0.32	1972-2004	IFS
Sri Lanka	2.06	2.93	(1.42)	8.28	(4.01)	0.36	0.40	0.15	1972-2004	IFS
South Asia Average	**1.90**	**4.28**	**(2.20)**	**9.20**	**(5.38)**	**0.41**	**0.23**	**-0.10**		
Middle East & North Africa (15)										
Algeria	2.36	4.55	(1.93)	5.80	(2.46)	0.50	0.15	0.39	1972-2004	WDI
Bahrain	4.45	11.91	(2.68)	6.93	(1.56)	0.61	0.08	0.08	1975-2004	IFS
Egypt, Arab Rep.	2.11	2.78	(1.31)	6.57	(3.11)	0.16	0.10	-0.56	1974-2003	WDI
Iran, Islamic Rep.	9.51	8.91	(0.94)	12.50	(1.31)	0.42	0.66	0.13	1972-2004	IFS
Israel	7.10	7.92	(1.12)	12.45	(1.75)	0.86	0.92	0.72	1972-2004	IFS
Jordan	6.37	8.08	(1.27)	9.89	(1.55)	0.74	0.52	0.59	1976-2004	WDI
Kuwait	11.14	19.64	(1.76)	18.60	(1.67)	0.33	0.38	0.91	1972-1989	IFS
Libya	11.59	9.28	(0.80)	19.14	(1.65)	0.40	-0.03	0.78	1972-1983	WDI
Morocco	3.25	3.05	(0.94)	10.33	(3.17)	0.62	0.50	0.12	1972-2004	IFS
Oman	6.09	22.35	(3.67)	7.70	(1.26)	0.55	0.26	0.08	1972-2003	IFS
Saudi Arabia	5.73	13.46	(2.35)	13.60	(2.37)	-0.10	0.03	0.46	1972-2004	IFS
Syrian Arab Republic	6.07	8.65	(1.43)	9.66	(1.59)	0.80	0.47	-0.01	1972-2002	IFS
Tunisia	2.13	2.19	(1.03)	3.61	(1.70)	0.46	0.24	0.41	1972-2004	IFS
United Arab Emirates	12.53	8.37	(0.67)	19.38	(1.55)	0.56	0.69	0.71	1975-1989	WDI
Yemen, Rep.	2.23	6.51	(2.91)	7.44	(3.33)	-0.22	-0.46	0.36	1990-2004	WDI
Middle East & North Africa Average	**6.18**	**9.18**	**(1.65)**	**10.91**	**(2.00)**	**0.45**	**0.30**	**0.34**		
Pacific (2)										
Fiji	21.24	22.61	(1.06)	20.56	(0.97)	0.98	0.95	0.92	1972-2001	IFS
Papua New Guinea	5.01	8.15	(1.63)	8.92	(1.78)	0.02	0.36	0.09	1973-2004	IFS
Pacific Average	**13.13**	**15.38**	**(1.35)**	**14.74**	**(1.37)**	**0.50**	**0.66**	**0.51**		

Table 2.5: (Appendix) Volatilities and Correlations of GDP, Private Consumption and Government Consumption (continued 2)

Country/Region (number of country)	Standard Deviation(%)					Contemporaneous Correlations			Sample Period	Source
	Y	PC (relative to Y)		GC (relative to Y)		Y, PC	Y, GC	PC, GC		
Other Europe & Central Asia (25)										
Albania	10.11	6.70	(0.66)	16.71	(1.65)	0.52	0.94	0.49	1990-2003	WDI
Armenia	16.63	11.22	(0.67)	5.33	(0.32)	0.86	0.43	0.29	1990-2004	WDI
Azerbaijan	16.50	18.89	(1.14)	6.57	(0.40)	0.97	0.84	0.76	1992-2002	WDI
Belarus	9.10	6.08	(0.67)	12.02	(1.32)	0.91	0.70	0.59	1990-2004	IFS
Bulgaria	6.44	7.26	(1.13)	12.92	(2.01)	0.86	0.69	0.71	1980-2004	WDI
Croatia	1.75	7.57	(4.33)	4.25	(2.43)	-0.15	-0.24	0.05	1994-2004	IFS
Cyprus	7.05	5.90	(0.84)	6.11	(0.87)	0.86	-0.06	-0.09	1972-2004	IFS
Czech Republic	3.80	5.89	(1.55)	4.33	(1.14)	0.90	0.62	0.53	1990-2004	WDI
Estonia	8.97	10.35	(1.15)	9.16	(1.02)	0.92	0.01	-0.20	1988-2004	WDI
Georgia	3.16	9.88	(3.13)	22.55	(7.13)	0.73	0.72	0.51	1994-2003	WDI
Hungary	4.05	3.28	(0.81)	6.20	(1.53)	0.34	0.44	0.67	1972-2004	IFS
Kazakhstan	9.63	12.69	(1.32)	12.65	(1.31)	0.87	0.66	0.60	1990-2004	WDI
Kyrgyz Republic	12.25	11.26	(0.92)	14.54	(1.19)	0.85	0.97	0.89	1990-2003	WDI
Latvia	11.95	16.35	(1.37)	3.88	(0.33)	0.97	0.28	0.20	1980-2004	WDI
Lithuania	11.34	8.11	(0.71)	16.91	(1.49)	0.88	0.42	0.17	1990-2004	IFS
Macedonia, FYR	4.70	5.22	(1.11)	6.76	(1.44)	0.53	0.39	-0.04	1990-2004	WDI
Malta	4.99	4.18	(0.84)	4.78	(0.96)	0.74	0.62	0.47	1972-2004	IFS
Moldova	11.07	9.27	(0.84)	24.43	(2.21)	-0.12	0.32	0.16	1992-2004	WDI
Poland	6.61	5.65	(0.85)	24.28	(3.67)	0.45	0.10	-0.13	1980-2004	IFS
Romania	6.77	7.05	(1.04)	23.62	(3.49)	0.86	-0.33	-0.22	1980-2004	IFS
Russian Federation	8.65	5.80	(0.67)	6.50	(0.75)	0.63	0.72	0.47	1990-2004	WDI
Slovak Republic	1.77	1.78	(1.00)	4.77	(2.69)	0.16	0.46	0.54	1993-2004	IFS
Slovenia	4.19	4.17	(1.00)	2.77	(0.66)	0.76	0.86	0.62	1990-2004	WDI
Turkey	3.83	4.12	(1.08)	9.65	(2.52)	0.74	0.30	0.59	1987-2004	IFS
Ukraine	12.26	11.22	(0.92)	9.06	(0.74)	0.69	0.65	0.09	1990-2004	WDI
Other Europe & Central Asia Average	**7.90**	**8.00**	**(1.19)**	**10.83**	**(1.73)**	**0.67**	**0.46**	**0.35**		
Latin America & Caribbean (26)										
Argentina	5.90	8.05	(1.37)	8.30	(1.41)	0.97	0.66	0.81	1993-2004	IFS
Barbados	4.14	7.47	(1.80)	9.00	(2.17)	0.75	0.03	0.18	1972-2002	IFS
Belize	6.92	7.61	(1.10)	4.49	(0.65)	0.67	0.35	0.19	1979-2004	IFS
Bolivia	3.72	5.44	(1.46)	17.79	(4.78)	0.50	0.46	0.08	1972-2004	IFS
Brazil	3.32	6.79	(2.05)	7.82	(2.36)	0.37	0.44	-0.29	1972-2004	IFS
Chile	5.92	7.75	(1.31)	7.43	(1.26)	0.80	0.53	0.57	1972-2004	IFS
Colombia	2.30	2.78	(1.21)	7.34	(3.19)	0.81	0.32	0.14	1972-2004	WDI
Costa Rica	3.69	5.17	(1.40)	3.71	(1.01)	0.84	0.83	0.68	1972-2004	WDI
Dominican Republic	3.48	5.25	(1.51)	25.91	(7.46)	0.74	0.19	-0.07	1972-2004	IFS
Ecuador	3.77	3.32	(0.88)	13.55	(3.59)	0.57	0.44	0.27	1972-2004	IFS
El Salvador	5.85	5.08	(0.87)	6.46	(1.10)	0.86	0.44	0.31	1972-2004	IFS
Guatemala	3.27	3.06	(0.94)	8.97	(2.74)	0.88	0.36	0.26	1972-2004	IFS
Guyana	9.33	12.99	(1.39)	18.84	(2.02)	0.59	0.30	-0.10	1972-1993	IFS
Haiti	3.02	3.97	(1.31)	13.81	(4.57)	0.71	0.27	-0.07	1972-1990	WDI
Honduras	3.21	2.37	(0.74)	7.47	(2.33)	0.25	0.07	0.35	1972-2004	IFS
Jamaica	2.89	3.83	(1.33)	9.97	(3.46)	0.62	0.02	0.08	1972-2003	IFS
Mexico	3.53	4.38	(1.24)	8.42	(2.39)	0.80	0.70	0.71	1972-2004	IFS
Nicaragua	7.13	10.65	(1.49)	18.11	(2.54)	0.29	0.24	-0.67	1972-2004	WDI
Panama	5.69	7.37	(1.29)	6.45	(1.13)	0.43	0.45	0.31	1972-2004	IFS
Paraguay	4.14	5.67	(1.37)	13.32	(3.21)	0.64	0.58	0.21	1972-2004	WDI
Peru	5.92	6.83	(1.15)	12.41	(2.10)	0.69	0.69	0.67	1972-2004	IFS
St. Lucia	4.40	11.69	(2.66)	7.14	(1.63)	0.78	-0.02	-0.13	1977-2003	IFS
Suriname	2.88	4.13	(1.43)	13.67	(4.74)	0.70	0.43	-0.07	1990-2003	WDI
Trinidad and Tobago	5.47	10.50	(1.92)	13.23	(2.42)	0.64	0.43	0.66	1972-2004	IFS
Uruguay	5.45	6.64	(1.22)	7.50	(1.38)	0.97	0.51	0.45	1972-2004	IFS
Venezuela, RB	5.05	7.58	(1.50)	17.94	(3.55)	0.57	0.49	0.17	1972-2004	IFS
Latin America & Caribbean Average	**4.63**	**6.40**	**(1.38)**	**11.12**	**(2.66)**	**0.67**	**0.39**	**0.22**		

Table 2.5: (Appendix) Volatilities and Correlations of GDP, Private Consumption and Government Consumption (continued 3)

Country/Region (number of country)	Standard Deviation(%)					Contemporaneous Correlations			Sample Period	Source
	Y	PC (relative to Y)		GC (relative to Y)		Y, PC	Y, GC	PC, GC		
Sub-Saharan Africa (40)										
Angola	3.68	12.23	(3.33)	5.85	(1.59)	0.50	-0.28	-0.71	1980-1990	WDI
Benin	3.50	4.70	(1.34)	15.78	(4.51)	0.51	0.40	0.19	1972-2004	IFS
Botswana	4.10	18.10	(4.41)	18.19	(4.43)	0.38	0.26	0.89	1974-2004	IFS
Burkina Faso	2.22	4.28	(1.93)	9.22	(4.15)	0.48	0.38	-0.20	1972-2003	WDI
Burundi	4.61	6.45	(1.40)	15.60	(3.38)	0.80	0.47	0.13	1972-2004	IFS
Cameroon	6.04	7.97	(1.32)	9.57	(1.59)	0.77	0.51	0.40	1972-2004	WDI
Cape Verde	2.68	3.48	(1.30)	10.48	(3.90)	0.49	0.27	-0.19	1980-2002	IFS
Central African Republic	3.69	5.91	(1.60)	7.89	(2.14)	0.85	-0.11	-0.06	1972-1991	WDI
Chad	7.24	10.59	(1.46)	19.25	(2.66)	0.88	0.28	0.16	1983-2004	WDI
Comoros	2.41	4.82	(2.00)	7.76	(3.22)	0.45	0.16	-0.18	1980-2003	WDI
Congo, Dem. Rep.	2.53	5.44	(2.15)	27.71	(10.97)	0.63	0.21	0.08	1993-2002	WDI
Congo, Rep.	7.56	13.33	(1.76)	15.62	(2.07)	0.53	0.49	0.02	1972-2004	WDI
Cote d'Ivoire	5.31	7.08	(1.34)	8.56	(1.61)	0.90	0.73	0.65	1972-2004	WDI
Ethiopia	12.01	12.64	(1.05)	21.23	(1.77)	0.93	0.70	0.49	1972-2001	IFS
Gabon	11.65	8.94	(0.77)	14.35	(1.23)	-0.27	0.56	-0.25	1972-2004	WDI
Gambia, The	2.78	12.97	(4.67)	13.46	(4.84)	0.04	-0.21	-0.36	1972-2004	WDI
Ghana	3.83	11.74	(3.06)	11.58	(3.02)	0.51	0.15	-0.39	1972-2004	WDI
Guinea-Bissau	6.18	13.48	(2.18)	11.76	(1.90)	0.42	0.39	-0.05	1972-2004	WDI
Kenya	7.53	7.58	(1.01)	9.07	(1.20)	0.70	0.79	0.77	1972-2004	IFS
Lesotho	5.83	7.33	(1.26)	7.22	(1.24)	0.24	-0.01	0.18	1972-2004	WDI
Madagascar	3.58	3.40	(0.95)	13.89	(3.88)	0.67	0.42	0.06	1972-2004	IFS
Malawi	4.02	7.37	(1.83)	9.87	(2.46)	0.68	-0.29	-0.63	1972-2004	WDI
Mali	4.78	4.60	(0.96)	15.48	(3.24)	0.76	0.10	-0.11	1972-2004	WDI
Mauritania	2.49	11.84	(4.75)	18.15	(7.28)	0.21	0.23	-0.13	1972-2000	WDI
Mauritius	4.27	5.79	(1.35)	7.98	(1.87)	0.38	0.55	0.66	1972-2004	IFS
Mozambique	6.72	7.07	(1.05)	15.81	(2.35)	0.84	0.23	0.42	1980-2004	WDI
Namibia	2.13	8.30	(3.90)	3.84	(1.80)	0.07	0.18	0.33	1980-2004	WDI
Niger	6.64	12.11	(1.82)	13.17	(1.98)	0.51	0.33	-0.39	1972-1999	WDI
Nigeria	11.53	16.37	(1.42)	22.51	(1.95)	0.72	0.35	0.48	1972-2003	IFS
Rwanda	12.76	8.39	(0.66)	20.90	(1.64)	0.78	0.67	0.35	1972-2004	WDI
Senegal	3.39	2.69	(0.79)	5.44	(1.60)	0.66	0.34	0.58	1972-2004	WDI
Sierra Leone	8.79	7.87	(0.89)	16.82	(1.91)	0.82	0.79	0.70	1972-2003	IFS
South Africa	2.08	2.57	(1.24)	4.21	(2.03)	0.52	0.05	0.37	1972-2004	IFS
Sudan	7.26	8.99	(1.24)	11.44	(1.58)	0.69	-0.08	-0.49	1972-1990	WDI
Swaziland	4.39	8.93	(2.04)	10.34	(2.36)	0.09	-0.06	0.22	1977-2001	IFS
Tanzania	2.18	2.91	(1.33)	15.77	(7.22)	-0.08	0.59	-0.41	1990-2004	WDI
Togo	5.81	9.65	(1.66)	10.89	(1.87)	0.53	0.19	-0.14	1972-2004	WDI
Uganda	3.20	3.73	(1.17)	4.36	(1.36)	0.94	0.31	0.25	1982-2004	WDI
Zambia	3.06	9.60	(3.14)	16.89	(5.53)	0.44	0.11	-0.20	1972-2004	WDI
Zimbabwe	5.84	10.78	(1.85)	15.02	(2.57)	0.17	0.07	-0.23	1972-2002	WDI
Sub-Saharan Africa Average	**5.26**	**8.30**	**(1.83)**	**12.82**	**(2.95)**	**0.53**	**0.28**	**0.08**		
Average all countries (148)	**5.07**	**6.69**	**(1.48)**	**10.00**	**(2.43)**	**0.60**	**0.32**	**0.22**		
Average OECD countries (23)	**2.18**	**2.32**	**(1.07)**	**2.74**	**(1.28)**	**0.76**	**0.16**	**0.26**		
of which G7 countries (7)	**1.87**	**1.91**	**(1.03)**	**2.55**	**(1.33)**	**0.83**	**-0.06**	**0.00**		
of which Other OECD countries (16)	**2.32**	**2.50**	**(1.09)**	**2.82**	**(1.26)**	**0.73**	**0.26**	**0.38**		
Average Developing Countries (125)	**5.60**	**7.49**	**(1.55)**	**11.34**	**(2.64)**	**0.58**	**0.35**	**0.21**		
(relative to G7 countries)	**(2.99)**	**(3.91)**		**(4.45)**						
of which Emerging Market Countries (33)	**4.63**	**5.49**	**(1.30)**	**9.60**	**(2.43)**	**0.64**	**0.43**	**0.33**		
(relative to G7 countries)	**(2.47)**	**(2.87)**		**(3.76)**						
of which Other Developing Countries (92)	**5.95**	**8.21**	**(1.64)**	**11.96**	**(2.72)**	**0.55**	**0.31**	**0.16**		
(relative to G7 countries)	**(3.18)**	**(4.29)**		**(4.69)**						

1/ Statistics are converted ot real term, taken logarithm, and detrended by Hodrick-Prescott filter with smoothing parameter of 100.

2/ Variables are: Y, real GDP; PC, real private consumption; GC, real government consumption.

3/ Some OECD member countries, which joined OECD after 1990s and/or are typically classified as emerging market countries (i.e. Turkey, Mexico, Czech, Hungary, Poland, Korea and Slovakia), are included in the developing countries.

4/ We include Argentina, Brazil, Bulgaria, Chile, China, Colombia, Cote D'Ivore, Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Hungary, Indonesia, Malaysia, Mexico, Morocco, Nigeria, Panama, Pakistan, Peru, Philippines, Poland, Russia, Korea, South Africa, Thailand, Tunisia, Turkey, Ukraine, Urugay, Venezuela, Vietnam, which are all included in the JP Morgan's EMBI global sovereign spread, in the emerging market countries.

Table 2.6.a: (Appendix) Government Expenditure by Economic Type/OECD Countries

	OECD Countries Average std %	(relative to Y)	correlation with Y	PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	4.57	(2.10)	-0.10	0.08	35.22	102.68
II. Total Expenditure (III+IV)	4.35	(1.99)	-0.08	0.09	34.38	100.00
III. Current Expenditure	4.44	(2.03)	-0.12	0.07	31.98	92.10
Expenditure on Goods & Serv.	6.09	(2.84)	0.02	0.10	8.93	26.20
Wages and Salaries	5.59	(2.64)	0.12	0.14	4.93	13.66
Employer Contributions	23.72	(12.46)	0.08	0.10	0.24	0.79
Other Purch.of Goods & Serv.	9.94	(4.62)	-0.10	0.00	4.22	12.66
Interest Payments	13.10	(6.06)	-0.06	-0.10	3.40	9.49
Subsidies & Oth. Curr. Transf.	6.40	(2.86)	-0.18	0.02	19.82	56.39
Subsidies	15.78	(7.35)	-0.20	-0.13	1.62	4.56
Transf. to Oth.Lev.Nat.Govt.	14.03	(6.54)	0.06	0.12	4.81	15.09
Transf. to Nonpft.Inst. & Houshld.	5.33	(2.44)	-0.32	-0.20	12.72	35.45
Transfers Abroad	24.83	(11.14)	0.04	-0.02	0.60	1.64
IV Capital Expenditure	12.57	(6.08)	0.13	0.15	2.63	7.90
Acquis. of Fixed Cap. Assets	14.43	(7.11)	0.15	0.19	1.17	3.52
Purchases of Stocks	84.83	(44.13)	-0.10	-0.13	0.06	0.19
Purch. of Land & Intang. Assets	40.39	(19.82)	0.01	0.07	0.10	0.30
Capital Transfers	16.61	(7.95)	0.06	0.12	1.51	4.52
Domestic	17.70	(8.33)	0.01	0.08	1.42	4.38
to Other Levels of Nat. Govt.	24.63	(11.70)	0.13	0.15	0.60	2.22
Abrord	41.66	(19.93)	0.03	0.05	0.07	0.18
V Lending Minus Repayments	-	-	-	-	0.88	2.68

	G7 Countries Average std %	(relative to Y)	correlation with Y	PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	3.42	(2.08)	-0.13	0.13	31.00	102.34
II. Total Expenditure (III+IV)	3.29	(2.00)	-0.09	0.10	30.29	100.00
III. Current Expenditure	3.27	(1.98)	-0.20	0.03	29.01	92.92
Expenditure on Goods & Serv.	4.76	(2.89)	0.03	0.08	7.56	24.22
Wages and Salaries	5.44	(3.30)	0.11	0.11	4.11	11.88
Employer Contributions	6.84	(4.16)	0.03	0.15	0.38	1.36
Other Purch.of Goods & Serv.	7.58	(4.61)	-0.09	0.03	4.27	13.78
Interest Payments	9.42	(5.72)	-0.01	0.09	3.42	10.94
Subsidies & Oth. Curr. Transf.	4.37	(2.65)	-0.21	-0.01	17.99	57.70
Subsidies	13.48	(8.19)	-0.16	-0.09	0.90	3.16
Transf. to Oth.Lev.Nat.Govt.	10.68	(6.49)	0.14	0.15	4.22	16.65
Transf. to Nonpft.Inst. & Houshld.	3.13	(1.90)	-0.51	-0.35	10.77	34.58
Transfers Abroad	21.95	(13.33)	0.09	-0.08	0.60	1.78
IV Capital Expenditure	13.37	(8.12)	0.27	0.28	2.00	7.06
Acquis. of Fixed Cap. Assets	11.59	(7.04)	0.30	0.30	0.68	2.44
Purchases of Stocks	59.44	(36.09)	-0.09	-0.13	0.06	0.19
Purch. of Land & Intang. Assets	30.16	(18.32)	0.18	0.15	0.05	0.26
Capital Transfers	15.05	(9.14)	0.27	0.34	1.46	5.10
Domestic	15.97	(9.70)	0.06	0.22	1.19	5.17
to Other Levels of Nat. Govt.	13.38	(8.12)	0.24	0.36	0.74	3.80
Abrord	30.09	(18.27)	0.09	0.20	0.07	0.19
V Lending Minus Repayments	-	-	-	-	0.71	2.34

	Other OECD Countries Average std %	(relative to Y)	correlation with Y	PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	5.07	(2.21)	-0.08	0.05	37.07	102.83
II. Total Expenditure (III+IV)	4.81	(2.09)	-0.08	0.09	36.16	100.00
III. Current Expenditure	4.96	(2.15)	-0.09	0.10	33.28	91.74
Expenditure on Goods & Serv.	6.67	(2.93)	0.02	0.11	9.53	27.07
Wages and Salaries	5.64	(2.50)	0.12	0.16	5.24	14.33
Employer Contributions	28.55	(15.12)	0.10	0.08	0.20	0.63
Other Purch.of Goods & Serv.	10.82	(4.77)	-0.11	-0.02	4.20	12.23
Interest Payments	14.71	(6.42)	-0.08	-0.18	3.39	8.85
Subsidies & Oth. Curr. Transf.	7.29	(3.09)	-0.17	0.03	20.62	55.82
Subsidies	16.55	(7.43)	-0.21	-0.14	1.86	5.03
Transf. to Oth.Lev.Nat.Govt.	15.83	(6.84)	0.01	0.11	5.12	14.26
Transf. to Nonpft.Inst. & Houshld.	6.18	(2.78)	-0.25	-0.15	13.47	35.79
Transfers Abroad	26.17	(10.71)	0.02	0.00	0.60	1.57
IV Capital Expenditure	12.22	(5.61)	0.07	0.10	2.91	8.27
Acquis. of Fixed Cap. Assets	15.67	(7.39)	0.09	0.14	1.38	3.99
Purchases of Stocks	122.92	(55.58)	-0.12	-0.13	0.06	0.19
Purch. of Land & Intang. Assets	43.80	(21.07)	-0.04	0.04	0.11	0.32
Capital Transfers	17.24	(7.82)	-0.02	0.04	1.53	4.29
Domestic	18.16	(8.28)	-0.01	0.04	1.48	4.17
to Other Levels of Nat. Govt.	27.84	(13.11)	0.11	0.09	0.56	1.77
Abrord	43.98	(20.20)	0.01	0.02	0.07	0.18
V Lending Minus Repayments	-	-	-	-	0.95	2.83

	Canada std %	(relative to Y)	correlation with Y	PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	3.74	(1.71)	-0.21	-0.19	22.96	102.45
II. Total Expenditure (III+IV)	3.21	(1.47)	-0.13	-0.10	22.45	100.00
III. Current Expenditure	3.09	(1.41)	-0.16	-0.12	21.97	97.79
Expenditure on Goods & Serv.	7.97	(3.64)	0.37	0.34	4.68	21.01
Wages and Salaries	6.58	(3.01)	0.15	0.24	2.18	9.76
Employer Contributions	3.58	(1.64)	0.39	0.57	0.38	1.70
Other Purch.of Goods & Serv.	11.06	(5.05)	0.40	0.32	2.30	10.35
Interest Payments	7.96	(3.64)	0.38	0.30	3.26	14.22
Subsidies & Oth. Curr. Transf.	4.05	(1.85)	-0.63	-0.55	14.02	62.56
Subsidies	17.38	(7.94)	0.04	0.24	0.49	2.09
Transf. to Oth.Lev.Nat.Govt.	6.75	(3.09)	0.02	0.05	4.00	17.93
Transf. to Nonpft.Inst. & Houshld.	5.17	(2.36)	-0.83	-0.63	9.90	43.24
Transfers Abroad	10.98	(5.02)	0.40	0.40	0.33	1.47
IV Capital Expenditure	19.59	(8.95)	0.13	0.10	0.49	2.21
Acquis. of Fixed Cap. Assets	16.22	(7.41)	0.10	0.12	0.45	2.00
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital Transfers	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Domestic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
to Other Levels of Nat. Govt.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Abrord	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
V Lending Minus Repayments	-	-	-	-	0.51	2.45

	France std %	(relative to Y)	correlation with Y	PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	2.61	(1.81)	-0.32	0.33	40.89	101.57
II. Total Expenditure (III+IV)	2.17	(1.50)	-0.39	0.29	40.29	100.00
III. Current Expenditure	2.16	(1.49)	-0.42	0.17	38.30	95.01
Expenditure on Goods & Serv.	6.15	(4.25)	-0.34	0.21	10.51	26.11
Wages and Salaries	4.97	(3.44)	-0.33	0.22	6.95	17.28
Employer Contributions	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	9.30	(6.44)	-0.32	0.19	3.56	8.83
Interest Payments	11.27	(7.80)	-0.59	-0.01	1.64	3.90
Subsidies & Oth. Curr. Transf.	2.67	(1.85)	-0.07	0.03	26.15	65.00
Subsidies	13.40	(9.27)	-0.64	-0.57	1.77	4.18
Transf. to Oth.Lev.Nat.Govt.	10.61	(7.34)	0.20	0.22	2.58	6.41
Transf. to Nonpft.Inst. & Houshld.	1.95	(1.35)	-0.35	0.04	21.12	49.52
Transfers Abroad	4.94	(3.42)	-0.02	0.09	1.50	3.68
IV Capital Expenditure	10.28	(7.11)	0.06	0.54	1.99	4.99
Acquis. of Fixed Cap. Assets	7.87	(5.45)	-0.16	0.39	0.83	2.08
Purchases of Stocks	101.24	(70.07)	-0.36	-0.27	0.09	0.27
Purch. of Land & Intang. Assets	13.83	(9.57)	0.06	-0.20	0.06	0.17
Capital Transfers	13.46	(9.31)	0.04	0.46	1.06	2.65
Domestic	12.47	(8.63)	-0.09	0.36	0.95	2.37
to Other Levels of Nat. Govt.	5.50	(3.81)	0.00	0.27	0.45	1.12
Abrord	40.40	(27.96)	0.26	0.43	0.11	0.28
V Lending Minus Repayments	-	-	-	-	0.60	1.57

