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## Financial Integration in Asia: Estimating the Risk-Sharing Gains for Australia and Other Nations

*Benoît Mercereau*



**IMF Working Paper**

Asia and Pacific Department

**Financial Integration in Asia: Estimating the Risk-Sharing Gains for Australia and Other Nations**

Prepared by Benoît Mercereau<sup>1</sup>

Authorized for distribution by James Gordon

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**Abstract**

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Holding foreign assets reduces the volatility of a country's income by allowing countries to share risk. Yet, financial integration is limited in Asia. This paper estimates how much Australia and other countries in the Asia-Pacific region would gain from greater financial integration. The results suggest that these welfare gains are large, which argues in favor of a progressive capital account liberalization across the region.

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Author's E-Mail Address: bmercereau@gmail.com

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<sup>1</sup> This study previously appeared as a selected issue paper in the 2005 IMF Staff Report for Australia. This selected issue paper is available at the following website:  
<http://www.imf.org/external/pubs/ft/scr/2005/cr05330.pdf>.

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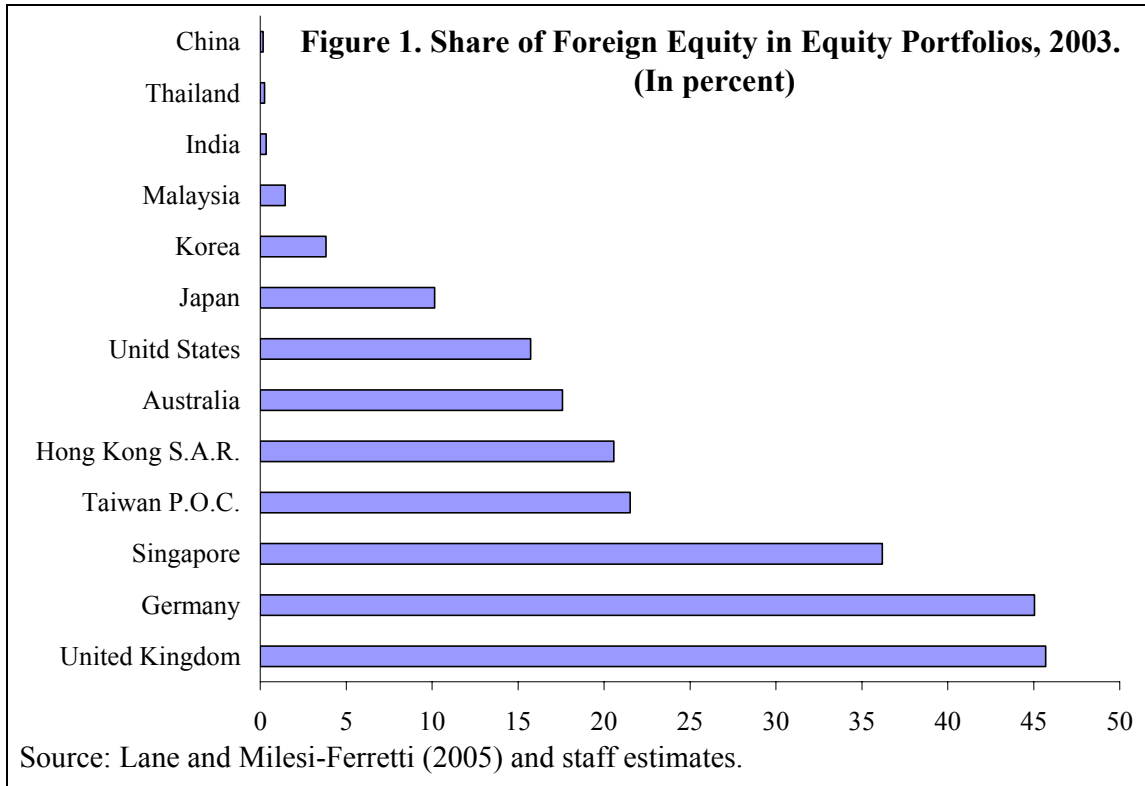
## **I. INTRODUCTION**

Economies are not synchronized. When one economy is booming, another may be in recession. Holding foreign assets therefore reduces the volatility of a country's income, allowing countries to share risk. For example, Indonesia experienced a deep recession in the late 1990s, when the Australian economy was booming. Holding more Australian assets would have provided Indonesia with a source of income that would have cushioned the impact of its crisis. This example illustrates that countries can reduce the volatility of their income by diversifying into foreign assets. This paper estimates how much Australia and other countries in the Asia-Pacific region would gain from greater financial integration. The results suggest that these welfare gains are large, arguing in favor of a progressive capital account liberalization across the region, once the needed supporting measures, for example prudential regulation, are in place. The paper is organized as follows. Section II gives evidence that financial integration is limited in Asia and discusses how greater integration would reduce risk. Section III introduces the estimation methodology and the data. Section IV presents the results and discusses them. Section V concludes.

## **II. FINANCIAL INTEGRATION REDUCES RISK**

International diversification reduces risk. Countries are subject to shocks, but not to the same ones. For example, weather conditions matter a great deal for a large producer of agricultural goods like Australia. But computer chip exporters, like Taiwan Province of China, are more sensitive to shocks on world prices for chips. Investing in foreign assets allows countries to insure themselves against these country-specific risks. Simply said, diversifying internationally is a way not to put all of one's financial eggs into one basket.

Yet, financial integration is limited in Asia. In most Asian countries, equity portfolios are largely biased towards domestic stocks (Figure 1).



