

Financial Integration and Consumption Risk Sharing in East Asia

by

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Abstract

This paper estimates the degree of consumption risk sharing and analyzes the channels of consumption risk sharing among the ten East Asian countries. Estimation results show that a bulk of cross-sectional variance of GDP, about 80%, is not smoothed within the region, which suggests that the degree of consumption risk sharing is far from complete and very low in the region. Capital markets play a minimal role, and credit markets provide a positive but limited role. These results imply that market channels do not function well in smoothing idiosyncratic output shocks. To be consistent, we also find that potential welfare gains from consumption risk sharing within East Asia are quite large.

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Key words: consumption risk sharing, East Asia, financial integration, risk sharing gains

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1. Introduction

The theory of optimum currency areas (OCA), developed by Mundell (1961), McKinnon (1963) and Kenen (1969), has been used extensively as a benchmark framework for discussion of a currency union. In particular, the incidence of idiosyncratic shocks across member countries is a critical determinant of the design of optimum currency areas (Bayoumi and Eichengreen, 1993: p. 195). When asymmetric output shocks occur across the member countries of a currency union, monetary policy cannot be tailored to an individual country's particular disturbances. Hence, it is less costly for the economies to form a common currency area if their business cycles are synchronized.¹ However, even in an integrated economy as the United States—which can be considered as a successful currency union—regional shocks can be large. Then, do countries have to take asymmetric shocks given? Are there any ways to reduce the negative effects of asymmetric shocks? In fact, even when countries have asymmetric business cycles, consumption does not have to follow asymmetric shocks. Countries can share country specific output shocks through various arrangements in financial markets, which is known as “consumption risk sharing.” Therefore, a high degree of consumption risk sharing can be a good substitute for synchronized business cycles as a condition for a successful currency union.

There are various channels of consumption risk sharing. First, countries can share country specific risks via cross-ownership of productive assets (portfolio diversification), facilitated by a developed capital markets. Second, countries can smooth their consumption by adjusting their non-contingent asset holdings, for example through lending and borrowing in international credit markets (intertemporal trade). Third, governments or international organizations can arrange fiscal transfer system that can serve as a vehicle for further income and consumption smoothing.²

A number of previous studies have analyzed the role of these channels in providing consumption risk sharing across regions or countries. Some have focused on the role of fiscal transfer system. Sala-i-Martin and Sachs (1992) empirically examined the insurance role of the federal government's tax-transfer system in smoothing regional shocks. Using U.S. state income

¹ Monetary policies can be considered as a source of economic disturbances. In this case, a currency union can reduce country specific shocks from independent monetary policies by adopting a single monetary policy.

² Some studies call the second channel “intertemporal consumption smoothing” or “intertemporal trade” as opposed to narrowly defined “risk sharing” like the first channel. In this paper, we call all these channels “consumption risk sharing” channels or “consumption smoothing” channels.

data in level for the period 1970-1988, they found that in the United States, federal taxes and transfers offset roughly one-third of deviations of regional from national income. Similarly, by using gross state product data in differenced logs, for the period 1981-1986, von Hagen (1992) obtained somewhat lower estimates of 9-10 percent.³ As shown in the case of U.S., however, the heavily federalized fiscal system alone offers only a partial solution to the problem of regional stabilization. In other words, there are other, more decentralized channels that need to operate to attenuate regional shocks. In this regard, French and Poterba (1991) and Atkeson and Bayoumi (1993) were among the first to document the (scarce) extent of risksharing through capital markets across a few industrial countries and among the US states.

An interesting study by Asdrubali, Sørensen and Yosha (1996) develops a framework for assessing how much regional shocks are smoothed by above three markets, including market and non-market channels. They used decomposition of cross-sectional variance of GDP for the case of U.S. states. For the period 1963-1990, they found that 39 percent of regional income shocks are smoothed by capital markets, 23 percent are smoothed by credit markets, and 13 percent are smoothed by the federal government. The 25 percent remain unsmoothed. In sum, although perfect insurance is not achieved, there is considerable risk sharing among U.S. states. Capital markets are more important than credit market as a means of smoothing regional shocks in the U.S. Still, credit itself is nearly twice as important as net transfers from the federal fiscal system. Thus, market channels evidently play an enormous role.