	Germany std %	(relative to Y)	correlation with Y	PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	4.41	(2.36)	0.57	0.76	30.55	100.97
II. Total Expenditure (III+IV)	4.23	(2.26)	0.56	0.75	30.26	100.00
III. Current Expenditure	4.02	(2.15)	0.48	0.69	28.49	94.08
Expenditure on Goods & Serv.	3.21	(1.72)	0.13	0.24	10.10	33.50
Wages and Salaries	3.55	(1.90)	0.11	0.19	2.67	8.89
Employer Contributions	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	3.59	(1.92)	0.11	0.23	7.43	24.61
Interest Payments	9.36	(5.01)	0.08	0.34	1.39	4.50
Subsidies & Oth. Curr. Transf.	4.92	(2.64)	0.58	0.78	17.00	56.07
Subsidies	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Oth.Lev.Nat.Govt.	18.79	(10.06)	0.73	0.71	1.52	5.03
Transf. to Nonpft.Inst. & Houshld.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transfers Abroad	19.10	(10.23)	0.09	0.00	0.87	2.87
IV Capital Expenditure	11.58	(6.20)	0.80	0.87	1.81	6.09
Acquis. of Fixed Cap. Assets	6.91	(3.70)	0.71	0.78	0.43	1.46
Purchases of Stocks	17.97	(9.62)	0.28	0.26	0.06	0.22
Purch. of Land & Intang. Assets	16.67	(8.93)	0.24	0.37	0.04	0.14
Capital Transfers	13.89	(7.44)	0.78	0.86	1.28	4.27
Domestic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
to Other Levels of Nat. Govt.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Abrord	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
V Lending Minus Repayments	-	-	-	-	0.29	0.97

Table 2.6.a: (Appendix) Government Expenditure by Economic Type/OECD Countries (continued 2)

	Italy						Japan						United Kingdom					
	std		correlation with		% of Y	% of total	std		correlation with		% of Y	% of total	std		correlation with		% of Y	% of total
	%	(relative to Y)	Y	PC		expend.	%	(relative to Y)	Y	PC		expend.	%	(relative to Y)	Y	PC		expend.
I. Tot.Exp. & Lend-Repay (II+V)	3.33	(2.14)	-0.40	0.24	45.67	106.01	4.00	(2.08)	0.47	0.58	16.57	102.12	3.86	(1.80)	-0.60	-0.48	38.92	102.06
II. Total Expenditure (III+IV)	3.45	(2.22)	-0.06	0.03	43.42	100.00	4.01	(2.08)	0.43	0.57	16.24	100.00	3.83	(1.79)	-0.62	-0.53	38.20	100.00
III. Current Expenditure	4.21	(2.71)	-0.55	-0.16	44.88	92.41	3.69	(1.92)	0.37	0.51	13.37	82.17	3.87	(1.81)	-0.64	-0.55	35.95	94.11
Expenditure on Goods & Serv.	6.48	(4.16)	0.51	-0.47	7.87	16.26	1.78	(0.93)	0.01	0.35	2.28	14.20	2.60	(1.21)	-0.42	-0.27	11.52	30.24
Wages and Salaries	7.70	(4.95)	0.62	-0.50	5.99	12.39	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.89	(3.22)	0.00	0.18	4.55	11.99
Employer Contributions	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10.11	(4.72)	-0.34	-0.27	0.39	1.01
Other Purch.of Goods & Serv.	9.24	(5.94)	-0.11	-0.08	1.88	3.87	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.55	(2.59)	-0.56	-0.58	6.79	17.78
Interest Payments	11.49	(7.38)	-0.16	-0.11	9.34	19.25	10.38	(5.40)	0.03	0.17	2.24	13.39	8.41	(3.93)	0.41	0.31	3.48	9.13
Subsidies & Oth. Curr. Transf.	4.57	(2.93)	-0.72	0.07	27.44	56.48	5.26	(2.73)	0.49	0.62	8.84	54.56	6.03	(2.82)	-0.69	-0.62	20.95	54.74
Subsidies	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16.93	(8.81)	0.05	0.04	0.73	4.48	11.13	(5.20)	-0.38	-0.38	0.94	2.40
Transf. to Oth.Lev.Nat.Govt.	15.56	(10.00)	-0.20	-0.33	5.50	15.27	5.46	(2.84)	0.52	0.71	7.16	44.15	10.67	(4.99)	-0.45	-0.43	6.57	17.14
Transf. to Nonpft.Inst. & Houshld.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.16	(0.60)	0.08	0.16	0.71	4.33	5.10	(2.38)	-0.69	-0.57	13.22	33.87
Transfers Abroad	50.79	(32.64)	0.27	-0.83	0.53	1.47	20.25	(10.53)	0.21	0.21	0.03	0.16	36.25	(16.95)	-0.42	-0.53	0.73	1.90
IV Capital Expenditure	13.43	(8.63)	0.49	-0.17	3.47	7.15	7.97	(4.15)	0.37	0.50	2.87	17.83	14.35	(6.71)	-0.06	-0.01	2.25	5.89
Acquis. of Fixed Cap. Assets	27.05	(17.38)	0.45	-0.41	0.85	1.75	7.03	(3.66)	0.28	0.48	0.88	5.53	11.97	(5.60)	0.19	0.32	1.02	2.67
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	25.21	(13.11)	0.14	0.30	0.11	0.69	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital Transfers	12.09	(7.77)	0.44	0.12	2.60	5.34	8.42	(4.38)	0.36	0.47	1.87	11.61	19.44	(9.09)	-0.10	-0.08	1.20	3.14
Domestic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	8.42	(4.38)	0.36	0.47	1.87	11.61	20.08	(9.39)	-0.13	-0.11	1.18	3.10
to Other Levels of Nat. Govt.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	8.42	(4.38)	0.36	0.47	1.87	11.61	29.81	(13.94)	0.01	0.18	0.29	0.76
Abrord	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	19.77	(9.24)	-0.08	-0.03	0.04	0.09
V Lending Minus Repayments	-	-	-	-	2.25	6.01	-	-	-	-	0.33	2.12	-	-	-	-	0.73	2.06

	United States						Australia						Austria					
	std		correlation with		% of Y	% of total	std		correlation with		% of Y	% of total	std		correlation with		% of Y	% of total
	%	(relative to Y)	Y	PC		expend.	%	(relative to Y)	Y	PC		expend.	%	(relative to Y)	Y	PC		expend.
I. Tot.Exp. & Lend-Repay (II+V)	1.99	(1.00)	-0.40	-0.32	21.43	101.22	5.83	(3.54)	-0.21	0.12	23.93	101.98	2.23	(1.59)	0.46	0.39	36.76	102.11
II. Total Expenditure (III+IV)	2.12	(1.07)	-0.40	-0.28	21.17	100.00	5.08	(3.09)	-0.16	0.15	23.55	100.00	2.30	(1.64)	0.35	0.30	36.71	100.00
III. Current Expenditure	1.85	(0.93)	-0.48	-0.35	20.08	94.85	4.68	(2.84)	-0.20	0.07	21.59	91.62	2.26	(1.61)	0.27	0.32	33.61	91.45
Expenditure on Goods & Serv.	5.11	(2.58)	-0.02	0.16	5.97	28.23	4.29	(2.60)	0.07	0.29	5.82	24.78	2.77	(1.97)	-0.02	0.26	9.52	26.04
Wages and Salaries	2.93	(1.47)	0.14	0.35	2.31	10.99	6.76	(4.11)	0.42	-0.03	0.54	2.20	3.66	(2.61)	-0.15	0.08	3.84	10.51
Employer Contributions	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	19.00	(11.54)	-0.37	-0.05	0.02	0.08	4.37	(3.12)	-0.47	-0.48	0.33	0.83
Other Purch.of Goods & Serv.	6.77	(3.41)	-0.07	0.08	3.66	17.23	2.72	(1.65)	-0.28	-0.45	5.99	24.05	3.59	(2.55)	0.10	0.29	5.69	15.53
Interest Payments	7.04	(3.55)	-0.25	-0.34	2.61	12.16	14.94	(9.07)	0.50	0.12	1.65	6.99	7.02	(5.00)	0.20	0.33	2.49	6.59
Subsidies & Oth. Curr. Transf.	3.09	(1.56)	-0.44	-0.41	11.50	54.46	6.14	(3.73)	-0.40	-0.03	14.12	59.84	2.78	(1.98)	0.32	0.27	21.54	58.67
Subsidies	8.56	(4.32)	0.11	0.23	0.57	2.64	12.17	(7.39)	-0.34	-0.37	0.60	2.49	11.66	(8.31)	0.08	0.20	1.89	5.12
Transf. to Oth.Lev.Nat.Govt.	6.95	(3.50)	0.14	0.09	2.21	10.58	6.41	(3.89)	-0.05	0.32	5.93	25.12	14.94	(10.64)	0.40	0.23	3.06	8.35
Transf. to Nonpft.Inst. & Houshld.	2.27	(1.14)	-0.76	-0.73	8.91	41.93	7.98	(4.85)	-0.54	-0.27	7.44	30.94	2.21	(1.57)	0.05	0.13	16.24	44.28
Transfers Abroad	11.32	(5.70)	0.08	0.12	0.20	0.95	5.74	(3.49)	-0.22	-0.12	0.35	1.53	7.67	(5.47)	0.11	0.25	0.35	0.93
IV Capital Expenditure	16.42	(8.27)	0.11	0.16	1.12	5.29	16.54	(10.04)	0.03	0.30	1.95	8.38	9.06	(6.46)	0.32	0.09	3.10	8.55
Acquis. of Fixed Cap. Assets	4.05	(2.04)	0.50	0.43	0.33	1.58	32.00	(19.43)	0.26	0.45	0.73	3.05	6.12	(4.36)	-0.05	-0.02	1.11	3.09
Purchases of Stocks	59.10	(29.79)	-0.18	-0.37	0.03	0.10	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	64.94	(32.73)	0.26	0.15	0.01	0.03	91.86	(55.78)	0.27	0.31	0.01	0.05	19.05	(13.57)	-0.06	0.17	0.09	0.27
Capital Transfers	23.03	(11.61)	0.10	0.19	0.76	3.60	14.41	(8.75)	-0.34	-0.04	1.21	5.27	15.64	(11.14)	0.30	0.06	1.90	5.19
Domestic	22.91	(11.55)	0.08	0.18	0.76	3.59	14.41	(8.75)	-0.34	-0.04	1.21	5.27	15.68	(11.17)	0.30	0.06	1.89	5.16
to Other Levels of Nat. Govt.	9.77	(4.93)	0.57	0.51	0.36	1.71	14.45	(8.77)	-0.33	-0.03	1.10	4.80	27.51	(19.60)	0.67	0.46	0.67	1.80
Abrord	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	39.29	(28.00)	0.27	0.37	0.01	0.03
V Lending Minus Repayments	-	-	-	-	0.26	1.22	-	-	-	-	0.38	1.98	-	-	-	-	0.75	2.11

Table 2.6.a: (Appendix) Government Expenditure by Economic Type/OECD Countries (continued 3)

	Belgium std %	Belgium std (relative to Y)	Belgium correlation with Y	Belgium correlation with PC	Belgium % of Y	Belgium % of total expend.	Denmark std %	Denmark std (relative to Y)	Denmark correlation with Y	Denmark correlation with PC	Denmark % of Y	Denmark % of total expend.	Finland std %	Finland std (relative to Y)	Finland correlation with Y	Finland correlation with PC	Finland % of Y	Finland % of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	2.55	(1.65)	-0.13	0.02	48.73	101.10	3.83	(2.05)	-0.37	-0.27	37.72	100.98	6.31	(1.76)	-0.74	-0.57	32.84	104.65
II. Total Expenditure (III+IV)	2.40	(1.55)	-0.04	0.09	48.17	100.00	3.80	(2.03)	-0.33	-0.23	37.36	100.00	4.70	(1.31)	-0.75	-0.57	31.39	100.00
III. Current Expenditure	2.32	(1.49)	0.00	0.21	44.94	93.22	3.65	(1.96)	-0.31	-0.24	35.67	95.40	5.10	(1.42)	-0.80	-0.64	28.76	91.02
Expenditure on Goods & Serv.	2.82	(1.82)	0.09	0.23	10.02	20.90	2.72	(1.46)	-0.27	-0.41	8.28	22.48	3.22	(0.90)	-0.20	0.09	6.25	20.23
Wages and Salaries	3.85	(2.48)	0.25	0.19	7.25	15.13	2.85	(1.53)	-0.03	-0.10	5.13	13.96	3.45	(0.96)	0.10	0.32	3.04	10.03
Employer Contributions	34.18	(22.04)	-0.03	0.05	0.19	0.40	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	8.23	(5.31)	-0.18	0.05	2.58	5.37	5.36	(2.87)	-0.32	-0.47	3.15	8.52	4.62	(1.29)	-0.36	-0.12	3.21	10.20
Interest Payments	8.41	(5.43)	-0.30	-0.60	6.96	14.24	15.72	(8.41)	0.23	0.12	4.14	10.66	27.19	(7.59)	-0.33	-0.31	1.60	4.60
Subsidies & Oth. Curr. Transf.	3.20	(2.07)	0.13	0.40	27.96	58.09	4.47	(2.39)	-0.47	-0.23	23.25	62.27	6.24	(1.74)	-0.76	-0.62	20.91	66.19
Subsidies	5.69	(3.67)	0.27	0.12	2.18	4.41	8.60	(4.60)	-0.35	-0.34	1.78	4.61	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Oth.Lev.Nat.Govt.	4.11	(2.65)	0.16	0.10	3.10	6.45	4.44	(2.38)	-0.30	0.03	14.16	38.23	8.00	(2.23)	-0.51	-0.41	5.69	18.07
Transf. to Nonpft.Inst. & Houshld.	2.15	(1.39)	-0.21	-0.05	22.53	46.06	5.22	(2.79)	-0.54	-0.30	7.10	18.33	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transfers Abroad	20.76	(13.39)	0.09	-0.13	0.53	1.13	11.79	(6.31)	0.61	0.45	1.38	3.67	18.07	(5.05)	0.48	0.56	0.32	1.01
IV Capital Expenditure	7.88	(5.08)	-0.17	-0.35	3.23	6.78	12.92	(6.91)	-0.35	-0.09	1.69	4.60	10.84	(3.03)	0.44	0.44	2.63	8.98
Acquis. of Fixed Cap. Assets	9.19	(5.92)	-0.19	-0.34	1.60	3.38	9.95	(5.33)	-0.21	0.01	0.80	2.19	7.98	(2.23)	0.61	0.77	1.18	4.07
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	166.08	(88.89)	-0.36	-0.32	0.04	0.12	79.77	(22.27)	0.11	0.07	0.08	0.26
Purch. of Land & Intang. Assets	38.96	(25.12)	0.15	-0.03	0.14	0.31	31.90	(17.07)	0.31	0.48	0.02	0.06	29.67	(8.28)	0.12	0.11	0.18	0.58
Capital Transfers	8.83	(5.69)	-0.12	-0.27	1.49	3.08	20.38	(10.91)	-0.25	-0.04	0.82	2.23	18.83	(5.26)	0.24	0.19	1.21	4.10
Domestic	10.29	(6.63)	-0.10	-0.26	1.33	2.75	21.57	(11.55)	-0.26	-0.10	0.72	1.95	18.28	(5.10)	0.25	0.20	1.20	4.09
to Other Levels of Nat. Govt.	14.21	(9.16)	-0.06	-0.29	0.34	0.70	92.67	(49.60)	0.20	0.41	0.08	0.21	15.64	(4.37)	0.53	0.55	0.33	1.08
Abrord	22.35	(14.42)	-0.08	0.02	0.16	0.33	67.37	(36.06)	0.12	0.34	0.10	0.28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
V Lending Minus Repayments	-	-	-	-	0.56	1.10	-	-	-	-	0.36	0.98	-	-	-	-	1.45	4.65

	Greece std %	Greece std (relative to Y)	Greece correlation with Y	Greece correlation with PC	Greece % of Y	Greece % of total expend.	Iceland std %	Iceland std (relative to Y)	Iceland correlation with Y	Iceland correlation with PC	Iceland % of Y	Iceland % of total expend.	Ireland std %	Ireland std (relative to Y)	Ireland correlation with Y	Ireland correlation with PC	Ireland % of Y	Ireland % of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	10.19	(3.86)	0.05	-0.04	34.10	100.13	4.69	(1.68)	0.23	0.19	31.06	105.30	5.72	(2.24)	-0.05	-0.12	44.20	104.68
II. Total Expenditure (III+IV)	10.22	(3.87)	0.04	-0.05	34.06	100.00	5.79	(2.07)	0.42	0.38	29.58	100.00	4.85	(1.90)	-0.09	-0.22	42.21	100.00
III. Current Expenditure	11.32	(4.28)	0.04	-0.01	29.19	84.82	5.27	(1.88)	0.47	0.42	25.35	85.56	4.79	(1.88)	-0.16	-0.32	38.74	91.67
Expenditure on Goods & Serv.	12.38	(4.69)	0.11	-0.24	13.38	35.94	2.66	(0.95)	0.31	0.40	16.20	50.83	4.44	(1.74)	-0.14	-0.12	7.99	19.03
Wages and Salaries	9.01	(3.41)	-0.18	-0.34	9.45	28.97	3.79	(1.35)	0.20	0.31	8.86	27.82	4.85	(1.90)	-0.18	-0.13	5.71	13.60
Employer Contributions	5.40	(2.04)	0.18	0.17	0.10	0.32	12.31	(4.40)	0.72	0.49	0.43	1.45	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	24.90	(9.43)	0.08	-0.17	4.26	11.06	1.64	(0.59)	0.54	0.53	6.85	21.47	5.25	(2.06)	0.03	-0.05	2.29	5.43
Interest Payments	15.84	(6.00)	0.00	-0.07	5.40	15.61	13.58	(4.85)	-0.38	-0.38	2.39	8.00	5.14	(2.01)	-0.07	-0.41	6.58	15.35
Subsidies & Oth. Curr. Transf.	27.18	(10.29)	0.19	0.09	12.04	31.25	7.52	(2.69)	-0.20	-0.26	9.27	28.98	5.93	(2.33)	-0.17	-0.30	24.17	57.30
Subsidies	44.34	(16.78)	-0.58	-0.36	0.80	2.54	22.75	(8.13)	-0.28	-0.27	2.53	7.99	9.61	(3.77)	0.25	0.16	1.19	3.25
Transf. to Oth.Lev.Nat.Govt.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	50.72	(18.12)	-0.08	-0.25	0.47	1.48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Nonpft.Inst. & Houshld.	26.43	(10.00)	0.54	0.32	5.33	16.48	6.90	(2.46)	-0.40	-0.46	6.58	20.57	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transfers Abroad	30.84	(11.67)	0.26	0.14	0.08	0.23	26.44	(9.45)	-0.30	-0.52	0.08	0.26	35.80	(14.03)	0.02	-0.12	0.43	0.99
IV Capital Expenditure	8.04	(3.04)	0.21	-0.06	4.90	15.24	14.48	(5.17)	0.18	0.17	4.23	14.44	11.36	(4.45)	0.29	0.35	3.47	8.33
Acquis. of Fixed Cap. Assets	15.23	(5.77)	0.17	0.08	3.69	11.56	12.80	(4.57)	-0.12	-0.08	2.03	6.96	17.96	(7.04)	0.31	0.26	0.87	2.05
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	84.92	(32.14)	0.33	0.53	0.21	0.73	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital Transfers	38.74	(14.66)	-0.33	-0.41	1.00	2.94	23.53	(8.41)	0.27	0.24	2.19	7.49	10.49	(4.11)	0.22	0.34	2.60	6.28
Domestic	38.73	(14.66)	-0.33	-0.41	1.00	2.94	23.53	(8.41)	0.27	0.24	2.19	7.49	10.73	(4.21)	0.23	0.35	2.57	6.21
to Other Levels of Nat. Govt.	93.03	(35.21)	0.34	0.43	0.30	2.45	10.43	(3.73)	0.13	0.18	0.43	1.36	18.02	(7.06)	0.01	-0.09	0.98	2.42
Abrord	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	35.46	(13.90)	-0.26	-0.36	0.03	0.07
V Lending Minus Repayments	-	-	-	-	0.04	0.13	-	-	-	-	1.48	5.30	-	-	-	-	1.99	4.68

Table 2.6.a: (Appendix) Government Expenditure by Economic Type/OECD Countries (continued 4)

	Luxembourg std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	Netherlands std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	New Zealand std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	6.51	(1.95)	-0.05	0.48	42.10	101.80	2.56	(1.48)	0.04	0.13	51.13	99.03	4.68	(1.95)	-0.06	0.10	32.88	96.91
II. Total Expenditure (III+IV)	6.51	(1.95)	-0.09	0.42	41.35	100.00	2.25	(1.30)	0.04	0.14	51.60	100.00	3.79	(1.58)	0.06	0.64	34.07	100.00
III. Current Expenditure	5.94	(1.78)	-0.15	0.49	36.74	88.86	2.42	(1.41)	-0.05	0.03	48.22	93.53	3.88	(1.61)	0.18	0.68	33.10	97.17
Expenditure on Goods & Serv.	6.37	(1.91)	0.03	0.31	9.36	22.71	2.63	(1.52)	0.46	0.38	7.67	14.87	13.64	(5.68)	-0.32	-0.37	15.07	45.29
Wages and Salaries	6.91	(2.07)	0.16	0.30	7.60	18.43	3.08	(1.78)	0.59	0.48	4.69	9.09	4.12	(1.71)	0.70	0.26	4.28	10.83
Employer Contributions	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	9.31	(2.79)	-0.35	0.18	1.76	4.29	3.54	(2.05)	-0.02	-0.03	2.98	5.78	40.52	(16.87)	-0.73	-0.27	9.22	23.97
Interest Payments	23.56	(7.06)	-0.15	-0.08	0.55	1.35	8.52	(4.94)	-0.63	-0.51	4.06	7.91	7.01	(2.92)	0.14	-0.32	3.88	11.06
Subsidies & Oth. Curr. Transf.	6.66	(2.00)	-0.20	0.50	26.82	64.80	3.20	(1.85)	0.01	0.06	36.49	70.74	13.34	(5.55)	0.19	0.52	14.15	40.83
Subsidies	16.73	(5.02)	0.14	0.03	3.11	8.03	22.67	(13.14)	0.18	0.19	0.91	1.84	20.12	(8.37)	-0.49	-0.39	0.16	0.50
Transf. to Oth.Lev.Nat.Govt.	5.18	(1.55)	0.14	0.55	2.79	6.79	4.20	(2.44)	-0.33	-0.27	12.05	23.27	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Nonpft.Inst. & Houshld.	2.63	(0.79)	0.31	0.16	18.69	48.16	4.05	(2.35)	-0.57	-0.58	22.31	45.42	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transfers Abroad	13.48	(4.04)	-0.35	-0.11	1.04	2.54	8.51	(4.94)	-0.04	0.06	1.47	2.86	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
IV Capital Expenditure	10.93	(3.28)	-0.05	-0.03	5.02	12.12	10.89	(6.31)	0.18	0.21	3.38	6.47	23.54	(9.80)	-0.60	-0.25	0.98	2.83
Acquis. of Fixed Cap. Assets	10.79	(3.24)	0.08	0.13	2.62	6.37	9.61	(5.57)	0.27	0.26	0.80	1.55	10.30	(4.29)	-0.46	-0.05	0.86	2.52
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	36.52	(10.95)	0.24	-0.10	0.42	1.03	44.93	(26.05)	-0.71	-0.53	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital Transfers	12.86	(3.86)	-0.31	-0.07	1.97	4.73	13.11	(7.60)	0.14	0.15	2.58	4.92	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Domestic	13.29	(3.99)	-0.29	-0.06	1.90	4.56	13.80	(8.00)	0.13	0.14	2.48	4.72	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
to Other Levels of Nat. Govt.	15.91	(4.77)	-0.21	-0.06	0.57	1.38	15.30	(8.87)	0.11	-0.02	0.96	1.86	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Abrord	30.95	(9.28)	-0.11	0.33	0.07	0.17	38.93	(22.57)	-0.03	-0.05	0.11	0.20	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
V Lending Minus Repayments	-	-	-	-	0.75	1.80	-	-	-	-	-0.47	-0.97	-	-	-	-	-1.19	-3.09