Another sign of limited financial integration is the low correlation of countries' consumption growth (Table 1). If countries were fully integrated financially, they would hold the same portfolio of assets. Their incomes—and therefore their consumption—would be closely correlated. Yet, this is far from being the case. For example, from 1960 to 2003, the annual correlation of Australia's consumption growth with its closest economic partner, New Zealand, is only 0.5, and Australian consumption growth correlates negatively with a majority of countries in Asia—the average correlation with Asian economies is -0.04. In contrast, the correlation between euro-zone members averages about 0.6.

**Table 1. Correlation in Real Per Capita Consumption Growth Rates**

	AUS	CHN	HKG	IDN	IND	JAP	KOR	MYS	NZL	PHL	SGP	THA
Australia	1.00	0.12	-0.33	0.09	-0.23	0.25	0.02	-0.15	0.50	-0.27	-0.15	-0.26
China	0.12	1.00	0.01	-0.01	-0.30	-0.39	-0.07	-0.25	0.29	-0.44	-0.09	-0.14
Hong Kong S.A.R	-0.33	0.01	1.00	0.06	-0.34	0.68	0.56	0.21	-0.27	0.07	0.55	0.48
Indonesia	0.09	-0.01	0.06	1.00	0.16	0.14	0.01	0.11	0.20	0.11	-0.11	0.06
India	-0.23	-0.30	-0.34	0.16	1.00	-0.06	-0.11	0.27	-0.05	0.07	0.26	0.14
Japan	0.25	-0.39	0.68	0.14	-0.06	1.00	0.39	0.00	0.03	0.00	0.33	0.20
Korea	0.02	-0.07	0.56	0.01	-0.11	0.39	1.00	0.38	-0.03	0.03	0.45	0.63
Malaysia	-0.15	-0.25	0.21	0.11	0.27	0.00	0.38	1.00	-0.19	0.05	0.31	0.44
New Zealand	0.50	0.29	-0.27	0.20	-0.05	0.03	-0.03	-0.19	1.00	-0.15	-0.14	-0.29
Philippines	-0.27	-0.44	0.07	0.11	0.07	0.00	0.03	0.05	-0.15	1.00	-0.15	0.15
Singapore	-0.15	-0.09	0.55	-0.11	0.26	0.33	0.45	0.31	-0.14	-0.15	1.00	0.27
Thailand	-0.26	-0.14	0.48	0.06	0.14	0.20	0.63	0.44	-0.29	0.15	0.27	1.00

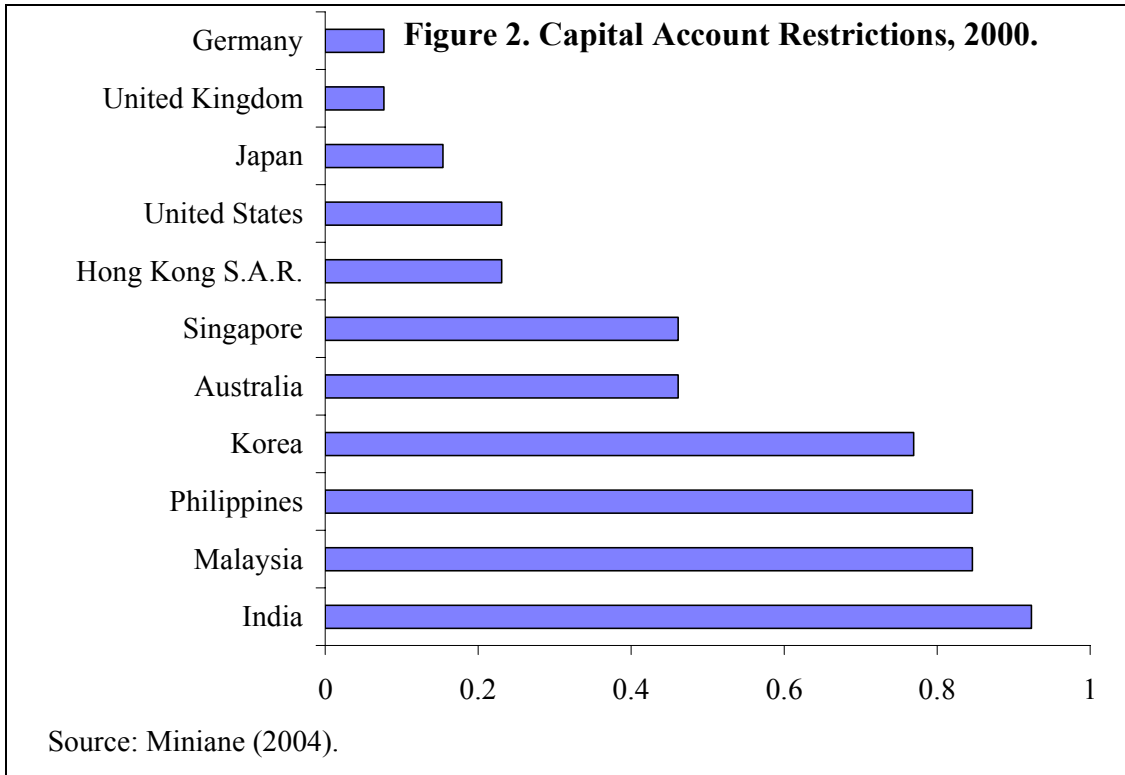
Source: World Bank (*World Development Indicators*) and IMF staff estimates.

Restrictions on capital account transactions are still high in Asia, especially compared with countries in the European Union. These restrictions may partially explain the lack of international diversification (Figure 2 presents an index summarizing capital account restrictions as recorded by the IMF in 2000. The more restrictions, the higher the index).<sup>2</sup>

Asian countries would gain from greater financial diversification. But the question is how much would they gain. Estimates of the gains for developed countries vary.<sup>3</sup> But gains for emerging markets are typically higher than for developed economies (Obstfeld, 1995; Kose, 1997). First, emerging markets economies tend to be more volatile, and there is therefore more scope to reduce volatility. Second, emerging markets tend to be less diversified internationally than their developed counterparts, and hence are more likely to be further from an optimal degree of diversification.