Consumption smoothing patterns at the international level have been explored by subsequent studies – see Sørensen and Yosha (1998) and Méltiz and Zumer (1999). To compare the extent of capital and credit market integration of European Community (EC) and OECD countries with that of U.S. states, Sørensen and Yosha (1998) decomposed the cross-sectional variance in GDP for a group of six EC countries, as well as for a larger group of OECD countries, into the levels of smoothing analyzed in the U.S. study. The results showed that for OECD as well as for EC countries, a large fraction of idiosyncratic output shocks (about 60-70%) go unsmoothed. In particular, the OECD countries as well as the EC countries, unlike interstate capital market in the U.S., international capital market plays a minimal role. In addition, the

³ The much higher estimates of 30 to 40 percent that Sala-i-Martin and Sachs (1992) obtain depend entirely on their use of data for state personal income rather than data for gross state product together with their adoption of the broad measure of net federal transfers. See Méltiz and Zumer (1999),

fraction of shocks to GDP smoothed via international transfers is also far smaller than those by the U.S. federal government, even in the case of the EC countries.

Most have concluded that consumption risk sharing at the international level is far less than that at the intra-national level. While considerable income insurance among U.S. states suggest that the United States is close to being an optimum currency area, negligible consumption smoothing via capital markets among EC and OECD countries indicate that, at least for the time being, these are not optimum currency areas. As Krugman (1993) pointed out, essentially fiscal federalism is the major regional stabilizer within the U.S., but the minor size of the EU budget poses questions about how an integrated EU economy can sustain a “one-size fits all” monetary policy in the face of country-specific disturbances. In this regard, Sørensen and Yosha (1998) stressed that further integration of European capital markets should be of high priority, in particular in light of monetary unification. However, comparison of the international and intranational evidence on risk sharing indicates that the integration of capital markets is unlikely immediately to lead to higher risk sharing, simply due to the fact that currently there is too little risk sharing among countries (Hess and Shin, 1997). In addition, recent extensive empirical studies based on international business cycle models with incomplete capital markets confirm low degree of international risk sharing.⁴ Then, our natural question is about whether the lack of international risk sharing would be a serious obstacle when countries decide to form a currency union.

The answer could be found in a less well-known contribution of Mundell (1973), to which McKinnon (2001a, 2001b) has recently drawn attention. In Mundell’s words,

“If two countries form a currency area the domain of risk sharing is extended.... A harvest failure, strikes or war in one of the countries causes a loss of real income, but the use of a common currency allows the country to run down its currency holdings and cushion the impact of the loss, drawing on the resources of the other country until the cost of adjustment has been efficiently spread over the future.”

⁴ See, for example, Baxter and Crucini (1995), Kollmann (1996), Heathcote and Perri (2002), and Kehoe and Perri (2002). These studies have investigated the quantitative impact of friction in international financial markets on the properties of international business cycles.

This argument stresses the possibility that a common currency area offers risk sharing benefits in the face of country-specific shocks and restricted capability for capital markets to promote consumption risk sharing (Ching and Devereux, 2000). In other words, the removal of exchange risk among member countries can facilitate cross-border investment in their financial assets. Although empirical analyses are rare in this area due to the lack of data unlike the case of trade, currency union itself could be a means of smoothing shocks by better portfolio diversification.⁵ Thus, a group of countries that have a low degree of risk sharing *ex ante* can have a much higher degree of risk sharing among them *ex post* after the completion of a currency union. Furthermore, the possibility of international risk sharing implies that similarity of shocks is not a strict condition for sharing a common currency if all members of the currency union are financially integrated and hold claims on each others' outputs (Karlinger, 2002). Indeed, substantial portfolio diversification within Europe had to wait for the advent of the euro on January 1, 1999 (McKinnon, 2001).

Given this background, this paper aims to analyze various consumption smoothing/risk sharing properties in the East Asian countries to diagnose the current state of consumption risk sharing among the East Asian countries. First, we document the current degree of consumption risk sharing among the East Asian countries. Second, we analyze the channels of consumption smoothing to further infer the role of international financial market. Third, we provide the estimate for the potential gains from risk sharing among the East Asian countries. We examine how much risk sharing opportunities have been missed in these countries and assess the state that can be achieved through future developments in the regional financial market.