	Norway std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	Portugal std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	Spain std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	4.73	(2.42)	0.34	0.59	40.20	111.97	5.58	(1.73)	0.12	0.37	41.36	103.52	3.33	(1.43)	0.12	0.12	29.80	103.49
II. Total Expenditure (III+IV)	3.55	(1.82)	-0.02	0.35	36.00	100.00	5.99	(1.86)	0.24	0.48	40.00	100.00	2.91	(1.25)	0.07	0.09	28.91	100.00
III. Current Expenditure	3.59	(1.84)	0.01	0.40	34.27	95.21	6.16	(1.91)	0.11	0.51	35.30	87.55	4.01	(1.72)	0.17	0.16	26.18	90.13
Expenditure on Goods & Serv.	3.15	(1.61)	-0.27	-0.15	7.25	20.20	8.82	(2.73)	0.58	0.80	14.07	34.89	7.85	(3.37)	0.34	0.39	8.35	31.02
Wages and Salaries	3.24	(1.66)	0.15	0.58	3.34	9.39	10.66	(3.30)	0.61	0.80	10.17	25.21	8.27	(3.55)	0.23	0.31	5.89	21.73
Employer Contributions	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	5.52	(2.83)	-0.35	-0.50	3.91	10.80	6.06	(1.88)	0.29	0.59	3.88	9.64	13.55	(5.83)	0.36	0.32	2.46	9.28
Interest Payments	12.69	(6.50)	0.49	0.51	2.06	5.64	12.87	(3.99)	-0.14	0.20	5.63	13.90	35.78	(15.37)	-0.16	-0.31	2.02	6.26
Subsidies & Oth. Curr. Transf.	4.18	(2.14)	-0.06	0.37	24.96	69.37	8.27	(2.56)	-0.30	0.06	15.60	38.76	5.88	(2.52)	-0.05	-0.07	15.81	52.85
Subsidies	7.49	(3.84)	-0.03	0.29	4.07	10.91	20.94	(6.49)	-0.58	-0.26	3.38	8.43	7.52	(3.23)	-0.37	-0.37	1.12	3.35
Transf. to Oth.Lev.Nat.Govt.	8.75	(4.48)	0.07	0.27	6.18	16.98	30.83	(9.55)	0.70	0.60	1.15	2.84	38.12	(16.38)	0.26	0.11	3.19	9.91
Transf. to Nonpft.Inst. & Houshld.	3.11	(1.59)	-0.62	-0.29	14.06	37.41	5.65	(1.75)	-0.06	0.27	10.50	26.07	4.95	(2.13)	-0.22	-0.09	13.67	40.61
Transfers Abroad	7.03	(3.60)	0.19	0.39	0.72	1.99	101.85	(31.55)	-0.58	-0.58	0.58	1.42	54.26	(23.32)	-0.16	-0.16	0.14	0.42
IV Capital Expenditure	9.57	(4.90)	-0.25	-0.25	1.73	4.79	13.94	(4.32)	0.53	0.54	4.70	11.66	9.17	(3.94)	0.14	0.13	2.81	10.21
Acquis. of Fixed Cap. Assets	8.71	(4.46)	-0.15	0.21	1.46	4.06	12.17	(3.77)	0.67	0.64	1.92	4.75	14.47	(6.22)	0.45	0.45	1.38	5.15
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	40.46	(20.73)	-0.56	-0.48	0.01	0.03	33.51	(10.38)	-0.15	0.19	0.07	0.16	50.70	(21.79)	0.10	0.10	0.05	0.20
Capital Transfers	18.21	(9.33)	-0.32	-0.17	0.37	0.99	17.63	(5.46)	0.41	0.42	2.72	6.74	10.74	(4.62)	-0.27	-0.26	1.37	4.86
Domestic	26.05	(13.34)	-0.11	-0.02	0.30	0.81	19.21	(5.95)	0.40	0.40	2.58	6.40	11.18	(4.80)	-0.26	-0.25	1.35	4.77
to Other Levels of Nat. Govt.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	8.29	(2.57)	0.61	0.30	0.81	1.99	34.44	(14.80)	-0.11	-0.09	0.34	1.09
Abrord	10.71	(5.49)	-0.41	-0.54	0.11	0.28	98.13	(30.40)	0.08	-0.04	0.14	0.34	87.44	(37.58)	0.02	0.02	0.03	0.09
V Lending Minus Repayments	-	-	-	-	4.19	11.97	-	-	-	-	1.36	3.52	-	-	-	-	0.89	3.49

Table 2.6.a: (Appendix) Government Expenditure by Economic Type/OECD Countries (continued 5)

	Sweden						Switzerland					
	std		correlation with		% of Y	% of total	std		correlation with		% of Y	% of total
	%	(relative to Y)	Y	PC		expend.	%	(relative to Y)	Y	PC		expend.
I. Tot.Exp. & Lend-Repay (II+V)	3.89	(1.97)	-0.65	-0.35	41.46	107.35	8.51	(4.02)	-0.45	-0.30	24.91	100.26
II. Total Expenditure (III+IV)	3.86	(1.96)	-0.68	-0.37	38.82	100.00	9.00	(4.25)	-0.39	-0.22	24.85	100.00
III. Current Expenditure	3.73	(1.89)	-0.65	-0.35	37.26	95.71	10.19	(4.82)	-0.38	-0.20	23.62	94.87
Expenditure on Goods & Serv.	4.31	(2.18)	-0.13	0.09	6.33	16.73	24.70	(11.68)	-0.32	-0.19	6.86	27.11
Wages and Salaries	3.78	(1.91)	-0.33	0.00	2.74	7.30	12.01	(5.68)	-0.62	-0.55	1.24	4.99
Employer Contributions	112.41	(56.92)	0.30	0.16	0.11	0.29	12.15	(5.74)	0.36	0.24	0.24	1.02
Other Purch.of Goods & Serv.	5.11	(2.59)	-0.21	0.00	3.52	9.25	33.17	(15.68)	-0.28	-0.15	5.38	21.10
Interest Payments	20.13	(10.19)	-0.19	-0.58	4.08	10.07	7.00	(3.31)	-0.52	-0.56	0.84	3.43
Subsidies & Oth. Curr. Transf.	4.87	(2.46)	-0.55	-0.04	26.85	68.91	6.73	(3.18)	-0.42	-0.20	15.92	64.34
Subsidies	23.59	(11.95)	-0.78	-0.34	2.95	7.02	14.38	(6.80)	-0.29	-0.37	1.22	4.91
Transf. to Oth.Lev.Nat.Govt.	13.37	(6.77)	-0.10	0.21	4.70	11.44	16.66	(7.87)	-0.20	-0.05	4.10	16.40
Transf. to Nonpft.Inst. & Houshld.	4.31	(2.18)	-0.41	-0.42	20.48	49.63	4.74	(2.24)	-0.60	-0.33	10.16	41.27
Transfers Abroad	15.80	(8.00)	0.20	-0.28	1.14	2.76	34.50	(16.31)	0.04	0.23	0.44	1.75
IV Capital Expenditure	18.48	(9.36)	-0.40	-0.23	1.56	4.29	7.81	(3.69)	0.66	0.59	1.14	4.68
Acquis. of Fixed Cap. Assets	39.21	(19.86)	0.03	-0.09	0.97	2.67	34.24	(16.18)	-0.30	-0.37	0.09	0.36
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	23.08	(10.91)	-0.50	-0.30	0.11	0.43
Capital Transfers	25.05	(12.69)	-0.67	-0.23	0.59	1.61	10.10	(4.77)	0.74	0.65	0.95	3.89
Domestic	25.51	(12.92)	-0.74	-0.29	0.58	1.60	10.12	(4.78)	0.74	0.65	0.95	3.89
to Other Levels of Nat. Govt.	25.97	(13.15)	-0.40	-0.23	0.28	0.81	3.91	(1.85)	-0.03	-0.29	0.69	2.81
Abrord	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	9.15	(4.32)	0.53	0.13	0.00	0.01
V Lending Minus Repayments	-	-	-	-	2.63	7.35	-	-	-	-	0.06	0.26

1/ Statistics are converted ot real term, taken logarithm, and detrended by Hodrick-Prescott filter with smoothing parameter of 100.
2/ Variables are: Y, real GDP; PC, real private consumption.

Table 2.6.b: (Appendix) Government Expenditure by Economic Type/Selected Emerging Market Countries

	Selected Emerging Market Countries Average: std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	Mexico: std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	Chile: std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	8.98	(2.15)	0.20	0.12	19.84	103.63	14.52	(4.12)	-0.09	-0.33	18.25	101.93	7.97	(1.35)	0.60	0.40	26.35	99.44
II. Total Expenditure (III+IV)	8.78	(2.07)	0.20	0.13	19.26	100.00	11.56	(3.28)	-0.04	-0.28	17.90	100.00	7.87	(1.33)	0.52	0.33	26.47	100.00
III. Current Expenditure	8.49	(2.02)	0.18	0.17	16.11	83.69	13.64	(3.87)	-0.14	-0.35	14.95	82.67	9.07	(1.53)	0.43	0.43	22.72	85.89
Expenditure on Goods & Serv.	9.32	(2.24)	0.42	0.41	7.08	37.91	9.95	(2.82)	0.63	0.59	5.16	30.21	9.27	(1.57)	0.63	0.64	8.90	32.60
Wages and Salaries	10.29	(2.47)	0.33	0.36	4.29	22.39	12.22	(3.46)	0.63	0.58	3.76	21.97	11.69	(1.98)	0.67	0.76	5.94	21.73
Employer Contributions	21.83	(5.60)	0.36	0.48	0.36	2.05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	11.14	(2.63)	0.39	0.29	2.66	14.87	9.49	(2.69)	0.27	0.31	1.39	8.24	10.57	(1.79)	0.23	-0.15	2.79	10.32
Interest Payments	25.23	(5.86)	-0.19	-0.13	2.77	13.25	31.74	(9.00)	-0.49	-0.55	4.79	23.37	39.65	(6.70)	-0.61	-0.28	1.29	5.04
Subsidies & Oth. Curr. Transf.	17.75	(4.27)	0.20	0.11	6.26	32.16	24.18	(6.86)	0.38	0.04	5.00	29.10	14.54	(2.46)	0.44	0.33	12.57	48.42
Subsidies	30.22	(6.98)	-0.14	-0.09	0.29	1.77	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Oth.Lev.Nat.Govt.	22.63	(4.99)	-0.09	-0.04	1.67	10.30	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Nonpft.Inst. & Houshld.	11.18	(2.66)	0.30	0.28	3.80	23.50	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transfers Abroad	28.82	(6.33)	-0.06	-0.03	0.04	0.23	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
IV Capital Expenditure	19.72	(4.57)	0.33	0.19	3.03	16.24	14.23	(4.04)	0.75	0.54	3.13	18.19	14.58	(2.46)	0.33	-0.17	3.76	14.11
Acquis. of Fixed Cap. Assets	20.02	(4.66)	0.46	0.31	1.91	9.96	21.95	(6.23)	0.71	0.55	1.84	10.81	15.99	(2.70)	0.61	0.16	3.22	12.06
Purchases of Stocks	43.63	(13.36)	-0.14	0.08	0.07	0.53	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	38.51	(9.94)	0.43	0.40	0.44	2.91	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital Transfers	43.11	(9.79)	-0.17	-0.22	1.03	5.50	41.13	(11.66)	-0.26	-0.30	1.29	7.38	54.95	(9.28)	-0.43	-0.53	0.55	2.12
Domestic	42.72	(9.70)	-0.18	-0.22	1.00	5.29	41.90	(11.88)	-0.26	-0.30	1.28	7.16	54.95	(9.28)	-0.43	-0.53	0.55	2.12
to Other Levels of Nat. Govt.	36.09	(7.53)	-0.10	-0.17	0.62	3.75	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Abrord	86.96	(21.76)	-0.08	-0.12	0.01	0.05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
V Lending Minus Repayments	-	-	-	-	0.57	3.63	-	-	-	-	0.34	1.93	-	-	-	-	-0.12	-0.56

	Argentina: std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	Korea: std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.	Thailand: std %	std (relative to Y)	correlation with Y	correlation with PC	% of Y	% of total expend.
I. Tot.Exp. & Lend-Repay (II+V)	6.81	(1.15)	-0.13	-0.36	15.64	98.67	6.42	(1.97)	-0.03	0.11	18.68	113.14	9.48	(1.93)	0.04	0.08	18.01	102.16
II. Total Expenditure (III+IV)	7.31	(1.24)	-0.23	-0.45	15.85	100.00	5.39	(1.65)	0.06	0.22	16.48	100.00	9.38	(1.91)	0.11	0.17	17.61	100.00
III. Current Expenditure	6.82	(1.16)	-0.25	-0.45	14.75	93.05	5.09	(1.56)	0.36	0.62	13.29	80.98	5.58	(1.14)	0.11	0.23	12.84	73.76
Expenditure on Goods & Serv.	4.96	(0.84)	0.18	-0.03	3.25	20.54	6.07	(1.86)	0.32	0.32	5.94	36.38	7.93	(1.62)	0.30	0.38	9.61	55.13
Wages and Salaries	4.85	(0.82)	0.06	-0.13	2.47	15.60	7.13	(2.18)	0.26	0.38	2.25	13.74	8.11	(1.65)	0.05	0.19	4.96	28.33
Employer Contributions	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Purch.of Goods & Serv.	7.87	(1.33)	0.34	0.15	0.78	4.94	8.05	(2.47)	0.22	0.17	3.68	22.64	11.71	(2.39)	0.38	0.41	4.64	26.73
Interest Payments	7.14	(1.21)	0.71	0.77	2.21	13.67	17.06	(5.23)	-0.31	-0.24	0.79	4.78	36.78	(7.49)	-0.42	-0.36	1.45	8.38
Subsidies & Oth. Curr. Transf.	10.96	(1.86)	-0.34	-0.54	9.30	58.84	7.03	(2.15)	0.30	0.65	6.56	39.82	13.90	(2.83)	0.14	0.19	1.74	10.06
Subsidies	27.02	(4.58)	-0.65	-0.57	0.16	1.03	33.14	(10.15)	0.45	0.50	0.38	2.34	30.50	(6.21)	-0.23	-0.19	0.34	1.95
Transf. to Oth.Lev.Nat.Govt.	21.84	(3.70)	-0.39	-0.56	0.93	5.91	7.04	(2.16)	-0.01	0.23	4.30	26.08	29.68	(6.04)	-0.01	0.02	0.71	4.26
Transf. to Nonpft.Inst. & Houshld.	10.88	(1.84)	-0.35	-0.56	8.18	51.67	14.70	(4.50)	0.81	0.91	2.32	13.86	7.95	(1.62)	0.43	0.51	0.90	4.97
Transfers Abroad	26.93	(4.57)	0.06	0.00	0.04	0.23	22.25	(6.81)	0.09	0.21	0.06	0.35	37.29	(7.59)	-0.31	-0.29	0.02	0.10
IV Capital Expenditure	21.98	(3.73)	-0.11	-0.41	1.10	6.95	16.48	(5.05)	0.04	0.06	2.94	17.69	25.98	(5.29)	0.21	0.24	4.77	26.24
Acquis. of Fixed Cap. Assets	21.51	(3.65)	0.31	0.08	0.23	1.49	12.99	(3.98)	-0.06	-0.04	1.24	7.50	23.56	(4.80)	0.43	0.46	3.58	20.34
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	43.63	(13.36)	-0.14	0.08	0.07	0.53	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	30.27	(5.13)	0.32	0.30	0.00	0.01	58.10	(17.79)	0.19	0.01	0.22	1.34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Capital Transfers	32.08	(5.44)	-0.29	-0.57	0.86	5.45	28.18	(8.63)	0.04	0.06	1.41	8.43	51.67	(10.52)	-0.11	-0.09	1.19	5.90
Domestic	31.97	(5.42)	-0.28	-0.56	0.85	5.40	28.25	(8.65)	0.03	0.08	1.40	8.36	51.62	(10.51)	-0.11	-0.08	1.19	5.88
to Other Levels of Nat. Govt.	53.90	(9.14)	-0.37	-0.64	0.72	4.56	23.02	(7.05)	0.02	-0.01	0.75	4.42	31.36	(6.39)	0.06	0.15	0.40	2.27
Abrord	94.14	(15.96)	-0.19	-0.08	0.01	0.05	128.15	(39.25)	0.02	-0.01	0.02	0.16	n.a.	n.a.	n.a.	n.a.	0.00	0.00
V Lending Minus Repayments	-	-	-	-	-0.21	-1.33	-	-	-	-	2.20	13.14	-	-	-	-	0.40	2.16

Table 2.6.b: (Appendix) Government Expenditure by Economic Type/Selected Emerging Market Countries (continued 2)

	Philippines						Turkey					
	std		correlation with		% of Y	% of total	std		correlation with		% of Y	% of total
	%	(relative to Y)	Y	PC		expend.	%	(relative to Y)	Y	PC		expend.
I. Tot.Exp. & Lend-Repay (II+V)	9.60	(2.42)	0.60	0.40	16.92	109.64	8.09	(2.11)	0.40	0.57	25.01	100.44
II. Total Expenditure (III+IV)	11.96	(3.02)	0.59	0.36	15.66	100.00	7.99	(2.08)	0.38	0.56	24.86	100.00
III. Current Expenditure	11.85	(2.99)	0.41	0.19	12.41	83.02	7.39	(1.93)	0.37	0.54	21.84	86.49
Expenditure on Goods & Serv.	13.37	(3.37)	0.64	0.49	7.62	52.18	13.72	(3.58)	0.26	0.52	9.06	38.33
Wages and Salaries	10.55	(2.66)	0.45	0.30	4.28	28.70	17.46	(4.55)	0.21	0.46	6.38	26.62
Employer Contributions	22.73	(5.73)	0.45	0.42	0.25	1.78	20.94	(5.46)	0.26	0.54	0.47	2.32
Other Purch.of Goods & Serv.	20.80	(5.25)	0.63	0.45	3.12	21.84	9.50	(2.48)	0.64	0.65	2.21	9.41
Interest Payments	19.85	(5.01)	-0.25	-0.40	2.98	17.66	24.38	(6.36)	0.05	0.17	5.91	19.86
Subsidies & Oth. Curr. Transf.	27.65	(6.97)	0.27	0.12	1.74	10.61	26.01	(6.79)	0.22	-0.03	6.87	28.29
Subsidies	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Oth.Lev.Nat.Govt.	31.96	(8.06)	0.06	0.16	0.73	4.94	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transf. to Nonpft.Inst. & Houshld.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Transfers Abroad	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
IV Capital Expenditure	27.69	(6.98)	0.70	0.56	2.51	16.98	17.08	(4.46)	0.38	0.49	3.02	13.51
Acquis. of Fixed Cap. Assets	30.98	(7.81)	0.71	0.51	1.23	8.34	13.14	(3.43)	0.51	0.43	2.06	9.22
Purchases of Stocks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Purch. of Land & Intang. Assets	33.28	(8.39)	0.63	0.52	1.41	9.70	32.39	(8.45)	0.57	0.78	0.12	0.60
Capital Transfers	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	50.62	(13.21)	0.01	0.13	0.84	3.70
Domestic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	47.63	(12.43)	-0.01	0.09	0.69	2.80
to Other Levels of Nat. Govt.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Abrord	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	38.59	(10.07)	-0.08	-0.26	0.00	0.00
V Lending Minus Repayments	-	-	-	-	1.26	9.64	-	-	-	-	0.15	0.42

1/ Statistics are converted ot real term, taken logarithm, and detrended by Hodrick-Prescott filter with smoothing parameter of 100.
2/ Variables are: Y, real GDP; PC, real private consumption.

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Chapter III

Financial Integration and Consumption Risk Sharing

Abstract

This paper empirically explores how international financial integration provides risk sharing opportunities. In order to answer to this question, a joint test of rational expectation and permanent income hypothesis (RE/PIH) is conducted. I pay particular attention to the stochastic properties of income process and diverse theoretical predictions for the consumption path responding to various types of income shock. Thereby, two unobserved components of income (i.e. permanent and transitory components) and three types of income shocks (i.e. level, slope and transitory shocks) are considered. The results suggest that there is less than full consumption risk sharing overall, while OECD countries are insured better against predictable changes in transitory income. I also show that financial integration improves consumption risk sharing on the whole. Moreover, OECD and the emerging market countries, albeit to a lesser extent, have been sharing risk through cross border holdings of equities and securities besides debts. Furthermore, the results support the hypothesis that financial integration leads to an even larger adjustment in consumption in response to a permanent shock to income growth, which can explain the higher relative volatility of consumption growth in the 1990s and strongly countercyclical current account observed in the emerging market countries.

III.1 Introduction

Economists typically regard international financial integration as an opportunity to share idiosyncratic risks, and thus varieties of theoretical models in international business cycle predict that a country should experience a lower relative volatility of consumption vis-à-vis national income when it is well-integrated into the international financial market. Nevertheless, Kose, Prasad and Terrones (2003) report empirical findings which are incompatible with this prediction (Table 3.1). They show that the median ratio of the volatility of total consumption growth rate to that of income growth rate for more financially integrated developing countries goes up from the 1970s and 1980s to the 1990s to reach the level in the 1960s. This is due both to the decrease in the volatility of income growth rate as well as to the increase in the volatility of consumption growth rate. Moreover, industrial countries virtually experienced no change in their average relative volatility over time since the 1970s. Given the developments of financial integration during last several decades and particularly the surge in the cross border capital flow among the developed countries in the 1990s, those findings are interpreted as puzzling and cast some doubts on the functioning of international financial integration in terms of providing better opportunities to share idiosyncratic risks.

On closer inspection, these patterns of relative volatility of consumption growth rate are puzzling because they contradict to the usual prediction of rational expectations and the permanent income hypothesis (RE/PIH). However, I claim that RE/PIH prediction is indeed contingent on the types of income shock and process considered. When income growth is positively autocorrelated, consumption volatility can exceed income volatility under risk sharing, contrarily to the standard case of mean reverting income process. With this idea in mind, this paper empirically explores how international financial integration provides risk sharing opportunities. The goals of this analysis are to test whether countries are subject to credit constraint and to investigate how financial integration improves consumption risk sharing, after accounting for the stochastic properties of the income process. Specifically, I apply joint test of RE/PIH, which is developed by Flavin (1981) and then expanded by Elwood (1998) who argue that due consideration for the specification of the income process is crucial. By explicitly considering multiple income components which follow different processes respectively, this paper tries to disentangle the adjustment patterns of consumption path against the various types of income shocks when sample countries are integrated to international financial markets. To be specific, the empirical results clarify the presence of full international consumption risk sharing for transitory component of income. Furthermore, the results show how financial integration helps consumption risk sharing against predictable income changes as well as various types of income shocks including level shock (permanent shock to level income), slope shock (shock to the income growth) and transitory shock.

The results suggest that there is less than full consumption risk sharing overall, while OECD countries are insured better against predictable changes in transitory income. Moreover, while international financial integration is shown to improve consumption risk sharing on the whole, some of this effect is attributed to rating effect of country classification group. In addition, an even larger increase in consumption responding to permanent shock to income growth with more financial integration is supported, which is consistent with the prediction of RE/PIH.

This paper is related to a vast empirical literature discussing the lack of international consumption risk sharing[17], particularly through regression approach focusing on consumption growth and income growth. Most of them argue that the fruits of better consumption risk sharing are, at best, limited to developed countries and little evidences that developing countries benefit

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[17] Backus, Kehoe and Kydland (1992) point out that consumption correlations are too low to be explained by a standard DSGE model with complete markets (the quantity anomaly).

from recent financial integration in this sense have been reported. Lewis (1996) shows that consumption risk sharing cannot be rejected for unrestricted countries, by allowing for both nonseparability between tradables and nontradable leisure or goods and capital market restrictions. On the other hand, Sørenson and Yosha (1998), applying risk sharing regression developed by Asdrubali, Sørenson and Yosha (1996), show only 40% of shocks to GDP are insured in European countries and OECD countries. Among many of the succeeding studies, three recent studies are most closely related to this paper. Artis and Hoffmann (2006) show that OECD countries have become more insured against permanent shocks. Kose, Prasad and Terrones (2007), who explicitly investigate the impact of financial integration on consumption smoothness, argue that developed countries have attained better risk sharing outcomes during the recent period of globalization, while developing countries have been shut out of this benefit. Contrarily, Bai and Zhang (2005) show that there have been no substantial improvement in the degree of international risk sharing in the last two decades even in developed countries.

The rest of this paper is organized as follows: Section 2 discusses theoretical predictions for consumption path under risk sharing with various income processes. Section 3 reviews ways to measure the degree of international financial integration. Section 4 describes the data set used in the analysis. Section 5 presents the empirical framework and methodology. Section 6 shows regression results. Finally, section 7 draws up the conclusions.

III.2 Theoretical Predictions under Risk Sharing with Various Income Processes

In this section, I show that prediction of RE/PIH on consumption path hinges on the underlying types of income shocks and processes. These predictions are the bases of the null hypotheses to be tested in the following sections. Note that discussions are based on the assumption of a simple endowment economy under trade in one period bonds where households can not use investment to smooth consumption.

As is illustrated in Figure 3.1, RE/PIH predicts that consumption growth should be smaller than income growth in a small open endowment economy under risk sharing, when the income process is mean reverting. This supports the conventional notion that financially integrated countries should benefit by consumption smoothness. Since the domestic agents seek to adjust consumption level by trading one period bonds when they foresee future income changes, already anticipated income changes may not affect consumption at all under full risk sharing. Furthermore, if the agents have an opportunity to insure through contingent bonds in advance, then even unpredicted income changes may not affect consumption.

On the other hand, when income follows random walk, RE/PIH predicts that consumption growth should correspond to income growth even under risk sharing (Figure 3.2). This implies that volatility of consumption is independent of the degree of international financial integration. Nevertheless, should the contingent bonds be the available option, financial integration would lead to lower consumption volatility.

Moreover, as Aguiar and Gopinath (2007) recently argue, income process may be characterized by permanent shock to income growth rate rather than transitory shock to level income, particularly in the emerging market countries. As illustrated by Figure 3.3, RE/PIH predicts that instantaneous increase in consumption should be greater than that of income in a small open endowment economy, when income changes are positively autocorrelated. Thereby higher consumption volatility, as well as strongly countercyclical current account[18], is possible under risk sharing.

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[18] Related to this, Kaminsky, Reinhart and Végh (2004) report procyclical capital inflow in most of the developed and developing countries. They provide three explanations which are based on (i) dominating investment effect in a standard international business cycle model with physical capital stock, (ii) intertemporal distortion in consumption imposed by temporary policies, and (iii) varying risk premium over the business cycle.

These simple exercises show that we need to draw a sharp line between consumption risk sharing and consumption smoothness. In fact, consumption risk sharing can reinforce volatility of consumption exceeding that of income, when positively autocorrelated permanent income shocks dominate transitory shocks. Therefore, I will pay explicit attention to those diverse predictions of RE/PIH for the consumption path responding to various types of income shock under risk sharing in the empirical analysis.

III.3 Measuring International Financial Integration

This section is devoted to discuss the ways to measure degree of international financial integration, which are indispensable to analyze the impact of integration on consumption risk sharing. There is some consensus that international financial integration has dramatically advanced in last two decades in the globalization era following the goods and services trade integration. Number of emerging market and other developing countries took liberalization policy in the late 1980s and early 1990s, after developed countries adopted open capital account policy in the 1970s and 1980s. Therefore, international financial integration is true of not only developed countries but also of emerging market countries in post 1990 period. Since capital account liberalization policy typically precedes spur for the foreign investment, I consider two kinds of measure of international financial integration, which are de jure measure based on capital account liberalization policy adopted and de facto measure founded on a realized macro variable.

As a de jure measure of international financial integration, I employ official equity market liberalization indicator constructed by Bekaert, Harvey and Lundblad (2005). They specify a date of formal regulatory change after which foreign investors officially have the opportunity to invest in domestic equity securities which potentially has far-reaching impact on the consumption risk sharing. This indicator is a binary variable taking a value of one when the equity market is officially liberalized and thereafter, and zero otherwise (denoted by BHL hereafter). According to BHL, many of the OECD countries were already open by 1980 and most of the remaining OECD countries were financially liberalized in the 1980s. On the other hand, many of the emerging market countries became liberalized only in the late 1980s or in the early 1990s, and some other developing countries are to be officially opened up to foreign investors.

An alternative avenue being explored in the literature is de facto measures based on actual capital flows and other realized macroeconomics variables. Those measures include saving-investment correlation which probably is the most popular one after Feldstein and Horioka puzzle (Feldstein and Horioka, 1980). Nevertheless, alternative explanations for the observed high saving-investment correlation are proposed by Tesar (1991). Moreover this correlation based measure is hard to apply for the empirical analysis based on annual frequency data. In this sense, Lane and Milesi-Ferretti (2006) recently proposed a direct measure of de facto financial openness by estimating gross stocks of foreign assets and liabilities. The measure (denoted by LMF hereafter)[19] computes gross assets and liabilities including portfolio equity, FDI, debt, financial derivatives and official reserves, via the accumulation of the corresponding inflows and outflows as well as relevant adjustments for valuation changes, and is normalized by GDP. Thereby, I have

$$LMF_{i,t} = \frac{FA_{i,t} + FL_{i,t}}{GDP_{i,t}}, \tag{1}$$

where FA (FL) denotes the stock of external asset (liabilities) and GDP is denominated in current

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[19] Lane and Milesi-Ferretti (2006) also proposed alternative de facto measure based on only FDI and portfolio equity data (GEQ). While LMF and GEQ show similar tendency, the latter shows more rapid and wider integration after the 1990s. This difference is considered to be derived from the valuation changes of equity assets during the boom in the stock market, which affect the numerator of GEQ more prominently and does not directly affect the denominators. This implies that both GEQ and LMF, albeit in lesser extent, are subject to over identification when leading stock markets are in the boom.