<sup>2</sup> Restrictions in Australia include regulations on real estate and direct investments, (the IMF's *Annual Exchange Arrangements and Exchange Restrictions* details these restrictions).

<sup>3</sup> See van Wincoop (1999), Lewis (2000), and Sill (2001) for a survey of the literature.



### III. ESTIMATION METHODOLOGY AND DATA

#### A. Estimation Methodology

Gains from diversification are estimated from the point of view of a financial investor, as is done in the finance literature. The investor can invest in domestic and foreign assets. Her utility under autarky (where she can invest in the domestic asset only) is then compared to her utility holding a portfolio that is fully diversified internationally. The improvement in utility measures the welfare gains of financial diversification.

This paper follows the methodology developed by Lewis (2000). Calculating the gains requires specifying a utility function. A constant relative risk aversion utility function is often used in the literature. But this function assumes that the coefficient of relative risk aversion is the inverse of the intertemporal elasticity of substitution coefficient. However, Obstfeld (1994a) shows that these two coefficients have opposite effects upon welfare gains. Not imposing a constraint on these coefficients therefore allows assessing the sensitivity of the results to assumptions on these coefficients. As in the finance literature, Lewis assumes that utility depends upon wealth:

$$U_t = \left\{ W_t^{1-\theta} + \beta \left[ E_t \left( U_{t+1}^{1-\gamma} \right) \right]^{(1-\theta)/(1-\gamma)} \right\}^{1/(1-\theta)}, \quad (1)$$

where



$\gamma$ : relative risk aversion,

$1/\theta$ : intertemporal elasticity of substitution in consumption,

$\beta$ : subjective discount factor,

and  $W_t$ : wealth (i.e., the portfolio of assets held by the investor).

The evolution of wealth is given by  $W_{t+1} = R_{t+1}W_t$ , where  $R_{t+1}$  is the return on the portfolio.  $\mu$  and  $\sigma$  are the returns' mean and standard deviation, respectively.

Assuming that wealth is log-normally distributed, Lewis (2000) shows that the investor's utility is equal to the following:

$$U_0 = W_0 \left\{ 1 - \beta \exp \left[ (1-\theta) \left( \mu - \frac{1}{2} \gamma \sigma^2 \right) \right] \right\}^{-1/(1-\theta)} \quad (2)$$

Equation (2) makes clear that utility depends on the risk/return tradeoff the investor faces. More precisely, her utility is increasing in the certainty equivalent log wealth growth path,  $\mu - \frac{1}{2} \gamma \sigma^2$ . Higher returns increase the investor's welfare, while more volatile returns reduce it. The more risk-averse the investor, the higher the return needed to compensate the investor for taking risk.

To simplify, the investor is assumed to have the choice between two assets: one domestic, one foreign.  $\varphi$  is the share of foreign assets in her portfolio. The mean  $\mu$  and variance  $\sigma^2$  of the portfolio depend on this share, so the investor's utility therefore depends on  $\varphi$ :

$U_0 = U_0(\varphi)$ . The optimal degree of international diversification is the share of foreign assets  $\varphi^*$  that maximizes this utility.  $\varphi^*$  is computed using numerical methods described below. The welfare gains from diversification are then given by:

$$\text{Welfare Gains} = \frac{U_0(\varphi^*)}{U_0(0)} - 1 \quad (3)$$

Replacing the utility function by its expression and rearranging the terms yields the following equation:

$$\text{Welfare Gains} = \left\{ \frac{1 - \beta \exp \left[ (1-\theta) \left( \mu^* - \frac{1}{2} \gamma \sigma^{*2} \right) \right]}{1 - \beta \exp \left[ (1-\theta) \left( \mu_0 - \frac{1}{2} \gamma \sigma_0^2 \right) \right]} \right\}^{-1/(1-\theta)} - 1, \quad (4)$$

where  $(\mu^*, \sigma^{*2})$  and  $(\mu_0, \sigma_0^2)$  are the mean and variance of returns on wealth under autarky and under an optimally diversified portfolio, respectively.

The optimal share of foreign assets,  $\varphi^*$ , is computed using a grid search algorithm with 1000 increments. For each share of foreign assets, the mean and variance of the corresponding portfolio's returns are calculated. The mean and variance are then plugged into equation (4). The share of foreign assets which yields the highest welfare gains is the optimal degree of international diversification.

Gains from diversification come from two sources, as equations (2) and (4) illustrate. Investing in foreign assets can reduce the volatility of the portfolio returns; it may also increase their mean.

## **B. Data**

The analysis is conducted for 13 emerging and developed economies of the Asia-Pacific region: Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan Province of China, and Thailand.

Data on asset returns are needed to estimate the gains. These data are readily available for equity, but not for other types of investment such as foreign direct investment. The study therefore focuses on equity returns. In so far as different types of assets are substitutes, returns on equity are a reasonable proxy for returns on other types of capital. Data include annual observations from 1988 to 2003. Data for Australia, Hong Kong SAR, Japan, and Singapore are available starting 1970. All returns are expressed in real terms. Appendix I describes data sources and construction.