Estimation results show that the degree of risk sharing among the East Asian countries is far from complete and quite low. Regional capital markets play a very small role of smoothing consumption of each country. The smoothing provided by regional credit markets is far from complete. These patterns of risk sharing were found in various sub-periods and among various sub-groups of the East Asian countries. Finally, we show that the average potential welfare gains from complete risk sharing within East Asia are about 1.5 percent of permanent consumption***.

⁵ Frankel and Rose (1998) emphasized the endogenous nature of a decision to join a currency union. In other words, since the economic structure is likely to change dramatically as a result of a currency union, an introduction of a currency union itself can lower asymmetric shocks through increased trade. However, the theoretical implications of trade integration on business cycle co-fluctuations are not unambiguous. Recent empirical studies suggest that business cycle co-fluctuations are strengthened only when increased trade is accompanied by more intra-industry trade. See Shin and Wang (2003a, 2003b) and Imbs (2003).

For ASEAN countries, potential gains are around 2.2 percent. In relatively more developed countries in the region (Japan, Korea, Taiwan, and Singapore), potential risk sharing gains are less than 1 percent, which indicates that these countries currently achieve more risk sharing than other East Asian countries.

The remainder of this paper is organized as follows. Section 2 reviews the empirical method of decomposing cross-sectional output variance and reports the results. Section 3 discusses potential welfare gains of risk sharing among the East Asian countries. Section 4 offers the conclusion and draws the implications for financial and monetary cooperation in East Asia.

2. Risk Sharing among the East Asian Countries

This section analyzes the channels of consumption risk sharing among the East Asian countries. To infer the degree of risk sharing and channels of risk sharing, we modify the variance decomposition method that is initiated by Asdrubali, Sorensen, and Yosha (1996), and applied to the East Asian countries. This method decomposes the cross-sectional income variability into various channels of risk sharing, including the role of international capital markets and credit markets —and unsmoothed part of consumption. Although the method is limited in various aspects, the decomposition has been widely used as the first cut to measure the degree and channels of consumption risk sharing.⁶

2.1. Decomposing Cross-Sectional Variance of Income

Asdrubali, Sørensen, and Yosha (1996) suggested a method to decompose cross-sectional variance in income within a region. The basic idea is to break down cross-sectional consumption smoothing – i.e., the reduction in consumption variance in the face of a given idiosyncratic output variance – into several levels. Some provide consumption smoothing via risk sharing (i.e., through cross-country arrangements that automatically insure consumption against idiosyncratic output shocks, “capital markets”) whereas others provide consumption smoothing

⁶ Refer to Asdrubali and Kim (2003a, 2003b) for the limitation of the method and examples of applications.

via intertemporal trade (i.e., by lending and borrowing internationally, “credit markets”).⁷ Let us consider the identity, holding for any period t ,

$$GDP^i = \frac{GDP^i}{GNP^i} \frac{GNP^i}{C^i} C^i \quad (1)$$

where all the magnitudes are in per capita terms, and i is an index of countries. To stress the cross-sectional nature of our derivation, we suppress the time index. GDP is Gross Domestic Product, GNP is Gross National Product, C is the sum of private and government consumption.

By taking logs and differences on both sides of Eq. (1), multiplying by $\Delta \log GDP$, taking expectations, and finally dividing by the variance of $\Delta \log GDP$, one obtain the following equation:

$$g_k + g_c + g_u = 1 \quad (2)$$

where g_k , the coefficient in the regression of $\Delta \log GDP - \Delta \log GNP$ on $\Delta \log GDP$, is interpreted as the percentage of smoothing of a GDP shock carried out by net factor income payments; g_c , the coefficient in the regression of $\Delta \log GNP - \Delta \log C$ on $\Delta \log GDP$, is interpreted as the percentage of smoothing of a GDP shock carried out by changes in national saving; finally g_u , the coefficient in the regression of $\Delta \log C$ on $\Delta \log GDP$, is interpreted as the percentage of smoothing of a GDP shock that remains unsmoothed.