US$[20]. This stock based measure is less problematic for my analysis than the ones based on underlying flow data. Since I explicitly allow multiple income shocks which simultaneously have different and potentially offsetting impacts on saving and capital flow paths with various adjustment patterns of consumption, year to year flow data may not be an appropriate indicator of financial integration for my purpose. For example, simultaneous positive permanent shock to the income growth rate and transitory shock may affect national saving oppositely under risk sharing, and so result in smaller capital flow even under completely functioning credit market.

Figure 3.4 plots unweighted mean of the LMF for OECD[21] and developing countries from 1970 to 2004. While degree of financial integration has increased over time for both country groups, surge in the cross border financial asset holdings after the mid-1980s and its acceleration in the 1990s in OECD countries are not matched by the developing countries. The scale of financial integration for the emerging market countries[22], a sub-sample of the developing countries, largely follow the trend of whole developing countries, while emerging market countries are more severely affected by the debt crisis in the late 1980s than other developing countries.

III.4 Data

This paper examines the patterns of consumption risk sharing assuming various types of income shocks and investigates how financial integration improves consumption risk sharing. For this purpose, I employ annual per capita real GDP and per capita real private consumption

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[20] All the data used to construct this measure is provided by Lane and Milesi-Ferretti (2006).
[21] The OECD countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherland, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom (UK), and United State of America (USA).
[22] The emerging market countries cover Argentina, Brazil, Bulgaria, Chile, Colombia, Cote D'Ivore, Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Hungary, Indonesia, Korea, Malaysia, Mexico, Morocco, Panama, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Thailand, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, which are all included in the JP Morgan's EMBI global sovereign spread.

(both are in constant US$ in 2000) taken from the World Development Indicators (WDI). In order to conduct a panel data analysis, the data set needs to be in real terms and denominated in a same unit. Considering the existence of non-traded goods and durable goods, it would have been more appropriate to use disaggregated consumption data. However, such data is not available for large numbers of countries including developing countries as well as long time series over 30 years. For the measure of financial integration, as discussed in section 2, I employ LMF based on the sum of gross stocks of foreign assets and liabilities divided by GDP, relying on the External Wealth of Nations Mark II data provided by Lane and Milesi-Ferretti (2006), as well as BHL based on the date of official equity market liberalization following Bekaert, Harvey and Lundblad (2005).

There are 113 countries[23] in the sample, which can be divided into sub-samples of OECD countries (22), the emerging market countries (30) and other developing countries (61). The sample covers from 1970 to 2004, which I consider both whole period as well as globalization period after 1990. The sample composition changes overtime, since data are missing for a number of countries particularly for developing countries in the earlier years.

III.5 Estimation Model

The empirical analysis consists of two stages. The first stage decomposes GDP into permanent and transitory components and specifies their processes using the state-space/unobserved component model. I assume particular income processes for these two components respectively and jointly estimate the autoregressive coefficient as well as various income shocks which present predictable and unpredictable income changes for these two

[23] Luxemburg and Hong Kong are excluded from the sample due to extreme value for LMF as pointed out by Lane and Milesi-Ferretti (2006).

components respectively. Note that the autoregressive coefficients vary by countries, since I consider country specific business cycles. The second stage analyzes excess sensitivity of consumption applying the result of the first stage. This inquires whether consumption risk sharing holds in the sense that RE/PIH is rejected or not, after accounting for the stochastic nature of the income path. Moreover, by including the interaction terms between income changes and degree of international financial integration, I can explicitly investigate the impact of financial integration on the validity of RE/PIH and successful consumption risk sharing.

First, I decompose GDP ($y_{i,t}$) into two components of permanent component ($y^P_{i,t}$) and transitory component ($y^T_{i,t}$) as,

$$y_{i,t} = y^P_{i,t} + y^T_{i,t} \tag{2}$$

where subscript i and t denote country and year respectively. I assume that permanent component ($y^P_{i,t}$) follows local linear trend model following Harvey (1989),

$$\begin{aligned} y^P_{i,t} &= y^P_{i,t-1} + \mu_{i,t-1} + \eta_{i,t}, \quad & \eta_{i,t} &\sim NID(0, \sigma^2_\eta), \\ \mu_{i,t} &= \mu_{i,t-1} + \zeta_{i,t}, & \zeta_{i,t} &\sim NID(0, \sigma^2_\zeta), \end{aligned} \tag{3}$$

where I call $\mu_{i,t}$ as slope. $\eta_{i,t}$ and $\zeta_{i,t}$, which are serially independent disturbances from normal distributions with zero mean, are the level shock and slope shock respectively. Note that $\eta_{i,t}$ and $\zeta_{i,t-1}$ represent new information at period t, which may affect consumption at that period ($c_{i,t}$). On the other hand, $\Delta y^P_{i,t-1}$ - $\eta_{i,t-1}$ represents a change in the component at period t that is fully anticipated by a rational agent given this specification. Note that predictable change in permanent component of income is governed by slope of the previous period, which is past information known to rational agents (that is, $\Delta y^P_{i,t-1} - \eta_{i,t-1} = \mu_{i,t-2}$). Then, consumption should respond more to unanticipated slope shock ($\zeta_{i,t-1}$) than to predictable change in permanent component of income ($\Delta y^P_{i,t-1}$ - $\eta_{i,t-1}$), when forward looking rational agents succeed in consumption risk sharing.

I also assume that transitory component ($y^T{}_{i,t}$) follows AR(1) process,

$$y^T{}_{i,t} = \phi^T{}_i y^T{}_{i,t-1} + \varepsilon_{i,t}, \qquad \varepsilon_{i,t} \sim NID(0,\sigma^2_\varepsilon), \tag{4}$$

where $\phi^T{}_i$ is the autoregressive coefficient and $\varepsilon_{i,t}$ is serially independent disturbance from a normal distribution with zero mean. This stochastic disturbance $\varepsilon_{i,t}$, which I call transitory shock, is the change in transitory component of income ($\Delta y^T{}_{i,t}$) which can not be anticipated by a rational agent. The remaining elements of $\Delta y^T{}_{i,t}$, calculated as $\phi^T{}_i\Delta y^T{}_{i,t-1}$ - $\varepsilon_{i,t-1}$, is a function of past information and model structure, both of which are predictable by rational agents. Thus, if RE/PIH holds, the consumption should respond to $\varepsilon_{i,t}$ but may not to $\phi^T{}_j\Delta y^T{}_{i,t-1}$ - $\varepsilon_{i,t-1}$.

Using the state-space/unobserved component model, permanent component ($y^P{}_{i,t}$), slope ($\mu_{i,t}$), transitory component ($y^T{}_{i,t}$), autoregressive coefficient ($\phi^T{}_i$), and the error terms ($\eta_{i,t}$, $\zeta_{i,t}$ and $\varepsilon_{i,t}$) are jointly estimated and computed. Thereby I identify various unanticipated shocks ($\eta_{i,t}$, $\zeta_{i,t-1}$ and $\varepsilon_{i,t}$) and predictable income changes in permanent and transitory components of income ($\Delta y^P{}_{i,t-1}$ - $\eta_{i,t-1}$ and $\phi^T{}_j\Delta y^T{}_{i,t-1}$ - $\varepsilon_{i,t-1}$) respectively.

Second, I check the presence of excess sensitivity in consumption as well as investigate the impact of financial integration on the ability to share risks, after accounting for the stochastic properties of income path using the information obtained in the first stage. Specifically, I consider following estimation

$$\begin{aligned} \Delta c_{i,t} = k^c &+ \beta_1^{LVL} LVLSHK_{i,t} + \beta_2^{LVL}(LVLSHK_{i,t} * LMF_{i,t}) \\ &+ \beta_1^{SLP} SLPSHK_{i,t} + \beta_2^{SLP}(SLPSHK_{i,t} * LMF_{i,t}) \\ &+ \gamma_1^{P} PRDPMNT_{i,t} + \gamma_2^{P}(PRDPMNT_{i,t} * LMF_{i,t}) \\ &+ \beta_1^{T} TRSTSHK_{i,t} + \beta_2^{T}(TRSTSHK_{i,t} * LMF_{i,t}) \\ &+ \gamma_1^{T} PRDTRST_{i,t} + \gamma_2^{T}(PRDTRST_{i,t} * LMF_{i,t}) \\ &+ \delta\, LMF_{i,t} + v_i + u_{i,t}, \end{aligned} \tag{5}$$

where k^c is a constant term, which helps capture the effects of subsequent generations' increased consumption due to greater lifetime wealth from increased productivity over time following Elwood (1998). The regression is estimated by fixed effects model, and so v_i represents the unobserved time-invariant country-specific effects. $u_{i,t}$ is an error term including measurement error and preference shocks. LVLSHK, SLPSHK, and TRSTSHK are level shock ($\eta_{i,t}$), slope shock ($\zeta_{i,t-1}$), and transitory shock ($\varepsilon_{i,t}$) respectively obtained in the first stage. PRDPMNT and PRDTRST are the predictable income changes in permanent component ($\Delta y^P_{i,t-1}$ - $\eta_{i,t-1}$) and transitory component ($\phi^T_i \Delta y^T_{i,t-1}$ - $\varepsilon_{i,t-1}$) respectively, which can be computed based on the result of first stage regression. LMF is the de facto measure of international financial integration based on the estimated gross stocks of foreign assets and liabilities defined in the section 2.

As a robustness check, I also run the same estimation model with alternative de jure measure of BHL as following,

$$\begin{aligned}\Delta c_{i,t} = k^c &+ \beta_1^{LVL} LVLSHK_{i,t} + \beta_2^{LVL}(LVLSHK_{i,t} * BHL_{i,t}) \\ &+ \beta_1^{SLP} SLPSHK_{i,t} + \beta_2^{SLP}(SLPSHK_{i,t} * BHL_{i,t}) \\ &+ \gamma_1^{P} PRDPMNT_{i,t} + \gamma_2^{P}(PRDPMNT_{i,t} * BHL_{i,t}) \\ &+ \beta_1^{T} TRSTSHK_{i,t} + \beta_2^{T}(TRSTSHK_{i,t} * BHL_{i,t}) \\ &+ \gamma_1^{T} PRDTRST_{i,t} + \gamma_2^{T}(PRDTRST_{i,t} * BHL_{i,t}) \\ &+ \delta\, BHL_{i,t} + v_i + u_{i,t}.\end{aligned} \tag{6}$$

III.6 Empirical Results

Table 3.2.a shows the parameter estimates of the regression with LMF by fixed effects model for whole sample period as well as post 1990 globalization period respectively. Moreover, marginal propensities of consumption (MPCs) for the unpredictable income changes (that is level, slope and transitory shocks) as well as the predictable income changes in permanent and transitory components for an average country in terms of degree of international financial integration are reported in Table 3.2.b. Those results are also reported for sub-sample regressions

within country group (i.e. OECD (Table 3.3.a/b) and the emerging market countries (Table 3.4.a/b)).

For permanent component of income, as naturally expected, the results provide significantly positive MPCs for the level shock and the slope shock respectively. The coefficients indicate that consumption instantaneously grows responding to those shocks for average degree of international financial integration and other reasonable levels of LMF. This also holds in most of the cases for sub-samples regardless of the country groups (i.e. OECD and the emerging market countries) and periods (i.e. full sample period and post 1990 globalization period). I also find significantly positive MPC for the predictable change in permanent component of income both in full sample countries cases and sub-sample countries cases of OECD and the emerging market countries. Moreover, I do not obtain any evidences supporting that MPC for predictable change in permanent component is significantly smaller than MPC for slope shock, and indeed the former often exceeds the latter. This suggests that countries are hardly successful in insuring against the predictable change in permanent component of income. Turning our eyes to the implication of financial integration, estimates of the full sample regressions (γ_2^P) indicate that consumption comes to be adjusted less to predictable changes in permanent component of income as countries become more involved in cross border holdings of financial assets. This implies that financial integration improves consumption risk sharing against permanent income changes on the whole. However, such result is less clear and inconsistent sub-sample regressions, which imply that financial integration does not necessarily improve consumption risk sharing within country groups. The estimates for the impact of financial integration on the response of consumption to level shock (β_2^{LVL}) are thought-provoking. Since level shock indicates an equivalent scale one time change in the permanent income, it should have affected consumption permanently regardless of the degree of financial market integration, if primary channel of international consumption risk sharing is through lending and borrowing. However, contrarily to this prediction, estimated coefficients for the interaction term between level shock and degree of financial integration (β_2^{LVL}) are negative and significantly different from zero. This significantly negative β_2^{LVL} is observed more clearly in the sub-sample regressions among OECD[24] and, to lesser extent, the emerging market countries. This implies that well-integrated OECD and the emerging market countries are insured against idiosyncratic level shocks through prearranged contingent bonds such as cross border holding of equities and securities. Furthermore, I observe evidences that international financial integration promotes even higher consumption growth volatility responding to the permanent shock to the GDP growth. Consistently with the RE/PIH prediction, the coefficient for the interaction term between slope shock and degree of financial integration (β_2^{SLP}) is significantly positive within emerging market countries both in whole period and globalization era after 1990. While I also observe positive β_2^{SLP} in full sample and OECD in globalization era, estimates of β_2^{SLP} are much larger for the emerging market countries. These results suggest that financial integration leads to an even sharper adjustment of consumption responding to permanent shock to the income growth particularly in the emerging market countries.

As for the transitory income, I also observe significantly positive MPCs for transitory shock for average degree of international financial integration in full sample regressions. However, it is not the case in OECD countries for post 1990 regression. This suggests that the average OECD countries have come to be well-insured against transitory income shock through prearranged contingent bonds in the globalization period. For predictable income change, RE/PIH is rejected for transitory component on the whole[25], as shown by significantly positive

[24] This result is consistent with the finding by Artis and Hoffmann (2006) which studies consumption risk sharing in OECD countries.
[25] One caveat in this interpretation is that the consumption data include non-traded goods which may not

MPC for predictable transitory income change in full sample countries case. However, looking at the sub-sample countries cases, while significantly positive MPCs for predictable changes in transitory income are reported for the emerging market countries, full consumption risk sharing is not rejected in average OECD countries. Turning our attention to the implication of financial integration, I observe no clear evidences which support that international financial integration de-links predictable change in transitory component of income and consumption. The coefficients on the interaction term between predictable transitory income change and degree of financial integration (γ_2^T) are not significantly different from zero for full sample countries case as well as any sub-sample countries cases. On the other hand, the parameter estimates for the interaction term between transitory shock and degree of financial integration (β_2^T) are significantly negative. This implies that consumption comes to instantaneously respond less to transitory shock as countries become more involved in the cross border holdings of financial assets, suggesting that financial integration improves risk sharing through contingent bonds. Looking at the sub-samples, I also observe significantly negative β_2^T within the emerging market countries in the post 1990 period. The emerging market countries, which are subject to credit constraint against future predictable change in transitory component of income, benefit from financial integration in terms of better opportunities of consumption risk sharing particularly during the post 1990 globalization period. On the other hand, such impact is detected less clearly within OECD countries. This, together with the insignificant MPC for predictable change in transitory component of income, implies that OECD countries are well insured for transitory income changes regardless of the degree of international financial market integration.

The parameter estimates and MPCs from the regression with alternative measure of BHL

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be perfectly smoothed out even under perfect insurance (see Lewis, 1996).

are reported in Table 3.5.a/b (full sample countries), Table 3.6.a/b (OECD)[26] and Table 3.7.a/b (the emerging market countries). These results are overall comparable with those from the de facto measure of LMF confirming the robustness of the empirical results discussed above. However, I occasionally obtain less clear results (e.g. insignificant β_2^{SLP} in the emerging market countries and full sample countries) which are presumably driven by less variation in the binary dummy variable by nature. I also find several discrepancies (e.g. negative γ_2^{P} in the emerging market countries and significantly positive MPC for predictable change in transitory component of income in OECD). They can be attributable to the smaller variation of BHL indicator as well as to the disparities between developments of de jure restriction measure and de facto measure. As Prasad et al (2003) argue, cross border holdings of assets can increase without capital account liberalization policy when capital control is less effective. To illustrate this phenomenon, they refer to capital flight from some Latin American countries in the 1970s and 1980s. On the other hand, liberalization policy may not be enough to induce foreign investors to actually invest in the country, either because of other concerns or because of home bias (Bekaert and Harvey (2000)). Then, de facto measure of LMF based on stock data may move slowly with substantially long lead years before it goes up after liberalization policy is adopted.

I here sum up the empirical results. First of all, presence of consumption risk sharing varies by country classifications and income components. While less than full consumption risk sharing is indicated on the whole, RE/PIH is not rejected for transitory component of income in OECD countries implying full consumption risk sharing. Nevertheless, the emerging market countries are shown to fail to share risks for predictable change in transitory component of income, even in the post 1990 globalization period. On the other hand, no evidences suggest

[26] Since most of the OECD countries were already liberalized by 1990, estimates of the regression for OECD countries in post 1990 period are not reported.

successful risk sharing against the predictable change in permanent component of income in the full and sub-sample countries. Second, the evidences suggest that international financial integration helps consumption risk sharing on the whole. More financially integrated countries are shown to cope with income shocks better in general. However, such effects are sometimes less clear and inconsistent within OECD and the emerging market countries. This implies that country groups such as OECD and the emerging market countries work themselves as sorts of rating categories to support consumption risk sharing somewhat independently from the degree of financial integration. Third, international financial integration promotes an even larger adjustment of consumption responding to unanticipated shock to the income growth. This effect is observed particularly clear in the emerging market countries, and it can reconcile the puzzling empirical fact reported by Kose, Prasad and Terrones (2003), namely higher relative volatility of consumption growth in those countries in the 1990s. Fourth, OECD and the emerging market countries, albeit to a lesser extent, are insured against various types of shocks through transacting equities and securities besides debts. Both OECD and the emerging market countries come to adjust consumption less responding to level shock as they become more integrated to financial market. Moreover, consumption is much less responsive to unanticipated transitory income shock in the 1990s in OECD countries. Those findings together indicate the validity of a channel of consumption risk sharing through contingent bonds.

III.7 Conclusion

This paper asks whether international financial integration improves consumption risk sharing. A formal test of RE/PIH is conducted employing de facto and de jure measures of financial integration to answer this question. I particularly argue that we must be attentive to stochastic properties of income process, since RE/PIH predicts that consumption should respond differently to various types of income shocks. Therefore, I explicitly consider two unobserved components of income (i.e. permanent and transitory components) and three types of income shocks (level shock, slope shock and transitory shock), following the recent literature emphasizing the importance of shocks to the trend growth in the emerging market countries. The state-space/unobserved component model jointly estimates those two components of income and three types of shocks to present unanticipated income shocks and predictable income changes. Then, I investigate whether countries face credit constraint for consumption risk sharing against predictable future income changes and how international financial integration improves consumption risk sharing. This paper provides richer and sophisticated implications for the validity of RE/PIH and impact of financial integration on consumption risk sharing by accounting for the multiple income shocks and income components.

At the onset, results indicate less than full consumption risk sharing in general, while the presence of consumption risk sharing varies by country classifications and income components. OECD countries are shown to be insured better for changes in transitory component of income, while RE/PIH is rejected for the emerging market countries. Moreover, results show that countries are hardly successful in insuring against the predictable change in permanent component of income regardless of the country classification groups even during the globalization period.

Second, the regression results point to a fact that more integrated countries can deal with various income shocks better on the whole. Cross border financial assets holdings are shown to provide more opportunities of consumption risk sharing for both permanent and transitory components of income. Nevertheless, such effect is sometimes not detected within OECD and the emerging market countries respectively implying that those country classification categories themselves behave as sorts of rating categories to help better consumption risk sharing independently from the degree of financial integration. Moreover, evidences that OECD and the emerging market countries benefit from international financial integration not only from debts but also from equities and securities are provided. The response of consumption to level shock tends to be smaller in well-integrated countries, while it should be independent of the degree of financial integration when primary channel of international risk sharing is through borrowing and lending. Moreover, consumption comes to be less adjusted upon being struck by transitory shocks in OECD countries in the post 1990 period, which can also be interpreted as an evidence of risk sharing through cross border holdings of contingent bonds.

Third, the estimates for the impact of financial integration on the response of consumption to permanent shock to the income growth are consistent with the RE/PIH prediction. This effect is particularly clear for the emerging market countries and it can reconcile the observed higher relative volatility of consumption growth in the 1990s in the emerging market countries. Furthermore, it supports the alternative explanation for procyclical capital inflow and strongly countercyclical current account observed in those countries.

Table 3.1: Volatilities of Growth Rates of Selected Variables (percentage standard deviations; medians for each group countries)

	Full Sample	Decade			
	1960-99	1960s	1970s	1980s	1990s
Output (Y)					
Industrial Countries	2.18	1.91	2.46	2.03	1.61
	(0.23)	(0.26)	(0.28)	(0.30)	(0.14)
MFI economies	3.84	3.31	3.22	4.05	3.59
	(0.20)	(0.42)	(0.37)	(0.44)	(0.62)
LFI economies	4.67	3.36	4.88	4.53	2.70
	(0.35)	(0.61)	(1.01)	(0.69)	(0.38)
Consumption (C)					
Industrial Countries	2.37	1.47	2.16	1.98	1.72
	(0.31)	(0.27)	(0.25)	(0.28)	(0.20)
MFI economies	5.18	4.57	4.52	4.09	4.66
	(0.51)	(0.49)	(1.04)	(0.94)	(0.46)
LFI economies	6.61	5.36	7.07	7.25	5.72
	(0.78)	(0.58)	(1.07)	(0.81)	(0.78)
Income (Q)					
Industrial Countries	2.73	2.18	2.99	2.54	1.91
	(0.34)	(0.33)	(0.40)	(0.29)	(0.30)
MFI economies	5.44	3.60	5.43	5.45	4.78
	(0.50)	(0.47)	(0.45)	(0.65)	(0.72)
LFI economies	7.25	4.42	9.64	7.56	4.59
	(0.84)	(0.53)	(1.24)	(1.23)	(0.54)
Total Consumption (C+G)					
Industrial Countries	1.86	1.38	1.84	1.58	1.38
	(0.23)	(0.28)	(0.18)	(0.19)	(0.20)
MFI economies	4.34	3.95	4.19	3.43	4.10
	(0.47)	(0.51)	(0.54)	(0.84)	(0.53)
LFI economies	6.40	4.85	6.50	6.34	4.79
	(0.56)	(0.55)	(0.93)	(0.91)	(0.82)
Ratio of Total Consumption (C+G) to Income (Q)					
Industrial Countries	0.67	0.75	0.56	0.61	0.58
	(0.02)	(0.09)	(0.03)	(0.06)	(0.06)
MFI economies	0.81	0.92	0.74	0.76	0.92
	(0.07)	(0.13)	(0.12)	(0.11)	(0.04)
LFI economies	0.80	0.95	0.68	0.82	0.84
	(0.08)	(0.06)	(0.10)	(0.51)	(0.14)

Source: Kose, Prasad and Terrones (2003)
Notes: Standard errors are reported in parentheses.

Table 3.2.a: Fixed Effects Estimates (LMF; Full Sample Countries)

	whole period		after 1990	
LVLSHK (β_1^{LVL})	0.494 ***	0.496 ***	0.558 ***	0.565 ***
	(0.021)	(0.022)	(0.032)	(0.032)
LVLSHK * LMF (β_2^{LVL})	-0.018 *	-0.019 *	-0.013	-0.013
	(0.010)	(0.010)	(0.012)	(0.012)
SLPSHK (β_1^{SLP})	0.439 ***	0.454 ***	0.295 ***	0.323 ***
	(0.054)	(0.055)	(0.073)	(0.074)
SLPSHK * LMF (β_2^{SLP})	0.001	-0.001	0.041 **	0.038 **
	(0.016)	(0.016)	(0.019)	(0.019)
PRDPMNT (γ_1^{P})	0.636 ***	0.630 ***	0.548 ***	0.543 ***
	(0.030)	(0.031)	(0.040)	(0.041)
PRDPMNT * LMF (γ_2^{P})	-0.016 ***	-0.016 ***	0.005	0.007
	(0.005)	(0.005)	(0.007)	(0.007)
TRSTSHK (β_1^{T})	0.651 ***	0.649 ***	1.358 ***	1.377 ***
	(0.066)	(0.066)	(0.127)	(0.127)
TRSTSHK * LMF (β_2^{T})	-0.211 ***	-0.211 ***	-0.544 ***	-0.553 ***
	(0.047)	(0.047)	(0.068)	(0.068)
PRDTRST (γ_1^{T})	0.678 ***	0.674 ***	0.182	0.149
	(0.226)	(0.227)	(0.338)	(0.338)
PRDTRST * LMF (γ_2^{T})	-0.029	-0.018	0.257	0.280
	(0.161)	(0.161)	(0.194)	(0.194)
LMF (δ)	1.221	0.936	-3.931	-8.058
	(3.608)	(4.170)	(6.235)	(6.775)
CONSTANT	-5.890	-29.390 *	10.030	-8.942
	(6.120)	(16.747)	(11.252)	(18.489)
YEAR DUMMY	No	Yes	No	Yes
mean LMF	1.291	1.291	1.637	1.637
R-squared	0.526	0.533	0.526	0.530
Number of Observations	2914	2914	1525	1525
Number of Countries	113	113	112	112

Notes:
Upper rows are coefficients and lower rows in parentheses are standard errors.
*** Estimates significantly different from zero at the 1% level
** Estimates significantly different from zero at the 5% level
* Estimates significantly different from zero at the 10% level

Table 3.2.b: MPCs for Shocks and Predictable Income Changes (LMF; Full Sample Countries)

	whole period		after 1990	
$\beta_1^{LVL}+\beta_2^{LVL}$*average[LMF]	0.470	0.472	0.538	0.543
(MPC for level shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{SLP}+\beta_2^{SLP}$*average[LMF]	0.441	0.453	0.363	0.385
(MPC for slope shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{T}+\beta_2^{T}$*average[LMF]	0.379	0.377	0.467	0.472
(MPC for transitory shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{P}+\gamma_2^{P}$*average[LMF]	0.616	0.610	0.556	0.555
(MPC for predictable permanent income change)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{T}+\gamma_2^{T}$*average[LMF]	0.641	0.651	0.602	0.607
(MPC for predictable transitory income change)	(0.000)	(0.000)	(0.001)	(0.001)

Notes:
Upper rows are point estimates and lower rows in parentheses are p-values of the F-test for the hypotheses being equal to zero.

