



# ASIA-PACIFIC DEVELOPMENT JOURNAL

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## **Explanatory notes**

References to dollars (\$) are to United States dollars, unless otherwise stated.

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A solidus (/) between dates (e.g. 1980/81) indicates a financial year, a crop year or an academic year.

Use of a hyphen between dates (e.g. 1980-1985) indicates the full period involved, including the beginning and end years.

The following symbols have been used in the tables throughout the journal:

Two dots (..) indicate that data are not available or are not separately reported.

An em-dash (—) indicates that the amount is nil or negligible.

A hyphen (-) indicates that the item is not applicable.

A point (.) is used to indicate decimals.

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## INTRAREGIONAL TRADE COSTS IN ASIA: A PRIMER

*Yann Duval and Chorthip Utoktham\**

*While much has been said about the need to promote intraregional trade and the importance of reducing associated trade costs, quantitative estimates of such costs have been lacking. In this paper a new comprehensive measure of international trade costs is applied to calculate, according to value, trade costs within and between four Asian subregions, including the Association of Southeast Asian Nations (ASEAN) and the South Asian Association for Regional Cooperation (SAARC). Extraregional trade costs of the four subregions with free trade areas outside Asia, such as the North American Free Trade Area (NAFTA) and the European Union (EU), as well as their trade costs with China, India and Japan are also calculated. The analysis concludes with an evaluation of the importance of tariffs in overall trade costs and with the identification of sharp differences across Asian subregions.*

*JEL Classification:* F10, F12, F15.

*Key words:* Trade facilitation, trade costs, regional integration, subregion, Asia.

### I. INTRODUCTION

Reducing international trade costs is a high priority for developing countries in Asia as they strive to maintain or enhance their trade competitiveness in an increasingly challenging global environment. At the same time, it has become increasingly clear that these countries need to diversify their export markets and trade more among themselves, both to foster harmonious and sustainable regional development and to reduce risks associated with dependence on a limited number of developed country markets.

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\* Trade and Investment Division, ESCAP, Bangkok, Thailand.



Most Asian countries are already actively engaged in bilateral or regional trade and economic integration initiatives, many of which include trade facilitation or trade cost reduction programs or targets.<sup>1</sup> There is ample evidence that successful implementation of these programs – or achievement of targets – would have a very significant impact on intraregional trade.<sup>2</sup> However, little is known about the level of intraregional trade costs in Asia and to what extent these costs may have decreased over time. In an effort to address this knowledge gap, we estimate and analyze intra and extraregional trade costs of four Asian subregions, namely Association of Southeast Asian Nations (ASEAN), South Asian Association for Regional Cooperation (SAARC), North and Central Asia, and East and North-East Asia.

The definition and measure of trade costs adopted in this paper is presented in the next section, along with other methodological considerations and data sources. Empirical findings are discussed in sections III, IV and V, starting with intra and extraregional trade costs of Asia as a whole, followed by intra- and inter-subregional trade costs, and trade costs of Asian and other subregions with China, Japan and India. Tariff and non-tariff trade costs of Asian subregions are also examined briefly in section VI, while section VII provides conclusions and recommendations.

## II. METHODOLOGY AND DATA

### Trade cost definition and measure

There have been many attempts to develop trade costs measures. Much effort has focused on direct measurement of various trade cost components, such as international transport costs (using actual shipping costs of a standard container to various destinations or more aggregate CIF/FOB trade data),<sup>3</sup> or costs of moving goods from the factory to the deck of a ship at the nearest sea port (including cost of preparing trade documentation, customs clearance, goods transport and handling to the port).<sup>4</sup> Others (Kee and others, 2006) have estimated the cost of observed tariff and policy based non-tariff barriers (import quotas, subsidies, antidumping duties). Still others have relied on surveys of business or logistics service providers to derive

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<sup>1</sup> For example, Asia-Pacific Economic Cooperation (APEC) leaders committed to a 5 per cent reduction in trade costs in 2001, followed by an additional commitment of a 5 per cent cut in 2005. Quantitative estimates of trade costs – necessary to determine whether or not targets were being achieved – have not been made available, however (Shepherd, 2010).

<sup>2</sup> See, e.g., Helble and others (2007), Abe and Wilson (2008), and Duval and Utoktham (2009).

<sup>3</sup> See, e.g., Limão and Venables (2001) and De (2006a; 2006b).

<sup>4</sup> For example, cost of export and/or cost of import indicator in World Bank Doing Business Report 2010.

qualitative or quantitative indicators of international trade cost components.<sup>5</sup> However, these approaches do not provide a comprehensive measure of international trade costs, and combining the different measures and indicators into a comprehensive measure is hardly feasible.

We therefore adopt the measure of comprehensive trade costs proposed by Jacks and others (2009) for calculating international trade costs in this paper.<sup>6</sup> This bilateral measure of trade costs is comprehensive in the sense that it includes all additional costs involved in trading goods bilaterally relative to those involved in trading goods intranationally (domestically). It captures trade costs in its wider sense, including not only international transport costs and tariffs, but also other trade cost components discussed in Anderson and van Wincoop (2004), such as costs associated with the use of different languages and currencies. Direct and indirect costs associated with completing trade procedures or obtaining necessary information are also included.

This measure is derived from the gravity equation, the workhorse econometric model of trade, and is fully grounded in trade theory. Bilateral trade costs can be expressed as a tariff equivalent as follows:<sup>7</sup>

$$\tau_{ij} \equiv \left( \frac{t_{ij} t_{ji}}{t_{ii} t_{jj}} \right)^{\frac{1}{2}} - 1 = \left( \frac{x_{ii} x_{jj}}{x_{ij} x_{ji}} \right)^{\frac{1}{2(\sigma-1)}} - 1$$

where  $\tau_{ij}$  denotes geometric average trade costs between country  $i$  and country  $j$

$t_{ij}$  denotes international trade costs from country  $i$  to country  $j$

$t_{ji}$  denotes international trade costs from country  $j$  to country  $i$

$t_{ii}$  denotes intranational trade costs of country  $i$

$t_{jj}$  denotes intranational trade costs of country  $j$

$x_{ij}$  denotes international trade flows from country  $i$  to country  $j$

$x_{ji}$  denotes international trade flows from country  $j$  to country  $i$

$x_{ii}$  denotes intranational trade of country  $i$

$x_{jj}$  denotes intranational trade of country  $j$

$\sigma$  denotes elasticity of substitution

<sup>5</sup> For example, see the Logistics Performance Index of the World Bank or the Executive Opinion Survey of the World Economic Forum, and its Enabling Trade reports.

<sup>6</sup> This measure was also earlier derived by Head and Ries (2001).

<sup>7</sup> For the detailed derivation, see annex A.

According to this equation, trade costs are directly inferred from observable bilateral and intranational (domestic) trade data, showing how much more expensive bilateral trade is relative to intranational trade. Intranational trade is ideally defined as gross output less exports. However, since gross output data is not available for most developing countries in Asia, intranational trade is calculated instead as gross domestic product (GDP) minus export. This approach is proposed and tested by Jacks and others (2009), who finds that the percentage change of trade costs over time using GDP in the calculation is similar to those computed with gross output. That paper shows a high correlation between change in gross output and GDP growth, which makes using GDP as a proxy of gross output still theory consistent.<sup>8</sup> Novy (2009) notes, however, that using GDP data overstates intranational trade and thus, the level of trade costs because GDP includes (non-tradable) services.

Subregional trade costs are calculated as simple averages of bilateral trade costs of countries within each subregion.<sup>9</sup>

## Data and country groups

Bilateral international trade flows<sup>10</sup> from 1988-2008 are obtained from the United Nations Commodity trade database (Comtrade) and downloaded using the World Integrated Trade Solution (WITS). Bilateral import data is used as it is generally believed to be of better quality than export data. GDP and gross exports, which are used in the calculation of bilateral intranational trade, are obtained from the World Development Indicator (WDI) and the United Nations Comtrade respectively.<sup>11</sup> Bilateral tariff data used to calculate non-tariff trade costs at the subregional level are from the United Nations Conference on Trade and Development (UNCTAD) TRAINS database.<sup>12</sup> Following past literature, elasticity of substitution is assumed to be constant over time and set at  $\sigma = 8$ .<sup>13</sup>

<sup>8</sup> As pointed by an anonymous referee that the paper does not show the levels of trade costs calculated using GDP as opposed to gross output will be correlated across country-pairs. This issue deserves further study.

<sup>9</sup> We initially calculated subregional trade costs using aggregate international and intranational trade of subregions, but this was found to be misleading due to missing trade and GDP data of different countries in each subregion in various years.

<sup>10</sup> Bilateral trade flows used for calculating trade costs are bilateral imports.

<sup>11</sup> All above-mentioned data was downloaded in June 2010.

<sup>12</sup> Data downloaded through WITS as simple average of effectively applied tariff in July 2010.

<sup>13</sup> This value of elasticity of substitution is the same as in Anderson and van Wincoop (2004) and Novy (2009). The past literature, for example, Anderson and van Wincoop (2003) and Jacks and others (2009), suggests that results are not sensitive to the choice of parameter. To check the robustness of our dataset, we calculated trade costs with elasticity of substitution equals 5, 8 and 10 as well. Relative trade costs are found to remain stable across the different values.

Various country groups were identified to enable analysis of trade costs at the subregional level. Most country groups were based on existing subregional integration initiatives or free trade area memberships such as ASEAN and the North American Free Trade Area (NAFTA). The East and North-East Asia and the North and Central Asia subregions are defined following the practice of the United Nations. Importantly, table 1 shows countries in each subregion of which data were available, and which could therefore be included in the calculation of subregional trade costs.

**Table 1. Country groups – definition of regions and subregions**

MERCOSUR	EU5	NAFTA	AUS-NZ	Asia			
				ASEAN	East and North-East Asia	North and Central Asia	SAARC
Argentina	France	Canada	Australia	Indonesia	China	Armenia	Bangladesh
Brazil	Germany	Mexico	New	Malaysia	Japan	Azerbaijan	India
	Italy	United	Zealand	Philippines	Republic of	Georgia	Pakistan
	Spain	States of		Thailand	Korea	Kazakhstan	Sri Lanka
	United	America			Macao,	Kyrgyz Rep.	
	Kingdom				China	Russian	
					Mongolia	Federation	

### III. INTRAREGIONAL AND EXTRAREGIONAL TRADE COSTS OF ASIA

As shown in table 1, the Asia group considered here consists of Japan and 20 developing economies spanning South, South-East, East and North-East, as well as North and Central Asia – all are members of ESCAP. Figures 1 and 2 show trade costs of Asia with subregional groups of economies both within and outside it, and how these costs have changed between 2003 and 2007.

Asia trade costs with all of its four subregions are higher than those with the European Union 5 (EU5). They are also higher than ones with NAFTA, except in the case of trade with East and North-East Asia and ASEAN. Trade costs with NAFTA amount to a 190 per cent tariff equivalent, while those with intraregional groups range from 175 per cent (for ASEAN) to 253 per cent (for North and Central Asia) tariff equivalents. Asia extraregional trade costs with the Common Market of the South America (MERCOSUR) are the highest as of 2007, but it is with that subregion that most progress was made in reducing costs since 2003 (-6 per cent).

Asia intraregional trade costs with North and Central Asia are the highest, followed by South Asia. Those with ASEAN are the lowest, but the results suggest progress in reducing trade costs with that subregion may have stalled since 2003. Most progress in reducing intraregional trade costs seems to have been made with South Asia (-6 per cent), although trade costs with that subregion remain 26 per cent higher than ones with ASEAN. Overall, trade costs of Asia, as a group, with itself remain high. Intra and extraregional trade costs have changed little between 2003 and 2007, decreasing by similarly small amounts during that period.

Generally, these results confirm the lack of economic and trade integration between economies of the greater Asia region. It also shows that these countries, as a group, may have focused more on reducing trade costs with developed countries and trading blocs outside Asia than within the region. We explore if these results hold at the more disaggregated level of Asian subregions in the next section.

Figure 1. Intraregional trade costs of Asia (with its subregions)

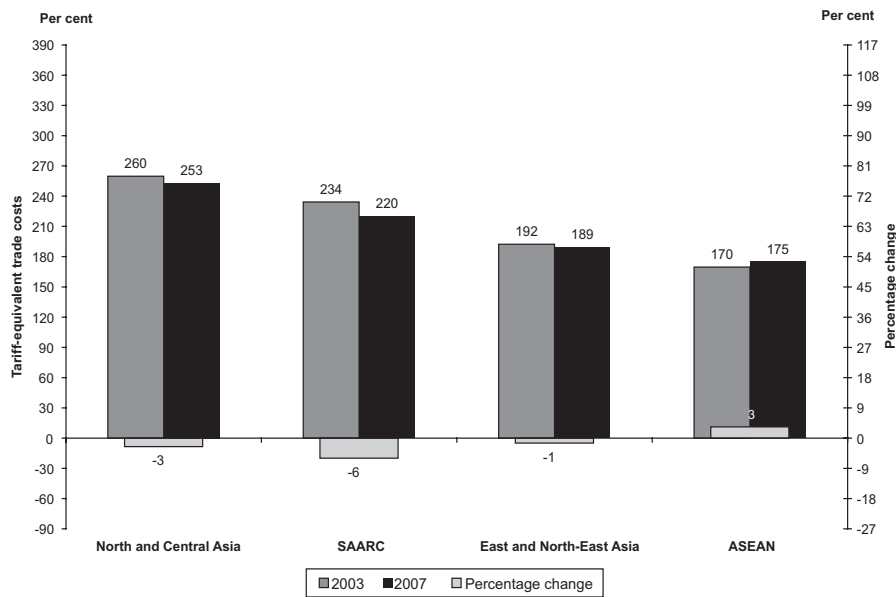
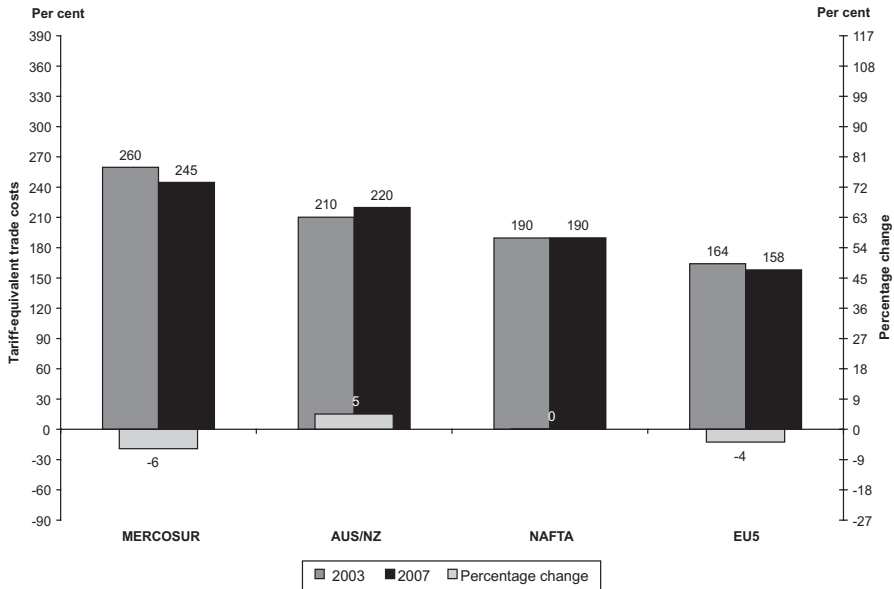


Figure 2. Extraregional trade costs of Asia (with selected free trade areas)



**Box 1. Comparison of trade costs with those of other similar studies**

Anderson and van Wincoop (2004), based on an extensive reviews of available information on trade costs, suggested that overall ad valorem trade costs between developed countries might amount to about 170 per cent, broken down into 74 per cent international trade costs and 55 per cent local distribution costs.

Very recent papers by Novy (2009) and Shepherd (2010) use the same trade cost measure adopted in our paper. Novy reports trade costs in 2000 ranging from 25 per cent (between the United States of America and Canada) to 70 per cent (between the United States and Germany), but used gross output data rather than GDP data. He finds that using GDP data increases substantially its trade cost estimates (from 31 per cent to 47 per cent for the United States and Canada in 1993).<sup>14</sup> Shepherd (2010) uses GDP data and its trade cost estimates in 2006 range from 35 per cent (between China and the World) to 86 per cent (between Brunei Darussalam and the World) respectively. According to Shepherd

<sup>14</sup> Our own estimate in this study is 50 per cent for the same year, which is also consistent with the estimate of Anderson and van Wincoop (2004).

(2010), trade costs of APEC and ASEAN with the rest of the world during 2001-2006 stand at 56 and 53 per cent respectively.<sup>15</sup>

Our own estimate of trade costs between the United States and Canada and the United States and Mexico stand at 41 per cent and 47 per cent in 2007 respectively. This is in line with Novy's own estimates using GDP data. However, the Asian subregional trade costs calculated using the same method and data sources and reported in this paper range from 61 per cent (between ASEAN countries) to 359 per cent (between Australia/New Zealand and North and Central Asia) in 2007. The mostly higher values of ad valorem trade costs in this paper may therefore not be attributed to methodological or data differences but rather to the fact that we are estimating trade costs between groups of developing countries (with the exception of Japan), some of which including landlocked countries facing significant natural barriers to trade. The impressively wide range of comprehensive trade costs reported in this study is consistent with findings from earlier studies that focused on measuring specific trade cost components. For example, import costs reported in the World Bank Doing Business 2010 for Central Asian landlocked countries often exceed US\$ 3,000 per container while they amount to around US\$ 600 for ASEAN.

Brooks and Ferrarini (2010), using a closely related but different trade cost measure and trade data sources, report trade costs of 27 per cent between China and ASEAN, and 42 per cent between India and ASEAN in 2007. In contrast, we estimate trade costs between China and ASEAN at 62 per cent, and at 113 per cent between India and ASEAN. One underlying reason for the different estimates is the use of different elasticities of substitutions. While these estimates are clearly different in absolute terms, they are similar in relative terms, both suggesting that trade costs of ASEAN with India are much higher (at least 60 per cent higher) than those with China.

Overall, the variation in absolute values of overall trade costs in the most recent literature suggests that it would be inappropriate to use estimates from different studies – using different methodologies and data sources – to compare and assess national or regional performances, although comparison of trade cost results presented in relative terms may be feasible. In that context, the development of a consistent and up-to-date database of bilateral trade cost estimates by ESCAP and the Asia-Pacific Research and Training Network (ARTNeT) is a welcome development.

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<sup>15</sup> Shepherd (2010) appears to be using  $i = \text{country}$  and  $j = \text{rest or the world}$  when applying the bilateral trade costs formula, such that his results are difficult to compare with those of Novy (2009) or ours.

#### IV. INTRA-SUBREGIONAL AND INTER-SUBREGIONAL TRADE COSTS IN ASIA

Trade costs of the four Asian subregions among themselves and with one another are summarized in table 2. Trade costs of these subregions with Australia and New Zealand (AUS/NZ), EU5 and NAFTA are also included for benchmarking purposes.

**Table 2. Intra-subregional and inter-subregional trade costs in Asia:  
2007 estimates and progress since 2003**

Full Dataset	2007						
	ASEAN	SAARC	East and North-East Asia	North and Central Asia	AUS/NZ	EU5	NAFTA
ASEAN	61% (-2%)						
SAARC	151% (-7%)	150% (-8%)					
East and North-East Asia	155% (-1%)	246% (1%)	128% (-3%)				
North and Central Asia	300% (8%)	301% (-14%)	223% (-7%)	162% (-3%)			
AUS/NZ	103% (-4%)	185% (-1%)	174% (4%)	359% (-3%)	74% (3%)		
EU5	127% (1%)	155% (-5%)	153% (-4%)	184% (-5%)	148% (0%)	72% (-2%)	
NAFTA	122% (1%)	179% (-10%)	138% (-12%)	282% (-6%)	149% (0%)	124% (-4%)	62% (-3%)

Note: Values in parentheses show percentage changes in trade costs since 2003.

Inter-subregional costs are consistently much higher than intra-subregional costs. This is consistent with the existence of natural trade costs, such as those associated with geographical distances and not easily addressed through policy intervention, as well as the fact that most trade integration initiatives have taken place at the subregional rather than at the regional level of Asia. At the same time, however, trade costs changes reported in table 2 suggest that in recent years more progress



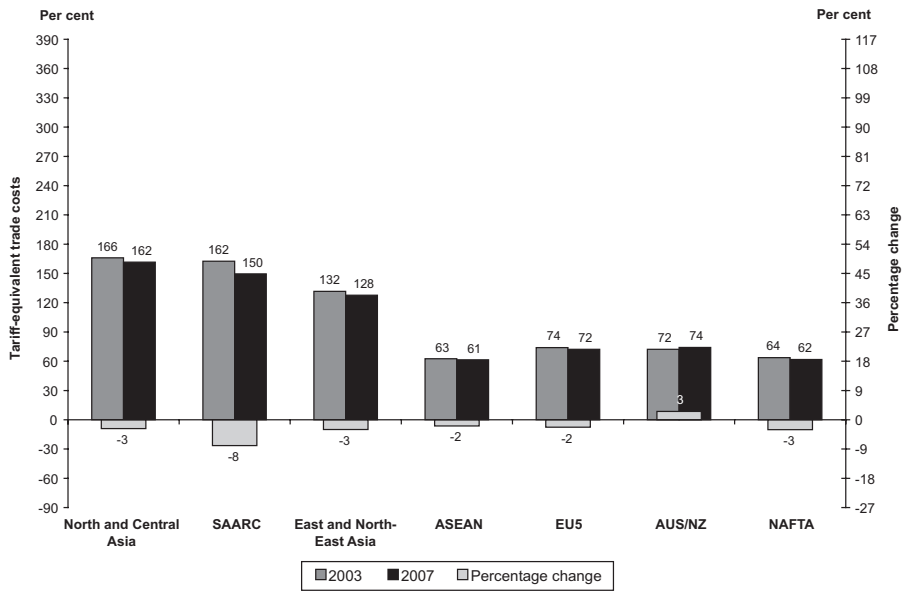
has been made in reducing trade costs inter-subregionally than intra-subregionally. Trade costs of each Asian subregion are briefly discussed below.