The first channel captures net factor income movements as a consequence of risk sharing achieved by international portfolio diversification, and may be interpreted as risk sharing role of

⁷ Conceptually, risk sharing and intertemporal consumption smoothing are different. Risk sharing across regions means mutual insurance across states of nature against idiosyncratic regional risks, ex ante. On the other hand, intertemporal consumption smoothing means diversification of idiosyncratic consumption changes across time, ex post. Complete risk sharing implies the completeness of financial markets that provide state-contingent assets for insuring risks from uncertain future income before shocks arise. By contrast, intertemporal consumption smoothing is based on the intertemporal optimization behavior of economic agents through trading of non-contingent assets such as bonds with foreign countries after observing shocks to the economy.

international capital market. The second channel reflects the saving movements; a country can smooth consumption by adjusting saving through lending and borrowing in the international credit markets. Therefore, this channel can be interpreted as the role of international credit markets. Finally, g_u can be interpreted as the fraction of income volatility that is not smoothed by any consumption smoothing/risk sharing channels. Note that we do not consider the role of international organization (or government) since the East Asian countries do not have the international organization that significantly redistributes or stabilizes income within the region.

In practice, the following panel equation system can be estimated:

$$\begin{aligned}
 \Delta \log GDP_t^i - \Delta \log GNP_t^i &= d_{k,t} + g_k \Delta \log GDP_t^i + e_{kt}^i \\
 \Delta \log GNP_t^i - \Delta \log ABS_t^i &= d_{c,t} + g_c \Delta \log GDP_t^i + e_{ct}^i \\
 \Delta \log C_t^i &= d_{u,t} + g_u \Delta \log GDP_t^i + e_{ut}^i
 \end{aligned} \tag{3}$$

where $d_{.,t}$'s are time fixed effects. The time fixed effect is introduced to capture year-specific impact on growth rates, especially aggregate output, and the g coefficients are weighted average of year by year cross-sectional regressions.

Following Asdrubali, Sørensen, and Yosha (1996), we first estimate the above equation system by pooled OLS, which is equivalent to the SUR (Seemingly Unrelated Regression) since the RHS variables are the same across equations. From the regression, we estimate the variance of error terms in each country to correct for heteroscedasticity. Then, we estimate the whole system by the SUR.

2.2. Risk Sharing and Consumption Smoothing Among the East Asian Countries

We estimate the empirical model for the whole sample periods and each sub-period of the 1970s, 1980s, and 1990s. Since the economy may have behaved differently during the Asian crisis period, we also estimate the 1990s sample only up to 1996 by dropping the Asian crisis

period and the 10-year period just before Asian crisis (1987-1996). The results are reported in Table 1. The numbers in parentheses are standard errors.

Table 1. Results for Various Sub-Periods

	g_k	g_c	g_u
1971-2000	0.6 (0.8)	19.4 (3.9)	79.6 (4.0)
1971-1996	2.1 (0.9)	18.9 (4.2)	78.7 (4.2)
1971-1980	3.0 (1.0)	20.9 (8.0)	72.7 (8.1)
1981-1990	-1.2 (1.3)	22.0 (6.3)	79.3 (6.2)
1991-2000	-2.4 (1.2)	11.6 (6.0)	92.1 (6.1)
1987-1996	2.7 (1.6)	18.3 (5.5)	79.6 (5.4)

For the whole sample period, only 20.4 percent of cross-sectional GDP variance is smoothed but most parts, 79.6 percent, is unsmoothed. Regional credit markets play some positive smoothing role, but quite limited; only 19.4 percent is smoothed by credit markets. The role of regional capital markets is minimal, only 0.6 percent. For the sample dropping the period after the Asian crisis, the results are similar. The role of capital markets becomes slightly higher (2.1%), but still very small. The degree of consumption smoothing achieved in this region is lower than that achieved within OECD and EU countries. As documented by Sorensen and Yosha (1998), about 30-40% of cross-sectional GDP variance is smoothed within OECD and EU countries, which is larger than about 20% within East Asian countries.

For sub-period estimations, similar patterns are also found. In all sub-periods, the role of regional capital markets is very small. The largest role is found during the 1970s, but still very small (0.3%). In some sub-periods (1980s and 1990s), even a (small) negative point estimate is observed. In all sub-periods, credit markets play a significant positive role. The estimate ranges from 11.6% (1990s) to 22.0 % (1980s), which is not very large. Overall, the unsmoothed part is quite huge, ranging from 72.7% (1970s) to 92.1% (92.1%). Interestingly, the consumption risk sharing does not seem to increase over time. The degree of consumption risksharing becomes even smaller in the 1990s, probably due to the mal-functioning of regional financial markets during the Asian crisis. Even excluding the Asian crisis period, we still do not find an increase in the degree of consumption risk sharing in the recent years.