Table 3.3.a: Fixed Effects Estimates (LMF; OECD Countries)

	whole period		after 1990	
LVLSHK (β_1^{LVL})	0.625 ***	0.626 ***	0.592 ***	0.592 ***
	(0.031)	(0.031)	(0.040)	(0.040)
LVLSHK * LMF (β_2^{LVL})	-0.052 ***	-0.049 ***	-0.023	-0.020
	(0.014)	(0.014)	(0.016)	(0.016)
SLPSHK (β_1^{SLP})	0.164 **	0.189 **	-0.054	-0.024
	(0.083)	(0.085)	(0.109)	(0.115)
SLPSHK * LMF (β_2^{SLP})	0.019	0.009	0.069 ***	0.052 **
	(0.022)	(0.022)	(0.025)	(0.025)
PRDPMNT (γ_1^P)	0.501 ***	0.483 ***	0.400 ***	0.389 ***
	(0.047)	(0.048)	(0.057)	(0.060)
PRDPMNT * LMF (γ_2^P)	-0.009	-0.001	0.008	0.015
	(0.008)	(0.009)	(0.010)	(0.011)
TRSTSHK (β_1^T)	0.380 ***	0.385 ***	1.225 ***	1.108 ***
	(0.111)	(0.113)	(0.291)	(0.297)
TRSTSHK * LMF (β_2^T)	0.097	0.108	-0.414 **	-0.317
	(0.125)	(0.127)	(0.203)	(0.209)
PRDTRST (γ_1^T)	0.950 **	0.998 **	-0.164	0.090
	(0.483)	(0.490)	(1.002)	(1.018)
PRDTRST * LMF (γ_2^T)	-0.457	-0.526	0.204	-0.058
	(0.518)	(0.529)	(0.804)	(0.822)
LMF (δ)	1.245	-16.490	0.710	-20.385
	(6.983)	(10.552)	(9.270)	(13.189)
CONSTANT	21.956	-3.701	45.231	20.577
	(20.636)	(44.854)	(31.780)	(48.192)
YEAR DUMMY	No	Yes	No	Yes
mean LMF	1.838	1.838	2.829	2.829
R-squared	0.634	0.664	0.689	0.715
Number of Observations	722	722	323	323
Number of Countries	22	22	22	22

Notes:
Upper rows are coefficients and lower rows in parentheses are standard errors.
*** Estimates significantly different from zero at the 1% level
** Estimates significantly different from zero at the 5% level
* Estimates significantly different from zero at the 10% level

Table 3.3.b: MPCs for Shocks and Predictable Income Changes (LMF; OECD Countries)

	whole period		after 1990	
$\beta_1^{LVL}+\beta_2^{LVL}$*average[LMF]	0.529	0.536	0.527	0.536
(MPC for level shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{SLP}+\beta_2^{SLP}$*average[LMF]	0.199	0.206	0.142	0.123
(MPC for slope shock)	(0.003)	(0.003)	(0.088)	(0.172)
$\beta_1^{T}+\beta_2^{T}$*average[LMF]	0.558	0.583	0.053	0.212
(MPC for transitory shock)	(0.000)	(0.000)	(0.871)	(0.527)
$\gamma_1^{P}+\gamma_2^{P}$*average[LMF]	0.484	0.481	0.421	0.432
(MPC for predictable permanent income change)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{T}+\gamma_2^{T}$*average[LMF]	0.111	0.031	0.412	-0.075
(MPC for predictable transitory income change)	(0.847)	(0.958)	(0.763)	(0.958)

Notes:
Upper rows are point estimates and lower rows in parentheses are p-values of the F-test for the hypotheses being equal to zero.

Table 3.4.a: Fixed Effects Estimates (LMF; Emerging Market Countries)

	whole period		after 1990	
LVLSHK (β_1^{LVL})	0.765 ***	0.768 ***	0.692 ***	0.732 ***
	(0.044)	(0.045)	(0.092)	(0.094)
LVLSHK * LMF (β_2^{LVL})	-0.050 ***	-0.052 ***	-0.022	-0.030
	(0.015)	(0.016)	(0.059)	(0.059)
SLPSHK (β_1^{SLP})	0.585 ***	0.559 ***	0.629 ***	0.589 ***
	(0.114)	(0.116)	(0.146)	(0.146)
SLPSHK * LMF (β_2^{SLP})	0.128 **	0.171 ***	0.169 **	0.207 ***
	(0.064)	(0.065)	(0.078)	(0.078)
PRDPMNT (γ_1^{P})	0.372 ***	0.366 ***	0.494 ***	0.483 ***
	(0.077)	(0.077)	(0.109)	(0.108)
PRDPMNT * LMF (γ_2^{P})	0.256 ***	0.284 ***	0.223 ***	0.247 ***
	(0.051)	(0.052)	(0.063)	(0.063)
TRSTSHK (β_1^{T})	0.597 ***	0.644 ***	1.085 ***	1.128 ***
	(0.116)	(0.116)	(0.140)	(0.139)
TRSTSHK * LMF (β_2^{T})	-0.028	-0.063	-0.362 ***	-0.388 ***
	(0.086)	(0.087)	(0.100)	(0.099)
PRDTRST (γ_1^{T})	0.279	0.140	0.491	0.260
	(0.392)	(0.394)	(0.459)	(0.459)
PRDTRST * LMF (γ_2^{T})	0.496	0.681	0.441	0.668
	(0.421)	(0.424)	(0.479)	(0.478)
LMF (δ)	-13.479 ***	-12.707 ***	-60.516 ***	-59.374 ***
	(3.962)	(4.152)	(10.789)	(11.735)
CONSTANT	12.271 **	11.737	64.283 ***	58.046 ***
	(5.464)	(14.356)	(14.394)	(18.725)
YEAR DUMMY	No	Yes	No	Yes
mean LMF	1.087	1.087	1.252	1.252
R-squared	0.690	0.707	0.725	0.740
Number of Observations	833	833	426	426
Number of Countries	30	30	30	30

Notes:
Upper rows are coefficients and lower rows in parentheses are standard errors.
*** Estimates significantly different from zero at the 1% level
** Estimates significantly different from zero at the 5% level
* Estimates significantly different from zero at the 10% level

Table 3.4.b: MPCs for Shocks and Predictable Income Changes (LMF; Emerging Market Countries)

	whole period		after 1990	
$\beta_1^{LVL}+\beta_2^{LVL}$*average[LMF]	0.710	0.711	0.665	0.694
(MPC for level shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{SLP}+\beta_2^{SLP}$*average[LMF]	0.725	0.745	0.842	0.848
(MPC for slope shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{T}+\beta_2^{T}$*average[LMF]	0.567	0.576	0.632	0.643
(MPC for transitory shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{P}+\gamma_2^{P}$*average[LMF]	0.650	0.675	0.774	0.792
(MPC for predictable permanent income change)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{T}+\gamma_2^{T}$*average[LMF]	0.818	0.880	1.044	1.096
(MPC for predictable transitory income change)	(0.000)	(0.000)	(0.000)	(0.000)

Notes:
Upper rows are point estimates and lower rows in parentheses are p-values of the F-test for the hypotheses being equal to zero.

Table 3.5.a: Fixed Effects Estimates (BHL; Full Sample Countries)

	whole period		after 1990	
LVLSHK (β_1^{LVL})	0.846 ***	0.856 ***	0.217 *	0.226 *
	(0.037)	(0.038)	(0.117)	(0.117)
LVLSHK * BHL (β_2^{LVL})	-0.359 ***	-0.362 ***	0.297 **	0.294 **
	(0.040)	(0.041)	(0.118)	(0.118)
SLPSHK (β_1^{SLP})	0.393 ***	0.420 ***	0.188	0.203
	(0.076)	(0.076)	(0.135)	(0.136)
SLPSHK * BHL (β_2^{SLP})	-0.103	-0.106	0.055	0.059
	(0.092)	(0.092)	(0.145)	(0.146)
PRDPMNT (γ_1^{P})	0.612 ***	0.618 ***	0.497 ***	0.506 ***
	(0.043)	(0.044)	(0.078)	(0.078)
PRDPMNT * BHL (γ_2^{P})	-0.105 **	-0.110 **	0.001	-0.006
	(0.045)	(0.045)	(0.081)	(0.081)
TRSTSHK (β_1^{T})	0.361 ***	0.350 ***	2.371 ***	2.297 ***
	(0.136)	(0.136)	(0.467)	(0.468)
TRSTSHK * BHL (β_2^{T})	0.219	0.243 *	-1.671 ***	-1.585 ***
	(0.143)	(0.142)	(0.469)	(0.471)
PRDTRST (γ_1^{T})	0.064	-0.094	0.037	0.195
	(0.488)	(0.488)	(1.451)	(1.457)
PRDTRST * BHL (γ_2^{T})	0.564	0.714	0.423	0.245
	(0.509)	(0.508)	(1.460)	(1.466)
BHL (δ)	19.552 **	25.764 **	25.185	27.699
	(9.535)	(11.161)	(17.101)	(18.434)
CONSTANT	-9.505 *	-24.302 *	-11.674	-29.160 *
	(5.650)	(14.085)	(11.017)	(14.899)
YEAR DUMMY	No	Yes	No	Yes
R-squared	0.675	0.683	0.717	0.722
Number of Observations	1752	1752	1029	1029
Number of Countries	82	82	81	81

Notes:
Upper rows are coefficients and lower rows in parentheses are standard errors.
*** Estimates significantly different from zero at the 1% level
** Estimates significantly different from zero at the 5% level
* Estimates significantly different from zero at the 10% level

Table 3.5.b: MPCs for Shocks and Predictable Income Changes (BHL; Full Sample Countries)

	whole period		after 1990	
$\beta_1^{LVL}+\beta_2^{LVL}$	0.487	0.495	0.514	0.521
(MPC for level shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{SLP}+\beta_2^{SLP}$	0.289	0.314	0.243	0.262
(MPC for slope shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{T}+\beta_2^{T}$	0.580	0.593	0.700	0.712
(MPC for transitory shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{P}+\gamma_2^{P}$	0.508	0.509	0.497	0.500
(MPC for predictable permanent income change)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{T}+\gamma_2^{T}$	0.628	0.620	0.460	0.441
(MPC for predictable transitory income change)	(0.000)	(0.000)	(0.004)	(0.006)

Notes:
Upper rows are point estimates and lower rows in parentheses are p-values of the F-test for the hypotheses being equal to zero.

Table 3.6.a: Fixed Effects Estimates (BHL; OECD Countries)

	whole period	
LVLSHK (β_1^{LVL})	1.028 ***	1.015 ***
	(0.070)	(0.069)
LVLSHK * BHL (β_2^{LVL})	-0.530 ***	-0.507 ***
	(0.073)	(0.073)
SLPSHK (β_1^{SLP})	0.254	0.384 *
	(0.201)	(0.199)
SLPSHK * BHL (β_2^{SLP})	-0.064	-0.200
	(0.215)	(0.214)
PRDPMNT (γ_1^{P})	0.553 ***	0.548 ***
	(0.098)	(0.096)
PRDPMNT * BHL (γ_2^{P})	-0.103	-0.108
	(0.100)	(0.098)
TRSTSHK (β_1^{T})	-4.066 **	-3.981 **
	(2.049)	(2.024)
TRSTSHK * BHL (β_2^{T})	4.602 **	4.536 **
	(2.051)	(2.025)
PRDTRST (γ_1^{T})	46.062	-1.476
	(76.108)	(75.507)
PRDTRST * BHL (γ_2^{T})	-45.579	1.937
	(76.109)	(75.509)
BHL (δ)	75.358 *	67.028
	(40.335)	(42.414)
CONSTANT	-47.068	-77.313
	(38.545)	(54.281)
YEAR DUMMY	No	Yes
R-squared	0.682	0.711
Number of Observations	493	493
Number of Countries	22	22

Notes:
Upper rows are coefficients and lower rows in parentheses are standard errors.
*** Estimates significantly different from zero at the 1% level
** Estimates significantly different from zero at the 5% level
* Estimates significantly different from zero at the 10% level

Table 3.6.b: MPCs for Shocks and Predictable Income Changes (BHL; OECD Countries)

	whole period	
$\beta_1^{LVL}+\beta_2^{LVL}$	0.498	0.508
(MPC for level shock)	(0.000)	(0.000)
$\beta_1^{SLP}+\beta_2^{SLP}$	0.190	0.184
(MPC for slope shock)	(0.017)	(0.031)
$\beta_1^{T}+\beta_2^{T}$	0.537	0.556
(MPC for transitory shock)	(0.000)	(0.000)
$\gamma_1^{P}+\gamma_2^{P}$	0.450	0.440
(MPC for predictable permanent income change)	(0.000)	(0.000)
$\gamma_1^{T}+\gamma_2^{T}$	0.483	0.461
(MPC for predictable transitory income change)	(0.043)	(0.056)

Notes:
Upper rows are point estimates and lower rows in parentheses are p-values of the F-test for the hypotheses being equal to zero.

Table 3.7.a: Fixed Effects Estimates (BHL; Emerging Market Countries)

	whole period		after 1990	
LVLSHK (β_1^{LVL})	0.643 ***	0.639 ***	0.674 ***	0.709 ***
	(0.050)	(0.053)	(0.164)	(0.170)
LVLSHK * BHL (β_2^{LVL})	0.090	0.116	0.051	0.042
	(0.075)	(0.078)	(0.173)	(0.180)
SLPSHK (β_1^{SLP})	1.028 ***	1.057 ***	0.701 ***	0.757 ***
	(0.074)	(0.076)	(0.165)	(0.169)
SLPSHK * BHL (β_2^{SLP})	-0.124	-0.137	0.231	0.186
	(0.119)	(0.120)	(0.192)	(0.194)
PRDPMNT (γ_1^{P})	0.958 ***	0.985 ***	0.826 ***	0.860 ***
	(0.051)	(0.053)	(0.084)	(0.087)
PRDPMNT * BHL (γ_2^{P})	-0.097 *	-0.104 **	0.085	0.063
	(0.052)	(0.053)	(0.093)	(0.094)
TRSTSHK (β_1^{T})	0.254 ***	0.242 ***	1.928 ***	1.797 ***
	(0.072)	(0.074)	(0.367)	(0.374)
TRSTSHK * BHL (β_2^{T})	0.389 ***	0.413 ***	-1.281 ***	-1.134 ***
	(0.083)	(0.085)	(0.370)	(0.377)
PRDTRST (γ_1^{T})	-0.117	-0.033	3.147	2.306
	(0.272)	(0.281)	(3.780)	(3.874)
PRDTRST * BHL (γ_2^{T})	1.000 ***	0.857 ***	-2.305	-1.533
	(0.303)	(0.314)	(3.781)	(3.875)
BHL (δ)	-2.279	7.756	-10.214	-3.936
	(6.419)	(10.913)	(12.669)	(14.872)
CONSTANT	-11.905 ***	-8.863	-6.967	-1.576
	(4.383)	(13.003)	(10.351)	(14.224)
YEAR DUMMY	No	Yes	No	Yes
R-squared	0.764	0.766	0.816	0.818
Number of Observations	499	499	295	295
Number of Countries	23	23	23	23

Notes:
Upper rows are coefficients and lower rows in parentheses are standard errors.
*** Estimates significantly different from zero at the 1% level
** Estimates significantly different from zero at the 5% level
* Estimates significantly different from zero at the 10% level

Table 3.7.b: MPCs for Shocks and Predictable Income Changes (BHL; Emerging Market Countries)

	whole period		after 1990	
$\beta_1^{LVL}+\beta_2^{LVL}$	0.733	0.755	0.725	0.751
(MPC for level shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{SLP}+\beta_2^{SLP}$	0.904	0.920	0.932	0.943
(MPC for slope shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1^{T}+\beta_2^{T}$	0.643	0.656	0.647	0.663
(MPC for transitory shock)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{P}+\gamma_2^{P}$	0.861	0.881	0.911	0.923
(MPC for predictable permanent income change)	(0.000)	(0.000)	(0.000)	(0.000)
$\gamma_1^{T}+\gamma_2^{T}$	0.882	0.824	0.842	0.773
(MPC for predictable transitory income change)	(0.000)	(0.000)	(0.000)	(0.000)

Notes:
Upper rows are point estimates and lower rows in parentheses are p-values of the F-test for the hypotheses being equal to zero.

Figure 3.1: Consumption Path upon Being Struck by Transitory Shock under RE/PIH

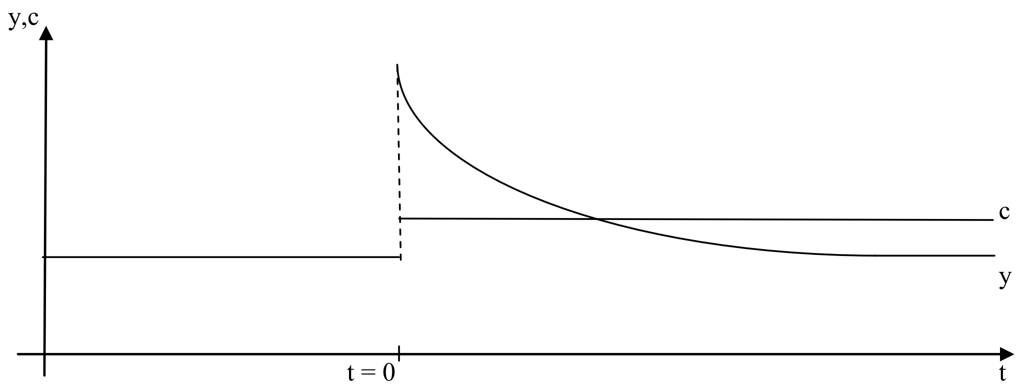


Figure 3.2: Consumption Path upon Being Struck by Permanent Shock under RE/PIH

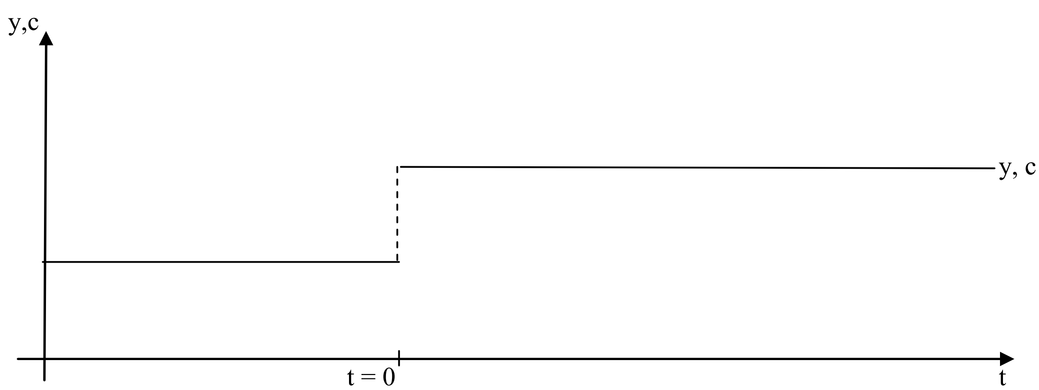


Figure 3.3: Consumption Path upon Being Struck by Positively Autocorrelated Permanent Shock under RE/PIH

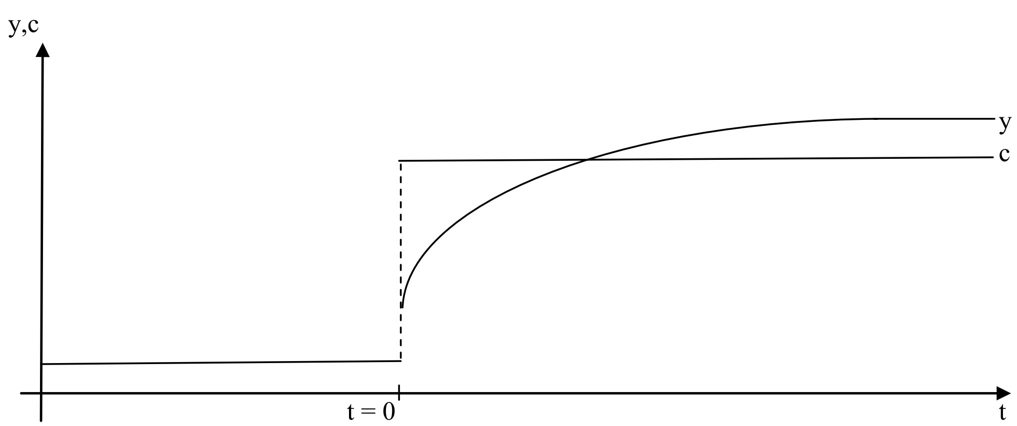
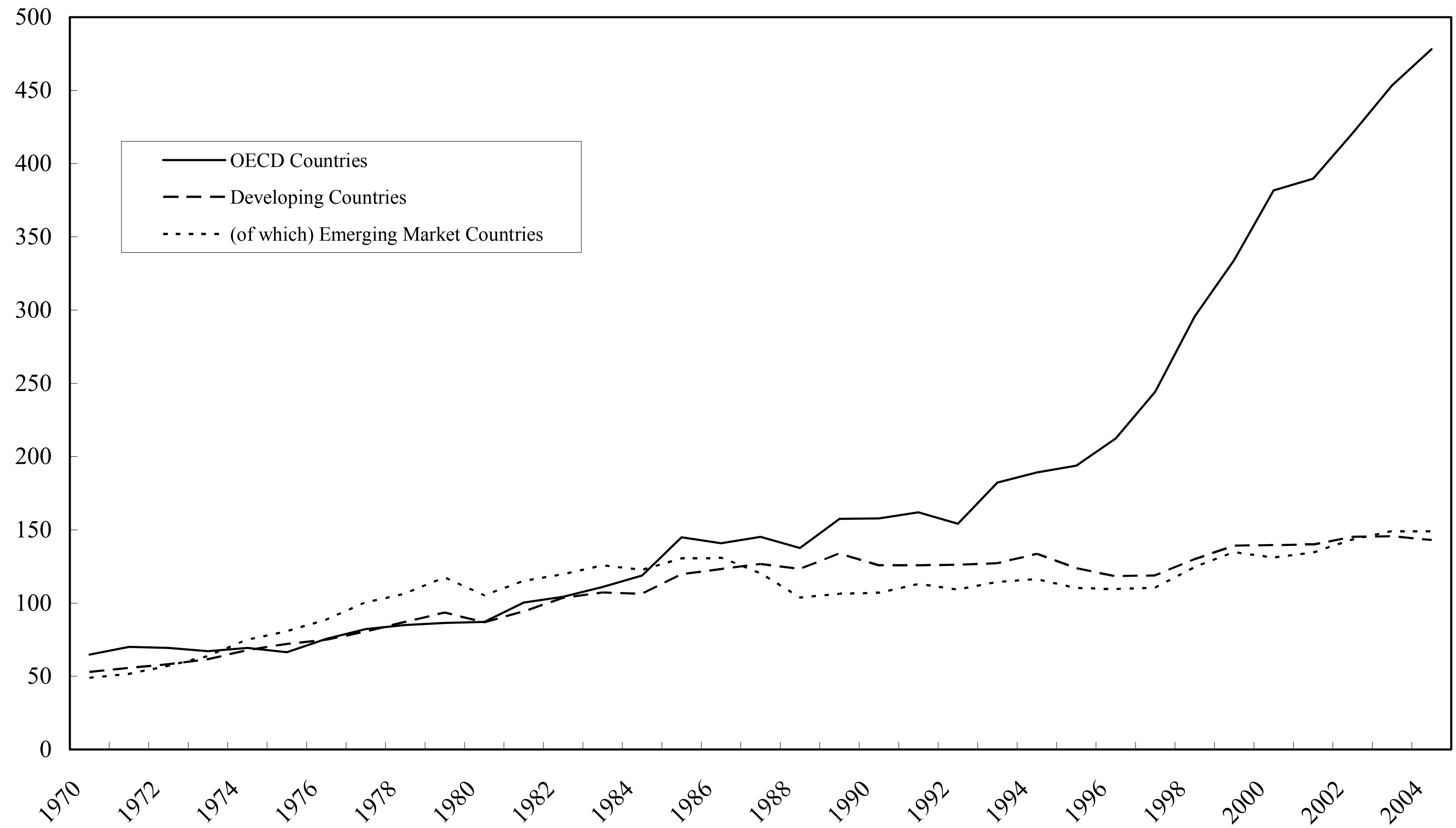


Figure 3.4: International Financial Integration
OECD countries, developing countries and emerging market countries, 1970-2004



note: computed by the author based on the data provided by Lane and Milesi-Ferretti (2006)

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Chapter IV

The Effects of Interprovincial Migration on Human Capital Formation in China[†]

Abstract

This paper examines the impacts of interprovincial migration on the creation and distribution of human capital in China. First, direct brain drain depends on the existing human capital stock in the source provinces. Second, the observed external economies and diseconomies of gross outflow migration on new human capital investment are generally consistent with the mechanism of migration-oriented investment/disinvestment in higher education at source provinces. This positive externality eclipses the negative one at the national level. Third, the effects of net outflow migration on new human capital investment based on the changes in relative labor supply mitigate direct brain drain by both encouraging and discouraging school enrollments at various levels.

IV.1 Introduction

Does migration impact human capital formation in the source (sending) economies in addition to affecting the existing human capital stock through direct brain drain? We argue that human capital mobility may also affect new human capital investment in the source economies both positively and negatively through various mechanisms, which signifies that internal

[†] This chapter is based on a joint work with Yukari Suzuki.

migration may accordingly alter the provincial distribution of human capital as well as the overall national level of new human capital formation. It is crucial to appraise these effects in the context of often less developed source economies in order to understand the impact of migration on regional economic inequality vis-à-vis the human capital theory.

Various studies have been conducted on the effects of international migration on human capital formation in the source economies. Theoretical analyses of brain drain date back to Bhagwati and Hamada (1974) who found a negative impact of international migration on human capital accumulation at source countries. Most endogenous growth theories stress that education is one of the major determinants of economic growth and thus the migration of residents with high educational qualifications is expected to have a negative impact on the source economy (Lucas, 1988; Stokey, 1991; Barro and Lee, 1993). Contrarily, as Docquier and Rapport (2004) survey, recent studies challenge these past studies and suggest that there could be a beneficial impact of international migration by taking into account the possibility of failure in migration (Mountford, 1997; Stark et al., 1998; Beine et al., 2001 and 2003), migrants' remittances (Edwards and Ureta, 2003; Hanson and Woodruff, 2003; Borraz, 2005; D. Yang, 2005), return migration (Borjas and Bratsberg, 1996; Stark et al., 1997), and migrants' networks (Kanbur and Rapoport, 2005).

However, research on the relationship between internal migration and human capital formation in the source economies is still thin. Unlike international migration, direct brain drain in internal migration does not affect the overall national level of existing human capital. However, as we will point out in section 4, internal migration can potentially influence new human capital formation at the national level as well as the regional distribution of human capital, given that internal migration flow affects the incentive for residents to invest in education.