ASEAN trade costs

ASEAN has the lowest intra-subregional trade costs of all subregions although results show only minor improvements have been made between 2003 and 2007. ASEAN intraregional trade costs fell from 92 per cent in 1996 to 66 per cent tariff equivalent in 2001, with limited subsequent progress (see annex B). ASEAN trade costs with other Asian subregions are found to be at least twice as high as the intra-ASEAN trade costs, suggesting a comparatively high level of trade and economic integration.

Figure 3 also shows that the intraregional trade costs of ASEAN are comparable to those of NAFTA and about 15 per cent lower than those of EU5 or between Australia and New Zealand. This is noteworthy as it suggests that the relatively low amount of intraregional trade within ASEAN – compared to that of EU5, for example – may not be attributed to trade facilitation issues, but rather to issues of trade complementarities between members.

Figure 3. Intra-subregional trade costs of Asian subregions, 2003/2007



ASEAN trade costs with the East and North-East Asia region and SAARC are similar, involving a 90 per cent additional ad valorem trade cost compared to intra-ASEAN trade.<sup>16</sup> This is significantly higher than the additional trade costs involved in trading with Australia/New Zealand or EU5 (42 per cent and 66 per cent respectively). ASEAN trade costs with North and Central Asia remain prohibitively high with no improvements made between 2003 and 2007. In contrast, ASEAN trade costs with SAARC have decreased substantially (-7 per cent) during that period.

### **SAARC trade costs**

Intra-SAARC trade costs are found to be very high, amounting to two-and-a-half times the Intra-ASEAN trade costs. SAARC is the only region investigated for which intraregional trade costs are not significantly lower than its extra-subregional trade costs. Indeed, SAARC trade costs with ASEAN and with itself are roughly the same.<sup>17</sup>

SAARC trade costs with other subregions do not compare favourably with those of ASEAN. Our estimates suggest that SAARC trade with EU5 and East and North-East Asia involves additional ad valorem trade costs of 28 to 91 per cent respectively, compared to ASEAN trade costs with those regions. SAARC and ASEAN trade costs with North and Central Asia are similar although SAARC is geographically much closer to that subregion.

Notwithstanding SAARC's generally high trade costs, results suggest that the region has made significant progress between 2003 and 2007 in lowering costs. Intra-SAARC costs have decreased by 8 per cent since 2003, and its costs with ASEAN and North and Central Asia have also decreased by 7 and 14 per cent respectively.

### **East and North-East Asia trade costs**

Aggregate trade costs of this subregion are difficult to interpret as it features two Organization for Economic Co-operation and Development (OECD) member countries (the Republic of Korea and Japan), as well as one least developed and landlocked country (Mongolia) and China. The intraregional trade cost estimate, which is roughly double that of ASEAN, suggests, at best, a moderate level of trade integration among members of this group.

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<sup>16</sup> As shown in annex C, trade costs between ASEAN and East Asia (China-Japan-the Republic of Korea) are only 69 per cent, such as involving only an 8 per cent additional trade costs compared to intra-ASEAN trade.

<sup>17</sup> This is particularly noteworthy, as our SAARC trade cost estimate does not even include Nepal trade costs due to missing data.

This group is characterized by a relatively narrow range of trade costs with other subregions, ranging from 155 per cent ad valorem trade costs with ASEAN to 246 per cent with SAARC. This subregion has the lowest trade costs of any Asian subregion with North and Central Asia, and trade costs with that subregion have decreased significantly since 2003 (-7 per cent).

When the three leading economies in this group, China, Japan, and the Republic of Korea, are isolated and brought together into an East Asia subregion, we find that this newly defined East Asia group has lower intra-subregional trade costs than even ASEAN. This is particularly remarkable as the three countries had not entered into free trade agreements with one another as of 2007. East Asia is also found to have made significant progress in reducing trade costs with all Asian and non-Asian subregions (-4 per cent to -19 per cent) between 2003 and 2007, resulting in this group having the lowest trade costs of any subregion with any subregion (see annex C).

#### **North and Central Asia trade costs**

This subregion consists of economies in transition that are mostly landlocked. This certainly contributes to making trade costs in North and Central Asia the highest among all Asian subregions. This is true of both its intra-subregional trade costs and its trade costs with other subregions.

While this subregion is geographically proximate to both EU5, East and North-East Asia, and SAARC, its trade costs with SAARC appear to be capping at approximately 70 per cent higher than those with EU5 or the East and North-East Asia subregion. However, the significant reduction in trade costs observed between North and Central Asia and both SAARC and East Asia (-14 per cent and -7 per cent respectively) indicate that Central Asia is increasingly integrating into the rest of Asia.

### **V. TRADE COSTS OF ASIAN SUBREGIONS WITH CHINA, INDIA AND JAPAN**

In order to further deepen our understanding of intra-Asia trade costs, we explore below the trade costs between the four Asian subregions and the three Asian giants: China, India, and Japan,

Trade costs of all subregions with China are the lowest, followed by Japan and India. The most striking finding is that the trade costs of all Asian subregions with China are lower or closely equal to their intra-subregional trade costs (refer to figure 3). The range of trade costs faced by China across the subregions is also much

Figure 4. Trade costs between selected subregions and China, India and Japan (2007)

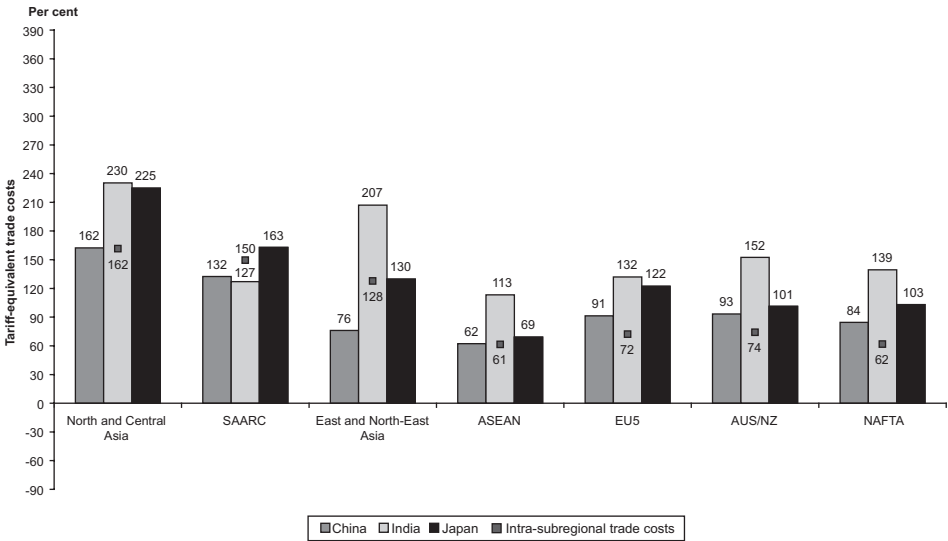
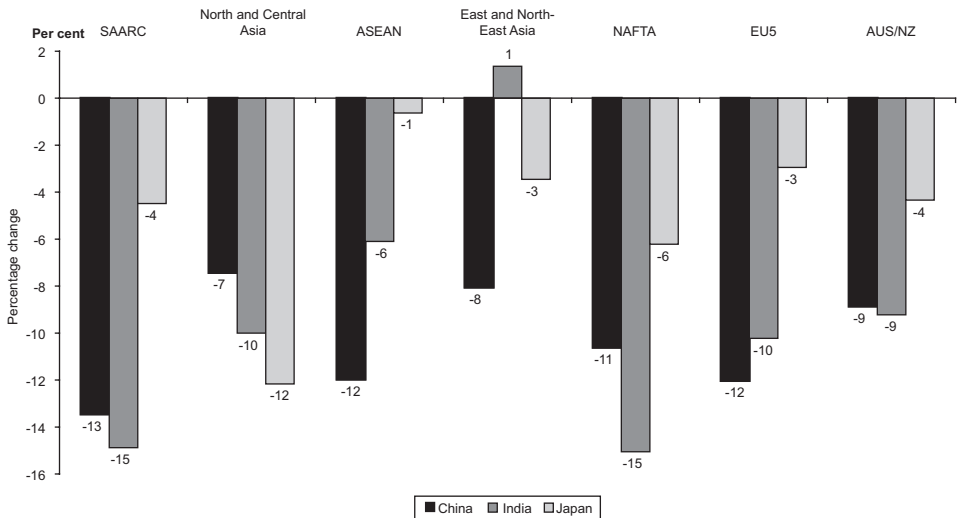


Figure 5. Changes in trade costs between selected subregions and China, India and Japan: 2003-2007 (percentage change)



lower than those faced by Japan (and India), revealing China's success in reducing trade costs with a wide range of country groups in Asia and beyond. Indeed, trade costs between China and Australia/New Zealand are even found to be slightly lower than those between Japan and Australia/New Zealand.

Trade costs of all three Asian giants with ASEAN are the lowest, ranging from a 62 per cent tariff equivalent for China to 113 per cent for India. This confirms the role of ASEAN as a regional trade hub, with which each of the three major Asian economies have signed free trade agreements. Trade costs between each of the three countries and other Asian subregions – to which they do not belong – are often almost twice as high as those with ASEAN. Trade costs of China, India and Japan with North and Central Asia are unsurprisingly the highest.

As shown in figure 5, trade costs reductions with China have been most consistent across all Asian subregions, ranging from 7 to 13 per cent. In contrast, trade costs reductions with India have varied greatly, from a 15 per cent reduction with SAARC (India's own subregion) to an actual increase in trade costs with the East and North-East Asia subregion.

In the case of Japan, improvement of trade costs in recent years are found to have been most significant with North and Central Asia (-12 per cent), with costs reduction with other subregions not exceeding 4 per cent. In particular, our results indicate that trade integration between ASEAN and Japan, measured in terms of trade costs reduction, has been much slower than with China in recent years, resulting in an ad valorem Japan-ASEAN trade cost premium of 7 per cent over those of China-ASEAN in 2007.

## **VI. ASIAN SUBREGIONS TARIFF VS NON-TARIFF TRADE COSTS**

The comprehensive measure of trade costs used in this study includes all added observable and unobservable costs associated with trading goods internationally rather than domestically. While breaking down this overall trade cost measure into its key components would be useful, we leave this challenging task for another paper. As an initial step, however, we simply calculate comprehensive non-tariff ad valorem trade costs by removing applied tariff rates from our comprehensive ad valorem trade costs.<sup>18</sup>

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<sup>18</sup> Non-tariff trade costs =  $[(1 + \text{Trade Costs}) / (1 + \text{Tariff})] - 1$ .

The resulting non-tariff trade costs are compared to tariff costs at the subregional level. Table 3 shows the level of these ad valorem costs for trade within and among each of the Asian subregions for the years 2003-2004 and 2007-2008. The results indicate that non-tariff barriers are clearly on a very different scale than tariff barriers: average subregional tariffs vary from nearly 0 to at most 21 per cent while non-tariff costs vary from 58 per cent to over 330 per cent. Table 3 also suggests that Asian subregions have made relatively more progress in reducing tariffs than in reducing non-tariff barriers, with reduction in tariff costs in many cases exceeding 25 per cent between 2003-2004 and 2007-2008.

**Table 3. Intra- and inter-subregional tariff and non-tariff trade costs in Asia (2003-2004 and 2007-2008)**

Reporter/Partner	Period	Data	ASEAN	East and North-East Asia	North and Central Asia	SAARC
ASEAN	2003-2004	Tariff	2%	8%	6%	7%
		Non-tariff	58%	136%	261%	144%
	2007-2008	Tariff	2%	4%	4%	7%
		Non-tariff	60%	145%	281%	136%
East and North-East Asia	2003-2004	Tariff	5%	6%	3%	7%
		Non-tariff	143%	117%	223%	231%
	2007-2008	Tariff	4%	4%	3%	4%
		Non-tariff	146%	118%	216%	231%
North and Central Asia	2003-2004	Tariff	4%	4%	6%	5%
		Non-tariff	268%	221%	151%	337%
	2007-2008	Tariff	5%	6%	0%	6%
		Non-tariff	275%	207%	165%	284%
SAARC	2003-2004	Tariff	20%	19%	15%	15%
		Non-tariff	116%	200%	300%	126%
	2007-2008	Tariff	14%	13%	10%	8%
		Non-tariff	121%	206%	267%	130%

*Note:* For each subregional pair (e.g. ASEAN-SAARC), the tariff costs shown are those of the first subregion mentioned in the label such as ASEAN tariff in our example.

ASEAN confirms its leadership position as an efficient and trade-friendly group, featuring the lowest intra-subregional non-tariff trade costs and moderate levels of tariff costs both intra- and extra-subregionally. The East and North-East Asia subregion features the lowest extra-subregional tariff costs. SAARC tariff and non-tariff trade costs with other subregions were clearly the highest in 2003-2004, but its trade cost gap with other subregions had rapidly narrowed by 2007-2008. The North and Central Asia group has also made impressive progress in lowering its tariff both within and outside the group, but has made very limited progress, if any, in reducing its non-tariff trade barriers. This is admittedly due at least in part to the geographic nature of these costs.

## **VII. CONCLUSION**

This paper provides for the first time an overview of the overall trade cost situation in Asia using a comprehensive measure of international trade costs. Following an overall assessment of trade costs of Asian countries as a group with selected regional groupings, trade costs within and between Asian subregions are presented and benchmarked against those of the EU5, NAFTA and Australia/New Zealand. Trade costs of Asian subregions with China, India and Japan are also examined.

Trade costs within Asian countries as a group are found to be high, generally exceeding those between them and non-Asian regional groupings, such as NAFTA and EU5. This is consistent with the heterogeneity of the greater Asian region and the lack of trade or economic integration initiatives spanning the entire region.

The subregional analysis reveals sharp differences across Asian subregions. ASEAN is found to have much lower intra-subregional trade costs than other Asian subregions, as well as mostly lower inter-subregional trade costs. On the other hand, SAARC intra-subregional trade costs remain exceedingly high although most progress in reducing such costs since 2003 was made in South Asia. North and Central Asia, which is grouped with Russia and landlocked economies in transition, faces prohibitive trade costs – sometimes exceeding 300 per cent tariff equivalent. Finally, within the East and North-East Asia subregion, a subset of three countries – China, the Republic of Korea and Japan – was found to have the lowest intra-group trade costs of any free trade areas examined in this paper (including NAFTA), although the three countries had not yet signed free trade agreements with one another.

Estimates of trade costs between Asian subregions and China, India and Japan, highlight how effective China has been in reducing its trade costs with ASEAN as well as other Asian and non-Asian subregions, achieving generally lower

international trade costs than Japan as of 2007. In contrast, estimates of trade costs between India and Asian subregions (other than SAARC) suggest much room left for improvement.

Our analysis shows that tariff costs account for a small portion of the overall international trade costs of Asian subregions – typically 10 per cent or less. This confirms the need for trade policy makers and negotiators to sharpen their focus on reducing non-tariff barriers, including trade facilitation and improvement of trade logistics services.

Decomposing the large non-tariff portion of the international trade costs presented here into key components will be emphasized in future work to derive more specific policy recommendations. Alternative ways to calculate intranational trade – as an essential element in the calculation of ad valorem trade costs – in the absence of gross output data in most Asian countries will also be explored, in particular to take into account the potential bias of the GDP-based estimates presented in this paper against countries and subregions with large services sectors.<sup>19</sup>

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<sup>19</sup> Updated bilateral trade cost data will be made available at: <http://www.unescap.org/tid/artnet/trade-costs.asp> as it becomes available.



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## APPENDIX

### Annex A. Derivation of trade cost equation

Anderson and van Wincoop (2003) derived the micro-founded gravity equation with trade cost component as

$$x_{ij} = \frac{y_i y_j}{y^w} \left( \frac{t_{ij}}{\Pi_i P_j} \right)^{1-\sigma} \quad (1)$$

where  $x_{ij}$  denotes nominal exports from  $i$  to  $j$ ;  $y_i$  and  $y_j$  denotes nominal income from countries  $i$  and  $j$  respectively;  $y^w$  denotes world income;  $\sigma > 1$  denotes elasticity of substitution across goods;  $\Pi_i$  and  $P_j$  denotes price index of countries  $i$  and  $j$  respectively;  $t_{ij}$  denotes bilateral trade costs (as one plus ad valorem term).

Anderson and van Wincoop (2003) defines  $\Pi_i$  and  $P_j$  as multilateral resistance terms<sup>20</sup> as those price indices incorporate average trade barriers with all other trading partners. Novy (2009) suggests the expression of intranational trade as

$$x_{ii} = \frac{y_i y_i}{y^w} \left( \frac{t_{ii}}{\Pi_i P_i} \right)^{1-\sigma} \quad (2)$$

where  $t_{ii}$  becomes intranational trade costs.

Re-arranging (2) as the product of multilateral resistance term as follows:

$$x_{ii} = \frac{y_i y_i}{y^w} \left( \frac{\Pi_i P_i}{t_{ii}} \right)^{\sigma-1}$$

$$(\Pi_i P_i)^{\sigma-1} = \frac{x_{ii} y^w}{y_i y_i} t_{ii}^{\sigma-1}$$

<sup>20</sup> Basically, multilateral resistance indicates the trade between reporting country  $i$  and a particular partner  $j$  depends on the bilateral barrier between  $i$  and  $j$  relative to the average barriers of that pair and all trading partners (such as global trading partners). From the derivation (from Equation (4) to (5)), the multilateral resistance is cancelled out in the mathematical equation (see Novy (2009)). Thus, the ex ante obstacles (such as the realized barriers before initiating international trade transaction) are not ignored; they have been taken into account but they disappear in the mathematical process.

$$\begin{aligned}
 (\Pi_i P_i)^{\sigma-1} &= \frac{x_{ii}/y_i}{y_i/y^w} t_{ii}^{\sigma-1} \\
 \Pi_i P_i &= \left( \frac{x_{ii}/y_i}{y_i/y^w} \right)^{\frac{1}{\sigma-1}} t_{ii}
 \end{aligned} \tag{3}$$

In the same analogy, the opposite direction of trade flows in (1) can be written as

$$x_{ji} = \frac{y_j y_i}{y^w} \left( \frac{t_{ji}}{\Pi_j P_j} \right)^{1-\sigma} \tag{4}$$

Multiply (1) and (4) together and get

$$x_{ij} x_{ji} = \left( \frac{y_i y_j}{y^w} \right)^2 \left( \frac{t_{ij} t_{ji}}{\Pi_i \Pi_j P_i P_j} \right)^{1-\sigma}$$

Substitute the result from (3)

$$\begin{aligned}
 x_{ij} x_{ji} &= \left( \frac{y_i y_j}{y^w} \right)^2 \left( \frac{\Pi_i \Pi_j P_i P_j}{t_{ij} t_{ji}} \right)^{\sigma-1} \\
 x_{ij} x_{ji} &= \left( \frac{y_i y_j}{y^w} \right)^2 \left( \frac{1}{t_{ij} t_{ji}} \right)^{\sigma-1} \left( \frac{x_{ii}/y_i}{y_i/y^w} \right) t_{ii}^{\sigma-1} \left( \frac{x_{jj}/y_j}{y_j/y^w} \right) t_{jj}^{\sigma-1} \\
 x_{ij} x_{ji} &= \left( \frac{t_{ii} t_{jj}}{t_{ij} t_{ji}} \right)^{\sigma-1} x_{ii} x_{jj} \\
 \frac{x_{ij} x_{ji}}{x_{ii} x_{jj}} &= \left( \frac{t_{ii} t_{jj}}{t_{ij} t_{ji}} \right)^{\sigma-1} \\
 \left( \frac{t_{ii} t_{jj}}{t_{ij} t_{ji}} \right)^{\sigma-1} &= \frac{x_{ii} x_{jj}}{x_{ij} x_{ji}}
 \end{aligned}$$

Then, the product of bidirectional trade costs relative to the product of their intranational trade costs is equivalent to

$$\frac{t_{ij} t_{ji}}{t_{ii} t_{jj}} = \left( \frac{x_{ii} x_{jj}}{x_{ij} x_{ji}} \right)^{\frac{1}{\sigma-1}} \quad (5)$$

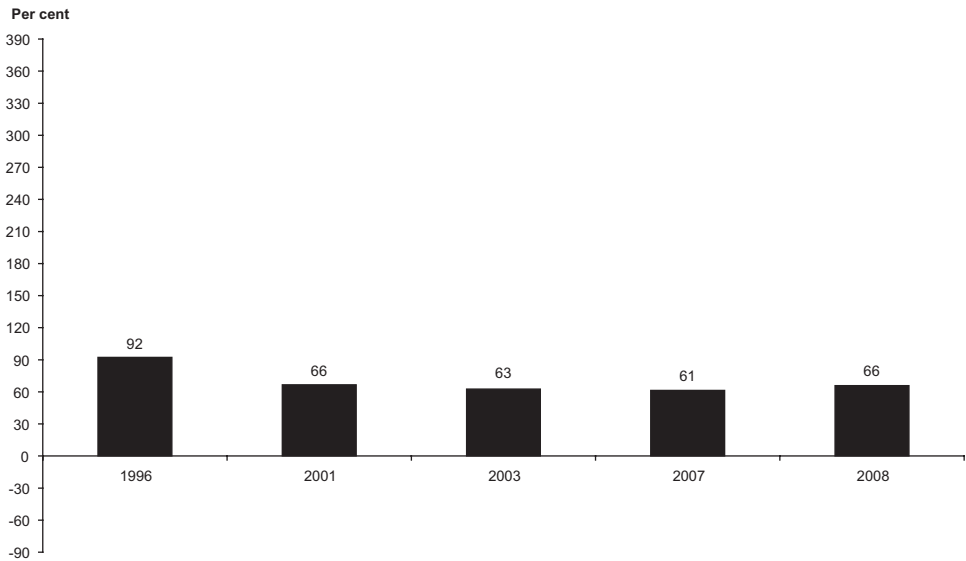
Therefore, geometric average of bilateral trade costs is defined as

$$T_{ij} = \left( \frac{t_{ij} t_{ji}}{t_{ii} t_{jj}} \right)^{\frac{1}{2}} = \left( \frac{x_{ii} x_{jj}}{x_{ij} x_{ji}} \right)^{\frac{1}{2(\sigma-1)}} \quad (6)$$

Tariff-equivalent term is done by deducting one from (6) and thus,

$$\tau_{ij} = \left( \frac{t_{ij} t_{ji}}{t_{ii} t_{jj}} \right)^{\frac{1}{2}} - 1 = \left( \frac{x_{ii} x_{jj}}{x_{ij} x_{ji}} \right)^{\frac{1}{2(\sigma-1)}} - 1 \quad (7)$$

Annex B. Intra-subregional trade costs of ASEAN (1996-2008)



**Annex C. Intra-subregional and inter-subregional trade costs of East Asia  
(China, Republic of Korea and Japan)**

	2007						
	ASEAN	SAARC	East Asia	North and Central Asia	AUS/NZ	EU5	NAFTA
ASEAN	61% (-2%)						
SAARC	151% (-7%)	150% (-8%)					
East Asia	69% (-4%)	147% (-7%)	57% (-11%)				
North and Central Asia	300% (8%)	301% (-14%)	193% (-19%)	162% (-3%)			
AUS/NZ	103% (-4%)	185% (-1%)	100% (-5%)	359% (-3%)	74% (3%)		
EU5	127% (1%)	155% (-5%)	111% (-6%)	184% (-5%)	148% (0%)	72% (-2%)	
NAFTA	122% (1%)	179% (-10%)	97% (-8%)	282% (-6%)	149% (0%)	124% (-4%)	62% (-3%)

# INFORMAL SOCIAL PROTECTION AND SOCIAL DEVELOPMENT IN PACIFIC ISLAND COUNTRIES: ROLE OF NGOS AND CIVIL SOCIETY

Manoranjana Mohanty\*

*Social security and social protection concepts are gaining importance, especially in the Pacific Island countries (PICs). The state-led welfare and social protection system is limited in PICs, where there has been a heavy reliance on traditional, informal and non-state social protection systems which are provided through extended family, kinship, and community. The aim of the paper is to examine the nature of traditional, informal and semi-formal social security and protection mechanisms within PICs, to explore the role of non-governmental organizations (NGOs) and civil society organizations (CSOs) in providing social security and safety nets and to aid in enhancing social development in PICs.*

*JEL Classifications:* F24, H55, G31.