Gains from diversification are estimated for three scenarios: financial integration within emerging Asia; financial integration in Asia as a whole; and financial integration with the whole world. In these scenarios, the investor can diversify by investing in a stock index for emerging Asia; or in an Asia index; or in a world index. Economies with longer data coverage (Australia, Hong Kong SAR, Japan, and Singapore) are treated separately to take advantage of these additional data. For each of these economies, a stock index is created using a weighted average of stock returns from the other countries with long data coverage. This index, called "Asia3", is a proxy for returns in the Asia-Pacific region. For Australia, Hong Kong SAR, and Singapore, the benefits of financial integration with Japan—the largest economy in the region—are also estimated.

## **IV. RESULTS**

### **A. Australia**

Table 2 presents the stochastic properties of stocks returns for an Australian investor. Returns on Australian stocks are not perfectly correlated with returns on foreign indexes, confirming

that there is room for risk-sharing between Australia and other nations. Returns on the world, Japanese, and Asia3 indexes are all higher than returns on the Australian index, but the Japanese and Asian indexes are also more volatile. Strikingly, the world stock index “dominates” the Australian index in that it offered both higher returns and lower risk.

	Mean	Stand. Dev.	Correlation
Australia	7.0	24.6	1
World	7.2	20.8	0.73
Rest of World	7.3	20.8	0.72
Japan	10.4	33.6	0.47
Asia3 (Japan, Singapore, Hong Kong SAR)	10.8	33.5	0.49

Source: Morgan Stanley and IMF staff estimates.

Tables 3 to 5 present the optimal share of foreign assets in the portfolio of the Australian investor, as well as the associated welfare gains from diversification.<sup>4</sup> The results are given for a set of plausible values for relative risk aversion  $\gamma$  and for intertemporal elasticity of substitution  $1/\theta$ , as discussed by Lewis (2000). As expected, welfare gains from diversification increase with risk aversion—the more risk averse, the greater the gains from reducing risk—and decrease with intertemporal elasticity of substitution. As utility decreases exponentially with risk aversion, welfare gains from diversification increase exponentially as risk-aversion rises. Gains are therefore sensitive to changes in the parameters. For example, they range from 4.4 to several hundred percent in the case of financial integration with the rest of the world. Gains are nonetheless high, on average. Moreover, the optimal share of foreign equities in the portfolio of an Australian investor is always high. For example, the optimal share of world equity is above 80 percent for an Australian investor regardless of the assumptions made on the parameters. By comparison, the Australian equity portfolio currently includes only 16 percent of foreign stocks.

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<sup>4</sup> Utility is not defined for portfolios that are too risky, particularly when combined with a low elasticity of substitution (i.e., a large  $\theta$ ). When utility under autarky is not defined, it is not possible to compute the welfare gains, which are reported as “n/a” in the tables. In some cases, the utility is not defined for any portfolio (that is, for any share of foreign assets) and the optimal portfolio is entered as “n/a” as well.

**Table 3. Australia: Welfare Gains from Financial Integration with Japan**

Optimal Share				
	$\theta=2$	3	4	5
$\gamma=1$	0.58	0.58	0.58	0.58
2	0.40	0.40	0.40	0.40
3	0.34	0.34	0.34	0.34
4	0.31	n/a	n/a	n/a
Welfare Gains (in percent)				
1	17.0	10.9	7.9	6.1
2	24.7	19.3	15.8	13.3
3	54.4	110.5	n/a	n/a
4	9276.8	n/a	n/a	n/a

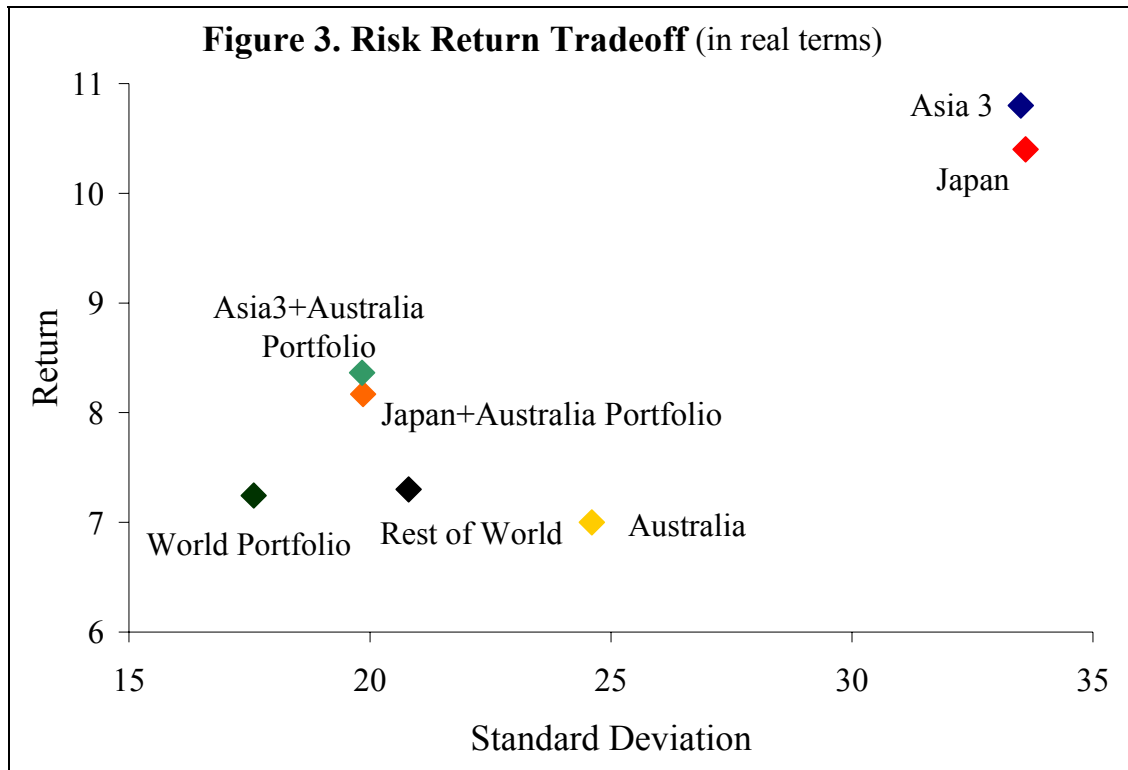
**Table 4. Australia: Welfare Gains from Financial Integration with Asia<sup>3</sup>**