This paper empirically examines the impacts of internal migration on the creation and distribution of human capital, using provincial level datasets from the 1990 and 2000 population censuses in China. Most previous works on internal migration in China have mainly investigated rural-urban migration. With respect to the effect of rural-urban migration on human capital formation, de Brauw and Giles (2005) suggest a negative relationship between migrant's opportunity and high school enrollment in rural China. Our main purpose is to clarify the creation and distribution of human capital at various levels of education at the national level by measuring the impacts of interprovincial migration on the existing human capital stock as well as new human capital investment at the provincial level, and to compare the trends noted in 1990 and 2000. We first seek to identify the provinces most affected by the direct brain drain through internal migration by focusing on the determinants of migration. Thereafter, we check for positive and/or negative effects of migration on new human capital investment in the source provinces based on two mechanisms: investment/disinvestment in higher education aimed at migration opportunities and changes in relative labor supply caused by migration with different levels of education.

In addition, there are several specific factors that make the Chinese case more relevant and interesting. First, China has strictly controlled internal migration, particularly migration to large cities, through a unique household/residential registration system "hukou." However, in the late 1980s, urban reforms weakened this system and facilitated rural-urban migration—especially of the temporary kind—which substantially increased population mobility. The number of migrants, including both intraprovincial and interprovincial migrants whose current residence is different from their location five years ago rapidly increased from 34 million in 1990 to 128 million in 2000. Our dataset shows that migration rates were much higher in 2000 than in 1990 in most provinces, and these increases can be mainly attributed to migrants with high school and junior high school degrees. The probability of migration was distinguishably high for those with college degrees in 1990 but this trend was apparently mitigated in 2000. Such unique policies to restrict migration and their subsequent relaxation are naturally expected to govern the impact of internal migration on the creation and distribution of human capital in the transition process in China.

Secondly, economic reforms such as the implementation of development strategies directed at coastal provinces and urban-oriented fiscal measures and subsidized credit dramatically widened regional inequality in the 1990s owing to rural-urban as well as inland-coastal disparities. The ratio of the average GDP per capita (at 1990 constant prices) in the coastal regions to that in the inland regions increased from 1.67 in 1990 to 2.08 in 1999 (Fu, 2004). This widening inequality operates as a strong economic incentive for migration from poorer provinces to richer provinces, which is in turn expected to strongly impact the trends of regional disparity of human capital.

Furthermore, labor market reforms enabled firms to hire workers less inhibited by the registration status and to move from the wage setting under wage grids to a market based setting; hence, the returns to skills and schoolings are expected to increase in the transition process. Previous literature points out that the return to schoolings in China remained remarkably low through the mid-1990s as compared with other transition countries, while it increased gradually as the transition process progressed further (Li, 2003; Fleisher et al., 2005). In addition, the dispersion of schooling returns across cities is estimated to grow substantially by the mid-1990s, which points at the segmentation of regional labor markets (D. T. Yang, 2005). Consequently, while the regional dispersion of schooling returns might also influence the incentives of internal migration and new human capital investment, the relative labor mechanism categorized by the schooling level of the workers was likely to be more impacting in 2000 than in 1990. It is also interesting to clarify the impacts of pervasive interregional migration on human capital formation in 1990 as well as 2000 since it can suggest whether a market mechanism such as relative labor market functions more effectively as the transition reforms take deeper roots.

Our main findings are as follows. First, the impact of internal migration through direct brain drain at three different educational levels hinges on the composition of the human capital in the source provinces. Our results indicate the incidence of more net outflow migration at any educational level from provinces with relatively larger populations of junior high school graduates. This relationship between migration and existing human capital stock can not be completely explained by the labor supply push effects. It is rather presumed to be due to rapid and unbalanced economic growth and the unfinished nature of the labor market during the transition process. Second, internal migration at different educational levels has both positive and negative effects on new human capital investment. The results support the presence of the mechanisms of (i) investment/disinvestment in higher education to secure better prospects vis-à-vis migration opportunity and (ii) changes in relative wages caused by migration associated with the fluctuations in relative labor supply at different educational levels. The analysis of the first mechanism indicates both external economies and diseconomies of gross outflow migration on new human capital investment at source provinces, while the positive externality eclipses the negative one at the national level. The assessment of the second mechanism suggests that the effects of interprovincial migration mitigate the direct brain drain by both encouraging and discouraging school enrollments at various levels. Our estimates also demonstrate more positive and less negative impacts in 2000 as compared with 1990.

The remaining part of this paper is organized as follows: Section 2 presents the datasets used for our empirical study and Section 3 shows the characteristics of interprovincial migration in 1990 and 2000; Section 4 presents an empirical framework and Sections 5 and 6 show our empirical results. Finally, Section 7 draws up the conclusions.

IV.2 Data[27]

In this analysis, we focus on interprovincial migration, although we recognize that intraprovincial migration—especially rural-urban migration within the same province—is also an important component of internal migration in China. The dataset for provincial migration in China comes from the 1990 and 2000 population censuses[28]. Migration is defined as the relocation of residence within the previous five years in both censuses[29]. We note a slight difference in the definition of migrants between 1990 and 2000 and thus the number of migrants in 1990 appears to be understated if we employ the definition of migrants in 2000 as the standard[30]. The number of interprovincial migrants accounts for around 30% of the number of all migrants including intraprovincial migrants in 1990 and 2000. In our study, we take into account the migrants aged 17−60 at the census years categorized by educational levels. To investigate the economic incentives of internal migration, we covered neither younger migrants aged under 17 who did not graduate from primary schools five years ago (1985/1995) nor older migrants aged above 60. The number of interprovincial migrants aged 17−60 excluding those who enrolled in schools at the census years tripled from 8.8 million in 1990 to 28.5 million in 2000, and they comprised 80−85% of the total number of interprovincial migrants without demographic restriction.

Our study mainly focuses on the relationship between internal migration and human

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[27] We thank Institute of Population and Labor Economics, Chinese Academy of Social Sciences, for providing us with the aggregated migration flow data tabulated based on the census data.
[28] In the 2000 census, the relevant questions were asked by long forms whose sampling ratio was 9.5%.
[29] Five year periods were chosen between July 1, 1985 to July 1, 1990 and Nov 1, 1995 to Nov 1, 2000 (dates of the censuses).
[30] When a person changed his/her residence together with his/her registration, he/she was counted as a migrant in both the censuses. When a person changed his/her residence without changing his/her registration, he/she was counted as a migrant only if he/she left the place of registration for longer than the minimum time period. This period was one year in 1990 but it was reduced to six months in 2000.

capital formation at the provincial level. Human capital formation is measured by two kinds of education indicators. First, to measure the stock of human capital, we calculate human attainment ratios at the various schooling levels—such as junior high school, high school, and college[31]—using data from the 1990 and 2000 population censuses. The human attainment rates in junior high school, high school, and college for those aged 17−60 changed from 32.7% to 43.3%, 11.6% to 14.1%, and 1.9% to 4.7%, respectively, between 1990 and 2000.

The second set of indicators that captures new human capital investment includes the percentage of students who join higher education institutes, such as junior high schools, high schools, or colleges vis-à-vis graduates from primary schools; this comparison is made based on the ratio of the number of new enrollments in a higher ranked institute to the number of graduates from a school a level below in the hierarchy. The nationwide percentage of children who had reached the age of schooling and who were enrolled in primary schools was 97.8% in 1990 and 99.1% in 2000. The percentage of primary school graduate who entered junior high schools increased from 74.6% in 1990 to 94.9% in 2000. The percentage of junior high school graduates going to high schools also increased from 40.6% in 1990 to 51.2% in 2000. A great volume of previous literature shows that internal migrants in China tended to possess degrees higher than the junior high school degree in the late 1980s and early 1990s (Liang and White, 1997; Zhao, 1997). The data derived from the population censuses also show that such migrants form the majority and their share increased further from 67.2% in 1990 to 76.9% in 2000. Taking into account these findings, we mainly focus on human capital formation at levels higher than junior high school. The data on the other variables at the provincial level in our study have been taken from the China Statistical Year Book, the Comprehensive Statistical Data and Materials on

[31] We categorize junior secondary schools under "junior high school," senior secondary and secondary technical schools under "high schools," and junior colleges and other higher ranked institutes under "college."

Fifty Years of New China, and the China Population Statistics Yearbook.

IV.3 Characteristics of Interprovincial Migration in 1990 and 2000

Before moving to our empirical study on the effects of internal migration on human capital formation, we will briefly describe the patterns of interprovincial migration in 1990 and 2000, employing three kinds of migration rates—gross outflow migration rate, gross inflow migration rate, and net outflow migration rate[32]—for migrants with different levels of education between the ages of 17−60 in both the census years. We observe the changes in the characteristics of interprovincial migration at different educational levels from 1990 to 2000 which induce different impacts of migration on human capital formation between those years as are introduced in following sections.

First, we focus on the relationship between gross inflow and outflow migration rates at the provincial level. Figure 4.1 shows the change in these rates for all migrants from 1990 to 2000. Remarkably, migration rates were much higher in 2000 than in 1990 in most provinces. Another striking change is that the differential between gross inflow and outflow migration rate widened in most provinces and thus the classification of the provinces into the two groups vis-à-vis net outflow or inflow migrants became distinct in 2000. While the two groups covered approximately equal number of provinces in both the years, seven out of 29 provinces changed groups between 1990 and 2000, which suggests a change in the interprovincial migration flow pattern in these ten years. In addition, net inflow migration became much more distinct in Beijing, Shanghai, and Guangdong in 2000.

Second, we compare the migration rates in 1990 and 2000 at different educational levels

[32] These are defined as (EDUCATION)MIGO, (EDUCATION)MIGI, (EDUCATION)MIGN respectively in Table 4.3.

for the whole country. The national average migration rate for the residents with high school degrees, junior high school degrees, and other degrees lower than the junior high school, respectively increased from 1.9% to 3.8%, 1.7% to 5.0%, and 0.8% to 2.3% from 1990 to 2000, while the national average migration rate for those with college degrees slightly decreased from 5.6% to 4.0%. In both the years, the probability of migration was found to be higher for those who had attended educational institutes higher than junior high school. It was distinguishably high for those with college degrees in 1990, but this trend was apparently mitigated in 2000 as the migration rates for residents with junior high school and high school degrees went up. The relaxation of migration control measures in the 1990s appears to have had a greater impact on migration opportunities for residents at relatively lower schooling levels such as junior high school and high school. In addition, the comparative study of the average net outflow migration rates in coastal provinces and inland provinces at three educational levels as shown in Table 4.1 also suggests the increasing probability of migration for residents with junior high school and high school degrees between 1990 and 2000. We found contrasting impacts of interprovincial migration on the human capital stock in the coastal and inland provinces at levels of education higher than junior high school. In particular, the impact of migration on the human capital stock with junior high school and high school degrees dramatically intensified in both coastal and inland provinces from 1990 to 2000.

Third, we analyze the composition of educational levels for outflow migrants, inflow migrants, and non-migrants at the provincial level. Figure 4.2 compares the differential of human attainment ratios at three levels of education between outflow migrants and non-migrants with that between inflow migrants and non-migrants. To investigate the effects of direct brain drain caused by outflow/inflow migration on human capital attainment rates at the provincial level, we focus on the cumulative human capital stock at educational levels higher than junior high school and high school as well as college. In 1990, outflow as well as inflow migrants in the provinces tended to have higher human attainment ratios than non-migrants, as is shown by the fact that most provinces belong in the first quadrant in Figure 4.2. However, we notice that in 2000 there is an increase in the number of provinces where the human attainment ratios of non-migrants were higher than those of outflow or inflow migrants. These facts signify that while the outflow migrants negatively impacted the human capital attainment rates at the sending province in 1990, outflow migrants could have exerted positive as well as negative impacts on the human capital attainment rates in 2000 (the case was the reverse with inflow migrants).

Fourth, in Table 4.2, we examine the direction of migration, focusing on the composition of coastal and inland provinces as the destinations and sources of migration. We categorize all migrants and migrants at different educational levels into four groups according to the destination and source provinces; migrants within different coastal provinces (CC); from coastal provinces to inland provinces (CI); from inland provinces to coastal provinces (IC); and within different inland provinces (II). While CC, IC, and II accounted uniformly for approximately 25−30% of all migrants in 1990, the share of IC increased substantially to 63% in 2000, which is consistent with the findings of Lin et al. (2004). These features, true for all migrants, were also found valid for migrants with junior high school and high school degrees. By contrast, the share of IC for migrants with college degree increased only by 10% as compared with the approximately 30% increase for migrants at other educational levels. These changes suggest that the incentives of migration to coastal provinces with rapid economic growth were intensified for residents with junior high school and high school degrees in the 1990s.

Finally, we mention the peculiar characteristics of migration with college degrees. A nonnegligible part of the college students belonged to provinces other than those where the colleges were located and these individuals were not necessarily counted as migrants with college degrees. Some college graduates migrating from other provinces just stayed on to secure an urban "hukou," while other graduates returned to the original provinces or migrated again to other provinces. Internal migration with college degrees did not include the first type of migration but it did include the second type. Thus, the characteristics of this type of migration are expected to be different from that at other educational levels. While the ratio of college students from other provinces to all students was stable at around 20% between 1990 and 2000, there destination has been diversified as data shows that ratio of the migrants for college enrolment to large cities of Beijing, Tianjin, and Shanghai vis-à-vis all the in college migrants decreased from 67% in 1990 to 26% in 2000.

IV.4 Empirical Framework

This paper investigates the impact of interprovincial migration on human capital formation measured by existing stock and new investment at the provincial level in China, laying particular emphasis on the relationships between migration rate, human attainment rate, and school enrollment rate in the source provinces. Unlike international migration, interprovincial migration might be a "zero sum game" among provinces, implying that it does not affect the total existing human capital stock at the national level. Even if this were the case, large scale migration might have nonnegligible effects on the distribution of human capital in the provinces, which can potentially improve efficiency of human capital allocation. Moreover, there are high chances for the provinces to play a "positive or negative sum game" rather than a "zero sum game" by affecting new human capital investment through some mechanisms characterized by externality. This being the case, it is important to analyze the relationships between interprovincial migration, human capital stock, and new human capital investment; not merely the concern of each province but the interest of the central government becomes an important subject of consideration, since new human capital formation at the national level would be influenced by internal migration. We consider two kinds of migration, namely gross outflow migration and net outflow migration, since we observe more pervasive two-way migration in the case of internal migration than in the case of international migration from developing countries to developed countries. In addition, we compare the effects of internal migration at different educational levels.

First, we test the relationship between migration rate and existing human capital stock in the source economies. The sum of the effects of internal migration on the existing human capital stock in the source economies, associated with the actual migration flows of those with higher education, is zero for the whole country by construction. However, an analysis of the relationship between the migration rate and existing human capital stock in the source provinces is useful in identifying the provinces most affected by the direct brain drain through internal migration. As we noted in the previous section, the impact of direct brain drain is totally different for coastal and inland provinces. For this purpose, we estimate the following equation.

$$\begin{aligned} MIGN_{i\,\tilde{t}} = {} & \alpha_0 + \alpha_1 PCGDPDIFF_{i\,t\text{-}5} + \alpha_2 UEMPDIFF_{i\,t\text{-}5} \\ & + \alpha_3 HUMADIFF_{i\,t\text{-}5} + \alpha_4 TEMPDIFF_{i\,t\text{-}5} + \varepsilon_{i\,\tilde{t}} \end{aligned} \quad (1)$$

where $MIGN_i$, $PCGDPDIFF_i$, $UEMPDIFF_i$, $HUMADIFF_i$, $TEMPDIFF_i$, and ε_i, respectively represent net outflow migration rate; GDP per capita differential; unemployment rate differential; human attainment ratio differential; temperature differential; and an error term for province i. The subscripts t, t-5, and $\tilde{t}$ refer respectively to the census years (i.e., 1990 and 2000), the inaugural years of the five-year periods considered for this study (i.e. 1985 and 1995), and the five years between t and t-5 (i.e. 1985−1990 and 1995−2000). Table 4.3 provides the definitions of the variables employed in our estimates, and Table 4.6 summarizes the statistics.

Second, we investigate the effects of two-way migration on new human capital investment based on the understanding that interprovincial migration has recently become more pervasive in China. We check if there are positive and/or negative impacts of gross and net outflow migration on new human capital formation in the source provinces. In the previous section, we observed that the residents with educational levels higher than the junior high school degree were more likely to migrate in 1990 as well as in 2000. Previous studies on international migration have discerned a positive effect of gross outflow migration on new human capital investment in the source provinces from the point of view of investment in higher education to secure better migration opportunities. The uncertainty in migration induced by implicit or explicit migration restrictions might create a positive effect in new human capital investment in the source economies. Assuming that labor force at different educational levels is heterogeneous and that residents who are higher educated are also more likely to migrate, the average level of education of non-migrants in the source province will increase if a nonnegligible part of the population fails to migrate in spite of migration-oriented investments in education. This impact of gross outflow migrants with higher degrees on new human capital investment must be a positive one, which was proposed in a model of Beine et al. (2001). However, when residents with lesser education are also enabled to migrate, those who seek higher incomes through migration decide whether they invest more in education after comparing the returns and probabilities of migration at different educational levels and the cost of education. In this case, the prospects of migration and securing a higher income even for the less educated would be directly proportional to the opportunity cost of education. Therefore, gross outflow migration with lower education potentially works as a disincentive for new human capital formation in higher education. Consequently, gross outflow migration can have both external economies and diseconomies on new human capital formation in the source economies, contingent on the educational levels of the migrants, and thus it might work for new human capital formation positively and/or negatively at the national level. The effects of migration on new investment in some forms of higher education (e.g. college) are naturally considered to be induced more by the migrants at the closest level of education (high school, junior high school, and lower junior high school, in order). To test these positive and negative externalities of interprovincial migration on new educational investments at various education levels, we estimate the following equation.

$$\begin{aligned} EDUAVE_{it} &= \beta_0 + \beta_1 MIGO_{i\tilde{t}} + \beta_2 PCGDPAVE_{it} \\ &\quad + \beta_3 UEMPAVE_{it} + \beta_4 NUMSCHOOLAVE_{it} + \nu_{it} \end{aligned} \tag{2a}$$

where $EDUAVE_i$, $MIGO_i$, $PCGDPAVE_i$, $UNEMPAVE_i$, $NUMSCHOOLAVE_i$, and ν_i respectively represent the average percentage of students who attended higher education institutes; gross outflow migration rate; average real GDP per capita; average unemployment rate; and average number of schools per unit of land area for three years in succession; and an error term for province i. The subscripts t, t-5, and $\tilde{t}$ refer the same years as in equation (1).

Next, from the viewpoint of relative labor supply, net outflow migration can also impact new human capital investment at the provincial level by affecting the relative wages of workers at different educational levels; this is likely to happen when some aspects of migration (e.g. monetary cost, psychological cost, and uncertainty of migration) prevent the full and immediate arbitration of wages among the provinces. The net outflow migration of workers in a given educational category (e.g. high school) from a province causes excess demand of workers from that category, and hence the relative wages of the workers in that category register an increase. Furthermore, assuming that labor groups at different educational levels are heterogeneous and not perfectly substitute each other, the relative wages of workers in other educational categories (college, junior high school, and lower) would register a decrease. Relative labor supply mechanism can potentially impact school enrollment either positively or negatively; this signifies that net outflow migration at a particular educational level (high school) may encourage new human capital investment at the corresponding level of education (high school) and discourage enrollment at a higher level (college). Similar to the effects of gross outflow migration, the incentive to attend a corresponding educational institution (high school) is naturally considered to be stronger for those who were to join an institute one level lower (junior high school) without changes in the relative wages than for those who were to finish their education at a much lower level (lower than junior high school). In addition, supposing that the workers at closer educational levels are more substitutable, the wages for workers at those levels would be less depressed (i.e., wages for those with junior high school degree would be less depressed than for those with lower degrees) as a result of net outflow migration of workers in a given education category (high school), and thus all residents with lesser qualification in that province would have a greater incentive to invest in higher education. When there are net inflow migrants, the impact on new human capital investment in the source provinces is opposite to that induced by net outflow migrants. Therefore, net outflow migration may have a positive as well as negative effect on new human capital investment at the provincial level through relative labor supply effects. This labor mechanism is consistent with Ramcharan's (2002) argument that there is a positive association between the inflow of unskilled interstate migrants and high school attainment in the destination states in the U.S. We observe that this relative labor supply mechanism through internal migration does not affect the overall rate of new human capital formation at the national level unlike the former mechanism, from the perspective of investment/disinvestment in higher education with view to optimizing migration prospects. However, it does affect the provincial distribution of human capital by altering the pattern of new human capital investment at the provincial level. In order to analyze this mechanism of changes in relative labor supply caused by migration with different levels of education, we estimate similar model as equation (2a) but with net outflow migration rate (MIGN) instead of gross outflow migration rate (MIGO).

$$\begin{aligned} \text{EDUAVE}_{i\,t} &= \beta_0 + \beta_1 \text{MIGN}_{i\,\tilde{t}} + \beta_2 \text{PCGDPAVE}_{i\,t} \\ &\quad + \beta_3 \text{UEMPAVE}_{i\,t} + \beta_4 \text{NUMSCHOOLAVE}_{i\,t} + v_{i\,t} \end{aligned} \tag{2b}$$

The three equations are estimated by the fixed effects model or the random effects model, and are also estimated by OLS. While the fixed effects model treats residuals as province specific errors, the random effects model views them as random errors. We use Hausman's tests to check the validity of the estimates of these two models for new human capital investment at different educational levels. Our sample comprises 29 provinces in China, excluding Tibet and treating Chongqing as a part of Sichuan province[33], owing to the lack of consistent data. All variables are taken in natural logarithms. Equation (1) examines the relationship between net migration rate and existing human capital stock in the source provinces and equation (2a) and equation (2b) test the effects of gross/net migration on new education investment. To avoid simultaneity bias and clarify the causality between migration rate and human capital formation, we employ different education indicators in the two equations. The measure of new human capital formation ($\text{EDUAVE}_{i\,t}$) in equations (2a) and (2b) is a flow base indicator for the successive years of migration and is less likely to directly cause migration, while the stock base human attainment rates before migration ($\text{HUMADIFF}_{i\,t\text{-}5}$) used in equation (1) may affect migration. Furthermore, we investigate the relationship between human capital stock before migration (1985/95) and migration probabilities (1985−1990/1995−2000) in equation (1), while we assess the impact of migration probabilities (1985−1990/1995−2000) on new human capital investment in succeeding years (1990−93/2000−03) in equations (2a) and (2b). Following the implications of our hypotheses, we use net migration rates in equation (1) and equation (2b), while gross outflow migration rates are employed in equation (2a). Note that we employ the

[33] Chongqing was included in Sichuan province until 1997.

numbers of migrants at different educational levels to calculate these migration rates.

In equation (1), we use independent variables at time t-5 before migration occurs in order to avoid reverse causality. We check if interprovincial net migration flows in an equilibrating direction in terms of provincial differentials in economic conditions and existing human capital stock. To compare the elasticities of the migration rate at a different educational level with respect to relative income levels, relative unemployment rate, and relative human capital stocks in the source province, we employ these factors that differentiated a source province from other provinces five years ago. In accounting for the relative income levels, we employed the variables that reflect the relative GDP per capita of the source province compared with the national average ($PCGDPDIFF_{i\ t-5}$), average GDP per capita of all provinces except for the source province weighted by inverse spatial distance from the source province ($PCGDPDIFFA_{i\ t-5}$), and average GDP per capita of the surrounding provinces weighted by inverse spatial distance from the source province ($PCGDPDIFFS_{i\ t-5}$)[34]. Distance, which could reflect transportation costs, psychological costs and the availability of information, might have different impacts on interprovincial migration decisions and destination choices across the educational levels of the migrants, as Schwartz (1973) suggests for US interdivisional migration using the 1963 census. We aim to accommodate this distance effect by weighting the differentials of income, unemployment rate, and human capital stock by spatial distance. Variables for temperature differences ($TEMPDIFF_i$, $TEMPDIFFA_i$, $TEMPDIFFS_i$) are also included as control variables following previous literature.

In equations (2a) and (2b), we use the variables for GDP per capita at 1990 constant prices ($PCGDPAVE_i$), unemployment rate ($UEMPAVE_i$), and number of schools per unit of land area ($NUMSCHOOLAVE_i$) between 1990−92/2000−02. The GDP per capita and unemployment

[34] We excluded Hainan—an island—while applying this third income difference variable.

rate control the provincial economic conditions, while the number of schools per unit of land area determines the accessibility of schools in the provinces. These are measured in absolute terms, differently from the variables used in equation (1), since equations (2a) and (2b) take into account the impacts of these variables as well as migration rates on school enrollment at various levels in the sample provinces.

IV.5 Migration and Human Capital Stock

Table 4.4.a and 4.4.b respectively present the estimates for equation (1) by the random effects model and OLS for both the years. These estimates show that the relative economic and educational variables of the source provinces, such as income levels, unemployment rates, and existing human capital stocks, are the determinants of the net outflow migration rates at different educational levels. We particularly give attention to the relationship between net outflow migration and existing human capital stock in the source provinces. By examining this relationship, we seek to identify the provinces most affected by the direct brain drain through internal migration by focusing on the determinants of migration. We also investigate the differences in the impact of existing human capital stock on migration between 1990 and 2000.

The results in Table 4.4.a and 4.4.b show several statistically significant relationships between net outflow migration and relative existing human capital stock. The positive relationship between net outflow migration at a certain educational level and human capital stock at the corresponding level can be interpreted by the labor supply push effect. The relative wages of labor at a given educational level tends to be lower in provinces that have abundant supplies of labor with that level of education; thus, the residents might aspire to higher wages in other provinces that are relatively deficient in labor at that educational level. The negative (positive) relationship between net outflow migration rate at a given educational level and human capital stock at other educational levels can be understood as the relative labor supply push effect based on the complementarity (substitution) in the relative labor market. The results by the random effects model and OLS indicate significantly positive coefficients (2.621~3.429 and 1.736~2.089, respectively) for the effect of human capital stock on net outflow migration rate at the junior high school level. This positive relationship suggests that direct brain drain involving those with junior high school degrees in the source province can be affected by the labor supply push effect at the same educational level. The estimates by the random effects model reveal positive coefficients (2.496~2.598 and 1.067~1.255, respectively) for the effect of human capital stock at the junior high school level on the outflow migration rate of the residents with high school and college degrees; this points at the relative labor supply push effect based on substitution. In addition, we observe a partially significant negative coefficient (−1.904) of the effect of relative human capital stock with high school education on the outflow migration rate of the residents with junior high school degrees, implying that the relative labor supply push effect based on complementarity operates more effectively for adjacent provinces. However, these cross relationships between net outflow migration rate at a certain level of education and human capital stock at other educational levels can not be consistently explained only by the labor supply push effects, as is obvious from the relationship manifest in the case of the residents with junior high school and high school degrees. The results indicate the incidence of more net outflow migration at all educational levels from provinces with relatively larger populations of junior high school graduates. This is presumed to be due to rapid and unbalanced economic growth and unfinished nature of the labor market during the transition process.

Furthermore, Table 4.4.b, which compares the changing effects of human capital stock on net outflow migration between 1990 and 2000, projects several statistically significant differences. The coefficients of human capital stock with high school education on outflow migration rate for the residents with junior high school degrees significantly changes from negative suggesting complementarity in 1990 to positive suggesting substitution in 2000. Furthermore, the effects of the relative human capital stock comprising high school graduates with respect to the national average on net outflow migration of the residents with college degrees shows more positive trends, thereby suggesting more substitution, in 2000. These findings might be supported by the fact that the labor market mechanism came to function gradually after the reforms while the labor market continued experiencing segmentation in the mid-1990s, as suggested by previous works too.