*Key words:* Informal social protection, Pacific Island countries, social safety nets, social development, social networks, social security.

## I. INTRODUCTION

Social security and social protection concepts are gaining importance in the wake of growing economic shocks, political instability, an increasing number of the aged and the rise in risk and vulnerability, which is accompanied by severe environmental and climatic change. Social protection is a fundamental issue in promoting social and human development and reducing risks and vulnerabilities. It is an agenda primarily designed for reducing vulnerability and managing risks of individuals, households and communities. Thus, social protection is a part of a broader framework of social risk management (WB, 2001; 2006a) and is closely

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\* Associate Professor, Development Studies Programme, Faculty of Business and Economics, the University of the South Pacific, Suva, Fiji, E-mail: Mohanty\_m@usp.ac.fj.

intertwined with human and social development. Social development is defined broadly as “sustainable human development which enhances human capabilities for enlarging human choices” (UNDP, 2006).

Social protection plays a crucial role in the alleviation of poverty and in the socio-economic development of a country. It contributes to economic growth by not only raising labour productivity, but also by enhancing social stability. The United Nations Commission for Social Development (United Nations, ECOSOC, 2001: 6) noted:

“The ultimate purpose of social protection is to increase capabilities and opportunities and thereby, promote human development... social protection should not simply be seen as a residual policy function of assuring the welfare of the poorest – but as a foundation at a societal level for promoting social justice and social cohesion, developing human capabilities and promoting economic dynamism and creativity”.

The terms “social security” and “social protection” are used interchangeably, when in fact, they are quite different. Social security covers all measures providing benefits, whether in cash or kind, to secure “protection” from lack of work-related income caused by sickness, disability, maternity, employment injury, unemployment, old age, or death; lack of access to health services; insufficient family support; and poverty and social exclusion (ILO, 2010/11: 13). On the other hand, social protection includes “actions to minimize risks or transfers between individuals or households to cope during difficult times”, according to Department of International Development (2006: 6).

Social protection empowers people, widens their choices, and promotes social inclusive development. Its strategies may include reduction, mitigation and strategies for coping with risk. Social security plays a critical role in times of crisis and provides mechanisms to alleviate and prevent poverty, reduce income disparities and enhance human capital and productivity (ILO, 2010/11).

Social security is not merely a need but rather a human right. Article 22 of the United Nations Universal Declaration of Human Rights (United Nations, 1948: 75) states that:

“Everyone, as a member of society, has the right to social security and is entitled to realization, through national effort and international co-operation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality”.



Article nine of the International Covenant on Economic, Social and Cultural Rights (United Nations, 1966: 7) also makes reference to social security, noting: “the right of everyone to social security, including social insurance”. The concept of a “social protection floor” has been in use in recent years to mean a set of basic social rights, services and facilities that global citizens should enjoy. The report of the World Commission on the Social Dimension of Globalization states: “a minimum level of social protection for individuals and families needs to be accepted and undisputed as part of the socio-economic floor of the global economy”. A “social protection floor” could consist of two main elements – services (access to water and sanitation, health and education) and social transfers, in cash or in kind that help to realize respective human rights (ILO, 2010/11: 17). Social protection mechanisms are central to achieving the Millennium Development Goals and to fulfilling fundamental human rights entitlements to shelter, employment, food, education and health. Failures in social protection will undermine achievement of the Goals and will increase vulnerability.

The majority of the world population still has “no access to a comprehensive social security system” (ILO, 2010/11: 121). A “welfare state” regime exists in advanced capitalist countries in which the needs of individuals are provided for through a combination of social security provisions including pensions, social protection benefits, social services and labour market regulations. Another regime is an “informal security regime” that describes “institutional arrangements where people rely upon community and family relationships to meet their security needs” (Wood and Gough, 2006: 1696-1699). The former security regime which is a state-based welfare and social protection system is of a “formal type” which is very limited in its coverage in the “majority world” while the latter type, the “informal” regime, is invisible but more protective. It is estimated that only 20 per cent of the world’s working-age population (and their families) have effective access to comprehensive social protection (ILO, 2010/11). Regarding informal social protection, Oduro (2010: 3) writes, “(it) encompasses those arrangements and actions taken by individual or groups of individuals that are not guided by formal legal regulations but are not necessarily contravening these laws and regulations”.

Social capital is also an important tool of social protection. The concept of “social capital” commonly refers to reciprocity, trust and networking among groups, and takes a prominent place in an “informal security regime” and in any development discourse. It also refers to community/household relationships that play a crucial role in reducing the vulnerability of the poor. Abom (2004: 343) observes that social capital is generated at a variety of levels: family, kin, friends, community, wider social networks, and civic associations, to achieve shared results. It helps the poor to draw resources and make their living.

Non-governmental organizations (NGOs) and civil society organizations (CSOs) play a crucial role in social security and social protection. They have become increasingly involved in a range of social service delivery and in social development. Today, NGOs cover most facets of social development: reducing poverty and exclusion; improving access to basic services; preventing conflicts; fostering democracy; and influencing public policies (Fowler, 2000). NGOs are especially well suited for human and social security because of their size and reach, closeness to local populations, willingness to confront the status quo, and ability to address transnational threats through coalition-building (Michael, 2002). NGOs based on capacity building, advocacy and incentives to collective action have played a significant role in social capital construction (Abom, 2004; Fukuyama, 2001).

As noted earlier, PICs have limited formal social security systems, but rather an overdependence on traditional, informal and or semi-formal social security arrangements based on extended families and kinship. Besides migration itself, remittance and the informal economic sector also play significant roles in social security and protection. However, the social protection system of traditional and informal sector is breaking away. In view of foregoing discussions, this paper addresses the questions: how does traditional and informal social protection work in the Pacific? Why is informal social protection weakening in the Pacific? How are informal and traditional social protection linked to formal social protection system? How has traditional social protection changed over the years? What role do NGOs play in social protection and social development in PICs?

The following section focuses on the concepts of social security and social protection, and social “safety net” and their linkages to social development.

## **II. SOCIAL SECURITY, SOCIAL PROTECTION AND SOCIAL DEVELOPMENT**

Social security and “safety nets” are important tools of social protection that assist in social development. Social security has two main functions, income security and availability of medical care and health security (ILO, 2010/11: 13). All social security benefits comprise “social transfers”, either in cash or in kind. Social security has two main components: social insurance and social services.

Social security arrangements can be either universal or targeted at specific groups and generally manifest in two basic schemes: contributory and non-contributory types. The most common form of contributory social security scheme is “social insurance” which mainly covers formal wage employment. National Provident Funds would be an example of this. Social insurance schemes generally refer to

those which guarantee protection through an insurance mechanism. This includes, for example, social pension, health insurance, life insurance, disaster insurance and so on. The non-contributory schemes on the other hand are social assistance schemes based on condition of entitlement to receive benefits and provide conditional or unconditional transfers in cash or kind (ILO, 2010/11). Social assistance as the Department of International Development (2006: 1) notes, “comprises non-contributory transfers that are given to those deemed vulnerable by society on the basis of their vulnerability or poverty”.

Social “safety nets” are “tools of social protection that help vulnerable households cope with temporary shocks” (ADB, 2010b: vii). They are a collection of services provided by state and non-state actors including communities to individuals for overcoming poverty and vulnerability and includes transfers in cash or kind, subsidies, and welfare (ILO, 2006a: 7), and aim to prevent poor and other vulnerable groups from falling into poverty, or being caught in a poverty trap when affected by temporary shocks, such as natural disasters or economic downturn. Social “safety nets” can take several forms: targeted or untargeted, conditional or unconditional cash or in-kind allowances such as conditional cash transfers, child allowances, food stamps, food rations or school feeding programmes (ADB, 2010b: 1).

Social security, social protection and social development are closely linked in a two way process. Generally speaking, the higher the social development, the greater is social security and in turn, the greater the social protection. Similarly, stronger social security measures foster stronger social protection which, in turn, raises the level of social development and vice versa. Social development generally includes three closely interrelated processes: “social transfers”, “social services” and “social integration” (Streeten, 1981 cited in Prasad, 2008: 930).

### **Dimensions of social protection**

Social protection has four dimensions: preventive, protective, promotive and transformative (Devereux and Sabates-Wheeler, 2004 cited in Oduro, 2010). The preventive dimension such as pensions and health insurance helps to manage shocks. The protective dimension involves the provision of assistance to those who are unable to work and children. The promotive dimension includes measures for income generation and building capabilities. It includes, for example, provisions for subsidized inputs, microfinance, school feeding programmes, primary education, and communicable disease reduction measures. The transformative dimension seeks to address concerns pertaining to social security and social exclusion. It can protect people against social risks such as discrimination or abuse. The “transformative” dimension is, however, a broad category that extends beyond elements of risk management and includes income generation and regulatory framework and so on.

This conceptualization of social protection covers various groups: poor, excluded and vulnerable (Oduro, 2010: 2). The informal social protection system covers all these dimensions of social protection as well.

Other than individual scholars (e.g. Baulch and others, 2008; Kidd and others, 2009; Oduro, 2010; Prasad, 2008; Ritchie, 2000; Wood and Gough, 2006), studies related to social protection have been undertaken by various international agencies such as the Asian Development Bank (2003; 2009; 2010a; 2010b); the Department of International Development (2006); the International Labour Organization (2004; 2006a; 2006b; 2006c; 2006d; 2006e; 2010/11); the Overseas Development Institute (2010); the United Nations (2001); and the World Bank (2001; 2006b; 2006c).

The Asian Development Bank (2003) identified five broad areas of social protection relevant to the Asia-Pacific region. These include labour markets, social insurance, social assistance, micro and area-based schemes to protect communities, and child protection. Social protection typically includes individual or bundled policies in the form of labour market support, social insurance, and social safety nets. Social protection policies can range from short-term targeted policies to universal coverage.

The following section focuses on social protection systems and social development in PICs. Part one of the next section discusses the social challenges and vulnerabilities in PICs, while part two focuses on informal and traditional types of social protection system that exist in PICs. Part three deals with the role of NGOs and CSOs in social security and protection in PICs.

### **III. PACIFIC ISLANDS CONTEXT**

#### **Social challenges in PICs**

PICs are undergoing rapid social and cultural transformations. PICs exhibit wide socio-economic and cultural diversity as well as numerous social challenges. Various social groups and individuals are becoming increasingly vulnerable, while facing social exclusion. Incidences of poverty, youth unemployment, social and gender inequality, domestic violence, sexual abuse and exploitation, teenage pregnancy, crime, suicide, ageing, and disability, alcoholism and substance abuse, poor health and sickness (life-style diseases), and sexually transmitted diseases including HIV/AIDS are some areas of growing concerns in PICs.

Most Pacific Island governments acknowledge that a growing number of households face greater hardship (ADB, 2010b). The United Nations Resident Coordinator in Fiji reported that “almost 30 per cent of the population is living in the state of basic needs hardships and poverty”. The Resident Coordinator further observed that the poverty level in Fiji has increased from 25 to 40 per cent while that of Papua New Guinea (PNG) has risen from 24 to 54 per cent between 1990-2008.<sup>1</sup> The numbers reported for Fiji can be misleading since Fiji’s Income and Expenditure Survey 2008-2009 estimates the national poverty at only 31 per cent whereas the rural poverty level has increased to 43 per cent (Narsey and others, 2010).

The most vulnerable groups are unemployed youth, elderly individuals without family, the poor, people with disabilities (physically and mentally), women and children (including street children), squatter dwellers, prisoners, dependents, the chronically sick, single mothers, widows and widowers, the homeless and ex-prisoners. It is a triple vulnerability for elderly people if they are without a family, poor and suffer a disability.

Most PICs have a relatively young population, with a high percentage of people under the age of 25 (35 to 40 per cent). The “youth bulge” is a social challenge in PICs. However, PICs are now witnessing an increase in the percentage of elderly within their populations. The United Nations projected that by 2050, about 4 per cent of Fiji’s population would be 80 years or older.<sup>2</sup> The elderly population, defined as 60 years or older, is expected to increase to a double digit figure in all PICs by 2050, reaching 23 per cent in Palau, 16 per cent in the Cook Islands, 15 per cent in Tuvalu, 13 per cent in Fiji, 12 per cent in Samoa, and 10 per cent in Tonga by 2025 (see table 1). The rapidly growing ageing population has significant implications with regard to social protection and security measures in PICs.

### ***Vulnerability index in PICs***

Vulnerability is defined as the degree of exposure and coping capacity of a country. The vulnerability index (VI) is a composite index measuring the exposure of a country to global economic crisis and the coping capacity of that country to mitigate the crisis (UNESCAP and other, 2009/10). The greater the exposure of a country to global economic crises for which it may not have the capacity to cope, the greater would be the vulnerability of the country. Five indicators were taken for measuring the exposure to economic crisis: (a) income content of exports (EXPY) per

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<sup>1</sup> “Eradicating poverty, an improbable target for Pacific Islands”, Editorial, *Pac News*, 28 July 2010.

<sup>2</sup> “Elderly to make up 13 pc of population”, Editorial, *The Fiji Times*, 27 September 2010.

**Table 1. Projected ageing population in selected PICs**

Country	Percentage of older population (60 years and over)		
	2000	2025	2050
Cook Islands	10	16	23
Fiji	6	13	17
Kiribati	5	8	18
Marshall Islands	3	6	12
Nauru	3	8	13
Palau	8	23	25
PNG	4	6	11
Samoa	7	12	20
Solomon Islands	5	6	11
Tonga	8	10	13
Tuvalu	9	15	17
Vanuatu	5	8	12

Source: Kidd and Others (2009).

gross domestic product (GDP) per capita, (b) foreign direct investment, (c) official development assistance, (d) worker's remittances and (e) inbound tourism; all expressed as percentage of GDP. Similarly, to calculate the coping capacity, the following five indicators were used: (a) external public debt stocks, (b) total reserves in months of imports and gross savings, all to GDP ratio, (c) government effectiveness, (d) world governance indicators, and (e) human development index. The exposure index (EI) and capacity index (CI) were the weighted average of the selected indicators. The vulnerability index was discovered by calculating the differences between the exposure index and coping capacity index. As table 2 shows, the vulnerability indices are relatively higher in Tonga, the Solomon Islands and Vanuatu compared to Samoa, Fiji and PNG.

### **Social protection in PICs**

Social protection in various PICs may be at different stages of development, but it is grossly inadequate in all PICs. Nearly all have limited formal social protection system coverage and inadequate benefits to cover medical care, unemployment, old age, workers compensation to compensate for injuries sustained at work, maternity leave, invalidity and the next kin in the event of a death in a family (Naidu and Mohanty, 2009).

**Table 2. Vulnerability and social protection indices in selected PICs**

Country	Exposure Index (EI)	Capacity Index (CI)	Vulnerability Index (VI)	Social Protection Index (SPI)*
Cook Islands	..	..	..	0.55
Fiji	0.78	0.57	0.54	0.15
Marshall Islands	..	..	..	0.34
Nauru	..	..	..	0.42
PNG	0.63	0.44	0.53	0.01
Samoa	0.83	0.50	0.68	..
Solomon Islands	0.75	0.27	0.85	..
Tonga	1.00	0.45	0.94	0.08
Tuvalu	..	..	..	0.26
Vanuatu	0.86	0.48	0.74	0.08
<b>Total Pacific</b>	..	..	..	0.24

Source: UNESCAP and others (2009/10: 107).

Note: \* Baulch and others (2008: 87).

Baulch and others (2008) have developed social protection indices (SPIs) utilizing two broad dimensions: social protection expenditures/social protection impacts and coverage of social protection. Altogether four indicators were selected in formulation of SPIs: (a) total social protection expenditure (as a percentage of GDP); (b) social protection expenditure going to the poor (as per capita expenditure going to the poor as a percentage of national poverty line); (c) a total number of beneficiaries of social protection programmes (as social protection coverage ratio); and (d) the number of poor beneficiaries of social protection programmes (as a percentage of poor receiving some social protection). A detailed procedure for the calculation of SPIs is, however, beyond the scope of this paper.

The Pacific region has a lower average SPI value (0.24) compared to the average SPI for Asia as a whole (0.36). A wide variation, however, exists in SPIs in PICs, primarily due to variations in social protection expenditures and in coverage for social protection. Higher SPIs are found in the Cook Islands, Nauru, the Marshall Islands and Tuvalu, while below average SPI values are recorded in Fiji, Tonga, Vanuatu, with the lowest value found in PNG (see table 2).

**Table 3. Social protection expenditure in selected PICs**

Country	Social protection expenditure as a percentage of GDP	Per capita social protection expenditure going to the poor as a percentage of national poverty line	Total social protection coverage ratio	Percentage of the poor receiving some social protection
Cook Islands	3.6	29.0	0.67	100.0
Fiji	2.9	8.0	0.13	22.0
Marshall Islands	13.5	20.0	0.23	9.0
Nauru	6.5	24.0	0.31	74.0
PNG	0.3	0.0	0.01	1.0
Tonga	1.3	2.0	0.11	11.0
Tuvalu	6.9	4.0	0.17	41.0
Vanuatu	1.1	2.0	0.13	10.0
<b>Total Pacific</b>	4.5	11.0	0.22	35.0

Source: Baulch and others (2008).

In terms of social expenditure by category of social protection programmes, the Pacific region has a higher percentage of expenditures in the labour market and in social assistance programmes, but has lower expenditures in the social insurance sector compared to those programmes in Asia as a whole (Baulch and others, 2008).

Table 3 shows data on widely varying social protection expenditures as percentages of GDPs between 13.5 per cent in the Marshall Islands to a mere 0.3 per cent in PNG. The social protection expenditure is relatively higher in Nauru and Tuvalu compared to Fiji, Tonga and Vanuatu (see table 3).

In terms of the proportion of total target populations covered in social protection programmes, the Pacific region has a low value of 35 per cent compared to 57 per cent in Asia (Baulch and others, 2008). With the exception of the Cook Islands, Nauru, and Tuvalu, most of PICs show below average coverage, varying between 22 per cent in Fiji to 1 per cent in PNG (table 3). The social protection expenditure going to the poor is quite insignificant within the Pacific region. The value is much lower in the Pacific region (11 per cent) when compared to the 23 per cent in Asia (Baulch and others, 2008). Except for the Cook Islands and Nauru, the values vary between 8 per cent in Fiji to 0 per cent in PNG (table 3). PNG is “notable for a total absence of formal social protection” (AusAID, 2010: 7).



Although both formal and informal social protection systems co-exist in PICs, the formal social protection systems are grossly inadequate and weak. As elsewhere, the National Provident Fund (NPF) is the most common type of a formal social security system in the Pacific region. However, it is limited to workers in the formal employment sector, which represents only a small fraction of the working population, and excludes the majority of workers in the informal economy, where the bulk of the poor are concentrated (ILO, 2006a: 60). Social assistance programmes providing cash transfers to poor and vulnerable people are very limited or non-existent in PICs, with the exception of Fiji's Social Welfare Family Assistance Program (FAP) and the school fee scheme of the Social Affairs Department of Kiribati. It is clearly evident that there exist high social protection deficits within PICs.

### **Informal and traditional social protection mechanisms in PICs**

In the absence of strong state-led social protection services, there has been heavy reliance on traditional, informal and non-formal social protection provided through family, kinship and community, religious bodies and associational groups such as NGOs and CSOs. Most Pacific Island states have long relied only on traditional support mechanisms from families, overseas migrants, community institutions, and churches. In Vanuatu, for example, "family and community arrangements are the main support for the long-term poor as the government has not funded direct social assistance" (WB, 2006b). Moreover, Fiji and Kiribati have the most extensive social assistance programmes in the Pacific.

The informal social protection mechanism is more complex and multifaceted. Different forms of informal social protection mechanisms exist in PICs. However, a knowledge gap exists within informal social protection mechanisms in PICs and within their linkages to labour markets and other formal sector protection mechanisms.