Optimal Share				
	$\theta=2$	3	4	5
$\gamma=1$	0.64	0.64	0.64	0.64
2	0.43	0.43	0.43	0.43
3	0.36	0.36	0.36	0.36
4	0.32	n/a	n/a	n/a
Welfare Gains (in percent)				
1	19.3	12.3	8.9	6.9
2	26.6	20.6	16.8	14.1
3	56.8	113.9	n/a	n/a
4	9478.5	n/a	n/a	n/a

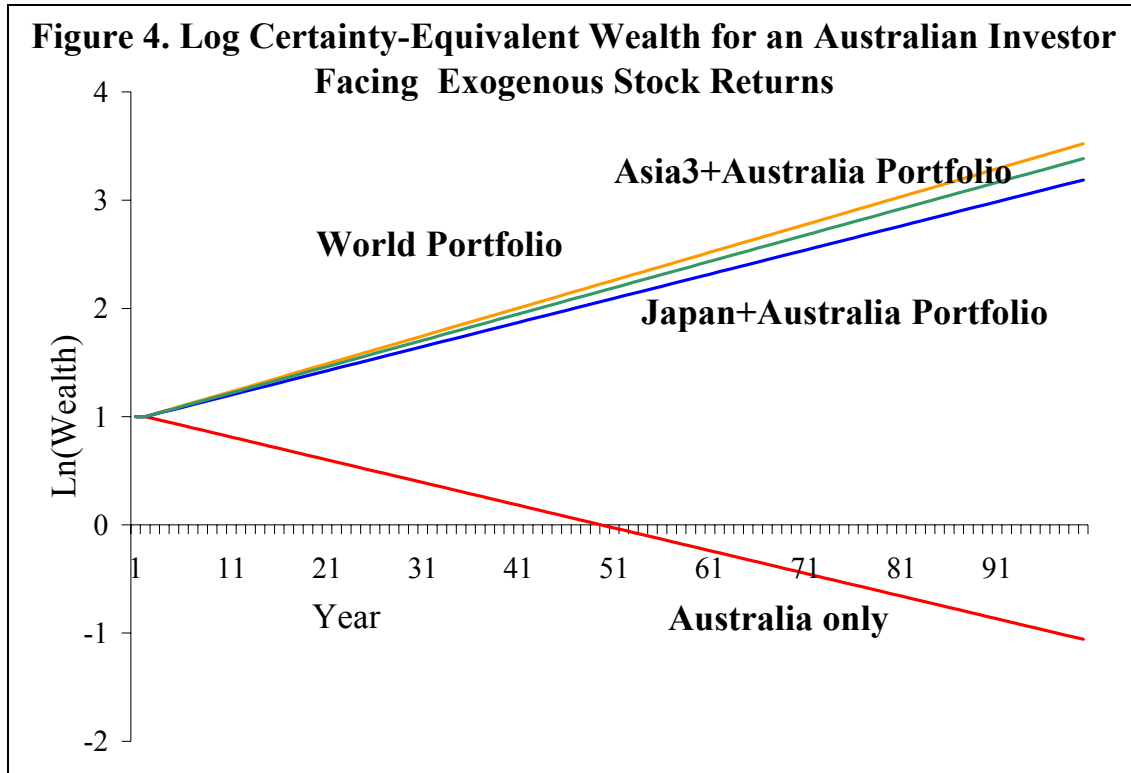
**Table 5. Australia: Welfare Gains from Financial Integration with the World**

Optimal Share				
	$\theta=2$	3	4	5
$\gamma=1$	0.87	0.87	0.87	0.87
2	0.83	0.83	0.83	0.83
3	0.82	0.82	0.82	0.82
4	0.81	0.81	0.81	0.81
Welfare Gains (in percent)				
1	11.9	7.8	5.7	4.4
2	32.6	24.7	19.9	16.6
3	95.3	164.0	n/a	n/a
4	19102.3	n/a	n/a	n/a

Figures 3 and 4 further illustrate the gains from diversification for Australia.<sup>5</sup> Figure 3 shows the risk-return trade-off an Australian investor faces. It makes clear that diversifying allows the investor to enjoy both lower risk and higher returns. Figure 4 shows the certainty-equivalent path of an investor's wealth under the various scenarios discussed. The certainty-equivalent wealth of an Australian investor would decrease over time under autarky. If she is allowed to diversify into foreign assets, however, her certainty-equivalent wealth grows over time.