Second, three kinds of income differentials between source province and other provinces are found to be important determinants of net outflow migration rates for migrants at any given educational level. The statistically significant negative elasticities of migration rates in the three education categories vis-à-vis income differences indicate that the poorer provinces tend to be affected by direct brain drain. The elasticities of migration rate with respect to the income differences at three different educational levels in the random effects model (−3.112~−2.463, −2.720~−1.954, −1.841~−1.233, from the lower levels of education, respectively) suggests that the poorer provinces tend to be the source of less educated migrants and vice versa. Furthermore, the relative income levels with respect to the surrounding provinces had a greater impact on net outflow migration in 2000. The lesser impact of income differences on migrants with college degrees is partly explained by the peculiar inclusion of return migration by nonnative college graduates, as observed in section 3.

Finally, we note significantly positive relationships between migration rates at the three educational levels and relative unemployment rates, implying equilibrating mechanism for the differences in unemployment rates across the provinces, only for the case compared with adjacent provinces in 2000. In contrast, the data for 1990 show significantly negative relationships for migrants with college and high school degrees. These results can be interpreted to signify that whereas the phenomenon suggested by Harris and Todaro (1970) was valid in 1990, the equilibrating mechanism for the economic conditions in the adjacent provinces was operating more in 2000. While economic incentives to migrate to more promising provinces with higher income levels can be noted in both the years, a nationwide equilibrating mechanism was not a strong determinant of migration for those who had received education higher than a junior high school degree.

IV.6 The Effects of Migration on New Human Capital Investment

We now present the impacts of interprovincial migration on new human capital investment in the succeeding years at the provincial level in China. Table 4.5.a and 4.5.b show the estimates of the fixed effects model and random effects model as well as the pooled OLS estimates for equations (2a) and (2b). In addition, Table 4.5.c indicates the changes in the effects of interprovincial migration on new human capital investment between 1990 and 2000. Our results support the presence of positive as well as negative effects of interprovincial migration on new human capital investment at the provincial level in China.

First, we analyze the effects of gross outflow migration on new human capital investment separately at the junior high school, high school, and college levels[35] in order to check for investment/disinvestment in higher education to secure better prospects vis-à-vis migration opportunity. We concentrate on the effects induced by gross outflow migration on school enrollments (e.g. high school) at four educational levels: all levels higher (high school and college) and lower (junior high school and lower) than the corresponding degree, the

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[35] We had to take into account the problem of multicollinearity in the estimation of equations (2a) and (2b) owing to the correlation of gross outflow/inflow migration rates in the different educational categories. Adjacent educational categories demonstrated a high degree of correlation.

corresponding degree itself (high school), and one level lower than the corresponding degree (junior high school). Our estimates in Table 4.5.a indicate significantly positive coefficients (0.425, 0.270~0.296 and 0.071~0.075, respectively, in descending order of education) for the effect of gross outflow migration at the same and at higher levels of education on enrollments in the corresponding schools at all three educational levels. These positive results could imply that the greater probability of migration at levels of education higher than junior high school inspired the residents to attend higher schools. On the other hand, although significantly negative impacts of gross outflow migration with lower degrees on school enrollments can be observed only for high school and college enrollments (the coefficients are −0.116 and −0.164, respectively), we do notice negative coefficients for the impacts on migration in many cases, as portended by the presence of a disinvestment mechanism. These results could signify that the greater probability of migration at lower educational levels discourages the residents from attending higher levels of education. As we have observed so far, our empirical results are mostly consistent with the proposed existence of investment/disinvestment in higher education to secure better prospects vis-à-vis migration opportunity. These results support positive as well as negative effects of gross outflow interprovincial migration on new human capital investment through externality, while the absolute values of the estimated elasticities suggest that positive externality eclipses negative externality at the national level.

Furthermore, we note statistically significant differences in the effects of gross outflow migration on new human capital investment between the two years, focusing on the interaction terms in Table 4.5.c. The positive impacts of gross outflow migration with junior high school degrees on enrollments in junior high schools appear to be more evident in 2000, while the negative impacts of gross outflow migration with lower degrees of education on college enrollments more clearly in 1990. The greater tangibility of the positive impacts of gross outflow migration with junior high school degrees on enrollments in corresponding schools in 2000 appears to have stemmed from relaxations in migration restrictions for the residents with relatively lesser education. It is easy to appreciate the increased incentives to achieve relatively lower levels of education (such as a junior high school degree) to secure better prospects of migration, as the probability of migration with junior high school degrees increased dramatically in the 1990s. On the other hand, the reduced impact of gross outflow migration at lower levels of education on college enrollments during the 1990s contradicts our expectation based on the fact that the probability of migration with junior high school and high school degrees increased and nearly equaled that for migration with college degrees from 1990 to 2000. However, we can justify the fact that college enrollment is less affected by the probabilities of migration at lower educational levels if we concede that the wage premium for college education increased and its regional dispersion also swelled during this period.

Next, we analyze the effects of net outflow migration on new human capital investment that can be understood through the relative labor supply effect. We focus on exploring the impact on school enrollment (e.g. high school) induced by net outflow migration at different educational levels (college, high school, junior high school, and lower). This mechanism of the relative labor supply effect induces adjustments in the provincial distribution of human capital at the national level already affected by direct brain drain, whereas the mechanism of migration-oriented investment/disinvestment in higher education opportunity might affect the total human capital formation at the national level. The estimates in Table 4.5.b show statistically significant impacts of net outflow migration on enrollments at three different educational levels. We observe positive impacts of net outflow migration on corresponding enrollments at these educational levels as well as negative impacts of net outflow migration at the junior high school level on high school enrollments. Here, we partly find the impacts augmented by relative labor supply effects, which are mainly brought by the migrants at their respective educational levels. Our results suggest that the net interprovincial migration at the three educational levels mitigates the direct brain drain by encouraging new human capital investment in the corresponding schools at the provincial level. Additionally, the net interprovincial migration at the junior high school level can be seen to have had a negative impact on high school enrollments. This also mitigates the direct brain drain of junior high school graduates, but it does so by discouraging new human capital investment at the high school level. The interaction terms in Table 4.5.c also bring out the statistically significant differences in the effects of net outflow migration on new human capital investment between 1990 and 2000. The positive impacts of net outflow migration with college and junior high school degrees on enrollments at the corresponding level tend to be more evident in 2000, which entails that the relative labor supply effects of migration were more impacting in 2000. Our estimates support more positive than negative impacts of net outflow migration on new human investment in 2000 as compared with 1990.

Finally, we study the effects of economic conditions and the accessibility of schools in the provinces. The income level has statistically significant effects on educational enrollments at all levels but these effects are greater on school enrollment at higher levels; unemployment rates, on the other hand, always affect college enrollment. The spatial accessibility of schools measured by the ratio of the number of schools to land area has a positive effect on college enrollment only. We also seek to assess the monetary cost of education using the ratio of tuition costs to educational funds[36]. Unfortunately, we can apply this only for the OLS estimates of 2000 (not reported) due to lack of data, and confirm that the estimated results are robust.

Before concluding, we comment on the results for college enrollments. College

[36] Owing to constrictions in the availability of data, we added the ratio of tuition costs to educational funds in all educational categories in every equation for the OLS estimate, using only the data for 2000.

enrollments from other provinces—a theme that we introduced in Section 3—determined the percentage of students who progress to colleges at the provincial level. Our estimates do not reflect the impact of gross/net outflow migration with college degrees on college enrollments in the native provinces but on enrollments including students coming from other provinces. The positive relationship between net inflow migration for college education and return migration by college graduates might influence the relationship between college enrollments and gross/net outflow migration with college degrees. Unfortunately, this potential problem can not be resolved owing to our data availability.

IV.7 Conclusions

This paper empirically examines the impact of interprovincial migration at different educational levels on the creation and distribution of human capital in the source provinces in China. First, we seek to identify the provinces most affected by the direct brain drain through internal migration by focusing on the determinants of migration. The negative elasticities of migration rates vis-à-vis relative income levels suggest that the poorer provinces are more affected by direct brain drain at three educational levels. In addition, the higher income elasticities for migration with lesser education suggest increasing levels of direct brain drain at relatively lower educational levels, such as at the junior high school level, in the poorer provinces. Furthermore, if migration probabilities were higher in the provinces abundant with corresponding human capital stocks and if the labor supply push effects were to work effectively, the differences in human capital stock across provinces would have shown a propensity to diminish. However, this is not the case according to our empirical results for the relationship between migration and existing human capital stock. Our results indicate the incidence of more net outflow migration at any educational level from provinces with relatively larger populations of junior high school graduates. The relationship between migration and existing human capital stock can not be completely explained by the labor supply push effects presumably due to rapid and unbalanced economic growth and the unfinished nature of the labor market during the transition process.

Second, we examine both external economies and diseconomies of gross outflow migration on new human capital investment. The underlying mechanism of those effects is based on investment/disinvestment in higher education to secure better prospects vis-à-vis migration opportunity. Our estimates support both positive and negative externalities of gross outflow migration and suggest that the positive "brain effect" eclipses the negative one at the national level.

Third, we analyze the effects of net outflow migration on new human capital investment in the forms of responses to the changes caused by migration in relative wages associated with the fluctuations in relative labor supply. Our results imply that the direct brain drain is mitigated by relative labor supply effects by both encouraging new educational investment at the corresponding levels and discouraging enrollments at higher levels. While we observed positive as well as negative impacts of net outflow migration on school enrollments, the data for 2000 showed more positive and less negative impacts. This might suggest that relative labor supply worked more favorably for the provinces that were more influenced by direct brain drain in 2000.

Table 4.1: Average Ratios of Net Outflow Migrants to Human Capital Stock Categorized by Educational levels in Coastal Provinces and Inland Provinces (%)

	College 1990	College 2000	High School 1990	High School 2000	Junior High School 1990	Junior High School 2000
Coastal Provinces	-3.18	-3.20	-0.93	-3.88	-2.02	-9.46
Inland Provinces	2.86	3.39	0.70	2.92	0.16	3.29

Notes:
1. Coastal provinces include 12 provinces such as Beijing, Liaoning, Tianjin, Hebei, Shangton, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Hainan, and Guangxi. Other 17 provinces are included in the inland provinces. Tibet is excluded.
2. The ratios are caluculated by (Total number of net outflow migrants at each educational level from province i to other provinces within the previous five years (1985-90/1995-2000) for coastal (or inland) provinces)/ (Total number of non-migrants at each educational level in province i in 1985-1990 /1995-2000 for coastal (or inland) provinces + Total number of gross outflow migrants at each educational level from province i in 1985-1990/1995-2000 for coastal (or inland) provinces) (%).

Table 4.2: The Shares of Coastal and Inland Provinces as the Destinations and Sources of Migration (%)

	Year	CC	CI	IC	II
All	1990	27.26	13.99	32.13	26.62
	2000	18.30	4.47	63.44	13.79
College	1990	30.67	11.99	40.81	16.52
	2000	28.76	7.45	49.78	14.01
High School	1990	27.28	15.96	31.48	25.28
	2000	19.00	5.64	62.28	13.08
Junior High School	1990	30.08	14.08	31.01	24.83
	2000	18.85	4.03	66.16	10.96

Notes:
The shares are calculated by the percentages of migrants in the flollowing four groups (CC, CI, IC, II) to all migrants.
CC: migrants from coastal provinces to coastal provinces, CI: migrants from coastal provinces to inland provinces
IC: migrants from inland provinces to coastal provinces, II: migrants from inland provinces to inland provinces.

Table 4.3: Definitions of Variables

Variables in Equations	Variables in Regressions	Definition
MIG_i	MIGO	Number of all migrants from province i to other provinces within the previous five years (1985-90/1995-2000) /(Population in province i in 1990/2000 + Number of all net outflow migrants in 1985-1990/1995-2000) (%)
	MIGI	Number of all migrants moving from other provinces to province i within the previous five years (1985-90/1995-2000) /(Population in province i in 1990/2000 + Number of all net outflow migrants in 1985-1990/1995-2000) (%)
	MIGN	MIGO/MIGI
	EDUCATION MIGO	Number of migrants at each educational level from province i to other provinces within the previous five years (1985-90/1995-2000) / (Number of people at each educational level in province i in 1990/2000 + Number of net outflow migrants at each educational level from province i in 1985-1990/1995-2000) (%)
	EDUCATION MIGI	Number of migrants at each educational level from other provinces to province i within the previous five years (1985-90/1995-2000) / (Number of people at each educational level in province i in 1990/2000 + Number of net outflow migrants at each educational level from province i in 1985-1990/1995-2000) (%)
	EDUCATION MIGN	*EDUCATION* MIGO/*EDUCATION* MIGI
	BMIGO BMIGN	EDUCATION = primary schools and below
	JMIGO JMIGN	EDUCATION = junior secondary schools
	HMIGO HMIGN	EDUCATION = senior secondary or secondary technical schools
	CMIGO CMIGN	EDUCATION = junior college and above
	BMIGO BMIGN	EDUCATION = junior secondary schools and above
	JMIGO ABOVE	EDUCATION = junior secondary schools and above
	HMIGO ABOVE	EDUCATION = senior secondary or secondary technical schools and above
	HMIGO BELLOW	EDUCATION = junior secondary schools and below
	CMIGO BELLOW	EDUCATION = senior secondary or secondary technical schools and below
$PCGDPDIFF_i$	PCGDPDIFF	GDP per capita of province i / national average GDP per capita (in 1985/95)
	PCGDPDIFFA	GDP per capita of province i / average GDP per capita weighted by inverse of distance from province i (in 1985/95)
	PCGDPDIFFS	GDP per capita of province i / average GDP per capita for surrounding provinces of province i, weighted by inverse of distance from province i (in 1985/95)
$PCGDPAVE_i$	PCGDPAVE	GDP per capita of province i at 1990 constant prices (yuan, in 1990-92/2000-02)
$HUMADIFF_i$	HUMA*EDUCATION* DIFF	EDU ATTAINMENT in province i/ national average EDU ATTAINMENT (in 1985/95)
	HUMA*EDUCATION* DIFFA	EDU ATTAINMENT in province i/ average EDU ATTAINMENTweighted by inverse of distance from province i (in 1985/95)
	HUMA*EDUCATION* DIFFS	EDU ATTAINMENT in province i/ average EDU ATTAINMENTfor surrounding provinces of province i, weighted by inverse of distance from province i (in 1985/95)
	EDU ATTAINMENT	(Number of people with each educational degrees in province i in 1990/2000 + number of net outflow migrants with each educational degrees from province i between 1985-1990/1995-2000) / (population in province i (in 1990/2000) + number of all net outflow migrants (in 1985-1990/1995-2000)) (%)
	HUMAJDIFF HUMAJDIFFA HUMAJDIFFS	*EDUCATION* = junior secondary schools
	HUMAHDIFF HUMAHDIFFA HUMAHDIFFS	*EDUCATION* = senior secondary or secondary technical schools
	HUMACDIFF HUMACDIFFA HUMACDIFFS	*EDUCATION* = junior college and above
$EDUAVE_i$	EDUJ	Average percentage of students who go to junior secondary or secondary technical schools in province i vis-à-vis graduates of primary schools (in 1990-92/2000-02) (%) number of new enrollment in junior secondary and secondary technical schools / number of graduate from primary school *100
	EDUH	Average percentage of students who go to senior secondary or secondary technical schools in province i vis-à-vis graduates of primary schools (in 1990-92/2000-02) (%) number of new enrollment in senior secondary or secondary technical schools / number of graduate from junior secondary and secondary technical schools * EDUJ
	EDUC	Average percentage of students who go to junior colleges or above in province i vis-à-vis graduates of primary schools (in 1990-92/2000-02) (%) number of new enrollment in institutes of higher education / number of graduate from senior secondary schools or technical schools * EDUH
$UEMPDIFF_i$	UEMPDIFF	Urban registered unemployment rate in province i / national average urban registered unemployment rate (in 1985/1995)
	UEMPDIFFA	Urban registered unemployment rate in province i / average urban registered unemployment rate weighted by inverse of distance from province i (in 1985/1995)
	UEMPDIFFS	Urban registered unemployment rate in province i / average urban registered unemployment rate for surrounding provinces of province i weighted by inverse of distance (in 1985/1995)
$UEMPAVE_i$	UEMPAVE	Average urban registered unemployment rate in provnce i (in 1990-92/2000-02)(%)
$TEMPDIFF_i$	TEMPDIFF	Average annual temparature of major city of province i/ average annual temparature of major 30 cities of provinces (in 1985/1995)
	TEMPDIFFA	Average annual temparature of major city of province i/ average annual temparature of major 30 cities of provinces weighted by inverse of distance from province i (in 1985/1995)
	TEMPDIFFS	Average annual temparature of major city of province i/ average annual temparature of major 30 cities of surrounding provinces weighted by inverse of distance from province i (in 1985/1995)
$NUMSCHOOLAVE_i$	NUMJ	Number of junior secondary schools per land area (10000 sq.km) (in 1990-92/2000-02)
	NUMH	Number of senior secondary or secondary technical schools per land area (10000 sq.km) (in 1990-92/2000-02)
	NUMC	Number of junior college or above per land area (10000 sq.km) (in 1990-92/2000-02)
$TUITION_i$	TUITION	Tuition and Miscellaneous Fee/Educational Funds (in 1990-92/2000-02)(%)

Table 4.4.a : Effects of Human Capital Stock on Migration at Educational Levels by the Random Effects Model

Dependent Variable	CMIGN	HMIGN	JMIGN
Independent Variable	Relative to National Average		
CONSTANT	0.197	0.153	0.121
	(0.128)	(0.139)	(0.180)
PCGDPDIFF	-1.618 ***	-1.954 ***	-2.463 ***
	(0.346)	(0.458)	(0.551)
UEMPDIFF	-0.366 **	-0.189	-0.025
	(0.170)	(0.264)	(0.294)
HUMAJDIFF	1.067 *	2.496 ***	3.429 ***
	(0.649)	(0.838)	(1.013)
HUMAHDIFF	0.161	-0.316	-1.284
	(0.623)	(0.839)	(0.997)
HUMACDIFF	-0.036	-0.192	0.106
	(0.423)	(0.611)	(0.705)
TEMP	-1.131 ***	-0.542 *	-0.123
	(0.284)	(0.318)	(0.407)
R-squared	0.583	0.545	0.620
Number of Observations	58	58	58

Dependent Variable	CMIGN	HMIGN	JMIGN
Independent Variable	Relative to National Average Weighted by Inverse of Distance		
CONSTANT	-0.053	-0.246	-0.378 *
	(0.140)	(0.152)	(0.194)
PCGDPDIFFA	-1.841 ***	-2.492 ***	-3.036 ***
	(0.376)	(0.464)	(0.570)
UEMPDIFFA	-0.296 *	-0.099	0.049
	(0.173)	(0.247)	(0.284)
HUMAJDIFFA	1.255 *	2.499 ***	3.241 ***
	(0.697)	(0.871)	(1.060)
HUMAHDIFFA	-0.134	-0.369	-1.269
	(0.603)	(0.773)	(0.929)
HUMACDIFFA	0.399	0.321	0.590
	(0.395)	(0.544)	(0.634)
TEMPDIFFA	-1.255 ***	-0.509	0.005
	(0.325)	(0.337)	(0.442)
R-squared	0.589	0.574	0.640
Number of Observations	58	58	58

Dependent Variable	CMIGN	HMIGN	JMIGN
Independent Variable	Relative to Surrounding Provinces Average Weighted by Inverse of Distance		
CONSTANT	0.266	0.076	0.025
	(0.164)	(0.155)	(0.207)
PCGDPDIFFS	-1.233 ***	-2.720 ***	-3.112 ***
	(0.439)	(0.586)	(0.682)
UEMPDIFFS	-0.280	-0.099	0.062
	(0.209)	(0.305)	(0.341)
HUMAJDIFFS	0.878	2.598 **	2.621 **
	(0.866)	(1.032)	(1.267)
HUMAHDIFFS	-0.312	-1.347	-1.904 *
	(0.788)	(0.901)	(1.121)
HUMACDIFFS	0.110	0.784	0.735
	(0.455)	(0.566)	(0.679)
TEMPDIFFS	-1.556 **	-1.014	-0.132
	(0.781)	(0.808)	(1.041)
R-squared	0.345	0.473	0.502
Number of Observations	56	56	56

Notes:
*,**, *** Statistically significant at the 10%, 5%, 1% level. Standard errors are in parentheses.

Table 4.4.b: Effects of Human Capital Stock on Migration at Educational Levels in 1990 and 2000 by OLS

Dependent Variable	CMIGN	HMIGN	JMIGN
Independent Variable	Relative to National Average		
CONSTANT	0.084 (0.149)	-0.037 (0.118)	-0.046 (0.155)
PCGDPDIFF	-1.220 * (0.606)	-1.297 *** (0.376)	-1.485 ** (0.556)
PCGDPDIFF*YEAR00	-0.464 (0.608)	-0.677 (0.715)	-1.058 (0.754)
UEMPDIFF	-0.578 ** (0.251)	-0.342 ** (0.154)	-0.165 (0.238)
UEMPDIFF*YEAR00	0.239 (0.352)	0.088 (0.519)	0.074 (0.577)
HUMAJDIFF	0.809 (0.906)	0.389 (0.714)	2.089 *** (0.712)
HUMAJDIFF*YEAR00	-0.159 (0.946)	1.898 (1.384)	0.473 (1.230)
HUMAHDIFF	-0.058 (0.675)	0.128 (0.506)	-1.258 * (0.661)
HUMAHDIFF*YEAR00	2.553 ** (1.056)	2.326 (1.585)	3.231 * (1.825)
HUMACDIFF	-0.317 (0.478)	-0.252 (0.414)	-0.259 (0.605)
HUMACDIFF*YEAR00	-1.168 (0.735)	-2.469 * (1.305)	-2.058 (1.482)
TEMPDIFF	-1.330 *** (0.280)	-0.730 *** (0.244)	-0.275 (0.408)
R-squared	0.637	0.659	0.672
Number of Observations	58	58	58

Dependent Variable	CMIGN	HMIGN	JMIGN
Independent Variable	Relative to National Average Weighted by Inverse of Distance		
CONSTANT	-0.224 (0.193)	-0.286 * (0.153)	-0.488 ** (0.207)
PCGDPDIFFA	-1.315 * (0.657)	-1.516 *** (0.484)	-1.891 *** (0.545)
PCGDPDIFFA*YEAR00	-0.919 (0.610)	-1.262 (0.795)	-1.564 ** (0.734)
UEMPDIFFA	-0.443 * (0.235)	-0.239 (0.146)	-0.081 (0.181)
UEMPDIFFA*YEAR00	0.254 (0.350)	0.301 (0.524)	0.401 (0.575)
HUMAJDIFFA	0.985 (0.923)	0.382 (0.818)	1.736 ** (0.743)
HUMAJDIFFA*YEAR00	-0.374 (0.968)	1.902 (1.341)	0.783 (1.126)
HUMAHDIFFA	-0.226 (0.631)	0.052 (0.529)	-1.120 * (0.646)
HUMAHDIFFA*YEAR00	2.502 ** (0.965)	2.010 (1.373)	2.682 (1.638)
HUMACDIFFA	-0.029 (0.477)	0.030 (0.417)	0.016 (0.527)
HUMACDIFFA*YEAR00	-0.785 (0.691)	-1.697 (1.160)	-1.089 (1.397)
TEMPA	-1.393 *** (0.311)	-0.561 ** (0.265)	0.006 (0.473)
R-squared	0.657	0.688	0.696
Number of Observations	58	58	58

Dependent Variable	CMIGN	HMIGN	JMIGN
Independent Variable	Relative to Surrounding Provinces Average Weighted by Inverse of Distance		
CONSTANT	0.135 (0.175)	-0.024 (0.134)	-0.110 (0.186)
PCGDPDIFFS	-0.735 (0.708)	-1.377 *** (0.477)	-1.978 *** (0.652)
PCGDPDIFFS*YEAR00	-2.452 *** (0.665)	-3.362 *** (0.786)	-3.621 *** (0.913)
UEMPDIFFS	-0.407 ** (0.196)	-0.340 * (0.199)	0.006 (0.254)
UEMPDIFFS*YEAR00	0.963 ** (0.406)	1.572 ** (0.588)	1.841 *** (0.657)
HUMAJDIFFS	0.575 (1.087)	0.916 (0.725)	1.764 ** (0.802)
HUMAJDIFFS*YEAR00	0.941 (1.071)	2.411 (1.790)	1.732 (2.139)
HUMAHDIFFS	-0.464 (0.937)	-1.082 (0.711)	-2.054 ** (0.891)
HUMAHDIFFS*YEAR00	1.597 (1.065)	1.561 (1.449)	2.312 (1.801)
HUMACDIFFS	-0.058 (0.558)	0.472 (0.546)	0.489 (0.759)
HUMACDIFFS*YEAR00	0.774 (0.693)	0.366 (1.062)	1.119 (1.197)
TEMPS	-2.057 *** (0.747)	-0.838 (0.570)	0.258 (0.854)
R-squared	0.468	0.648	0.621
Number of Observations	56	56	56

Notes:
1. Dummy of year 2000 is included in the regression.
2.*,**, *** Statistically significant at the 10%, 5%, 1% level. Standard errors (robust) are in parentheses.