Traditional and informal social protection has the potential to effectively cope with emergencies, alleviate poverty, and build the resilience of poor, vulnerable and marginalized groups. Informal and non-formal social protection systems are closely linked to, and influenced by, cultural values and the tradition of Pacific societies.

### **Traditional social protection systems in PICs**

The Pacific has a strong tradition of giving and sharing among extended families and communities (ADB, 2010b). Social protection in PICs has traditionally been provided by informal means through individuals, families, communities, churches and by NGOs and CSOs. Traditionally, there had been no institutionalized systems of social protection as such. However, each component of social life had

a role in social protection (Ratuva, 2006). The “extended family is still an extremely important source of identity and provides a sense of belonging and well-being”; it “ensures that no one goes hungry, and that no one is destitute” and that “everybody is looked after” (Monsell-Davis, 1993: 1-13). According to Ratuva (2006: 102-103), “traditional forms of social protection exist in various forms such as collective reciprocity of goods and services, ceremonial exchange or even at a level of individual behavioural disposition”. Traditional socio-political systems in Pacific societies are closely linked to customary systems of social protection.

Reciprocity, which refers to people's informal exchange of goods and services, is still practiced in various forms in Pacific societies, particularly in rural areas. Reciprocity can be of different types: generalized, specialized or redistributive. The generalized type of reciprocity refers to the exchange of goods without specific value or time bound in terms of repayment. This is exemplified in the *kerekere* system of Fiji. Specialized reciprocity refers to the simultaneous exchange of goods. Redistributive reciprocity is the collective exchange of goods through ceremonial processes, as demonstrated in another tradition of Fiji, the *solevu* (Ratuva, 2006).

Pacific societies are based on principles of community-based caring and sharing. Continuing with the example of Fiji, the idea of share and care is embodied in the Fijian “ideal terms of *veivukei* (offering a helping hand), *veinanumi* (the act of being considerate), *veilomani* (being loving and friendly with one another), *duavata* (togetherness) or *yalovata* (of the same spirit)” (ILO, 2006a: 28). The other traditional forms of social protection in Fiji include, for example, *kerekere* (asking for aid based on reciprocity), *solesolevaki* (joint communal labour), and *solevu* (large scale mobilization and redistribution of community resources), *solivakavanua* (communal collection and accumulation of funds) and *yalo solisoli* (social generosity) (Ratuva, 2006). In Fiji, kinship networks called *viewekani* constituting blood and social relations do exist as a network of social protection where individuals and families are looked after by other members of the network in times of need. Contribution and distribution are the binding forces of the Fijian system (Suguta, 1986).

#### *Kerekere system in Fiji*

In Fiji, rights and duties that kin entertain towards each other are institutionalized in what is known as the *kerekere* system. Derived from the Korean word meaning “to request”, *kerekere* means “to solicit a good, resource or service or the use of good resource”. Almost “anything can be solicited: food, tapa, mats, canoes, whale's teeth, cloth, tobacco, money, pigs and so on” (Monsell-Davis, 1993: 5). *Kerekere* is a form of reciprocity in which one may ask neighbours, friends and relatives for goods and services to meet one's basic socio-economic needs, or for the purpose of fulfilling certain social obligations (Ratuva, 2006). In Suva, as

Gounis and Rutz (1986: 79) observed, the social system of Fiji provides a form of social insurance which succeeds in “spreading both the risks and the benefits” derived from urban labour market participation.

### *Traditional social protection mechanisms in other PICs*

In Kiribati, strong family and community bonds and customs exist which provide safety nets to the disadvantaged (ILO, 2006b). Some of these customs are traditions, such as the *utu* (extended family), *karekare* (taking turns at joint work with non-utu members), *te aiai* (sharing fire), *bubuti* (the requesting of gifts based on family relationships), *te Katabetabe* (burden sharing, especially at funerals) and *tekaonono* (sharing food with people outside the utu).

In Samoa, social security systems that exist informally include the traditional order or *Fa’a Samoa*, church-based welfare schemes, religious social support groups, voluntary provident fund membership for religious orders, and micro-schemes for access to credit (ILO, 2006c: 228). The *Mata* (chiefly title) system in Samoa that controls all local government is a traditional, well-organized social protection system. Over 80 per cent of the land in Samoa is under *Matai* control, and about 65 per cent of the population derive their livelihoods from *Matai* land. The *Aiga* (descent group) in rural Samoa is redistributive social and political units, pooling resources of both cash and food allocation by the *Matai* chiefs according to individual needs (WB, 2006b: 73).

In Samoa, there exist various traditional terms of social protection such as *Fa’ alavelave* (acceptance of socio-cultural responsibility), *Totoma* (expectation of reciprocity), and *Atula* (non-reciprocal giving). The traditional system in Samoa, however, has been undergoing dramatic changes as a result of modernization and socio-cultural transformations (ILO, 2006c: 89).

In Vanuatu, social protection for the weak, orphans, the aged and those who might have fallen on hard times, is a communal responsibility. In Vanuatu, *nakamal* is a community of related households that are headed by a chief. A number of *nakamals* form a tribe and within each *nakamal* a social safety net system exists (Prasad and Kausimae, 2009). With regard to social protection, Ni-Vanuatu relies mostly on families and kinship networks, on access to traditional family land holdings for subsistence farming, and on a broad array of community-based organizations (churches) and NGOs (WB, 2006c: 5). There is, however, little or no government funding provided to NGOs or agencies dealing with social problems (ILO, 2006e).

Ratuva (2006) observes that in the absence of a strong formal social security system, the entire kinship system itself, referred to as *veiwekani* in Fiji, *fa’a Samoa* in Samoa and *wantok* in the Solomon Islands and Vanuatu, provides the basis or

foundation of social protection on a daily or occasional basis. There have been considerable successes in the integration of traditional values such as collective participation, sharing of resources and social integration.

The *wantok* system, a traditional socio-cultural network of people with shared kinship, language and history providing community support, is widely practiced in Melanesian countries such as the Solomon Islands, PNG and Vanuatu (Mihalic, 1971: 202; Mannan, 1978: 199-200; Monsell-Davis, 1993: 3; ILO, 2006d: 86). *Wantok*, in Melanesian Pidgin, is made up of two words, “wan” meaning “one” and “tok” meaning “talk” (Jak, 2010: 1). The *wantok* refers to one’s kin or those closely linked together, either socially or biologically, and it literally means “same language” (ILO, 2006d: 86). According to Mihalic (1971: 202), a *wantok* is “one who speaks the same language, one who is of the same nationality, a compatriot, one who is from the same country, or a neighbour”. The *wantok* system could be seen as an unwritten social contract between those that speak the same language, to assist each other in times of need. It is a “kin obligation” based on the principle of reciprocity (Mannan, 1978: 199). The *wantok* has often been described as a “safety net” for a country like the Solomon Islands, where there are no social service schemes. In the Solomon Islands, there are about 220 different languages spoken. Traditionally, the members of the *wantok* system look out for each other during hard times, for example, to pay school fees of their children and for other assistance in times of need.<sup>3</sup> This “type of security has a certain edge over the social security of an impersonal bureaucracy”. The *wantok* system is also well-suited to promote social welfare activities, such as the construction of community centres (Mannan, 1978: 206).

The concept of *wantok* in the Solomon Islands and PNG and *kerekere* in Fiji are broader concepts, acting not only as social “safety nets”, but also emphasizing continuity, the creation of primary relationships, reciprocity, safe relationships, the imperative to respond to requests, and the underlying values of prestige and reputation (Monsell-Davis, 1993: 7). *Wantok* is a system where people depend, care, and help each other in almost all societal affairs of PNG. The “system works very well in a traditional setting” and social protection is the underlying value of the *wantok* system (Jak, 2010: 1-2).

However, the *wantok* and *kerekere* systems, the traditional systems of reciprocity, have negative impacts as well. Instead of safety nets, they act as disincentives (Monsell-Davis 1993; Mannan, 1978). Problems include the intense and continuing pressure of demands being made by others, from requests for bus fares, food, or school fees to even larger ceremonial matters, such as marriage and

<sup>3</sup> “The Cost of the ‘Wantok System’”, Editorial, *The Solomon Times*, 16 February 2008, accessed from <http://www.solomontimes.com/news.aspx?nwID=1368> on 5 March 2011.

mortuary payment and contribution to church funds (Monsell-Davis, 1993: 7). Mannan (1978: 200) identified some of the negative impact of the *wantok* system: (a) the system reduces the incentive of the successful entrepreneur, as much of his profit is shared within his *wantok*, leaving little return for his efforts; (b) the *wantok* system also prompts rural-urban migration, thus aggravating urban problems such as “unemployment, squatter settlements and juvenile delinquency”; and (c) it encourages tribal fighting in rural areas, regionalism in politics and nepotism in the area of public service.

### **Land ownership**

Land is considered as a fundamental social security. It remains one of the most important sources of social protection in all Pacific societies. Land in PICs is mostly customary and communally owned. Land defines “identity and cultural legitimacy” and is referred to in the Pacific by different terms such as *vanua* in Fiji and Vanuatu, *fenua* in Samoa, *henua* in many parts of the Solomon Islands and *abana* in Kiribati (Ratuva, 2006: 103).

Ratuva (2006: 106-109) noted that the socio-cultural identity of Fiji has direct links with *vanua*. Native land which consists of 85 per cent in Fiji is collectively owned by extended family units such as *matqali*. This collective land ownership acts as a strong social protection system. Land ownership is vested in the *mataqali*, which is both a land owning unit and a kinship group (Suguta, 1986). Ratuva (2006: 109) observed that “native land cannot be brought or sold”, it is “passed down from generation to generation, thus ensuring that everyone has access to land and resources”. Moreover, “land provides sustained income for many communities from leases, and in many cases this income has been reinvested for village businesses, housing schemes, children’s education and the upgrading of various community amenities”. Land plays a critical role in social protection. It not only provides a sense of socio-cultural identity but also provides the means for socio-economic sustenance (Ratuva, 2006). However, landlessness is a growing problem either because people have moved away from their traditional lands or because of a growing imbalance between traditional land tenure systems and demand for land (ADB, 2010b).

### **Migration and social protection**

Migration itself is an informal type of social protection strategy. Families that are vulnerable socially, economically and environmentally, adopt a risk reduction strategy by migrating within the country (from rural to urban areas) and internationally. Migration, as a social protection strategy, fulfils promotive, preventive and protective roles of social protection. People, especially the poor, migrate to improve their

income or life chances (promotive strategy). Migration is also seen as a risk diversification strategy (preventive strategy). Migration is thus both a risk reducing and a coping strategy.

PICs have a long history of migration. Rural migration to the national capital and other towns is a rapid process in PICs which accelerates urbanization. People are migrating from low-lying, smaller and outer islands to larger islands in search of secured land with hopes of minimizing the impact of environmental and climatic change. The motivation to relocate is, first and foremost, a risk reduction and coping strategy, as the economic and environmental “push factors” in rural and outer islands are stronger than the “pull factors” attracting migrants towards urban destinations. The strong desire to remain at home is outweighed by the need to alleviate poverty and overcome vulnerability.

There has been large scale emigration of Pacific Islanders to metropolitan countries such as Australia, Canada, New Zealand and the United States of America. Emigration destinations of those in PICs are largely connected to past and present political affiliation of the countries. For example, there are more Niuean in New Zealand (about 20,000) than Niue (1,500). Similarly, about 6,000 Tokelauan are in New Zealand and nearly 8,000 Cook Islanders are living outside the country. There are a large number of migrants from Fiji living in Australia, New Zealand, Canada and the United States (Mohanty, 2006a). The emigration rate is high in PICs, especially in Samoa, Tonga and Fiji. Table 4 shows that in 2005 the emigration rates for these countries were 35 per cent, 34 per cent and 15 per cent respectively.

**Table 4. Emigration rates and remittances in selected PICs**

Country	Emigration (%), 2005	Remittances (millions of United States dollar) 2008	Remittances as a percentage of GDP, 2007
Fiji	15.2	175	4.8
Kiribati	5.0	9	9.0
PNG	0.8	13	0.2
Samoa	35.4	135	22.8
Solomon Islands	0.9	20	5.3
Tonga	34.3	100	39.4
Vanuatu	61.4	7	1.2

Source: UNESCAP and others (2009/10: 80-81).

As previously noted, migration is seen as a risk reduction and social protection strategy. Migrants build social networks, which help to strengthen social capital and the informal social protection system. Migrants use informal social protection mechanisms, especially the family and community networks, to manage risks during the transit. Migration is also seen as one of the major factors in breaking traditional community ties, thereby weakening the traditional and informal social protection system in PICs. Migration, therefore, can be argued as a tool that both strengthens and weakens the social protection system.

### **Remittances**

Remittance sent by migrants is yet another important informal social protection mechanism. Remittances from both urban to rural areas and international transfer play a critical role in alleviating poverty and providing social protection services and, therefore, contribute significantly to social development. Table 4 shows that international migrants' remittances comprise a substantial proportion of the GDP in many PICs such as Fiji (5 per cent), Kiribati (9 per cent), Samoa (23 per cent) and Tonga (39 per cent). In 2008, the volume of remittance was \$175 million in Fiji, \$135 million in Samoa and \$100 million in Tonga (see table 3). Fijians serving on foreign ships bring in around \$15 million of remittance annually.<sup>4</sup> The Federated States of Micronesia, Fiji, Kiribati, Samoa and Tonga all have high levels of per capita remittance (Prasad, 2008).

Remittances are used by families as a form of social protection measure and "safety net" that assists in alleviating poverty and in supporting family businesses. In Tonga, for example, remittances have both reduced the poverty headcount from 57 per cent to 32 per cent and significantly impacted inequality, reducing the Gini co-efficient from 0.605 to 0.495 (WB, 2006a: 88). Similarly, in Samoa, family remittances from overseas play a vital role in providing social protection and social security to their relatives and friends living in the country. Samoans overseas contribute towards their "social obligations" by remitting money to their extended family. Almost every Samoan has a relative overseas and money sent back home helps to subsidize the socio-economic needs of the relatives. Some of this money is directed to churches, some towards the *fa'alavelave* and some used to start micro-businesses (ILO, 2006c: 91). Studies show that remittances are used by extended families as a form of social protection in Fiji. Remittances have helped family members "to pay for general family subsistence, for the welfare of their children and for bills, fees and other traditional obligations in Fiji" (Rokoduru, 2002: 46).

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<sup>4</sup> "Seafarers earn \$15 m annually", Editorial, *The Fiji Times*, 27 September 2010.

In Kiribati, remittances from seafarers and others working overseas are an important source of cash income that provides a “safety net” for many families. About 24 per cent of all Kiribati households get receipts from abroad. This percentage accounts for 20 per cent of all outer island households and 30 per cent of the households on the South Tarawa (ILO, 2006b: 45).

Unlike Samoa, Tonga, and Fiji, remittances from abroad in the Solomon Islands are very limited. Similarly, remittances from abroad in Kiribati, Tuvalu and Vanuatu are limited, but in recent years remittances are on the rise in these countries due to labour migration to New Zealand under the “Recognised Seasonal Employer” (RSE) Scheme. There is also evidence of “reverse remittances”, where families send money from their home countries to relatives living abroad to help them cope with growing hardship (ADB, 2010b: 9).

In addition to the remittances from abroad, remittance transfers in cash or kind from urban areas within PICs to rural areas and outer islands provide supplementary and protective support to rural households. These “local remittances” are quite common in the Solomon Islands. Both formal and informal mechanisms are used in remitting money within countries and from overseas. On the Island of Tanna in Vanuatu, for example, remittances from urban migrants are the largest source of income for several villages (AusAID, 2010). In addition to cash, remittances in terms of food and household consumable goods are also exchanged between urban and rural areas. However, information on the volume and precise nature of remittances within PICs is scant.

### ***Social capital: domestic and overseas social networks***

Informal social protection is provided through kinship and social networks operating nationally and abroad. These networks are defined in terms of family and community networks. The family is an important institution for informal protection, and transfers in cash or in kind occur when a family member is faced with a crisis. The family assumes all the social protection roles: protective, preventive and promotive (Oduro, 2010).

Many informal social networks and community organizations exist in Fiji. For example, the Young People’s Concerned Network (YPCN) in Fiji is a youth network made up of activists from around Fiji who advocate for human rights, gender rights, children rights, youth policies, mental health, HIV/AIDS, reproductive health, and civic duties. There exist a number of social network systems between urban and rural areas and the outer islands in PICs. In Kiribati, for example, a mutually beneficial social network system exists between urban South Tarawa and the outer islands. Outer island households often receive additional remittances, such as school fees



which are paid by employed relatives who live on South Tarawa. In return, the relatives on South Tarawa receive produce from their outer island relatives (ILO, 2006b). In urban areas of Vanuatu, extended networks are usually based on kinship ties among individuals originating from the same island or village. Various urban informal settlements around Port Vila and Lauganville tend to be inhabited by migrants from the same island of origin (WB, 2006c).

### *Diaspora associations abroad*

A good number of families and communities maintain well-knit social network support systems overseas. Migrant families and relatives living overseas provide cash and in-kind support periodically to friends and relatives residing abroad as well as in their home country. *Wantok* association exists abroad as well. An example of such association would be the Solomon Islands Wantok Association in the United Kingdom of Great Britain and Northern Ireland.<sup>5</sup> There are a number of diaspora associations which currently exist overseas. These associations are actively undertaking social and cultural causes in the name of PICs, with an emphasis in the fields of education, health, sports, etc. Some examples of these associations are: the Auckland Fiji Community, the Auckland Fiji Youth Forum, the Waikato Fiji Association, the Fiji Waikato Community in New Zealand, the Samoa College Old People's Association (SCOPA) in Auckland, the Tongan Nurses Association of New Zealand (TNA), the Tongan Women's Cultural Development Group in New South Wales, the Australian Tongan Tennis Association; Fiji Golf Association in Vancouver, Canada, the Fiji Indian Community in San Francisco, the United States and USA-Fiji Outreach, which provides scholarships to under privileged students of Fiji heritage (USA-Fiji Outreach, 2010). Similarly, the Fiji Australia Association of Tasmania provides help to Fiji nationals with regard to "relocation, education and finance" (Fiji Australia Association of Tasmania, 2010).

A relatively well-knit social network support system of migrant families also exists among Samoans overseas. This network assists in supporting Samoans abroad and in their home country by providing cash and in-kind support to friends and relatives (ILO, 2006c).

### ***Informal sector economic activities***

The role of the informal sector is specially crucial in alleviating poverty and providing livelihoods and social protection to vulnerable groups. With rapid urbanization, informal economic activities are growing in urban areas and provide

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<sup>5</sup> Glass, Victoria, "Wantok System", *The Solomon Star*, 26 November 2010, accessed from <http://www.solomonstarnews.com/viewpoint/letters-to-the-editor/9158-wantok-system>.

social protection of various types: preventive, protective and promotive to poor and vulnerable groups. It aids in providing employment in labour markets and generating income, especially for the poor. In some PICs, informal enterprise has developed into a dynamic source of employment and income. In Fiji, for example, informal sector workers account for about 62 per cent of the total labour force (ILO, 2006a: 84). This employment played a critical role in the labour market of Fiji and contributed to the alleviation of poverty (Mohanty, 2006b; Reddy and others, 2003).

In Samoa and Tonga, urban informal enterprise, in terms of trade of second hand clothes and other goods, has grown and currently operates through the diaspora of family networks that span several countries (WB, 2000).

### ***Other informal coping strategies***

Various coping strategies are adapted by the poor to overcome vulnerabilities. Family borrowing and the transfer of cash from friends and relatives is a form of informal social assistance that is strong in PICs. Many families survive due to the borrowing of cash or in-kind supports from their relatives, friends or neighbours. Household and community relations and networking act as “safety nets” and as “shock absorbers” and help reduce the vulnerability of the poor. Social capital, *wantok* and *kerekere* systems greatly assist in this regard. Families also adopt additional coping strategies in the face of economic crisis: (a) raising income by taking up various informal sector activities to adapt to price rises and an increase in the cost of living, and (b) adopting “consumption modifying” strategies in the event of declining income such as reducing household spending, family budgeting, changing dietary habits, cutting back on the purchasing of non-essential goods and even withdrawing children from school.

### **Role of NGOs and CSOs**

NGOs and CSOs have become increasingly involved in a range of social services such as health care and education, and have become critical in ensuring social welfare (Jianxiu, 2006). Civil society generally refers to “those voluntary organizations occupying the intermediary space between the state, on the one hand, and the most localized entities of tribe, clan, language group, and family, on the other hand” (Dinnen, 2003: 5). They are active agents of social change and development. CSOs are the link between people and the government. They make significant contributions to non-state social protection systems, and participate informally in all social protection programmes such as labour markets, social insurance, social assistance, micro and area-schemes, and child protection. NGOs in the Pacific are largely involved in advocacy, counselling, education and awareness, training, capacity

building, improving coping capacity, community empowerment, resilience building, and community development.

The NGO sector itself provides employment to a large number of workers especially in Fiji and thus plays a crucial role in the labour market. NGOs assist in building “social capacity”, or the “ability of a social group or community to function and care for itself” (Ritchie, 2000: 641). NGOs in PICs are actively involved in education, health insurance, maternal and child health, reproductive health, micro-finance, micro-credit, community disaster risk management, housing development, income generation, poverty alleviation, social enterprising activities and social welfare services for women, children, the aged and the disabled.

PICs, especially the large Melanesian countries such as Fiji, PNG and the Solomon Islands have a vibrant NGO sector that includes a wide range of local, national, regional and international organizations. There is a substantial umbrella of national NGOs. These include the Fiji Council of Social Services (FCOSS), the Fiji Women’s Crisis Centre (FWCC), Kiribati Association of NGOs (KANGO), Samoa Umbrella for NGOs (SUNGO), the Solomon Island Development Trust (SIDT), Tonga Community Development Trust (TCDT), Tuvalu Association of NGOs (TANGO) and the Vanuatu Association of NGOs (VANGO). Regional NGOs include the Pacific Regional Non-Governmental Organizations (PRINGOs), the Pacific Islands Association of NGOs (PIANGO) and the Foundation of the Peoples of the South Pacific International (FSPI). Examples of international NGOs are Helpage International, World Vision International, the Save the Children Fund, and Educational International. All provide social protection services at various and appropriate levels.