To summarize, regional financial markets do not play much role in smoothing cross-sectional variance of GDP among the East Asian countries; the role of regional capital market is minimal and the role of regional credit market is positive but still very limited.

2.3. Results for Sub-Groups of East Asian Countries

We examine the degree of risk sharing among various groupings of the East Asian countries. The groups that we consider are ASEAN 5 (Indonesia, Malaysia, Philippines, Singapore, Thailand), Northeast Asia (NEA: China, Korea, Japan), ASEAN 5+NEA, and a group of relatively more developed countries (Korea, Japan, Hong Kong, Singapore, Taiwan).

Table 2 reports the estimation results. In general, the results are similar to those for all East Asian countries. The overall degree of risk sharing and consumption smoothing is very low. The role of regional capital market is minimal while the role of regional credit market is positive, but limited. Note that the unsmoothed part is smaller within relatively more developed countries. Within relatively more developed countries, 34.6% of cross-sectional GDP variance is smoothed, and 65.4% is unsmoothed. Such a larger smoothing within more developed countries is mostly achieved by a larger role of regional credit market; regional credit market smoothes 32.9%. The level of risk sharing achieved within more developed Asian countries is similar to that within OECD and EU countries.

Table 2. Results for Various Sub-Groups

	g_k	g_c	g_u
ASEAN	3.5 (2.0)	24.8 (8.1)	73.3 (8.2)
NEA	-1.0 (0.6)	20.8 (4.6)	80.4 (4.6)
ASEAN+NEA	0.5 (0.8)	20.7 (4.1)	78.4 (4.1)
Developed	1.8 (1.7)	32.9 (5.7)	65.4 (5.4)

3. Potential Welfare Gains from Risk Sharing

What are the potential welfare gains when countries perfectly diversify country specific income shocks and smooth out consumption stream? Many economists have tried to measure potential welfare gains from consumption risk sharing by comparing welfare level of the complete (financial) markets economy (where all country specific risks are shared) with that of financial autarky (or incomplete markets economies). In this section, we follow van Wincoop (1994, 1999) to estimate potential welfare gains when each East Asian country attains perfect risk sharing with other Asian countries in the region.⁸ As shown in Kim, Kim, and Levin (2003) and van Wincoop (1999), potential welfare gains positively depend on the degree of risk aversion, time discount factor, and persistence and volatility of output shocks. Welfare gains negatively depend on the cross-country correlation of output shocks.

Following van Wincoop (1999), we assume that there are N symmetric countries with complete asset markets and each country i maximizes the following utility function;

$$U_i = E \int_0^T e^{-\beta t} \frac{c_{it}^{1-\gamma}}{1-\gamma} dt, \quad (4)$$

where T is the time horizon (number of years), γ is the risk aversion parameter, c_i is aggregate consumption. Endowment y_i follows a random walk with drift

$$dy_{it} = \mu y_{it} dt + \sigma y_{it} d\eta_i, \quad (5)$$

where η is a standard Brownian motion and $\rho = d\eta_i \eta_k$ ($i \neq k$) represents the correlation between innovations of endowment growth rates of two different countries.

Under autarky, domestic consumption is equal to domestic endowment and the expected utility becomes

⁸ van Wincoop (1999) derived closed form solution for welfare gains of complete markets from financial autarky. Kim, Kim and Levin (2003) further analyze potential welfare level when countries are restricted to trade non-contingent bonds only (incomplete markets economy) compared to the complete markets economy and autarky.

$$E(U_i) = \frac{1 - e^{-vT}}{v} \frac{c_{i0}^{1-\gamma}}{1-\gamma}, \quad (6)$$

where $v = \beta + (\gamma - 1)(\mu - 0.5\gamma\sigma^2)$.

Under complete asset markets, country specific risks are perfectly diversified and consumption in each country is equal to the average world endowment: $c_i = y_i^w = \sum_1^N y_i / N$.