Table 4.5.a: Effects of Gross Outflow Migration on New Human Capital Investment

1. Effects on College Enrollment

	Fixed Effects			OLS		
Dependent Variable	EDUC	EDUC	EDUC	EDUC	EDUC	EDUC
CONSTANT	-10.193 ***	-9.922 ***	-10.200 ***	-3.356 ***	-3.613 ***	-3.168 ***
	(1.991)	(1.437)	(1.870)	(0.992)	(0.993)	(0.938)
UEMPAVE	-0.530 *	-0.513 **	-0.537 *	-0.387 ***	-0.395 ***	-0.405 ***
	(0.259)	(0.240)	(0.264)	(0.140)	(0.133)	(0.137)
PCGDPAVE	1.601 ***	1.565 ***	1.602 ***	0.619 ***	0.662 ***	0.599 ***
	(0.274)	(0.202)	(0.258)	(0.129)	(0.130)	(0.123)
HMIGO			-0.033			-0.164 **
			(0.138)			(0.080)
CMIGO BELLOW	-0.023			-0.093		
	(0.117)			(0.070)		
CMIGO	0.114	0.093	0.126	0.425 ***	0.378 ***	0.475 ***
	(0.257)	(0.230)	(0.272)	(0.118)	(0.107)	(0.119)
NUMC	0.269	0.298	0.276	0.088 *	0.090 *	0.069
	(0.535)	(0.506)	(0.524)	(0.049)	(0.048)	(0.050)
R-squared	0.691	0.687	0.689	0.889	0.886	0.893
Number of Observations	58	58	58	58	58	58

2. Effects on High School Enrollment

	Random Effects			OLS		
Dependent Variable	EDUH	EDUH	EDUH	EDUH	EDUH	EDUH
CONSTANT	0.333	0.814 ***	0.665 *	-0.067	0.306	0.309
	(0.371)	(0.314)	(0.368)	(0.547)	(0.662)	(0.670)
UEMPAVE	-0.052	-0.106	-0.076	-0.034	-0.083	-0.079
	(0.074)	(0.072)	(0.082)	(0.067)	(0.066)	(0.077)
PCGDPAVE	0.420 ***	0.394 ***	0.404 ***	0.478 ***	0.474 ***	0.472 ***
	(0.039)	(0.038)	(0.040)	(0.085)	(0.089)	(0.095)
JMIGO			-0.071			-0.015
			(0.090)			(0.111)
HMIGO ABOVE	0.270 ***			0.296 **		
	(0.098)			(0.120)		
HMIGO BELLOW	-0.116 *			-0.127		
	(0.064)			(0.086)		
HMIGO		0.058	0.139		0.055	0.072
		(0.043)	(0.112)		(0.046)	(0.131)
NUMH	-0.029	-0.038	-0.031	-0.045	-0.063 *	-0.060
	(0.030)	(0.033)	(0.034)	(0.043)	(0.034)	(0.042)
R-squared	0.696	0.639	0.641	0.700	0.648	0.648
Number of Observations	58	58	58	58	58	58

3. Effects on Junior High School Enrollment

	Fixed Effects			OLS		
Dependent Variable	EDUJ	EDUJ	EDUJ	EDUJ	EDUJ	EDUJ
CONSTANT	2.854 ***	2.870 ***	2.865 ***	3.076 ***	3.169 ***	3.143 ***
	(0.434)	(0.451)	(0.457)	(0.196)	(0.207)	(0.220)
UEMPAVE	-0.075	-0.097 *	-0.100 *	-0.037	-0.048 *	-0.048 *
	(0.052)	(0.051)	(0.051)	(0.026)	(0.026)	(0.025)
PCGDPAVE	0.171 ***	0.181 ***	0.183 ***	0.176 ***	0.171 ***	0.173 ***
	(0.034)	(0.034)	(0.035)	(0.024)	(0.026)	(0.027)
BMIGO	0.008		0.024	-0.025		-0.013
	(0.033)		(0.038)	(0.019)		(0.020)
JMIGO ABOVE	0.075 *			0.071 ***		
	(0.043)			(0.025)		
JMIGO		0.062 ***	0.040		0.033 **	0.044 *
		(0.022)	(0.041)		(0.012)	(0.026)
NUMJ	0.053	0.041	0.044	-0.010 *	-0.012 **	-0.012 **
	(0.081)	(0.084)	(0.085)	(0.005)	(0.006)	(0.006)
R-squared	0.548	0.570	0.554	0.746	0.726	0.728
Number of Observations	58	58	58	58	58	58

Notes:
1. We show one of the fixed effect estimates and random effect estimates for each schooling enrollment according to Hausman's test.
2. Dummy of year 2000 is included in OLS.
3. *,**, *** Statistically significant at the 10%, 5%, 1% level. Standard errors (robust) are in parentheses.

Table 4.5.b: Effects of Net Outflow Migration on New Human Capital Investment

1. Effects on College Enrollment

	Fixed Effects			OLS		
Dependent Variable	EDUC	EDUC	EDUC	EDUC	EDUC	EDUC
CONSTANT	-9.187 ***	-9.269 ***	-9.212 ***	-3.123 **	-2.520 **	-1.876
	(1.005)	(1.021)	(1.054)	(1.155)	(1.149)	(1.362)
UEMPAVE	-0.435 *	-0.463 *	-0.488 *	-0.374 **	-0.366 **	-0.300 *
	(0.243)	(0.248)	(0.261)	(0.152)	(0.157)	(0.154)
PCGDPAVE	1.472 ***	1.482 ***	1.474 ***	0.674 ***	0.590 ***	0.493 **
	(0.179)	(0.181)	(0.188)	(0.148)	(0.147)	(0.180)
BMIGN			-0.017			0.126
			(0.155)			(0.093)
JMIGN			0.122			-0.261 *
			(0.198)			(0.148)
HMIGN		-0.053	-0.155		-0.093 *	0.079
		(0.074)	(0.150)		(0.047)	(0.105)
CMIGN	0.149	0.205	0.210	0.125 ***	0.196 ***	0.179 ***
	(0.120)	(0.145)	(0.150)	(0.044)	(0.058)	(0.058)
NUMC	0.329	0.351	0.402	0.111 **	0.118 ***	0.156 ***
	(0.481)	(0.487)	(0.552)	(0.046)	(0.043)	(0.053)
R-squared	0.714	0.707	0.689	0.868	0.875	0.883
Number of Observations	58	58	58	58	58	58

2. Effects on High School Enrollment

	Random Effects			OLS		
Dependent Variable	EDUH	EDUH	EDUH	EDUH	EDUH	EDUH
CONSTANT	0.792 **	0.876 ***	0.706 **	0.340	0.940	0.772
	(0.320)	(0.311)	(0.334)	(0.709)	(0.769)	(0.832)
UEMPAVE	-0.107	-0.030	-0.029	-0.082	-0.025	-0.017
	(0.072)	(0.077)	(0.077)	(0.069)	(0.085)	(0.090)
PCGDPAVE	0.405 ***	0.377 ***	0.398 ***	0.478 ***	0.370 ***	0.384 ***
	(0.039)	(0.039)	(0.041)	(0.098)	(0.114)	(0.122)
BMIGN			0.076			0.059
			(0.051)			(0.059)
JMIGN		-0.108 **	-0.188 ***		-0.111 **	-0.175 **
		(0.047)	(0.071)		(0.047)	(0.083)
HMIGN	0.029	0.143 ***	0.160 ***	0.022	0.135 **	0.129 **
	(0.023)	(0.054)	(0.059)	(0.031)	(0.053)	(0.056)
CMIGN			0.004			0.041
			(0.042)			(0.051)
NUMH	-0.043	-0.029	-0.024	-0.069 *	-0.033	-0.020
	(0.032)	(0.031)	(0.033)	(0.035)	(0.042)	(0.041)
R-squared	0.635	0.665	0.674	0.645	0.667	0.682
Number of Observations	58	58	58	58	58	58

3. Effects on Junior High School Enrollment

	Fixed Effects			OLS		
Dependent Variable	EDUJ	EDUJ	EDUJ	EDUJ	EDUJ	EDUJ
CONSTANT	2.519 ***	2.454 ***	1.945 ***	2.940 ***	2.993 ***	3.049 ***
	(0.439)	(0.461)	(0.481)	(0.211)	(0.178)	(0.199)
UEMPAVE	-0.088	-0.087	-0.061	-0.051 *	-0.048 *	-0.039
	(0.052)	(0.053)	(0.055)	(0.025)	(0.024)	(0.026)
PCGDPAVE	0.213 ***	0.218 ***	0.222 ***	0.210 ***	0.202 ***	0.190 ***
	(0.030)	(0.031)	(0.030)	(0.029)	(0.025)	(0.031)
BMIGN		0.018	0.040		-0.023	-0.016
		(0.033)	(0.031)		(0.019)	(0.023)
JMIGN	0.037 **	0.022	-0.043	0.026 ***	0.045 **	0.015
	(0.014)	(0.031)	(0.047)	(0.007)	(0.019)	(0.041)
HMIGN			0.077 *			0.034
			(0.038)			(0.028)
CMIGN			-0.076 **			-0.011
			(0.031)			(0.009)
NUMJ	0.069	0.077	0.177 *	-0.021 ***	-0.022 ***	-0.017
	(0.085)	(0.088)	(0.097)	(0.006)	(0.006)	(0.010)
R-squared	0.457	0.428	0.257	0.745	0.752	0.761
Number of Observations	58	58	58	58	58	58

Notes:
1. We show one of the fixed effect estimates and random effect estimates for each schooling enrollment according to Hausman's test.
2. Dummy of year 2000 is included in OLS.
3. *,**, *** Statistically significant at the 10%, 5%, 1% level. Standard errors (robust in OLS) are in parentheses.

Table 4.5.c: Effects of Gross and Net Outflow Migrations on New Human Capital Investment in 1990 and 2000 by OLS

1. Effects on College Enrollment

Dependent Variable	EDUC	EDUC	EDUC
Independent Variable	Gross Outflow		
CONSTANT	-3.471 ***	-3.561 ***	-3.429 ***
	(0.988)	(0.974)	(0.911)
UEMPAVE	-0.345 **	-0.389 ***	-0.350 **
	(0.156)	(0.133)	(0.154)
PCGDPAVE	0.652 ***	0.670 ***	0.664 ***
	(0.134)	(0.130)	(0.127)
HMIGO			-0.486 ***
			(0.144)
HMIGO*YEAR00			0.395 **
			(0.149)
CMIGO BELLOW	-0.324 **		
	(0.142)		
CMIGO BELLOW*YEAR00	0.277 *		
	(0.158)		
CMIGO	0.352 **	0.311 **	0.457 ***
	(0.150)	(0.138)	(0.156)
CMIGO*YEAR00	0.099	0.110	0.032
	(0.151)	(0.130)	(0.167)
NUMC	0.069	0.089 *	0.035
	(0.051)	(0.048)	(0.049)
R-squared	0.897	0.887	0.906
Number of Observations	58	58	58

Dependent Variable	EDUC	EDUC	EDUC
Independent Variable	Net Outflow		
CONSTANT	-3.197 **	-2.307 **	-1.959
	(1.175)	(1.113)	(1.274)
UEMPAVE	-0.359 **	-0.334 **	-0.329 **
	(0.138)	(0.145)	(0.152)
PCGDPAVE	0.685 ***	0.562 ***	0.513
	(0.151)	(0.142)	(0.168)
BMIGN			0.211 *
			(0.107)
BMIGN*YEAR00			-0.285 *
			(0.144)
JMIGN			-0.385 ***
			(0.132)
JMIGN*YEAR00			0.599 **
			(0.241)
HMIGN		-0.281 ***	0.003
		(0.081)	(0.117)
HMIGN*YEAR00		0.165 *	-0.316
		(0.091)	(0.201)
CMIGN	0.024	0.151 *	0.129
	(0.072)	(0.079)	(0.077)
CMIGN*YEAR00	0.163 **	0.137	0.204 *
	(0.074)	(0.110)	(0.102)
NUMC	0.109 **	0.104 **	0.127 ***
	(0.045)	(0.039)	(0.044)
R-squared	0.876	0.895	0.910
Number of Observations	58	58	58

2. Effects on High School Enrollment

Dependent Variable	EDUH	EDUH	EDUH
Independent Variable	Gross Outflow		
CONSTANT	-0.052	0.292	0.490
	(0.527)	(0.677)	(0.624)
UEMPAVE	-0.030	-0.076	-0.062
	(0.071)	(0.075)	(0.083)
PCGDPAVE	0.471 ***	0.481 ***	0.450 ***
	(0.086)	(0.093)	(0.093)
JMIGO			-0.205
			(0.153)
JMIGO*YEAR00			0.349
			(0.206)
HMIGO ABOVE	0.349 **		
	(0.149)		
HMIGO ABOVE*YEAR00	-0.129		
	(0.164)		
HMIGO BELLOW	-0.195 **		
	(0.083)		
HMIGO BELLOW*YEAR00	0.124		
	(0.138)		
HMIGO		0.018	0.211
		(0.086)	(0.180)
HMIGO*YEAR00		0.047	-0.317
		(0.079)	(0.225)
NUMH	-0.049	-0.067 *	-0.072 *
	(0.047)	(0.035)	(0.042)
R-squared	0.705	0.649	0.671
Number of Observations	58	58	58

Dependent Variable	EDUH	EDUH	EDUH
Independent Variable	Net Outflow		
CONSTANT	0.412	0.951	0.821
	(0.706)	(0.734)	(0.772)
UEMPAVE	-0.074	0.009	0.012
	(0.076)	(0.090)	(0.099)
PCGDPAVE	0.471 ***	0.366 ***	0.373 ***
	(0.098)	(0.109)	(0.114)
BMIGN			0.065
			(0.070)
BMIGN*YEAR00			-0.065
			(0.102)
JMIGN		-0.166 ***	-0.241 ***
		(0.048)	(0.086)
JMIGN*YEAR00		0.171 *	0.293
		(0.092)	(0.176)
HMIGN	-0.038	0.141 **	0.179 **
	(0.044)	(0.064)	(0.071)
HMIGN*YEAR00	0.068 *	-0.134	-0.289 *
	(0.034)	(0.116)	(0.158)
CMIGN			0.011
			(0.054)
CMIGN*YEAR00			0.112
			(0.076)
NUMH	-0.075 **	-0.037	-0.017
	(0.034)	(0.041)	(0.039)
R-squared	0.654	0.695	0.724
Number of Observations	58	58	58

Notes:
1. All regressions include dummy of year 2000.
2. *,**, *** Statistically significant at the 10%, 5%, 1% level. Standard errors (robust in OLS) are in parentheses.

Table 4.5.c (Cont): Effects of Gross and Net Outflow Migrations on New Human Capital Investment in 1990 and 2000 by OLS

3. Effects on Junior High School Enrollment

Dependent Variable	EDUJ	EDUJ	EDUJ
Independent Variable	Gross Outflow		
CONSTANT	3.077 ***	3.179 ***	3.146 ***
	(0.209)	(0.227)	(0.241)
UEMPAVE	-0.031	-0.034	-0.037
	(0.027)	(0.025)	(0.025)
PCGDPAVE	0.177 ***	0.172 ***	0.177 ***
	(0.024)	(0.028)	(0.029)
BMIGO	-0.029		0.001
	(0.041)		(0.041)
BMIGO*YEAR00	0.005		-0.033
	(0.047)		(0.045)
JMIGO ABOVE	0.049		
	(0.056)		
JMIGO ABOVE*YEAR00	0.027		
	(0.061)		
JMIGO		-0.008	-0.005
		(0.030)	(0.042)
JMIGO*YEAR00		0.052	0.079 *
		(0.031)	(0.043)
NUMJ	-0.012 *	-0.015 **	-0.015 **
	(0.007)	(0.007)	(0.006)
R-squared	0.749	0.741	0.747
Number of Observations	58	58	58

Dependent Variable	EDUJ	EDUJ	EDUJ
Independent Variable	Net Outflow		
CONSTANT	3.026 ***	3.098 ***	3.088 ***
	(0.239)	(0.214)	(0.231)
UEMPAVE	-0.030	-0.015	-0.016
	(0.024)	(0.029)	(0.030)
PCGDPAVE	0.193 ***	0.180 ***	0.183 ***
	(0.033)	(0.030)	(0.034)
BMIGN		-0.045	-0.042
		(0.045)	(0.052)
BMIGN*YEAR00		0.029	0.025
		(0.051)	(0.056)
JMIGN	-0.005	0.030	0.024
	(0.014)	(0.043)	(0.066)
JMIGN*YEAR00	0.035 ***	0.012	0.028
	(0.012)	(0.048)	(0.064)
HMIGN			0.003
			(0.047)
HMIGN*YEAR00			-0.006
			(0.048)
CMIGN			0.006
			(0.018)
CMIGN*YEAR00			-0.020
			(0.022)
NUMJ	-0.017 **	-0.017 **	-0.018 *
	(0.006)	(0.007)	(0.010)
R-squared	0.774	0.787	0.791
Number of Observations	58	58	58

Notes:
1. All regressions include dummy of year 2000.
2. *,**, *** Statistically significant at the 10%, 5%, 1% level. Standard errors (robust in OLS) are in parentheses.

Figure 4.1: The Relationship between Gross Inflow Migration Rate and Gross Outflow Migration Rate for All Migrants in 1990 and 2000

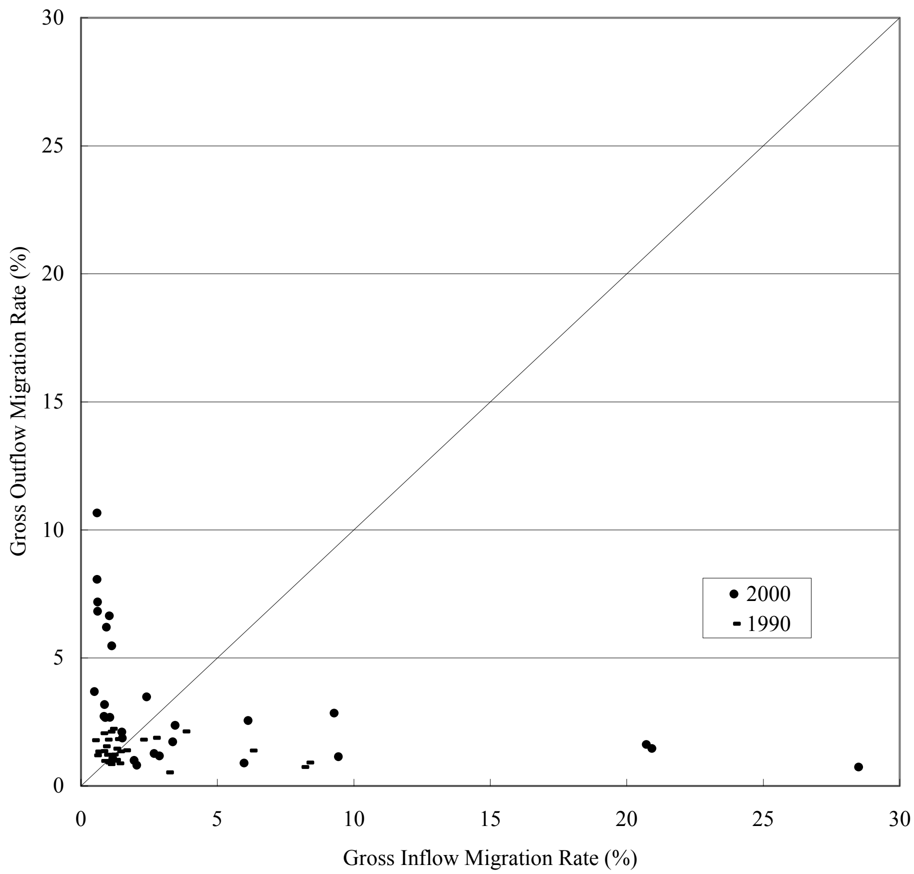

Figure 4.2: Comparison of Educational Attainment Rates between Outflow Migrants and Inflow Migrants vis-à-vis Non-migrants

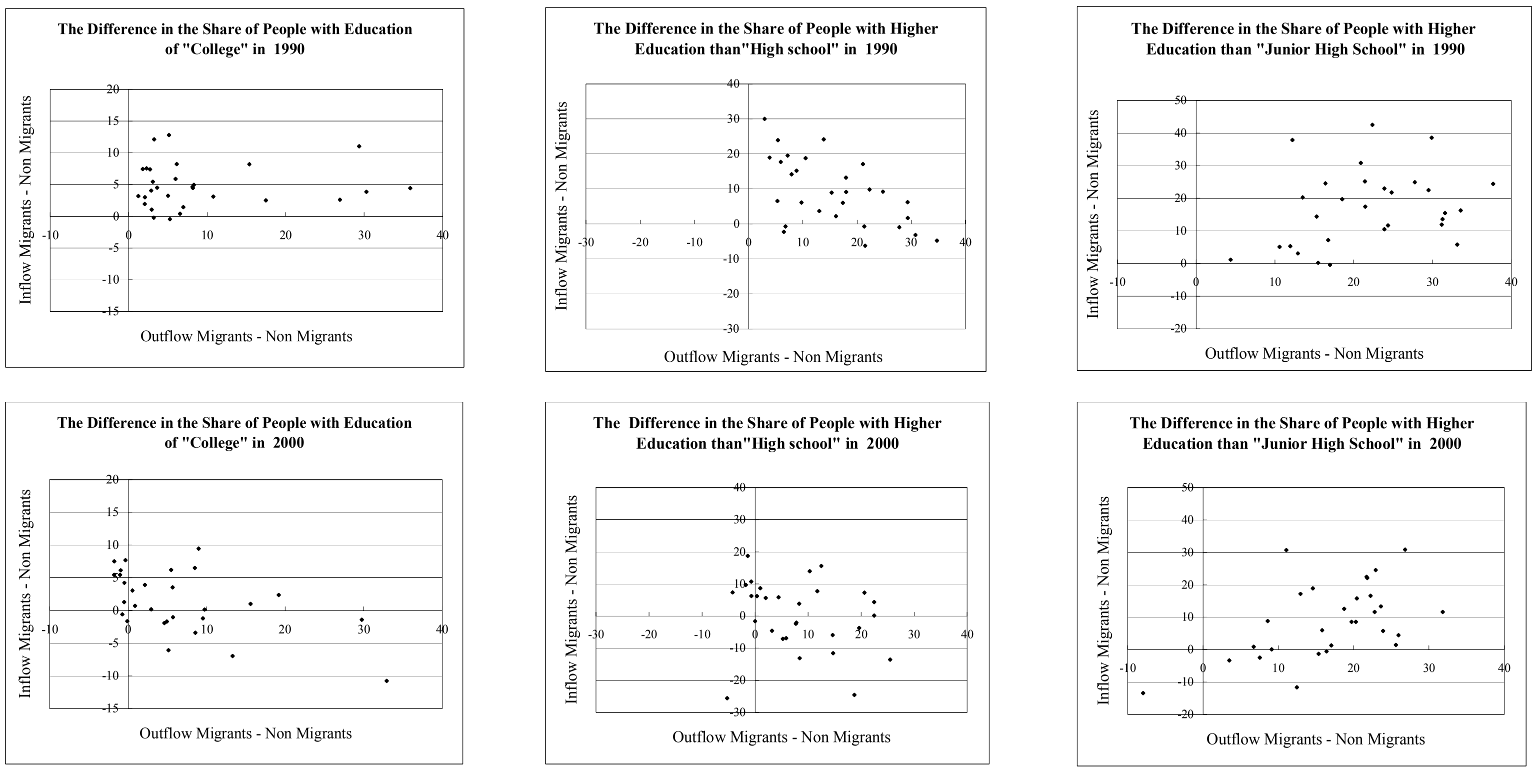

Table 4.6: (Appendix) Descriptive Statistics

	1900			2000		
	Observation	Mean	Standard Deviation	Observation	Mean	Standard Deviation
BMIGO	29	0.798	0.379	29	1.844	1.461
BMIGN	29	1.329	1.406	29	2.763	3.826
JMIGO	29	1.750	0.865	29	4.372	4.082
JMIGN	29	1.399	1.157	29	4.411	6.591
JMIGO ABOVE	29	2.057	0.803	29	4.269	3.560
HMIGO	29	2.170	0.999	29	3.625	2.805
HMIGN	29	1.288	0.671	29	3.320	4.863
HMIGO ABOVE	29	2.680	0.965	29	3.848	2.502
HMIGO BELLOW	29	1.136	0.485	29	3.070	2.662
CMIGO	29	5.772	2.409	29	4.372	2.267
CMIGN	29	1.735	1.377	29	2.649	3.293
CMIGO BELLOW	29	1.268	0.502	29	3.148	2.662
PCGDPDIFF	29	1.162	0.862	29	1.090	0.676
PCGDPDIFFA	29	0.969	0.722	29	0.973	0.550
PCGDPDIFFS	28	1.096	0.586	28	1.095	0.417
PCGDPAVE	29	2035.273	1193.152	29	5298.984	3223.033
HUMAJDIFF	29	0.993	0.199	29	0.960	0.168
HUMAJDIFFA	29	1.004	0.178	29	0.999	0.156
HUMAJDIFFS	29	1.043	0.206	29	1.022	0.174
HUMAHDIFF	29	1.128	0.467	29	1.108	0.381
HUMAHDIFFA	29	1.016	0.414	29	1.006	0.333
HUMAHDIFFS	29	1.083	0.438	29	1.056	0.311
HUMACDIFF	29	1.321	1.344	29	1.219	0.792
HUMACDIFFA	29	0.984	0.948	29	1.003	0.618
HUMACDIFFS	29	1.253	0.949	29	1.146	0.586
EDUJ	29	79.711	10.782	29	93.773	4.665
EDUH	29	37.518	12.071	29	52.760	13.954
EDUC	29	7.653	8.771	29	24.132	15.842
UEMPDIFF	29	1.144	0.808	29	1.117	0.525
UEMPDIFFA	29	1.061	0.730	29	1.028	0.417
UEMPDIFFS	29	1.110	0.724	29	1.014	0.317
UEMPAVE	29	2.532	1.008	29	3.477	0.662
TEMPDIFF	29	1.013	0.402	29	1.012	0.373
TEMPDIFFA	29	0.958	0.312	29	0.964	0.295
TEMPDIFFS	29	0.974	0.169	29	0.980	0.175
NUMJ	29	184.459	169.409	29	171.832	165.728
NUMH	29	97.894	138.225	29	58.245	101.941
NUMC	29	6.590	16.002	29	6.728	14.390
TUITION				29	15.593	4.060

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Chapter V

Conclusion

Three articles in this dissertation handle contemporary issues related to economic globalization and its various implications for the domestic economies. To be more specific, these essays discuss cross border capital transaction and inter-regional movement of human capital. Chapters II and III are in the field of international finance or open economy macroeconomics; they advance our understandings of the function and limitation of expanding international financial market. Chapter IV studies interprovincial migration in China resulted from its rapid industrialization when it becomes more incorporated into the world economy.

Chapter II argues that default option is the key driver for the observed asymmetries in the cyclical features of the fiscal policy between developed and emerging market countries, and in particular procyclical government consumption and transfer payments in emerging market countries. The default option is a sort of necessary evil in the sovereign borrowings given the unenforceable nature of the contracts due to sovereign immunity and the lack of an international proxy for the domestic bankruptcy court. This incompleteness, which is particularly relevant to the emerging market countries, severely constrains the optimal fiscal policy stance and intertemporal consumption smoothness over the business cycle.

Chapter III provides conclusions at odds with the conventional wisdom on the gain from international financial integration. While previous empirical works point out failures of risk sharing, the results of this chapter indicate improved consumption risk sharing through financial integration on the whole. Particularly, OECD countries are shown to be well-insured against predictable change in transitory income. Furthermore, the results support the hypothesis that financial integration leads to an even larger adjustment in consumption in response to a permanent shock to income growth. This can explain the higher relative volatility of consumption growth in the 1990s observed in the emerging market countries, which has been interpreted as suggesting less successful international risk sharing in those countries.

Chapter IV empirically examines the impacts of interprovincial migration at different educational levels on the creation and distribution of human capital in the source provinces based on Chinese provincial level data. We observe both external economies and diseconomies of gross outflow migration on new human capital investment which are consistent with the mechanism of migration-oriented investment/disinvestment in higher education at source provinces, and find that this positive externality eclipses the negative one at the national level. Moreover, the effects of net outflow migration on new human capital investment based on the changes in relative labor supply mitigate direct brain drain by both encouraging and discouraging school enrollments at various levels, whereas estimates support more positive than negative impacts in 2000 as compared with 1990. These results can be interpreted as favorable for easing regional inequality as well as contributing economics growth. We observe invisible hands which help to restore the availability of human capital at provincial level which is disturbed by the large scale migration of educated workers. More importantly, incentive mechanisms are shown to increase the new human capital investment at the national level which can be a good foundation of sustainable economic growth in China.