In Fiji, NGOs play a significant role in social welfare (FCOSS, 1981; Mohanty, 2008). In addition to the national umbrella organizations and international NGOs, there are large residential social welfare NGOs, such as Home of Hope and Pearce Home, that provide social services and protection to the poor and needy. Still other NGOs, like the Home of Compassion and the Father Law Home, provide shelter and care to the elderly of Fiji. Outside Fiji, there are few public programmes designed to assist the disabled. Therefore, NGOs have assumed the responsibility of providing education, training, counselling, and financial support to disabled individuals and their families (WB, 2006b). A number of NGOs are also active in the area of conflict resolution, peacemaking, as well as maintaining social stability and cohesion. Peace Foundation Melanesia (PFM), for instance, is a NGO working in the area of conflict resolution in PNG (Dinnen, 2003). Education and health are two fundamental social sectors where NGOs play a vital role.

### **Educational development**

Although education and health services are state-led, they are largely provided through informal and non-formal arrangements in PICs. For example, since the mid-1990s there has been a significant increase in the number of community schools in the Solomon Islands. These day junior secondary schools are run by community groups and churches and assisted by government grants (WB, 2006c: 3).

In Fiji, NGOs and CSOs remain the key providers of formal education ranging from pre-school to the upper secondary level. Almost 99 per cent of primary schools and 90 per cent of secondary and technical vocational schools in the country are in the NGO sector. Nearly 70 per cent of the schools in Fiji are committee-run. Some of the leading NGOs involved in education in Fiji are Arya Pratinidhi Sabha, Gujarat Education Society, the Catholic Archdiocese, the Methodist Church of Fiji, the Seventh Day Adventist and the Anglican Church (Mohanty, 2007). Non-formal education in Fiji is the sole domain of the CSOs (FCOSS, 2003). The NGOs such as the Ecumenical Centre for Research, Education and Advocacy (ECREA) in Fiji runs a Social Education and Empowerment Programme (SEEP) that covers a wider target area in community development, including voter education and the empowerment of women in selected rural areas.

Similarly, in Vanuatu, the government's limited resources are prioritized for formal education, leaving non-formal education to churches, communities and other NGOs. Non-formal education is important to Ni-Vanuatu especially to people in rural areas, which can learn a mix of traditional and contemporary trade skills aimed at increasing employment opportunities (WB, 2006b: 3).

### **Health services**

The role of communities in the provision of health services is not new in the Pacific. There exist community health councils in the Marshall Islands, village health workers in the Solomon Islands and Women's committees in Samoa (WB, 2007). In rural Vanuatu there are 180 aid posts organized and supported by the village councils. Families often assist relatives in travelling to distant health facilities in favour of local facilities that they consider less effective (WB, 2006c). In Fiji, several health service NGOs do exist. For example, the Kidney Foundation of Fiji, the Fiji Network for People Living with HIV/AIDS (FJN+), and the Vodafone ATH Foundation, which provides free eye clinics, heart surgery and medical rehabilitation with the help of overseas volunteers and medical experts. Another example is the Friends of Fiji Heart Foundation, an NGO located in Auckland, but providing health services, in terms of free operations, for the poor and needy citizens of Fiji who are suffering from heart disease. The Foundation of the Peoples of the South Pacific International (FSPi),

a regional NGO, is associated with a network of ten independent community-based organizations, and runs community-based health projects in the areas of reproductive health, family planning, awareness on sexually transmitted infections and HIV/AIDS, non-communicable diseases and youth mental health in Kiribati and Vanuatu (FSPI, 2010; FSPV, 2010). Tuvalu Family Health Association is actively engaged in health services including reproductive health and the social marketing of condoms.

### ***Micro-finance and micro-enterprise development***

Community/social enterprise is a relatively recent development in the NGO sector in Fiji. Micro-finance and micro-credit mechanisms play a significant role in establishing micro-enterprises and aiding in poverty alleviation. Several NGOs in Fiji are engaged in income generation activities and small businesses such as handicrafts, mat making and honey collection. The Peace Corps Beekeepers of Fiji, for instance, is involved in a honey bee project. Micro-finance institutions in the NGO sector in Fiji, for example, started with the FCOSS and Aglow Lautoka in Fiji. These early NGOs assisted in the implementation of micro-credit and savings projects, providing services to communities and villages (ILO, 2006a). The FCOSS runs a Social Enterprise Development and Education (SEDE) programme that aims at “promoting and empowering communities through entrepreneurial initiatives, capacity enhancements and micro-finance services”. The programme provides loans to establish micro-businesses and promotes saving by the poor (FCOSS, 2010: 1). Another NGO in Fiji, the Foundation for Rural Integrated Enterprises N Development (FRIEND), works towards poverty alleviation through its social and economic empowerment programme. FRIEND runs a programme called Developing Enterprises for Sustainable Income (DESI) which “encourages members of underserved communities to support themselves and their families through small enterprise, making use of available resources and existing skills” (UNHABITAT, 2010). Micro-credit systems exist informally in other PICs. The *wantok* system plays a vital role in entrepreneurial development, especially in PNG (Mannan, 1978).

Credit union systems also work for those who are not covered by formal social insurance schemes. Credit unions provide a sense of support to those without regular employment. In Fiji, for instance, there are several communities, professions or company-based credit unions that act as “safety nets”. These include, for example, the Fiji Credit Union League, the Fiji Teachers Union Credit Society and Service Workers Credit Union (Mohanty, 2008). The Ecumenical Centre for Research, Education and Advocacy (ECREA) in Fiji has an Economic Justice Programme (EJP) under which a People’s Community Network (PCN) has been promoted. This network works towards community-building and empowerment of marginalized and poor squatters and informal settlement dwellers around Suva City. The programme is also

mobilizing squatter dwellers for developing a community micro-saving scheme for the PCN members.

There are other forms of informal micro-credit system which exist in PICs. Informal lending, for example, is a micro-credit system that has been in existence in Fiji for quite some time. However, little is known about informal lending practices. This lack of knowledge creates disorganization within the system (ILO, 2006a). According to one estimate, about 20 per cent of households have access to such loans (Kidd and others, 2009).

### ***Housing development and assistance***

Housing development is another area where NGOs play a significant role. In Fiji, two prominent NGOs are working in housing development and providing assistance to homeless and destitute families. These are the Housing Assistance and Relief Trust (HART) and Habitat for Humanity, Fiji (HFH). HART provides shelters to destitute families and undertakes social welfare oriented programmes such as counselling and providing educational assistance to children (Mohanty, 2007). HFH is another lead NGO in housing development that aims at eliminating housing poverty in Fiji.

### ***Child protection***

NGOs in PICs, especially in Fiji, have been long engaged in child protection, providing protection to the needy, assistance for homeless, school fees, scholarships to poor and disadvantaged children and participating in child rehabilitation programmes. Fiji has a number of child care institutions, orphanages and boarding schools which have been established by NGOs, such as the Dilkusha Children's Home and the Veilomani Boys Home. The former not only nurtures neglected and needy young girls and provides protection to children who are victims of all forms of abuse, children of poor families and physically challenged children but also provides social assistance in terms of in-kind or cash educational assistance. The latter is a rehabilitation and vocational training centre for boys in Fiji. It provides accommodation to young boys who are placed in the custody of the state for juvenile delinquency, and rehabilitates them with the assistance of their families and communities.

### ***Role of women and women organizations***

Women in PICs play a critical role in productive activities and domestic work and in managing and reducing family risks and vulnerabilities. They participate in informal labour markets and, beginning very recently, have participated in small

business and micro-enterprise development. Women are engaged in various informal income-generating activities: child protection, community awareness/building, conflict resolutions, peace-building and maintaining social cohesion. There are a large number of women's associations in PICs, Fiji in particular, that champion women's issues and provide welfare services and protection to women. One example is the Fiji Women Crisis Centre (FWCC), which advocates against violence to women and children and provides crisis counselling, and legal, medical, and other practical support services for women and children who are the victims of domestic violence.

Women are the active agents for community-building and play a critical role in the process of social change. They play a leading role in community-based initiatives aimed at conflict resolution and peace-building and maintaining good order at local level. For example, one of the most remarkable peace-making initiatives by women in the Pacific has been the work of the Kup Women for Peace (KWP) in PNG (Dinnen, 2003).

#### **IV. THE INTERPLAY BETWEEN FORMAL AND INFORMAL SOCIAL PROTECTION SYSTEMS**

In many instances, the traditional and informal forms of social protection in the Pacific overlap with the formal system. For example, the traditional forms of social protection such as reciprocity such as duties during ceremonies are also formal. There exist clear linkages between formal and informal social arrangements. Many governments have formed partnerships with churches and other community organizations, particularly in the education and health sectors (ADB, 2010a). For example, the government provides grants to informal educational institutions in Fiji for imparting education and to organizations such as the Housing Assistance and Relief Trust (HART) for housing development in the country. Similarly, in the Solomon Islands, schools run by community groups and churches are also assisted by government grants. In health services in Samoa, for instance, a "network of women's social services, founded on strong traditional community support networks, assist governments in overcoming capacity and finance resource constraints in reaching the needs of the broad population" (ADB, 2010a: 6).

There is clear evidence showing formal social protection systems supporting the traditional support mechanisms in the Pacific. For instance, the Pacific Islanders living in New Zealand who were receiving formal social welfare benefits there were able to transfer assistance through remittances to support the traditional support mechanism (ADB, 2010b). The reverse is also true in some instances; remittances are sent from home countries to support families living with hardship abroad.

Employment in the informal sector plays a prominent role in the labour market and acts as social protection to the poor and needy while also supplementing the formal sector in terms of goods and services. Formal social protection that is more predictable and reliable can complement informal social protection arrangements. There is no doubt that spillover occurs in both the formal and informal social protection systems, making both systems mutually reinforcing. Community and civil society groups contribute in significant ways to the maintenance of peace and good order at local levels and thus provide important support to the formal sector (Dinnen, 2003).

## **V. CHALLENGES AND OPPORTUNITIES**

The formal social protection is inadequate and weak in the Pacific. This is largely due to, firstly, the fact that social protection in the Pacific is relatively a new field of government activity (WB, 2006a). Secondly, the formal social security system offers low coverage and the vast majority of informal sector employment is not covered under any social security measures. Thirdly, most of PICs are witnessing slow economic growth and have low social protection spending. Finally, since family, community and the traditional support systems still remain stronger, although declining, governments rely heavily upon them for social welfare services. This reliance encourages less willingness on the part of the governments to promote the formal system.

Both the informal and traditional social protection systems also have many weaknesses. They tend to be “patchy and uneven in coverage” and sharing tends to be stronger within extended families or kinship groups than in the “community at large” (AusAID, 2010: 23). They are uncertain and unreliable. The traditional social safety nets have been subjected to increasing strain and are less suited to the widespread hardship now facing the region (ADB, 2010b).

The traditional and informal safety net mechanisms in PICs have been weakening. Barr (1990: 121, 130) points out that “the breakdown of traditional patterns of family caring and sharing...is now strongly evident in the Fijian community”. As Nii-K Plange says (cited in Barr, 1990: 81) for many people “what is fading away is not the wish to care but the means to care”. The weakening of the informal safety nets in PICs is attributed to many factors such as a fast growing cash economy, urbanization, rural–urban migration, rapid population change, growing poverty and increasing hardships due to economic crises and frequent natural disasters. The majority of people are under constant fear of losing their livelihoods due to economic crises, and are unable to meet social obligations. Surveys found that in Fiji and Vanuatu, for example, the poorest households often have little or no



family support, and thus cannot maintain their social obligations in terms of contributions to the community and to the church, among other things. This leads to a feeling of social exclusion (Chung and Hill, 2002 cited in ADB, 2010b: 9).

However, there are opportunities to develop innovative arrangements that can link governments, NGOs and communities. In Samoa, for instance, women's village representatives act as a critical link between communities across the country and the Ministry of Women, Community and Social Development (ADB, 2010b). Similarly, the Vanuatu Association of Non-Government Organizations (VANGO) strengthened their relationship with the government by signing a memorandum of understanding in 2004 (WB, 2006c). The Pacific Island community's social networks, social capital and close-knit community structure are some of the strengths which can (a) assist in building a strong network of social "safety nets", (b) facilitate quicker dissemination of information through the community network, and (c) aid in the adaptation of social development programmes.

## **VI. CONCLUSIONS**

Social protection aids in poverty reduction and facilitates risk management and social development. Social protection measures can play a critical role in achieving the Millennium Development Goals in the same way that lack of social protection will undermine them and increase vulnerability. Formal protection systems are inadequate to meet growing challenges in PICs. Traditionally, PICs have heavily relied on support from extended family networks and strong community ties. However, those traditional informal safety net mechanisms are becoming inadequate in the face of growing economic and environmental climate changes. As these informal mechanisms become less effective, it is clear that strong formal mechanisms need to be in place. However, at this time, few exist. The dilemma is that both the state-led formal and the informal social protection systems are currently inadequate. What is needed is a sound social policy framework that is an integration of both the formal and informal mechanisms.

The approach to social protection needs to extend beyond mere financial-oriented considerations. These considerations should include investments aimed at supporting "informal arrangements", upgrading the non-profit sector, strengthening the "social rights" aspect of social policy, and extending the view of social risk management to include the broad concept of "social capital" (WB, 2001: 11).

The role of NGOs and CSOs in social protection is crucial, but the non-profit sector faces numerous challenges such as financial, manpower, professionalism, low capacity building and poor networking as well. There is, therefore, a greater need for

strengthening NGO networks and developing partnerships between civil society, governments and the private sector. Given the resource and capacity constraints of the formal sector, there is a need for strengthening and building informal social protection system and practices. A greater coordination of the formal social protection programmes of government together with programmes run by civil society organizations is needed. There is a need for integration of social policy, social planning and social development for achieving cost effectiveness and a sustainable social protection system.

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## TRADE AND EMIGRATION FROM A DEVELOPING COUNTRY: SOME EVIDENCE FROM PAKISTAN

Ather H. Akbari and Shabir Hyder\*

*Emigrants possess knowledge regarding the cultures and social environments of host and sending countries that can help strengthen the economic relationship between these countries. We find this to be true for Pakistan and its selected Organization for Economic Co-operation and Development (OECD) trading partners on whom data are available. During the period 1990-2003, Pakistan had a positive trade balance, on average, with English speaking countries, and a negative balance with non-English speaking countries of the OECD. Gravity model estimates, obtained in this study, suggest that the annual increase in the number of Pakistani emigrants in OECD countries accounted for a quarter of the annual growth in Pakistani net exports to the English speaking countries over the period of this study. Pakistan's trade deficit with non-English speaking countries would have been at least 46 per cent higher had there been no increase in its expatriate population in those countries which appears to be engaged in import substitution activities. This study provides important input pertaining to the debate on the economic effects of emigration from developing countries.*

*Jel Classification:* J161.

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\* Ather H. Akbari, Professor of Economics at St. Mary's University, Canada, E-mail: ather.akbari@SMU.Ca; Shabir Hyder, Assistant Professor, Comsats Institute of Information Technology, Attock, Pakistan. E-mail: shabir1975@hotmail.com. This paper is based on PhD dissertation of Shabir Hyder. The authors acknowledge valuable comments received on this research from the anonymous reviewers and Professors Ted McDonald, Syed Nawab Haider Naqvi and Wimal Rankaduwa.

## I. INTRODUCTION

Due to their slow or declining population growth rates, many developed countries in the western world are relying more and more on immigration to maintain their labour supply, especially in professional and skilled jobs.<sup>1</sup> Most immigrants arriving in these countries originate from developing countries of Asia and Africa. For example, in countries belonging to the Organization for Economic Co-operation and Development (OECD), developing countries account for about 64.5 per cent of total immigrants and 62 per cent of skilled immigrants (Docquier and others, 2007). In Canada, where about 20 per cent of the labour force is foreign-born, more than 60 per cent of annual immigrant arrivals are from developing countries. According to Citizenship and Immigration Canada (2008), by 2012, immigration will be responsible for nearly all of the growth in Canada's labour force. The Migration Policy Institute (2005) considers growing competition for skilled immigrants among the top issues of migration in the developed world.

Emigration of skilled workers from a developing country can have either a negative or a positive effect on the economy of the sending country. As noted by Barro and Salai-Martin (1995), a one-year increase in the average education of a nation's workforce increases the output per worker by between 5 and 15 per cent. Low levels of education slow economic growth, damage the earnings of low-skilled workers, and increase poverty. Hence, emigration of an educated workforce may be viewed as having an adverse effect on the economy of the sending country.

On the other hand, emigration can also be beneficial to the sending country. For example, home remittances from expatriates can help the economic development of the sending country. Using World Bank data, Carrasco and Ro (2007) have reported that remittances in developing countries were more than double in the first half of the last decade and have become a major source of income for them. Home remittances have led to improvements in household and community welfares.<sup>2</sup> Yang and Martinez (2005) have shown that home remittances in the Philippines reduced poverty rates among households through direct and spillover effects. Another beneficial effect of emigration is found in the "optimal brain drain theory" proposed by Lowell and Findlay (2002) who suggest and find support for the notion that emigration

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<sup>1</sup> While it is true that many developed countries within Europe are also experiencing persistent unemployment, shortages in specific professional jobs are also emerging. For example, shortages of doctors in the United Kingdom of Great Britain and Northern Ireland (United Kingdom, 2007) have caused the United Kingdom to recruit doctors from India. Shortages of health professionals in Canada are also well known.

<sup>2</sup> Two specific examples include development of a new hospital in Senegal and of a new airport in Kerala, India (Carrasco and Ro, 2007).



for higher wages induces more students in the sending country to pursue higher education. Moreover, many of these highly educated students end up staying in the sending country rather than emigrating, thus improving the educational profile of their own countries.

Another way in which the emigration of human capital can affect a sending country's economy is by enhancing the sending country's trade relationship with the host, or receiving country of its emigrants. In a host country, migrants form social networks to establish social linkages among themselves as well as with those who are left behind by them in the source country. In this shrinking global village, these networks may stimulate a reverse flow of innovations and technological capacity. At the same time, they also function as information source for the residents of their host and sending countries, thereby helping to reduce the transaction costs of direct investment and trade between countries. Immigrants in their host country may also have a "taste for home goods" and thus be a source of demand for their homeland products (Hutchinson and Dunlevy, 1999). Finally, in the presence of asymmetric information and uncertainties associated with international trade, migrants can become another source of contract enforcement by reducing contract establishment and enforcement costs (Rauch, 2001).

Using the arguments cited above as a backdrop, the present paper analyzes the effect of Pakistani immigrant networks on Pakistan's international trade. Pakistan is one of the major source countries of immigrants for many western countries. For example, in Canada where about 250,000 immigrants arrive each year, Pakistan was the third largest source country of immigrants during 1996-2000 and continued to be on the list of top ten source countries of immigrants for the most part of the last decade. Between 2000 and 2001, Pakistan was also among the top ten source countries of immigrants in Denmark. It was also the second largest source of immigrants who were granted citizenship in the United Kingdom of Great Britain and Northern Ireland in 2006 (United Kingdom, 2007).

With a per capita income of about \$1,000 for the year 2010, Pakistan is now classified among lower middle-income countries.<sup>3</sup> Vohra (2001) has shown that exports have a positive and significant impact on economic growth when a country has achieved some level of economic development. Hence, all factors that can cause increases in exports should be of interest to policy makers who wish to achieve economic growth.

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<sup>3</sup> <http://data.worldbank.org/about/country-classifications>.

The impact of Pakistani emigrants on Pakistan's international trade with the OECD countries is assessed by obtaining econometric estimates of a gravity model. Data on nine of the major OECD trading partners of Pakistan are used for the period 1990 to 2003.<sup>4</sup> These countries have a sizeable Pakistani community and also account for one third of Pakistan's total international trade. Table 1 provides relevant data for the 1990s, the latest decade for which data are available.

**Table 1. Number of Pakistani emigrants in, and Pakistan's bilateral trade with selected OECD countries over the 1990s**

Years	Pakistani emigrants in OECD countries <sup>a</sup>	Trade with OECD countries (Million of United States dollars) <sup>b</sup>	Percentage share of Pakistan's trade with OECD countries
1991	395 713	5 472.3	33.8
1992	423 037	5 559.3	33.1
1993	438 138	5 178.6	33.6
1994	454 612	6 322.2	34.1
1995	507 261	6 332.8	30.8
1996	526 071	6 933.9	34.3
1997	554 688	6 548.1	34.9
1998	583 327	5 498.3	31.9
1999	612 732	5 967.6	31.6
2000	647 380	5 815.3	29.1

Notes: <sup>a</sup> Actual data on stock of Pakistani emigrants were available for census years which vary between countries. For remaining years, these were calculated using a stock-flow formula similar to the one used by Head and Reis (1998) for Canada and its trading partners and Girma and Yu (2002) for the United Kingdom and its trading partners. Details of calculations can be provided by the authors upon request.

<sup>b</sup> Pakistan (2004).

<sup>4</sup> These nine OECD countries include Australia, Canada, Denmark, Germany, Italy, Norway, Sweden, the United Kingdom and the United States of America. Our analysis is limited to these countries as no consistent data are available on the stock of Pakistani expatriates residing elsewhere. We are aware that most emigration from Pakistan is towards the oil rich countries of the Middle East which are also attractive destinations due to their geographic proximity. However, consistent data on their residents of Pakistani origin are hard to find.

Each year, about 240,000 people leave Pakistan to reside in a new country. According to some estimates, about 8 million people of Pakistani origin now reside outside of Pakistan (Pakistan, 2008). These people maintain their contacts with Pakistan individually as well as through their networks and associations. Their impact on international trade is important because, as Kavoussi (1985) has shown, international trade plays a vital role in the economic development of developing countries. Any study that demonstrates the economic impact of overseas Pakistanis on Pakistan will in turn demonstrate their role in the country's economic development.

The rest of this paper is organized as follows: section II provides a review of literature on emigration and trade. Section III presents the economic model to be estimated in this study. Section IV discusses the data used for the estimation of the economic model and also provides variable definitions. Section V presents the characteristics of data used in an econometric estimation of the economic model. The method of econometric estimation of the economic model and its results are discussed in section VI, which also provides concluding remarks and discusses policy implications of the study.