In the complete markets with the same endowment process in (5), consumption in each country follows approximately a random walk with variance $\sigma_w^2 = \sigma^2((1/N) + (1-1/N)\rho)^2$. Welfare gains are measure by changes in certainty equivalent consumption.

$$\text{Welfare Gains} \approx -\frac{0.5\gamma d\sigma^2}{r - \bar{\mu}} \left[1 - T(r - \bar{\mu}) \frac{e^{-T(r - \bar{\mu})}}{1 - e^{-T(r - \bar{\mu})}} \right], \quad (7)$$

where $\bar{\mu} = \mu - 0.5\gamma\sigma^2$ denotes the risk adjusted growth rate and $d\sigma^2 = \sigma_w^2 - \sigma^2$ is the change in the variance of consumption growth rate when moving from autarky to the complete markets economy.

We adopt the parameter values in van Wincoop (1999). The risk-free real interest rate r is assumed to be 0.85 percent and the risk aversion parameter γ is 3. The horizon for welfare calculation T is set at 10 years.⁹ For mean growth rate and variance of per capita consumption, and the correlation between domestic consumption and average regional consumption growth rates are estimated from the data that are used in the previous section. By using the average of East Asia as a whole and sub-groups, we can calculate welfare gains of risk sharing within East Asia and its sub-groups. We report the results for all sub-grouping used in the previous section. In addition, we also present the results for Greater China (China, Hong Kong, Taiwan).¹⁰

⁹ Note that welfare gains increase as the number of years increases. The numbers reported in the table are based on 10 years and therefore are quite conservative.

¹⁰ We do not report the results for Greater China in the previous section since it includes only three countries but the data for one of the three countries (Taiwan) is incomplete.

Table 3. Risk sharing Gains (by region)

Region	Risk sharing Gains (%)
Whole sample (East Asia)	1.50
Sub-group	
ASEAN 5	2.05
Northeast Asia (NEA)	1.06
Developed	0.66
Greater China	1.33

Table 3 reports the potential welfare gains from perfect risk sharing within the region. The numbers represent percentage gains in certainty equivalent consumption level when countries move from the current state to perfect risk sharing.¹¹ The first line reports the average risk sharing gains that each country can achieve by engaging in perfect risk sharing with all other East Asian countries in the sample. On average, risk sharing gains are 1.5 percent of permanent consumption. These numbers are consistent with other results. For example, van Wincoop (1999) finds that risk sharing gains from OECD countries range from 1.1 percent to 3.5 percent for 50-year horizon. In Prasad, et al. (2003), they report that potential risk sharing gains for emerging markets are around 3.5 percent, whereas they are less than 1 percent for the OECD countries.

The numbers in the sub-group analysis denote average welfare gains that each country in the group achieves through perfect risk sharing within the same group. For example, the table shows that each ASEAN country can gain average 2.05 percent welfare gains when engaged in perfect risk sharing within ASEAN. This number is pretty high compared to welfare gains in other regions. In particular, relatively more developed countries in the region (Japan, Korea, Taiwan, Hong Kong and Singapore) potentially gain only 0.66 percent when they perfectly share risks among each other. For the Northeast Asian countries and Greater China, the gains are quite low as well, around 1 percent. The potential welfare gains that the ASEAN countries can achieve is about three times larger than the potential gains for the relatively more developed countries in the region. This result is broadly consistent with that in the previous section: current level of risk

¹¹ The formula used in this paper calculates welfare gains from financial autarky to the complete markets. However, by using the consumption data for calculating variance of endowment process σ , we can safely claim that we measure welfare gains when countries move from the current state to the complete markets (van Wincoop, 1994, 1999).

sharing in relatively more developed countries is higher than other countries in the region.

Table 4. Risk Sharing Gains (by country)

	With all East Asia	With ASEAN	With NEA	With developed	With Greater China
CHN	1.53	1.46	1.53	1.55	1.74
HKG	1.08	1.22	1.19	0.72	1.78
IDN	4.49	3.83	4.50	4.72	3.99
JPN	0.51	0.50	0.52	0.41	0.50
KOR	0.93	0.59	1.14	1.08	1.05
MYS	3.48	3.06	3.97	2.76	5.22
PHL	0.65	0.61	0.66	0.55	0.74
SGP	0.94	1.06	0.87	0.78	0.87
THA	1.03	1.70	1.13	1.15	1.38
TWN	0.42	0.45	0.41	0.31	0.47

Since the group analysis offers only average welfare gains, Table 3 does not provide differences across countries. Table 4 reports potential welfare gains that each country can achieve with certain sub-groups. While most countries have similar level of potential risk sharing gains for the whole group and sub-groups, some countries exhibit different risk sharing across sub-groups. For example, Hong Kong will be more than two times better off by engaging in perfect risk sharing with Greater China than with other developed countries. For Korea, welfare gains from risk sharing with ASEAN are quite low around 0.6 percent, while with other sub-groups gains are above 1 percent.