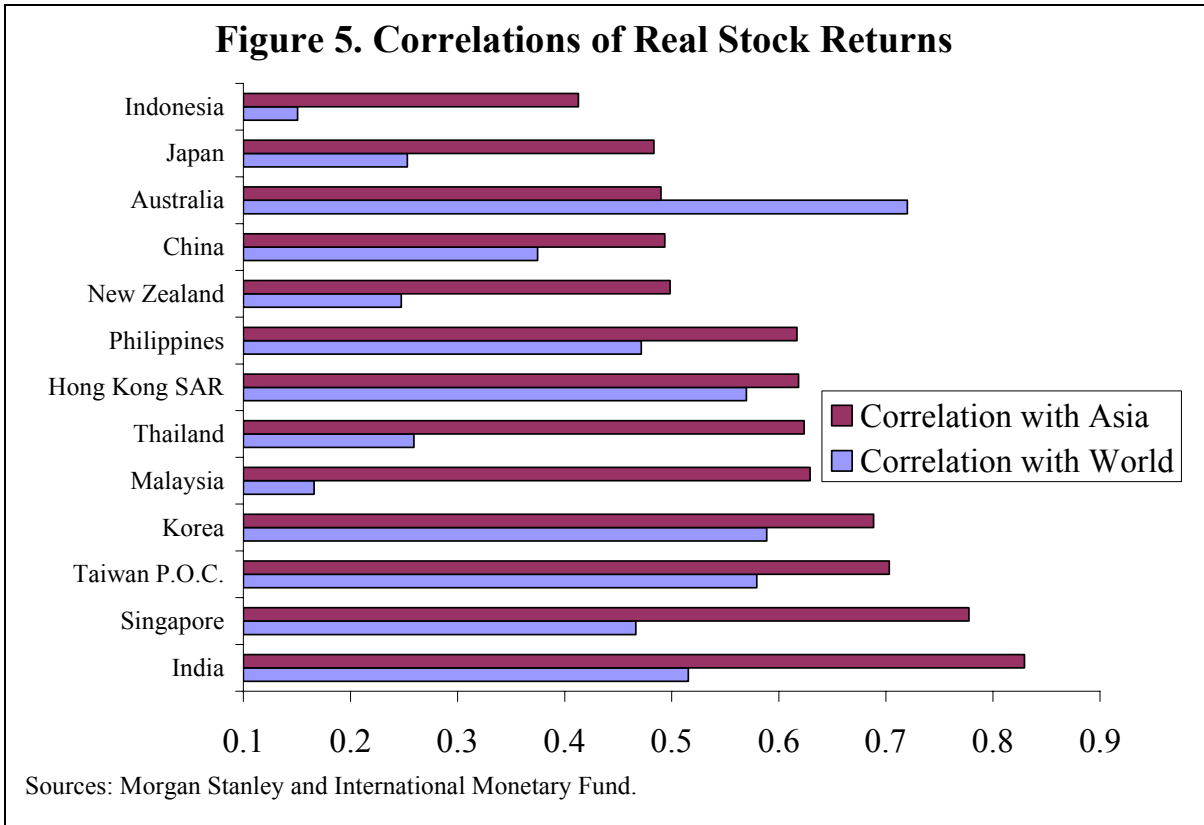


<sup>5</sup> Figures 3 and 4 correspond to parameters  $\gamma=\theta=3$ .



### B. Other Economies

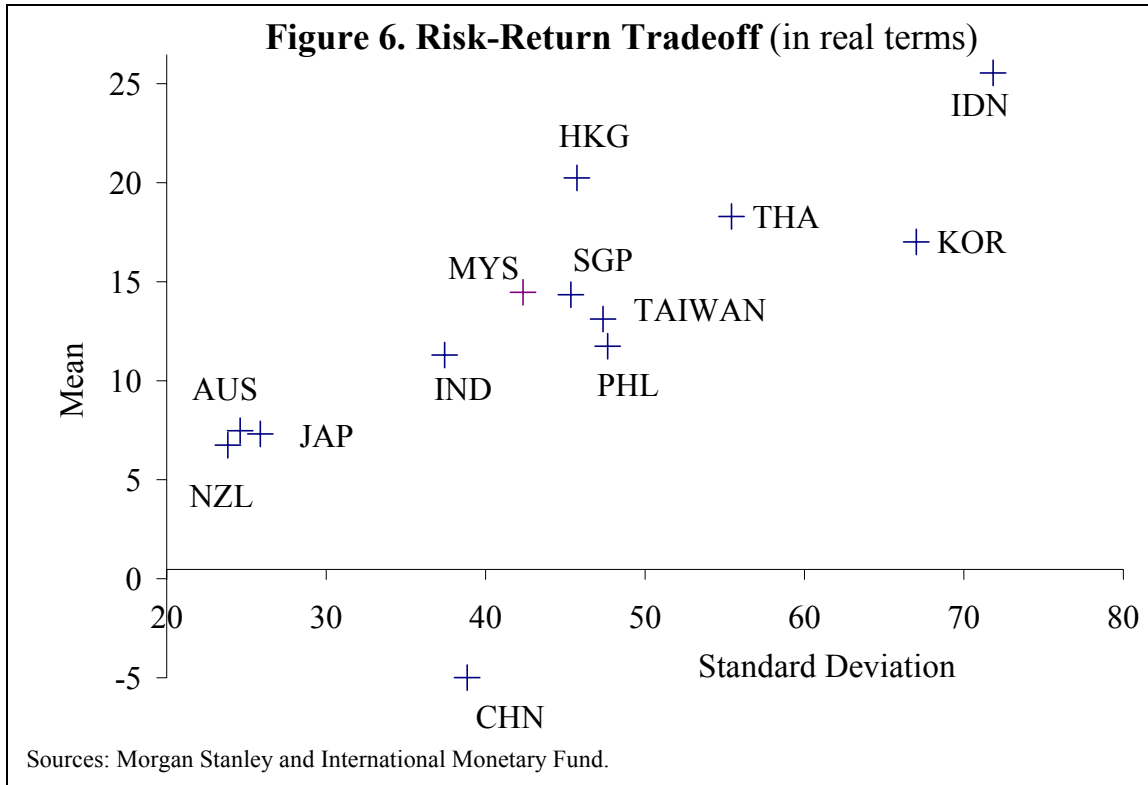
The paper estimates the gains from financial integration for other economies in the Asia/Pacific region. Figure 5 summarizes the correlation of each country's returns with the emerging Asia, Asia, and world indexes. Correlations with the world index tend to be lower than with the Asian indexes, reflecting the fact that Asian economies are more correlated with each other than they are with the rest of the world. Lower correlations offer more opportunity for risk-sharing. Moreover, the world index is less volatile than the Asian indices. It is therefore unsurprising that the welfare gains from worldwide financial integration are greater than the gains from integration within Asia for all countries in the sample (Table 6).