## **II. LITERATURE REVIEW**

Most empirical studies that have investigated international trade effects of international migrants used data for developed countries and have analyzed the collective effects of their resident migrant populations on international trade without focusing on any particular country of origin. For example, with regard to Canada, Head and Reis (1998) found a statistically significant impact of immigrants on imports from and exports to its 136 trading partners. The impact was higher regarding imports, which the authors attributed to a possible preference among immigrants for their home country products, and to immigrants' own involvement in the import business from their countries of origin. Turning to the United Kingdom, Girma and Yu (2002) found that while immigrants from non-commonwealth countries increased both exports and imports, those from commonwealth countries increased exports but reduced imports. This was possibly due to import substitution in the United Kingdom's manufacturing sector, fuelled by higher demand of those immigrants. In the United States of America, Hutchinson and Dunlevy (1999) found a higher effect of immigrants on imports originating from English-speaking countries, thereby concluding that the role of immigrant networks in developing international trade relations is enhanced by the presence of common language and similar culture in the sending and receiving countries of immigrants. Gould (1994) investigated the impact of immigrants on the United States bilateral trade with the countries of origin of its immigrant populations. He found that the trade enhancing effect of immigrants is

stronger in cases of consumer manufactured goods than in cases of producer goods. The stronger impact on consumer manufactured goods is attributed to strong information and knowledge sharing induced by immigrants.

To the best of our knowledge, only three studies have analyzed country-specific trade effects of emigrants and all have used the gravity model approach. Bacarreza and others (2006) found that the marginal effect of emigrant stock on Bolivia's intra-industry trade was small. This was possibly due to the reduction of transaction costs as well as migrants' preference for products made in their countries of origin.<sup>5</sup> Bolivian expatriates may also have established businesses in Bolivia and in their host countries within the same industries, to serve markets both within Bolivia and outside. For Asian countries, Rauch and Trindade (2002) studied the impact of ethnic Chinese networks on bilateral trade among countries where Chinese emigrants reside. Using data from 63 countries for the years 1980 and 1990, their gravity equation estimates showed that Chinese immigrants significantly affect international trade within countries where they reside. Kumagai (2007) compared the role of ethnic Chinese and Japanese networks in influencing bilateral trade of China and Japan with other countries. It was found that while Japanese networks affect international trade, their impact on trade is not as strong as that of Chinese networks.

In summary, empirical analysis confirms that migrant networks enhance trade between sending and receiving countries, and that this result is largely attributed to a reduction of transaction costs of trade, preference for source country products, language and culture common to migrants, and their countries of origin and current residence. All studies noted above have used a gravity model of international trade.

### III. GRAVITY MODEL OF INTERNATIONAL TRADE

Following the empirical literature which was reviewed above, the present study will also use the gravity model approach to analyze data from Pakistan (for brevity, it will be referred to as gravity model only). The gravity model was first developed by Tinbergen (1962) and Poyhonen (1963) to study global trade among countries. In migration literature, this model was first adopted by Gould (1994) who assessed the impact of migrants on bilateral United States international trade relations with home countries of immigrants living in the United States.

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<sup>5</sup> Transaction cost of trade is reduced because migrants have superior legal and market information regarding their countries of origin.

The gravity model of international trade is based on the gravitational law propounded by Newton in the discipline of physics. The gravitational pull between two bodies is proportional to their masses and is inversely related to the distance between them. This analogy can be applied to explain international trade as trade between two countries is directly proportional to the economic masses, usually proxied by the gross domestic products (GDP) of the respective countries, and is inversely proportional to the distance between them due to the fact that trade costs increase with distance. The model is augmented to include other determinants of international trade. For the present study, the following form of the model is estimated.

$$\ln T_{ijt} = \beta_1 \ln \text{ENG} * M_{jt} + \beta_2 \ln \text{NENG} * M_{it} + \beta_3 \ln (\text{GDP} * \text{GDP})_{ijt} + \beta_4 \ln \text{GDPD}_{ijt} + \beta_5 \ln (\text{PGDP} * \text{PGDP})_{ijt} + \beta_6 \ln \text{DIS}_{ijt} + \beta_7 \text{CLT} + \beta_8 \ln \text{TRF} + \mu_{ijt} \quad (1)$$

Where subscript *j* denotes Pakistan's trading partner and *t* denotes the time period. *T* shows the trade flows (export (EXP) and import (IMP) equations are estimated separately), *M* shows the stock of Pakistani emigrants residing in country *j*, *ENG* and *NENG* are the dummy variables for English speaking and non-English speaking countries respectively, *GDP\*GDP* shows the product of gross domestic products of Pakistan and of its trade partner, *GDPD* denotes the ratio of GDP deflators of Pakistan and its trading partner, *PGDP\*PGDP* denotes the product of per capita GDP of Pakistan and of its trading partner, *DIS* denotes the distance between the capital cities of Pakistan and its trading partners, *CLT* is the dummy variable used for the colonial ties between Pakistan and the United Kingdom, *TRF* shows the tariff rate and  $\mu$  is an error term. Justifications for the inclusion of each variable in the above equation are provided in the next section.

The structural gravity model is stated in multiplicative form. Its logarithmic form provides a linear equation in which the coefficient of each variable is the elasticity of trade with respect to that variable.<sup>6</sup> To account for autoregressive behaviour of exports and imports, lagged dependent variables are also introduced in each equation. This introduction controls for the long-run impacts of the variables included in equation 1.

<sup>6</sup> Distribution of logarithmic variables is also more likely to be normal which is a requisite property to obtain Best, Linear, Unbiased, and Efficient (BLUE) estimates in a regression analysis.

#### **IV. DATA USED AND VARIABLE DEFINITIONS**

The study is based on a pooled time series and cross sectional data spanning 1990 to 2003. Although most emigrants from Pakistan are destined for the Middle Eastern countries with which Pakistan also has strong trade and investment relationships, we are not able to consider these countries due to a lack of the availability of data on the population of Pakistani migrants who reside there. More consistent data are available to conduct the analysis for only 9 of the 34 OECD countries where a large number of Pakistani emigrants reside. These countries include Australia, Canada, Denmark, Germany, Italy, Norway, Sweden, the United Kingdom, and the United States. Hence, to determine the impact of Pakistani migrants on Pakistan's trade, the analysis in this study is specific to these nine countries.

The gravity model is estimated separately for imports to and exports from Pakistan in order to assess the impact of Pakistani migrant networks on these variables.

The dependent variables are defined as the dollar value of goods and services imported to and exported from Pakistan with regard to the OECD countries included in this study. Consistent data on annual exports/imports between Pakistan and these countries were obtained from the Government of Pakistan (Pakistan, 2004) while other independent variables are discussed below.

The population of emigrants from Pakistan who are living in OECD countries is used to reflect the strength of the network of these expatriates. With an increase in the expatriate population of a country, come greater ties of kinship, friendship and feelings of a shared origin, which following Massey and others (1993), are signs of the formation of a network of migrants originating from a single country. As discussed earlier in this study, this network of migrants can have an impact on the economic relationship between the sending and host countries. A quantitative assessment of the impact of Pakistani migrant networks on Pakistan's international trade is a primary objective of the present study. Hence, this variable is used as one of the independent variables in the present model. Consistent data on annual emigration are hard to obtain from Pakistani sources. The Migration Policy Institute (2005) publishes data on immigrant flows and populations (stocks) throughout the world, based on data obtained from the official sources of each host government. Therefore, data on Pakistani migrants residing in OECD countries are obtained from the official website of the Migration Policy Institute. However, since annual data on stock of immigrants are usually available after each census year, these are collected with a gap of five or ten years, depending on when a census is conducted in a country. Therefore, annual

inflows of immigrants had to be combined with stock of immigrants at the time of each census to estimate the annual stock of immigrants.<sup>7</sup>

One important determinant of international trade is the language used for communication among trading partners. Commonality of languages used in countries engaged in trade may reflect the strength of their past and current ties which can be an impetus for their continued cultural relationships. At the same time, it can also help reduce the transaction cost of negotiating business contracts between traders. In Pakistan, most legal documents are drafted in English, which is also the main medium of instruction at the post-secondary level of education. In our sample, English is the official language of four countries: Australia, Canada, the United Kingdom, and the United States. We expect the network effect of Pakistani expatriates in these countries to be stronger on bilateral trade through further reduction in transaction costs. Hence, we have introduced two separate dummy variables, ENG, which takes a value 1 for these English speaking countries and zero otherwise; and NENG, which takes a value of 1 for the non-English speaking countries and zero otherwise. Each of these variables is interacted with the stock of Pakistani migrants.

We also use the product of the GDP of Pakistan with that of its trade partner to proxy for their economic masses. In a simple macroeconomic model, each country's GDP determines its import. Hence, while imports from Pakistan are determined by the country's GDP, its exports are determined by the GDP of its trading partner country. The use of the two countries' GDP in multiplicative form is based on the expectation that the impact of each country's GDP on its trade with the other country is enhanced by the latter's GDP and is consistent with the previous studies which were reviewed in the previous section. The trade enhancing effect of this variable is probably because there will be mutual agreements between trading countries for adopting flexible trade policy towards each other. Data on GDP were obtained from World Bank (2005).

We have also included a ratio of GDP deflator of Pakistan with its trading partner, the product of its GDP per capita with its trading partner, and a distance variable giving the distance of Islamabad, the capital city of Pakistan, from its trading partner's capital city.

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<sup>7</sup> The data on stock and inflows of immigrants are obtained from the website of the Migration Policy Institute, i.e. [www.migrationpolicy.org](http://www.migrationpolicy.org). Details on the calculations of missing data in each country can be provided upon request.

The inclusion of the ratio of GDP deflator allows the incorporation of the effect of relative prices as suggested by Head and Reis (1998), who argue that in the absence of the law of one price, due to prevailing trade barriers, relative prices have an effect on trade.<sup>8</sup> A rise in this ratio is expected to increase exports and vice versa. The data on GDP deflators were obtained from World Bank (2005).

The per capita GDP is usually considered a proxy for the average wealth in each country. The product form of per capita GDP of Pakistan and its trading partner is used, following Rauch and Trindade (2002), to assess the impact of their joint wealth on bilateral trade.

The distance variable incorporates the effect of transaction and transport costs of trade. It is expected that the transaction and transportation costs of trade rise with an increase in distance between trading partners. Transaction costs also rise due to increased cultural disparity and lack of knowledge about the operation of each other's economic and trading system. In this study, distance between Pakistan's capital city, Islamabad, and the respective capitals of trading partners is calculated by great circle formula.<sup>9</sup>

Being a former colony of the United Kingdom, Pakistan has more established ties with the United Kingdom than with any other country in our sample. La Porta and others (1998), among others, argue that former British colonies inherited a legal system from their colonizer that produced superior economic outcomes for them. Head and others (2010) found a gradual trade deterioration with the colonizers following independence. A dummy variable for colonial ties is included in our model to incorporate the effect of colonial ties with the United Kingdom.

To incorporate the effect of changing trade restrictions, we also include a lagged value of average tariff rate.<sup>10</sup> Data on tariff rates are obtained from the Government of Pakistan (Pakistan, 2004; 2008).

<sup>8</sup> Trade barriers are variables that increase cost of trade and include transaction cost, information cost, tariffs, import or export quota, distance, etc.

<sup>9</sup> According to Head (2003) the great circle formula is calculated as follows:

$$D_{ij} = 3,962.6 \arccos ([\sin(Y_i) \sin(Y_j)] + ([\cos(Y_i)\cos(Y_j)]\cos(X_i-X_j)))$$

Where X is longitude in degrees multiplied by 57.3 to convert it to radians and Y is latitude multiplied by -57.3 (assuming it is measured in degrees west).

The data on distance are obtained from the website <http://www.cepii.fr/anglaisgraph/bdd/distances.htm> which is an official website of Centre d'Etudes Prospectives et d'Informations Internationales, a French research centre in international economics.

<sup>10</sup> The average tariff rate is expressed as a percentage of imports. We include a lagged value to avoid any endogeneity issue in the import equation.



## V. CHARACTERISTICS OF THE DATA

Before presenting the econometric results, we discuss the data characteristics by obtaining the average values of the variables included in the gravity model. These are presented in table 2. For ease of interpretation, average values of actual data are reported, not their logarithmic transformations. The average growth rates of these variables during the period of study are also provided in the same table.

**Table 2. Descriptive statistics of variables used in the regression model**

Variables	Average	Average annual growth rate (per cent)
EXP (\$)	3.5 billion	7.2
IMP (\$)	2.7 billion	4
M	528 000	5
GDP*GDP (\$)	8.85E+23	10
GDPD (\$)	1.48	-9
PGDP*PGDP (\$)	110.3 million	7
TRF	0.19	-8
DIS (Kilometres)	7 215	–

*Notes:* 1) EXP = Pakistan's exports to its OECD partners, IMP = Pakistan's imports from its OECD partners, M = Stock of Pakistani emigrants living in the host country, GDP\*GDP = Product of Pakistan and its trading partner gross domestic products, GDPD = GDP deflators ratio of Pakistan with respect to each of its trading partner, PGDP\*PGDP = Product of per capita gross domestic products of Pakistan and each of its trading partner, TRF = Lagged value of average tariff (Import duty/imports) and DIS = Distance between Pakistan and its trading partners capitals. 2) National averages for exports are \$9,678,105,010 which grew at 7 per cent per annum during the period; imports are \$11,130,314,989 which grew at 3 per cent during the period. 3) Sample includes following countries: Australia, Canada, Denmark, Germany, Italy, Norway, Sweden, the United Kingdom and the United States. Complete data are available only for Denmark, Sweden and the United States. For other countries in the sample, migrants' stock data are missing for some years. Therefore, models are estimated using unbalanced data. Data can be obtained from authors upon request.

During 1990-2003, an average of 528,000 Pakistani migrants resided in the nine OECD countries in any given year, and their population grew at an annual rate of 5 per cent. There is no standard value with which the average value of GDP\*GDP can be compared; its positive growth rate of 10 per cent is an indicator that the joint size of the economies of Pakistan and the OECD grew during our period of analysis.<sup>11</sup> The average value of the GDP deflator ratio indicates that the combined price level in its trading partners of the OECD region has been about 48 per cent higher than the price

<sup>11</sup> The average growth rate of GDP was 5.9 per cent in Pakistan and 3.9 per cent in OECD.

level in Pakistan itself. This is most likely because of higher wages in OECD. However, the negative growth rate in this variable indicates a closing of the gap in prices over time. The average value of PGDP\*PGDP grew at 7 per cent per annum indicating a growth in joint wealth of Pakistan and its trading partners.<sup>12</sup> The average distance from Pakistan to one of its trading partners is 7,215 kilometres. The tariff rate declined over the period at an average rate of 8 per cent indicating a tendency towards flexible trade policies.

Over the period, exports from Pakistan to the nine OECD countries were 28 per cent higher than its imports, and grew faster (at 7 per cent per year) than imports (which grew at 4 per cent only). Imports from OECD also grew faster than did the total imports in Pakistan, which grew only at a 3 per cent rate, while exports to OECD grew slower than did their total exports, which grew at a rate of 7 per cent. Overall, 36 per cent of the total exports of Pakistan in a given year went to the nine OECD countries and 24 per cent of its imports came from them.<sup>13</sup>

In table 3 we provide the means, average annual growth rates and standard deviations of the migrant stock and trade variables separately for the English and non-English speaking countries that are included in our sample.

**Table 3. Descriptive statistics of important variables for English and non-English speaking OECD countries**

Variables	Migrants stock		Exports		Imports	
	English	Non-English	English	Non-English	English	Non-English
Mean	474 000	54 500	2.54 billion <sup>a</sup>	942.3 million	1.72 billion <sup>a</sup>	1 billion
Average growth rate (per cent)	4.9	8.5	9.7	2.1	5.2	2.7
Std Dev.	139 076	24 839	847.11 million	104.21 million	342.93 million	253.4 million

Source: Authors' own calculations based upon data obtained from the Migration Policy Institute's website (<http://www.migrationinformation.org/datahub/comparative.cfm>) and Pakistan (2004).

Note: <sup>a</sup> Exports and imports mean values are in US dollars.

<sup>12</sup> The PGDP growth was 1.9 per cent in Pakistan and 3.3 per cent in the OECD countries.

<sup>13</sup> Data reported in this paragraph are not reported in table 2.

As expected, stocks of Pakistani migrants residing in English speaking countries are higher than those residing in non-English speaking countries. Pakistan's international trade with English speaking countries is also higher. The higher annual average growth rate of Pakistani migrants in non-English speaking countries may be reflective of stronger policy initiatives adopted in those countries to attract immigrants.

## VI. ECONOMETRIC RESULTS

The results of our econometric estimations, which utilize panel data, are provided in table 4. The fixed effect model has been criticized due to the presence of heteroskedasticity of unknown form between the error term and the independent variables (Santos and Tenreiro, 2006). Therefore, we used the generalized least squares (GLS) method to account for the unobserved heteroskedasticity that could result from correlation between the error term and the independent variables. We also estimated a dynamic version of the model by including lagged values of exports and imports in both models to analyze emigrants' impacts in the long run. Data were checked for multi-collinearity using simple correlations between independent variables and Klein's rule of thumb. These two tests are discussed in annex table A.1. We also tested for data stationarity using Levin, Lin and Chu (2002), whose results are reported in annex table A.2. The country specific effects are reported in annex table A.3.

The coefficient of tariff rate (TRF) variable is statistically insignificant in cases of static export equation, but is significant and unexpectedly positive in cases of static import equation. One possible reason is that a decline in the international prices of significant import items, such as capital goods, has offset the expected negative effect of declining tariff rates. All other variables are statistically significant in the static model and have displayed expected results. In the dynamic models, which control for the autoregressive behaviour of the corresponding trade variables, GDPD and TRF have statistically insignificant impact on exports, while DIS, CLT and TRF have statistically insignificant impact on imports. That the magnitudes of all coefficients are smaller in the dynamic model indicates that the corresponding variables have a stronger long run impact on trade variables.

Our main variable of interest is migrant stock. In the case of exports, this variable has a positive sign and is statistically significant in English speaking countries, but insignificant in non-English speaking countries. In the case of imports, this variable is statistically significant and negative for both English and non-English speaking countries. Thus, commonality of language appears to have a stronger

Table 4. Estimation results of the Augmented Gravity Model of trade

Variables	Static		Dynamic	
	EXP	IMP	EXP	IMP
EXP <sub>t-1</sub> , IMP <sub>t-1</sub>			0.81* (0.04)	0.72* (0.06)
M*ENG	0.13* (0.01)	-0.30* (0.03)	0.03* (0.03)	-0.09* (0.04)
M*NENG	-0.03 (0.01)	-0.41* (0.05)	-0.00 (0.01)	-0.14* (0.07)
GDP*GDP	0.87* (0.02)	1.06* (0.02)	0.17* (0.03)	0.29* (0.06)
GDPD	0.80* (0.17)	2.04* (0.60)	0.21 (0.18)	1.35* (0.42)
PGDP*PGDP	-0.50* (0.04)	-1.56* (0.18)	-0.13* (0.03)	-0.41* (0.16)
DIS	-2.17* (0.12)	-1.00* (0.27)	-0.40* (0.12)	-0.41 (0.24)
CLT	-0.93* (0.09)	0.36* (0.17)	0.21* (0.06)	0.01 (0.10)
TRF	0.21 (0.13)	0.73* (0.15)	0.12 (0.30)	-0.13 (0.55)
R <sup>2</sup>	0.97	0.89	0.99	0.95
No. of observations	116	116	111	111

Notes: ENG and NENG are dummy variables for English and non-English speaking countries respectively. CLT refers to colonial ties. For other variables and the list of countries included in the sample, please see notes at the bottom of table 2. Equations were estimated by including a time trend variable to account for systematic changes in macroeconomic and trade environments.

\* Statistically significant at 5 per cent level. Values in parentheses are White heteroskedasticity robust standard errors.

influence in increasing exports from Pakistan. With regard to imports, the negative impact is probably due to import substitution activities of the emigrants. It seems that after receiving the necessary technological training and acquiring capital in their host countries, emigrants tend to engage in production of those products and services within Pakistan, which Pakistan was previously importing.

Based on the results of the dynamic model, it may be inferred that (a) migrants' knowledge and business contacts work both in the short and long run, and (b) their import substitution effect is higher than their export enhancement effect in the long run.

Our descriptive statistics reported in table 3 showed that exports from Pakistan to English speaking OECD countries are growing three times faster than exports to non-English speaking countries, and that the level of migrant stock is about 8.5 times higher in English speaking countries. One reason for exports enhancing the effect of migrants living in those countries is the sheer size of the countries. However, our data also show that the average growth rate of emigrants in non-English speaking countries is almost double that of English speaking countries. Thus, it can be expected that as migrant stock goes above some threshold level in non-English speaking countries, their impact on the exports of Pakistan may rise.

We also calculate the monetary impact of each additional migrant on exports and imports between their countries of residence and Pakistan. These values, reported in table 5, are based on the estimated migrant elasticities of the two trade variables, and are evaluated at their average values and the average values of the migrant stock variable. Each additional migrant contributed \$1,800 to net exports in English speaking countries while this contribution was lower in non-English speaking countries.

**Table 5. Impact of each additional migrant on Pakistan's international trade per year, 1990-2003 (\$)\***

<i>Migrants residents of</i>	<b>Export</b>	<b>Import</b>	<b>Net export</b>
English speaking countries	700	-1 100	1 800
Non-English speaking countries	NA	-710	710

Notes: \* Based on the estimated elasticity value of exports and imports with respect to migrant stocks and evaluated at mean values of exports, imports and migrant stock. NA (not applicable) is used where the impact is statistically insignificant in econometric model.

Table 6 converts the above monetary values into percentage of contribution by additional migrants towards *net exports*. With non-English speaking countries, Pakistan experienced a trade deficit from 1990-2003 on average. However, a positive effect of each additional migrant on *net exports* (table 5) was their import substitution. Hence, the negative values in cases of non-English speaking countries, as reported in table 6, indicate the percentage by which trade deficits between those countries and Pakistan would have risen had there been no growth in migrant stock.