4. Conclusion and Policy Implications

In this paper, we have analyzed the degree and the channels of consumption risk sharing among the East Asian countries by decomposing the cross-sectional variance of income. Estimation results show that the degree of risk sharing among the East Asian countries is far from complete and quite low; only about 20% of cross-sectional GDP variance is smoothed. Regional capital markets play a minimal role while regional credit markets play some positive role, but limited. Such a level of consumption risk sharing achieved within East Asian countries is far

lower than that achieved within a successful monetary union like US states. It is also lower than that achieved within industrial countries such as OECD and EU countries. These patterns of risk sharing in East Asia were found in various sub-periods and among various sub-groups of the East Asian countries. One interesting exception is the group of more developed countries (Japan, Korea, Hong Kong, Taiwan, and Singapore). The level and pattern of risk sharing in these more developed Asian countries are similar to those in OECD and EU countries.

There can be many reasons why the degree of risk sharing among the East Asian countries, especially among relatively poor countries, is very low and why regional financial markets have not provided much consumption insurance/smoothing in this region. First, most emerging East Asian economies face with more severe financial market constraints, as shown in the fact that generally these economies find it impossible to issue debt denominated in national currencies. Under multiple currencies in the region, there is a risk with nominal bond trade that one country might resort to surprise inflation to reduce the real value of outstanding asset claims (Ching and Devereux, 2000; McKinnon, 2001a). Thus, international risk sharing through regional financial markets could be severely discouraged unless the exchange rate risks are sufficiently hedged.

Second, there are too much uninsurable country-specific risks such as shocks in the nontraded sector, wage and labor markets. These risks cannot be easily diversified across countries.¹² The levels of trade integration and labor mobility in East Asian countries are far smaller than those in European union, which may result larger idiosyncratic uninsurable shocks in nontraded sector and labor markets. This might explain a lower degree of consumption risk sharing achieved in East Asia.

Third, most East Asian countries have less developed financial markets with high transaction costs and information asymmetry. Lack of financial securities that can be traded for diversifying country-specific risks prevents countries from engaging in risk sharing activities. Furthermore, many emerging East Asian countries have still maintained restrictions on capital flows. Thus, less financial integration combined with less financial development in East Asia would result in less international risk sharing within East Asia through financial market channels.

¹² Models which explicitly account for non-traded goods is able to produce lower cross-country correlations even in the presence of perfect risk sharing, if the model economies are augmented with large preference shocks (Stockman and Tesar, 1995).

In addition, we show that the average potential welfare gains from complete risk sharing in East Asia are 1.5 percent of permanent consumption. In relatively more developed countries in the region (Japan, Korea, Hong Kong, Taiwan, and Singapore), potential risk sharing gains are less than 1 percent, which indicates that these countries currently achieve more risk sharing than other East Asian countries, to be consistent with our results on the degree of risk sharing estimate. However, even OECD countries do not achieve sufficient degree of risk sharing with each other, as documented by many past studies such as Sørensen and Yosha (1998), Méhitz and Zumer (1999), and Asdrubali and Kim (2003a, 2003b). In this context, financial market liberalization itself might not be a sufficient solution to smoothing consumption risk sharing at both international and regional level.

Finally, even heterogeneous economies could share the risks from asymmetric country-specific shocks better within a common currency area. In addition to the endogenous nature of optimum currency area criteria (Frankel and Rose, 1998), the domain of risk sharing could be extended through financial market channels or other formal arrangements such as reserve pooling as pointed out by Mundell (1973). First of all, a common currency area eliminates not only transaction costs related to currency conversion in cross-border trading of financial assets, but also exchange rate risk exposures to intra-regional exchange rate fluctuations. Second, a common currency area assumes free mobility of capital by liberalizing capital account among the member countries. Thus, a group of countries that have a low degree of business cycle synchronization and risk sharing *ex ante* cannot be necessarily discouraged to form a currency union because much closer business cycle coherence and higher degree of risk sharing could be possible *ex post* after the completion of a currency union.

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