Stock markets of most Asian countries in the sample display the stochastic properties typical of emerging markets: high average returns, but high risk. An interesting exception is China: while its stocks are risky, their average return is also low—indeed, the average return is negative (-5.5 percent).<sup>6</sup> China would therefore gain tremendously from financial integration, since it would be able to swap its high risk and negative return assets against lower risk and higher returns ones; indeed, it might be optimal for a Chinese investor to hold his or her entire wealth in foreign equity. Overall, the high level of risk in emerging economies translates into high gains from financial integration (Table 6).<sup>7</sup> These gains are higher than the gains usually found in the literature for developed countries, as discussed previously. Developed economies would nonetheless gain as well from integration with emerging markets, as they would still be able to diversify some of their risk away and would also benefit from the higher returns in these economies.

<sup>6</sup> The progressive privatization of some state-owned companies partially explains the low returns on Chinese stocks. The authorities sold some of their large holdings in these companies, putting downward pressure on stock prices.

<sup>7</sup> Because gains cannot be computed for some values of the parameters, parameters used in Table 6 vary across countries.





<b>Table 6. Welfare Gains from Financial Integration</b>					
<b>China (<math>\gamma=3, \theta=3</math>)</b>					
	<u>Returns</u>				
	Mean	St. Dev.	Correlation	Optimal	Gains
China	-5.5	38.8	1.00	Share	(in percent)
World	8.5	18.8	0.37	1.00	n/a
Emerging Asia	7.2	43.2	0.66	0.71	n/a
Asia	3.7	32.2	0.49	0.91	n/a
<b>Hong Kong SAR (<math>\gamma=1, \theta=3</math>)</b>					
	<u>Returns</u>				
	Mean	St. Dev.	Correlation	Optimal	Gains
Hong Kong SAR	19.8	45.7	1.00	Share	(in percent)
World	7.0	17.4	0.57	0.24	0.8
Asia3 (Australia, Japan, Singapore)	10.6	32.5	0.62	0.19	0.4
<b>India (<math>\gamma=1, \theta=2</math>)</b>					
	<u>Returns</u>				
	Mean	St. Dev.	Correlation	Optimal	Gains
India	10.8	37.4	1.00	Share	(in percent)
World	8.9	18.0	0.52	0.84	37.8
Emerging Asia	9.0	47.7	0.73	0.00	0.0
Asia	4.3	30.0	0.83	0.00	0.0
<b>Indonesia (<math>\gamma=1, \theta=3</math>)</b>					
	<u>Returns</u>				
	Mean	St. Dev.	Correlation	Optimal	Gains
Indonesia	25.1	71.8	1.00	Share	(in percent)
World	13.3	44.4	0.15	0.57	141.0
Emerging Asia	12.5	39.5	0.57	0.66	116.2
Asia	4.5	36.3	0.41	0.47	84.5
<b>Japan (<math>\gamma=2, \theta=2</math>)</b>					
	<u>Returns</u>				
	Mean	St. Dev.	Correlation	Optimal	Gains
Japan	6.8	25.9	1.00	Share	(in percent)
World	4.8	17.9	0.45	0.63	40.8
Rest of World	5.5	20.1	0.25	0.58	49.8
Asia3 (Australia, Singapore, Hong Kong SAR)	7.8	24.7	0.48	0.62	45.8
<b>Korea (<math>\gamma=3, \theta=2</math>)</b>					
	<u>Returns</u>				
	Mean	St. Dev.	Correlation	Optimal	Gains
Korea	16.5	67.0	1.00	Share	(in percent)
World	7.4	22.4	0.59	1.00	n/a
Emerging Asia	9.1	34.9	0.41	0.87	n/a
Asia	0.3	24.0	0.69	1.00	n/a

<b>Table 6. Welfare Gains from Financial Integration (continued)</b>						
<b>Malaysia</b> ( $\gamma=1, \theta=2$ )	<u>Returns</u>					
		Mean	St. Dev.	Correlation	Optimal	Gains
	Malaysia	14.0	42.3	1.00	Share	(in percent)
	World	10.3	22.6	0.17	0.64	36.8
	Emerging Asia	12.6	38.3	0.91	0.59	5.2
Asia	3.8	28.1	0.63	0.02	0.0	
<b>New Zealand</b> ( $\gamma=3, \theta=3$ )	<u>Returns</u>					
		Mean	St. Dev.	Correlation	Optimal	Gains
	New Zealand	6.3	23.8	1.00	Share	(in percent)
	World	6.6	19.2	0.25	0.67	39.3
	Emerging Asia	9.6	39.0	0.68	0.13	2.0
Asia	0.1	25.4	0.50	0.00	0.0	
<b>Philippines</b> ( $\gamma=1, \theta=3$ )	<u>Returns</u>					
		Mean	St. Dev.	Correlation	Optimal	Gains
	Philippines	11.3	47.7	1.00	Share	(in percent)
	World	8.4	20.5	0.47	0.86	84.8
	Emerging Asia	10.7	37.1	0.79	0.97	57.7
Asia	1.9	26.0	0.62	0.40	19.8	
<b>Singapore</b> ( $\gamma=1, \theta=3$ )	<u>Returns</u>					
		Mean	St. Dev.	Correlation	Optimal	Gains
	Singapore	13.9	45.3	1.00	Share	(in percent)
	World	7.5	20.3	0.47	0.62	20.6
	Asia <sup>3</sup>	11.1	32.7	0.78	0.77	16.6
(Australia, Japan, Hong Kong SAR)						
<b>Taiwan P.O.C.</b> ( $\gamma=1, \theta=3$ )	<u>Returns</u>					
		Mean	St. Dev.	Correlation	Optimal	Gains
	Taiwan P.O.C.	12.6	47.4	1.00	Share	(in percent)
	World	6.8	17.0	0.58	0.74	42.1
	Emerging Asia	10.2	38.6	0.75	0.63	21.2
Asia	1.0	27.2	0.70	0.15	1.5	
<b>Thailand</b> ( $\gamma=1, \theta=3$ )	<u>Returns</u>					
		Mean	St. Dev.	Correlation	Optimal	Gains
	Thailand	17.8	55.4	1.00	Share	(in percent)
	World	8.9	19.6	0.26	0.66	45.0
	Emerging Asia	11.0	35.9	0.86	0.73	20.2
Asia	2.1	24.3	0.62	0.33	9.6	