**Table 6. Percentages of annual growth in net exports contributed by additional migrants, 1990-2003\***

<i>Migrants resident of</i>	<i>Contribution to net export growth (%)</i>
English speaking countries	27
Non-English speaking countries	-46

*Note:*      \* Based on table 5 results and average annual growth of emigrants to the two types of countries. A negative value occurs because of Pakistan's trade deficit with non-English speaking countries and indicates the percentages by which annual growth in migrant stock reduced trade deficit.

**VII. SOME CONCLUDING REMARKS AND POLICY IMPLICATIONS**

Using panel data between Pakistan and the nine OECD countries for the period of 1990-2003, this study has found that expatriates from Pakistan have a positive effect on the country's exports to English speaking countries and negative effects on imports from both English and non-English speaking countries.

A positive impact on exports could be because most buyers of products made in Pakistan are emigrants from Pakistan, who may have strong preferences for their home country's products. The negative impact of these emigrants on their host countries' exports to Pakistan may be because they are engaged in import substitution in Pakistan, made possible through their exposure to foreign environments and access to the necessary capital required to establish import substitution industries.

The revelation that expatriates from Pakistan have export-enhancing and import substitution effects on Pakistan has an important implication for economic growth in developing countries. Using time-series data, Vohra (2001) shows a strong export-growth linkage in the Philippines, Malaysia, and Thailand.<sup>14</sup> Her analysis can also be used to imply that in the case of Pakistan, this linkage will be strengthened as it has now moved from being a low-income country to a lower middle-income country. The author suggests that pursuing liberal market policies that encourage exports could have a positive impact on economic growth. The findings of the present study, which are in line with those of Bolivia and China, as reviewed earlier, suggest that trade policies in developing countries should also view expatriate networks as another

<sup>14</sup> Literature, summarized by Vohra (2001), attributes export-growth linkages to: (a) increased specialization and the spillover effects of the export sector's growth, (b) greater capacity utilization, (c) diffusion of modern technology, and (d) economies of scale in production.

viable trade enhancing source. This source can be strengthened through proper institutional arrangements at government levels. Governments could provide support to their overseas residents and to those who decide to return in establishing businesses in their countries of origin in order to promote international trade. Establishment of counselling centres, mentorship programs to connect overseas residents with local businesspersons, and flexibility in movement of financial and physical capital can be important measures in this regard. China's government has already taken some important measures in this area. It encourages overseas entrepreneurs, including ethnic Chinese, to open high-tech firms in the country. As Zweig and Rosen (2003) note, those who relocate to Chinese cities where they may not have personal networks such as Beijing, Shenzhen or Shanghai, are encouraged to move into science parks, where local officials expedite the paperwork and limit the regulatory constraints they would normally face. Holders of foreign passports are given long-term residence permits, and in some cities the authorities and universities also help with their children's educational requirements as well as assist with any other problem that arises. In this regard, Pakistan lags behind China although some progress is being made through the formation of the Ministry of Labour, Manpower and Overseas Pakistanis. Expatriates of Pakistan are now able to apply for a National Identity Card for Overseas Pakistanis (NICOP) if they wish to acquire property, start a business, open a bank account, or seek employment. They can also open bank accounts in US dollars and repatriate their funds to their countries of residence. Holders of NICOP travelling on a foreign passport are also allowed a visa free entry into Pakistan.

Anecdotal evidence suggests that some expatriates of Pakistan are already operating businesses in Pakistan by obtaining franchises, enabling them to produce foreign products within Pakistan. The opening of Kentucky Fried Chicken (KFC) and McDonalds restaurants in various cities of Pakistan as well as the Reebok plant in Sialkot is an example. Some emigrants of Pakistan, who have returned to Pakistan from developed countries, now have the necessary skills, training and capital, and have established businesses in Pakistan. Omer Jibran Engineering Industries, Ghazi Fabrics, Bestway Cement and Food Industry are some such examples. These businesses will not only help reduce import reliance but will also help reduce unemployment.

Pakistan is among the countries that are major immigrant sources to many countries of the western world. By providing quantitative estimates of the impact of Pakistani emigrants on the exports and imports of their country of origin, the present study has provided some input to the debate on the economic impact of emigration in a developing country, whose results can be confirmed or denied in other topic based survey studies in future.

As is the case with other studies relating to developing countries, the present study also has a few caveats that mostly relate to the availability of data. One such caveat is our inability to analyze the impact of different immigrant entry classes (refugees, family class and independents) on international trade. As has been noted by Head and Reis (1998), independent class immigrants are likely to have a stronger impact on trade, followed by the family class, with refugees likely to have no significant impact. This is because independent and family class immigrants are more likely to be active in business and keep in contact with their home country while refugees are less likely to have such contacts with their home country. Another caveat is our inability to perform separate analysis of the trade impacts of expatriates on homogeneous and differentiated goods. Rauch and Trindade (2002) suggest that the information requirements for trade are greater in cases of differentiated goods than in cases of homogeneous goods. With regard to ethnic Chinese networks, these authors have found that migrants have more impact in the case of differentiated goods rather than homogeneous goods. Our data restrictions prevent us from pursuing these analyses in the present paper.



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## APPENDIX

**Annex table A.1. Correlation coefficients among variables**

	Migrants stock	GDP deflators ratio	GDP*GDP	PGDP*PGDP	Tariff rate
Migrants stock	1.00	-0.15	0.72	0.00	-0.11
GDP deflators ratio	-0.15	1.00	-0.21	-0.57	0.66
GDP*GDP	0.72	-0.21	1.00	0.03	-0.14
PGDP*PGDP	0.00	-0.57	0.03	1.00	-0.34
Tariff rate	-0.11	0.66	-0.14	-0.34	1.00

As annex table A.1 shows, the highest correlation coefficient is found between GDP\*GDP and migrant stock variables at 0.72, which is below the 0.8 threshold value suggested by Gujarati (1995) for considering multicollinearity to be affecting the t-values of regression results.<sup>15</sup> We can thus consider our t-tests regarding the significance of coefficients to be accurate.

**Annex table A.2. Levin Lin and Chu (LLC) test results for stationarity of variables used in Augmented Gravity Model of trade**

Variable	Test statistic	Probability
EXP	-2.86	0.00
IMP	-2.36	0.00
M	-11.16	0.00
GDPD	-2.63	0.00
GDP*GDP	-4.02	0.00
PGDP*PGDP	-4.06	0.00
TRF	-27.91	0.00

*Note:* The equation estimated for the unit root tests included intercept and trend. Data are used in logarithmic form. For variable legend, please see the notes under table 2.

<sup>15</sup> Multicollinearity was also found to be low based on the Klein's rule of thumb, as suggested by Gujarati (1995: 337).

**Annex table A.3. Coefficients of country specific dummies**

Country <sup>a</sup>	Exports	t-values	Imports	t-values
Australia	-96.33209	-1.689917	153.7935	1.314138
Canada	-97.98064	-1.700786	152.8847	1.292653
Denmark	-92.79422	-1.654104	156.2163	1.356366
Germany	-98.26155	-1.619888	171.3641	1.376036
Italy	-97.59448	-1.625367	169.2602	1.373060
Norway	-92.72261	-1.661567	154.3113	1.346909
Sweden	-93.39684	-1.640808	159.2306	1.362576
United Kingdom	-99.18262	-1.694077	155.6047	1.294580
United States	-102.6632	-1.679388	163.4259	1.302164

*Note:*     <sup>a</sup> Estimations are carried out while dropping the distance variable, which results in perfect multicollinearity with country specific dummies.

## AN EXPLORATION ON VOLATILITY ACROSS INDIA AND SOME DEVELOPED AND EMERGING EQUITY MARKETS

Paramita Mukherjee\*

*The opening up of financial markets in India has led to significant transformation within the financial sector, which has become more integrated with international stock markets. The general concern which is emerging with such development is the increased volatility of equity returns. This paper explores the relationship between volatility within not only the Indian equity market but also within other developed and emerging markets as well. Based on a daily data set for more than nine years, this paper estimates a joint Vector Auto Regression/Multivariate Generalized Autoregressive Conditional Heteroskedasticity (VAR-MGARCH) model. As the existing literature suggests, returns in the United States of America, the Republic of Korea and Hong Kong, China have a definite effect on returns in India. More interesting is the finding that Indian market returns also affect the returns in other markets such as Japan, the Republic of Korea, Singapore and Hong Kong, China. In addition, return volatility of the Indian market does not have an increasing or declining trend, but exhibits sudden sharp increases over the sample period. The conditional correlation of the Indian equity market return with all the other markets has increased over time in recent years.*

*JEL Classification:* F36, G15.

*Key words:* Volatility transmission, Indian equity market, market integration, volatility linkage.

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\* Institute of Engineering and Management, EE 140/11, Salt Lake City, Sector II, Kolkata 700 091, India. Phone: +91 33 2359 9290 (R), +91 94331 20454 (C), E-mail: oparmita@hotmail.com. The author is grateful to an anonymous referee for valuable comments. However, usual disclaimer applies.

## I. INTRODUCTION

In India, liberalization measures in the financial sector have been in vogue since the 1990s. This has led to considerable development of the capital market. The movement of some variables related to the stock market clearly points to this development. For example, during the financial years between 1992/93 and 2008/09, the number of trading days in the Bombay Stock Exchange (BSE) increased from 192 to 243, turnover from Rs. 456,960,000,000 to Rs. 11,000,740,000,000 and market capitalization on BSE from Rs. 188,146 to Rs. 30,860,750,000, implying a sixteen-fold increase. The stock market index (BSE Sensex) has also shown a phenomenal rise, especially in the past few years. For example, from June 2004 to January 2008, the Sensex jumped from 4,835 to 20,873, indicating a growth of more than 300 per cent. The improvement can also be observed in terms of stock returns. The average daily return on BSE was 0.23 in 2003, compared to 0.08 in the United States of America, 0.09 in the United Kingdom of Great Britain and Northern Ireland and 0.12 in Japan, Singapore and Hong Kong, China. During 2007, the return in BSE was 0.2 which is quite comparable to stock markets in developed countries.<sup>1</sup> Interestingly, the return in most of the Asian markets has been impressive, providing an immense opportunity for domestic and foreign investors to increase their potential gains.

In this process of gradual liberalization, the Indian equity market has also become more integrated with other developed and emerging markets in Asia. For example, Bekaert and others (1998) shows that free international capital mobility and growing financial integration are directly related to the movements of stock prices of various national markets. Using data on 20 emerging markets, including India, it is shown that stock market returns within these countries are mirroring the world market return. This is a result of the introduction of liberalization measures in the relevant financial sectors. Brooks and Catao (2000), in a March 1986 through August 2000 study involving 21 developed and 19 emerging countries, including India, found evidence of stock market integration operating through the channel of information technology (IT) industry.<sup>2</sup> Literature on the co-movement of stock returns, concerning the emerging markets in the Asia-Pacific region, has mixed evidences. Most of the work suggests that post-Asian crisis, some markets have cointegrated with the United States and some have cointegrated with Japan, while a few others have not cointegrated with either (Ghosh and others, 1999; Yang and Lim, 2002; Choudhry and Lin, 2004). In general, the studies conclude that markets can be said to have only

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<sup>1</sup> The Securities and Exchange Board of India (SEBI) Handbook of Statistics on the Indian Securities Market 2009.

<sup>2</sup> See also Mukherjee and Bose (2008).

partially converged. As a result, researchers are claiming that financial markets in the Asia-Pacific region are neither well integrated nor completely segmented.

However, with increased financial integration, there is an emerging concern among financial analysts and academia that Indian equity market volatility has increased substantially. As a result of this increased integration with stock markets internationally, the return volatility in other markets might be having a significant impact on the volatility in the Indian market. This concern is justified because the evidence demonstrates that the Indian market moves together with markets like Japan, the Republic of Korea, Singapore, the United States and Hong Kong, China (Mukherjee and Bose, 2008).<sup>3</sup> There are very few papers that directly deal with this issue in the Indian context. This paper makes an attempt to find out whether volatility in other developed/developing markets affected the volatility of the Indian market in the recent past.

Volatility spillover affects policy on two fronts: (a) the portfolio manager and (b) the government or regulatory authority. An international portfolio manager invests in a number of emerging and developed markets as this leads to portfolio diversification. Emerging economy markets, when compared to those in developed economies, generally offer a higher rate of return as well as more risk to investors. When choosing the optimal portfolio, the manager must be aware of the potential volatility of the returns as well. If he has information on the volatility linkage among countries, he will be in a better position to make informed decisions regarding his portfolio. With volatility linkage, comes the possibility of policy implications related to contagion. With liberalization, foreign investors increasingly invest in emerging markets. A sudden withdrawal on part of such investors may destabilize the home country's market even if the fundamentals are strong. This may hinder economic growth as well. Therefore, an analysis of volatility within financial markets of emerging countries will provide useful insights to policy makers, allowing for further opening up of the markets in line with the global liberalization process. For example, if it is observed that country A's volatility of returns is influenced by that of country B, then the authority should closely observe events of that country B in order to prevent possible collapse in country A. The authority may consider imposing restrictions on foreign investments if necessary in periods of economic turbulence.

There exists substantial literature on volatility spillover in developed markets, such as studies dealing with theoretical aspect as well as empirical estimation of such volatility spillover. For example, King and Wadhwani (1990) found evidence of contagion for the New York, London and Tokyo stock markets. Hamao and others

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<sup>3</sup> See also Wong and others (2005).

(1990) observed volatility spillovers from the stock markets of the United States and the United Kingdom to the Japanese stock market (Badrinath and Apte, 2005). Most of these works used variations of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models like exponential GARCH, univariate as well as multivariate GARCH. For instance, Bala and Premaratne (2004) examined volatility spillover concerning developed markets using the Multivariate GARCH model with Glosten-Jagannathan-Runkle (GJR) extensions as well as other methods (see also Ledoit and others, 2003). Forbes and Rigobon (1999) tested for stock market contagion, following a different approach, during the 1997 East Asian crises, the 1994 Mexican peso collapse, and the 1987 United States stock market crash, with 28 emerging markets from East Asia and Latin America, including India. It prescribed a new measure for contagion and found that no contagion implying that high market co-movements during these periods was a continuation of strong cross-market linkages.

There exist a few studies that examine the volatility spillover concerning the Indian equity market as well. For example, Kumar and Mukhopadhyay (2007) investigated short term linkages between National Association of Securities Dealers Automated Quotations (NASDAQ) of the United States and National Stock Exchange (NSE) of India for 1999-2001 and found that the effect of NASDAQ daytime return volatility shocks on NSE 50 Nifty Index (Nifty) overnight return volatility is 9.5 per cent and that of Nifty daytime return is a mere 0.5 per cent on average. In addition, Mukherjee and Mishra (2005) examined the return and volatility spillover to the Indian stock market from 12 other developed and emerging Asian countries<sup>4</sup> for the period of November 1995 to May 2005. They found that contemporaneous intraday return spillover among India and almost all the Asian countries are found to be positive and significant. Moreover, the foreign market return spillover significantly affected the Indian open-to-close return much more than that of its close-to-open return. Mainly, the volatility spillovers to BSE were from the Republic of Korea and Hong Kong, China.

The objective of this paper is to augment the findings already obtained on Indian equity return volatility with more recent data, ranging more than nine years and covering many Asian and developed countries. The previous studies either deal with NSE or BSE as representative of the Indian market with data dating back to 2005. In that time the Indian stock market has come a long way, and therefore the relation should be examined regarding the recent past. This paper attempts to examine this matter with the most recent data of the BSE Sensex. It deviates from contemporary

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<sup>4</sup> India, China, Hong Kong, China, Indonesia, Japan, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, Taiwan Province of China and Thailand.



studies on volatility transmission concerning the Indian economy in its coverage of countries, choice of sample period and method of analysis. Those markets, whose co-movements with the Indian market in terms of equity returns are already found in the literature, are included in this study. The analysis is based on daily data for more than nine years in the recent past. In addition, to explore the relation between the equity return volatility of India and other international markets, a multivariate GARCH model is estimated. Instead of the frequently applied Auto Regressive Moving Average-GARCH (ARMA-GARCH) model, an appropriate VAR-MGARCH model is estimated jointly to capture the interaction of the market returns in terms of their mean, variance and covariance.

The structure of the paper is as follows: section II provides an overview of volatility in the Indian stock market; section III discusses data and methodology; section IV presents the results and section V concludes the paper.

## II. STOCK MARKET VOLATILITY IN INDIA: SOME FACTS

The increased integration of India and global equity markets may partly be attributable to international investors since India, along with the Asian emerging markets, has become a favourite destination of such investors, who constantly switch their investments from one equity market to another. Foreign institutional investors (FIIs) invest in different markets based on their perception of the domestic market and available alternatives at different points of time. The consequent allocation of funds leads to a degree of synthesis between markets, which results in more integration. With the opening up of the financial sector in India, FII flows have increased substantially to the Indian economy. Portfolio investment has increased from a meagre \$6 million in 1990/91 to a substantial \$27,271 million in 2007/08. Since such flows are extremely volatile, grave concern is expressed by policy makers and practitioners.

There is mixed evidence regarding the role of such investors in increasing volatility in domestic markets. Some studies find that foreign investors do not have a destabilizing impact on stock prices, e.g. Choe and others (1999), Kim and Wei (1999) with Korean data and Froot and others (2001) based on data from 44 countries. Conversely, there exists evidence that foreign investors do cause higher volatility in the market compared to domestic investors (Jo, 2002),<sup>5</sup> and that stocks in which foreign investors mainly trade, experience higher volatility compared to those in which

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<sup>5</sup> They used data from the Korean stock markets, where data are available for different categories of traders.

they do not show much interest (Bae and others, 2002).<sup>6</sup> These studies also show that volatility caused by FII jumped significantly at the time of the crises.

The data on Indian equity market suggest that volatility, measured in terms of standard deviation of returns, has decreased over the past decade (see table 1). Gordon and Gupta (2003) made an observation that the volatility of portfolio flows into India was small in comparison to other emerging markets from 1998 to 2000.<sup>7</sup> While the co-efficient of variation for such flows in India was 1.58, the corresponding figures for Brazil, Chile, the Philippines, the Republic of Korea and Thailand stood at 2.14, 1.94, 1.79, 1.82 and 25.07 respectively. According to the Securities and Exchange Board of India (SEBI) Handbook of Statistics on the Indian Securities Market 2009, volatility in the market index declined from 3.33 in 1992 to 1.1 in 2005<sup>8</sup> and is now comparable to the volatility of stock market indices in the United Kingdom and the United States, as well as other advanced and emerging countries (see table 2). There are studies that examined the volatility of stock markets and foreign institutional investments in the Indian equity market as well. For example, foreign institutional investments and stock market returns in India exhibit quite high volatility with regard to both extent and duration. The evidence suggests that their volatility is interrelated (Coondoo and Mukherjee, 2004).

Whether the volatility of other markets affects the Indian market or not is an issue that cannot be ignored and therefore must be examined properly.

**Table 1. BSE Sensex volatility**

Year	1997/ 98	1998/ 99	1999/ 00	2000/ 01	2001/ 02	2002/ 03	2003/ 04	2004/ 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09
<b>Sensex Volatility<sup>a</sup></b>	2.3	1.83	1.72	–	1.5	1.01	1.35	1.48	1.03	1.75	1.93	2.8

Source: SEBI Handbook of Statistics on the Indian Securities Market 2009.

Note: <sup>a</sup> sd of daily returns.

<sup>6</sup> They analyze data from the Standard & Poor's (formerly the IFC) Emerging Markets Database (EMDB), which covers more than 2,000 stocks from 45 emerging markets.

<sup>7</sup> They have used the quarterly data for 17 emerging markets and measured volatility in terms of co-efficient of variation.

<sup>8</sup> Though there is an increase in volatility for the past two years, this may be attributable to the global crises and it should be noted that this increase in volatility has also occurred in other markets as well.

**Table 2. Return and volatility for some world stock indexes**

Year	United States of America		United Kingdom		Hong Kong, China		Singapore		Japan		India	
	(DJIA)		(FTSE 100)		(HSI)		(STI)		(NKY)		(BSE Sensex)	
	Return	Volatility	Return	Volatility	Return	Volatility	Return	Volatility	Return	Volatility	Return	Volatility
1992	0.0	0.6	0.1	1.0	0.1	1.4	0	0.9	NA	NA	0.1	3.3
1995	0.1	0.5	0.1	0.6	0.1	1.3	0	1	0	1.2	-0.2	1.3
2000	0	1.4	0	1.2	-0.1	2	-0.1	1.5	-0.1	1.4	-0.1	2.2
2001	-0.1	1.4	-0.1	1.4	-0.1	1.8	-0.1	1.5	-0.1	1.6	-0.1	1.7
2002	0.1	1.6	-0.1	1.7	-0.1	1.2	-0.1	1	-0.1	1.4	0	1.1
2003	0.1	1.1	0.1	1.2	-0.1	1.1	0.1	1.2	0.1	1.4	0.2	1.2
2004	0	0.7	0	0.7	0	1	0.1	0.8	0	1	0	1.6
2005	0	0.7	0.1	0.6	0	0.7	0.1	0.6	0.1	0.8	0.1	1.1
2006	0.1	0.6	0	0.8	0.1	0.9	0.1	0.9	0	1.3	0.2	1.6
2007	0	0.9	0.2	1.1	0.1	1.7	0.1	1.4	-0.1	1.2	0.2	1.5
2008	-0.2	2.6	-0.2	2.4	-0.2	3	-0.2	2.2	-0.2	2.9	-0.2	2.8
2009	-0.1	2.6	-0.1	2.4	0	3.2	0	2.4	-0.1	3	0	3

Source: SEBI Handbook of Statistics on the Indian Securities Market 2009.

### III. DATA AND METHODOLOGY

In this paper, the issue of whether the volatility of stock returns in India is significantly influenced by the stock market volatility of developed and emerging markets is analysed. BSE Sensex is considered to be the representative of the Indian equity market. Among other markets studied here are the three developed markets: Japan, the United Kingdom and the United States. As India is getting more integrated through the FII route, some international investors' favourite destinations in the Asia-Pacific region are also considered. These are the Republic of Korea, Singapore and Hong Kong, China. The stock indexes used for the study are the most important benchmark index for each country.