### C. Discussion

It is important to understand how some of the simplifying assumptions might affect the estimated welfare gains from diversification. Some assumptions tend to overstate the gains from diversification. First, utility with an fully diversified portfolio is compared with utility under autarky. In practice, countries have already achieved some degree of diversification, reducing the benefits of switching to their optimal portfolio. Second, many companies listed in a domestic stock market have overseas operations. Holding stocks of these companies therefore entails an element of international diversification. Treating the corresponding stocks as purely domestic assets understates the degree of diversification already achieved, and hence overstates the benefits of further diversification. Third, countries also produce non-tradable goods. Domestic assets can help hedging the risk in nontradable output, reducing the optimal level of international diversification. Pesenti and van Wincoop (2002) show, however, that nontradables have only a small impact on this optimal level. Finally, historical data are not always an accurate proxy for expectations of future means and variances. If so, the future gains of financial integration would differ from the estimated gains based on historical data.

But some assumptions also tend to understate the gains from diversification. In the above exercise, the investor can only buy one foreign assets. In reality, she could cherry-pick the stocks that are most valuable to her, increasing her gains from diversification. The assumption that asset prices are exogenous might also understate the gains from financial integration, as Lewis (2000) argues. Asset prices are endogenous and they would change when international investors start purchasing these assets. This change in domestic asset prices affects the wealth of the countries. This transfer of wealth allows substituting consumption intertemporally from low-growth economies to high-growth economies, leaving all countries better-off: high growth countries gain because they substitute future consumption for current consumption; low growth countries gain because they will get a slice of the high growth. In short, endogenous adjustment in asset prices allows for an extra avenue of welfare gains that is not present when stock prices are treated as exogenous.

### V. CONCLUSION

This paper argues that Asian economies would benefit from greater financial integration. We conclude by discussing how various economic agents would gain from enhanced risk-sharing, and by presenting some policy implications.

What benefits would risk-sharing to a country and its economic agents? Benefits include the following:

- Holding foreign assets could reduce the volatility of households' consumption.
- Investing abroad would also reduce the volatility of companies' earnings.
- Turning to foreign shareholders could reduce the cost of raising capital as well. For example, a foreign company importing iron ore is subject to fluctuations in iron ore world

prices. To invest in an Australian mining company would reduce the risk the foreign company faces: when iron ore prices are high, it also receives higher dividends from its investment in the Australian mining company. The foreign company benefits from such a reduction of risk. This foreign company would therefore be ready to pay more for a stake in an Australian mining company than an Australian investor, since the mining stock would yield less risk-hedging benefits to the Australian investor. For the Australian mining company, the special interest of the foreign company means a lower cost of raising capital.

- Finally, international risk-sharing may boost GDP growth, because investors are more willing to invest in high risk/high return projects if they can diversify away the risk (Obstfeld, 1994b).

What are the policy implications of these unrealized gains from risk-sharing? The results suggest that Australia and Asian countries could benefit significantly from enhanced financial integration, both within the region and with the rest of the world. The question is then why these countries have not already integrated more. Capital controls are probably part of the answer. But the persistent “home bias” among industrial countries, which have mostly open capital accounts, suggests that other forces must be at play. Figures 1 and 2 nonetheless stress that there is a correlation between capital account openness and international diversification. Lifting restrictions on capital account transactions would therefore promote financial integration. Of course, it is essential that financial systems and prudential regulation be sufficiently strong and that liberalization be done progressively to avoid instability. In addition, a significant degree of integration can be achieved only if all countries liberalize. In particular, a country cannot diversify successfully if it does not allow foreign investors in. The reason is that the country simply cannot afford purchasing large amounts of foreign assets if it does not sell some of its domestic assets. An orderly financial liberalization across the region would probably boost financial integration and the associated benefits from risk-sharing.

### **Appendix. Data Sources and Construction**

The data for the stock market are the country and region indexes from Morgan Stanley (MSCI) with gross dividends reinvested. The series are converted to real terms by deflating them with the consumer price index (from the IMF's *International Financial Statistics*) and population (from the World Bank's *World Development Indicators*).

An "Asia3" index is constructed for the four countries with longer data coverage (Australia, Hong Kong SAR, Japan, and Singapore). For each of this country, the "Asia3" index is created using a GDP weighted average of stock returns from the other three countries (the weights are the countries' 2003 GDP expressed in U.S. dollars).

The subjective discount factor  $\beta$  is set to 0.95 for all simulations. Results are robust to small changes in  $\beta$ .

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