The Indian BSE Sensex is regarded as the pulse of the Indian stock market. Sensex is a free-float market capitalization<sup>9</sup> based index estimated from a basket of 30 constituent stocks, representing a sample of large, liquid and representative companies. The constituent stocks are from a wide range of sectors such as Auto, Banking, Cement, Energy, Information and Entertainment, Oil and Gas, and

<sup>9</sup> Over the past few years, there has been a trend among index providers to consider the amount of shares that are actually available in the market (free-float shares), rather than the official shares outstanding, for use in calculating a company's market capitalization weighting in an index. This helps to reflect the investability of the index.

Pharmaceuticals, to name just a few. The Dow Jones Industrial Average (DJIA) in the United States is included in the study. The DJIA is one of the most closely-watched benchmark indices tracking targeted stock market activity and consists of 30 stocks. Also included in this study is the Financial Times Stock Exchange (FTSE) of the United Kingdom with an index of the 100 most highly capitalised companies listed on the London Stock Exchange. It is by far the most widely used stock market indicator in the United Kingdom, representing about 80 per cent of the market capitalisation of the whole London Stock Exchange.

Within the Asian markets, Japan, the Republic of Korea, Singapore and Hong Kong, China are parts of this study. In Japan, the Nikkei Stock Average is considered to be the most widely watched index of stock market activity. Its 225 components are among the most actively traded issues on the first section of the Tokyo Stock Exchange (TSE). The mix of components is rebalanced from time to time to assure that all issues in the index are both highly liquid and representatives of Japan's industrial structure. The market capitalization based index, the Korea Composite Stock Price Index (KOSPI), measures changes in the share prices of companies quoted on the Korea Stock Exchange (KSE). The index includes all companies listed on the KSE except for bond-type preferred stocks and newly listed stocks. The Straits Times Index (STI), which is compiled by the Straits Times Newspaper of Singapore, is a modified market capitalization-weighted index comprising of 55 of the most heavily weighted and active stocks traded on the Singapore Exchange (SGX). The Hang Seng Index is a capitalization-weighted stock market index in the Stock Exchange of Hong Kong, China (SEHK) and is used to record and monitor daily changes of the 33 largest companies of the Hong Kong, China stock market, drawn from four industry groupings forming the Finance, Utilities, Properties, and Commerce and Industry sub-indexes, and accounting for about three quarters of the market value of all stocks traded on the SEHK.

This study uses a daily data set that spans a little more than nine years, from 1 January 1999 to 15 February 2008, and focuses on days on which all the relevant markets were open for trading.<sup>10</sup> The data series of daily closing values of stock indexes were collected from the website [finance.yahoo.com](http://finance.yahoo.com). The daily return (close-

to-close) is calculated for each of the markets using the formulae:  $r_t = \ln\left(\frac{P_t}{P_{t-1}}\right)$ . The

market return series are referred to the name of the respective countries where the trading takes place. The plot of all the return variables, viz, India, Japan, USDJ (United States of America Dow Jones Industrial Average), HK (Hong Kong, China), SK

<sup>10</sup> This leads to 2,259 observations.

(Republic of Korea), SING (Singapore), and UK (United Kingdom) are presented in figures 1 to 7. They all show time-varying volatility which indicates that conditional heteroscedasticity should be included in the estimation.

Figure 1. India

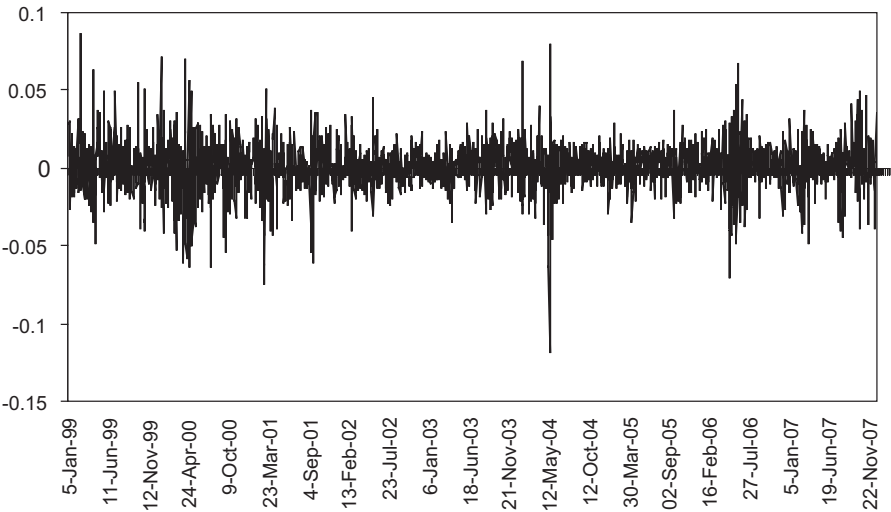


Figure 2. Japan

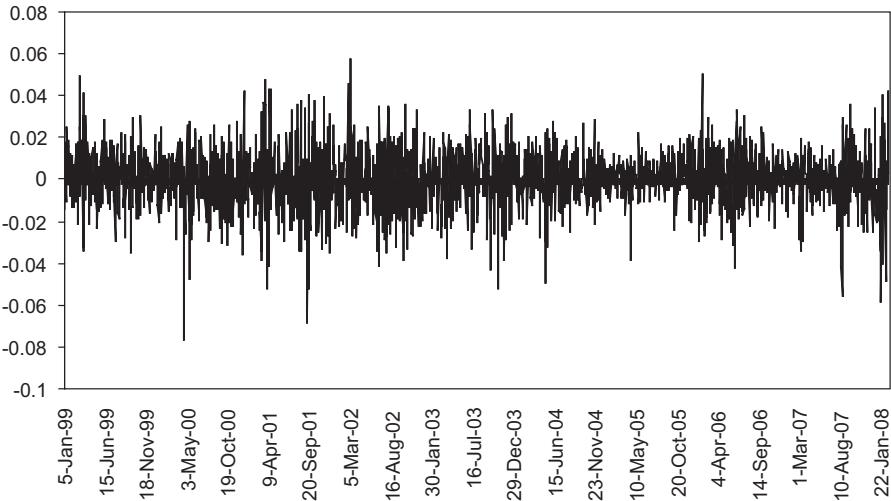


Figure 3. United States

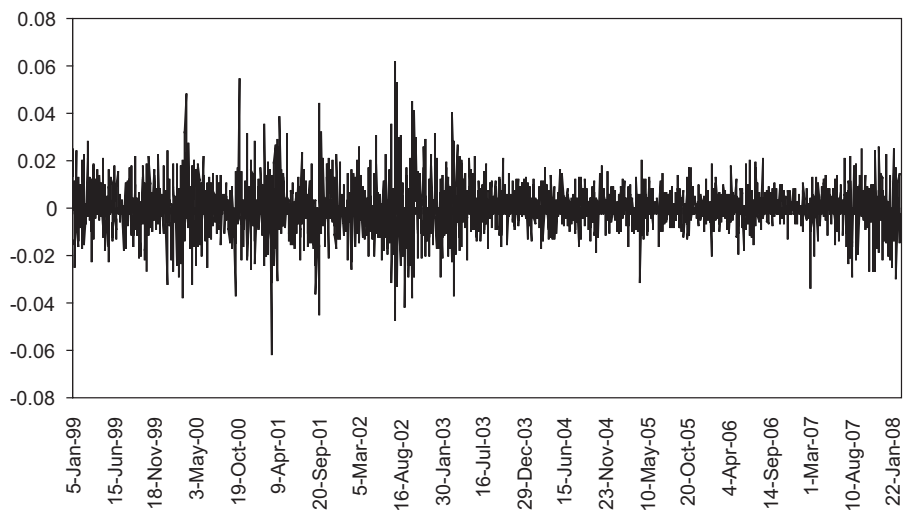


Figure 4. Hong Kong, China

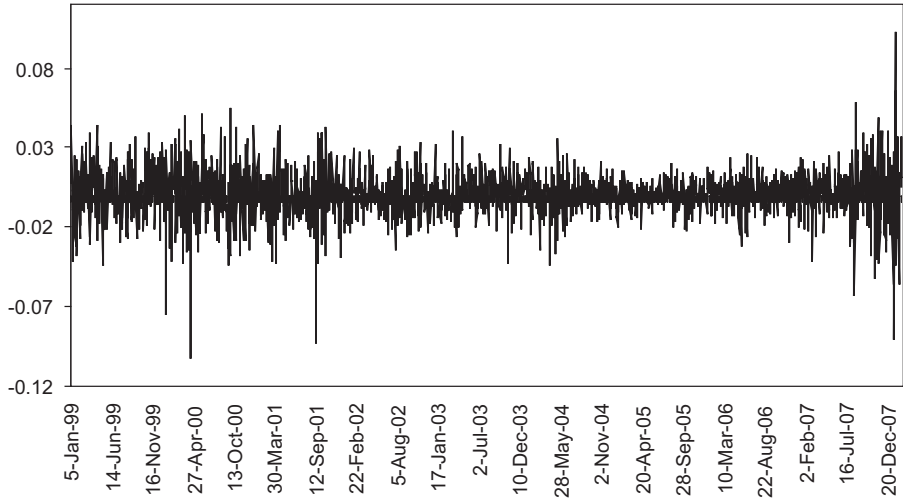


Figure 5. Republic of Korea

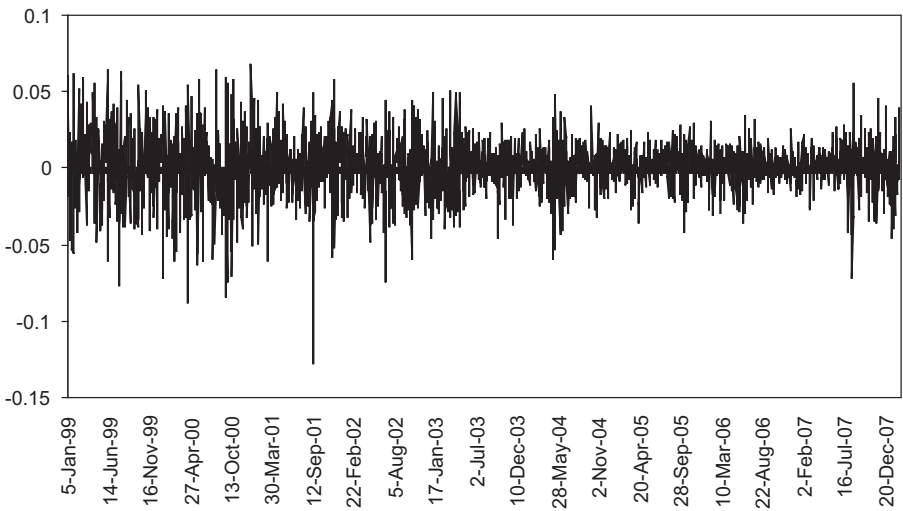


Figure 6. Singapore

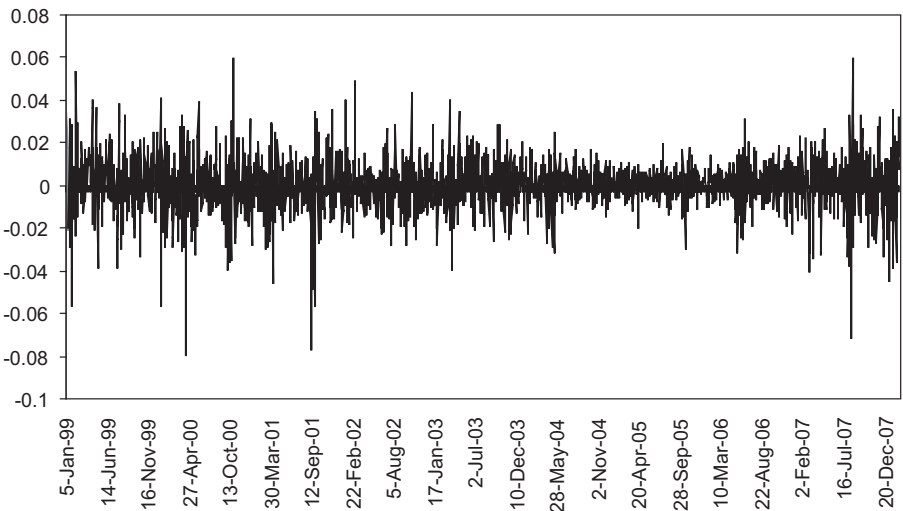
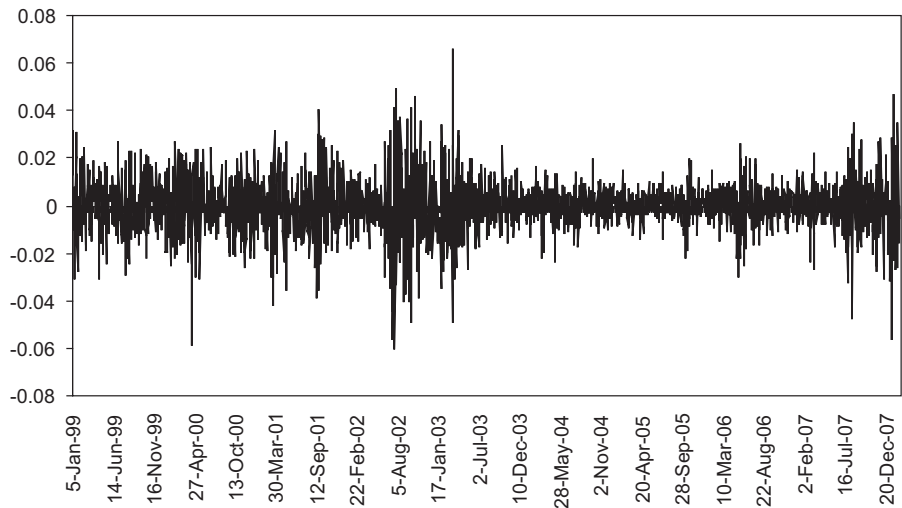


Figure 7. United Kingdom



Next, the stationarity of the return series is checked by augmented Dickey-Fuller as well as Phillips-Perron unit root tests. Then, the empirical analysis is undertaken in the framework of Vector Auto Regression (VAR) for conditional mean and MGARCH for conditional covariance matrix, both estimated simultaneously (Engle and Kroner, 1995; Bauwens and others, 2006). Hence, a VAR model is estimated to reveal the interrelations among the returns of these markets. The covariance of residuals is estimated by a multivariate GARCH. There are different specifications of multivariate GARCH model<sup>11</sup> and a diagonal Baba, Engle, Kraft and Kroner (1990) (DBEKK) model is estimated and used here.

In MGARCH model, the model structure is as follows:

$$r_t = \mu_t + \varepsilon_t \dots\dots\dots (1)$$

$$E(r_t|F_{t-1}) \equiv \mu_t = \Phi_0 + \Phi_1 r_{t-1} + \Phi_2 r_{t-2} + \dots\dots + \Phi_p r_{t-p}, \dots\dots\dots (2)$$

$$\varepsilon_t = H_t^{1/2} e_t, \dots\dots\dots (3)$$

<sup>11</sup> There are three commonly used model specifications, viz, constant conditional correlation (CCC) model by Bollerslev (1990), scalar BEKK model by Baba, Engle, Kraft and Kroner (1990) and Engle and Kroner (1995), and dynamic conditional correlation (DCC) model by Engle (2002).



$$E(\mathbf{e}_t \mathbf{e}_t' | \mathbf{F}_{t-1}) \equiv \mathbf{H}_t, \dots\dots\dots (4)$$

$$\mathbf{e}_t \sim N(0, \mathbf{I}), \dots\dots\dots (5)$$

Where  $\mathbf{r}_t$  is a  $k \times 1$  vector of stock market returns with conditional mean  $\boldsymbol{\mu}_t$ ,  $k$  is the number of stock markets considered ( $k = 7$  in this study),  $\mathbf{F}_t$  is the information at time  $t$  ( $t = 1, 2, \dots, 2259$ ),  $\mathbf{H}_t$  is a  $k \times k$  conditional covariance matrix,  $\mathbf{e}_t$  is from multivariate normal distribution  $N(0, \mathbf{I})$  and independent & identically distributed (i.i.d).

Now, in a Baba, Engle, Kraft and Kroner (BEKK) model<sup>12</sup> which is a multivariate extension of univariate GARCH model,  $\mathbf{H}_t$ 's positiveness is guaranteed by

$$\mathbf{H}_t = \boldsymbol{\delta} \boldsymbol{\delta}' + \mathbf{A} \mathbf{e}_{t-1} \mathbf{e}_{t-1}' \mathbf{A}' + \mathbf{B} \mathbf{H}_{t-1} \mathbf{B}' \dots\dots\dots (6)$$

where  $\boldsymbol{\delta}$ ,  $\mathbf{A}$  and  $\mathbf{B}$  are  $k \times k$  matrices of parameters to be estimated. Under this framework the conditional covariance matrix is influenced by a long term trend (e.g.  $\boldsymbol{\delta} \boldsymbol{\delta}'$ ), the estimated  $\mathbf{H}_t$  in the previous period (e.g.  $\mathbf{H}_{t-1}$ ) or the GARCH-term, and the one period lagged residuals (e.g.,  $\mathbf{e}_{t-1} \mathbf{e}_{t-1}'$ ) or the ARCH-term. This specification helps with clarification regarding how the conditional covariance matrix changes according to new information available and how fast the covariance matrix reverts to its long term level (Engle, 2004). The full BEKK model is reduced to a diagonal BEKK model when  $\mathbf{A}$  and  $\mathbf{B}$  are defined as diagonal matrices. While the full BEKK specification is able to model the volatility of and co-movement among the  $k$  time series more precisely, it becomes difficult to interpret the multiple parameters. As a result, the full BEKK model is primarily used to deal with low dimensional cases, such as the bivariate application in Cotter and Stevenson (2006). In this study, the diagonal BEKK model was used with the seven stock markets.

## IV. RESULTS

Before proceeding for the VAR-MGARCH model, the descriptive statistics of the returns series are first presented in table 3. Table 4 shows the correlation among the return variables. It is observed that, in general, Asian markets including India exhibit higher correlation among them when compared to the markets of the United Kingdom or the United States. Table 5 presents the results of the unit root tests. Both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test suggest that all the return series are stationary.

<sup>12</sup> It was adopted by Baba, Engle, Kraft and Kroner (1991) and Engle and Kroner (1995).

Table 3. Descriptive statistics of the return series

	INDIA	JAPAN	UK	USDJ	HK	SK	SING
Mean	0.00078	0.00001	-0.00001	0.00013	0.00040	0.00047	0.00035
Median	0.00147	0.00029	0.00048	0.00018	0.00057	0.00129	0.00065
Maximum	0.08592	0.05735	0.06533	0.06155	0.10184	0.06782	0.05944
Minimum	-0.11809	-0.07682	-0.06042	-0.06173	-0.10230	-0.12805	-0.07907
Std. Dev.	0.01610	0.01355	0.01159	0.01073	0.01438	0.01864	0.01219
Skewness	-0.34819	-0.25770	-0.16392	0.05033	-0.31094	-0.41321	-0.32111
Kurtosis	7.00888	4.87427	6.18904	5.81688	8.09763	5.81397	7.03098
Jarque-Bera	1 558.34	355.65	967.37	747.82	2 482.31	809.61	1 568.24
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	2 259	2 259	2 259	2 259	2 259	2 259	2 259

Table 4. Correlations of the returns

	INDIA	JAPAN	UK	USDJ	HK	SK	SING
INDIA	1.00						
JAPAN	0.28	1.00					
UK	0.19	0.27	1.00				
USDJ	0.09	0.16	0.45	1.00			
HK	0.38	0.50	0.32	0.13	1.00		
SK	0.30	0.48	0.26	0.12	0.54	1.00	
SING	0.34	0.44	0.34	0.17	0.61	0.50	1.00

Table 5. Unit root tests

	INDIA	UK	HK	SK	JAPAN	SING	USDJ
ADF-stat (level)	-27.36	-26.2174	-27.5555	-24.03853	-27.812	-26.0874	-24.1922
PP-stat	-44.015	-49.7197	-46.3387	-44.74084	-47.528	-44.5864	-48.7679
5 per cent Critical Value	-2.863	-1.940	-1.940	-1.940	-1.940	-1.940	-1.940

Note: The equation does not include intercept or trend for any of the series except India. For India it includes intercept only.

Next, the joint VAR-MGARCH model is simultaneously estimated. For specification of VAR, the order of the model is chosen according to the Akaike Information Criteria and the Schwarz Criteria, the values of which are shown in table 6. The lags 1, 2 and 3 are only taken into consideration because it is unlikely that the return in one market is following the return of the other markets more than three days back. The minimum value of the information criteria suggests that the VAR(1) model is the appropriate one. The estimation of diagonal BEKK (1,1) model is performed by the BHHH method prescribed by Berndt and others (1974). Here the  $\delta\delta'$  is taken as a rank one matrix. The estimated co-efficients of this joint VAR (1) – BEKK (1,1) model are presented in table 7, panels A and B.

From table 7, it is observed that the Indian market return is significantly influenced by not only its own past returns, but also those of others markets. The United States and the Republic of Korea are shown to exert positive influence while Hong Kong, China shows a negative influence. The positive co-efficients may be due to a feel-good-factor generated by the increase in returns in the developed markets like the United States and the Republic of Korea. The negative co-efficient with Hong Kong, China can possibly be explained through the activities of international investors. As both India and Hong Kong, China are preferred destinations of such investors, if the Hong Kong, China market return increases, the investors withdraw from India and invest there, resulting in a decline in the return in India. However, more interesting is the evidence that the past returns of the Indian market also have a positive and statistically significant impact on returns of Japan, the Republic of Korea, Singapore and Hong Kong, China.

Panel B of table 7 below shows the conditional variance matrix GARCH with  $M = \delta\delta'$  as constant co-efficient, specified as a rank one matrix in this model, A1 as the co-efficient matrix for the ARCH term and B1 as the co-efficient matrix of the GARCH term (see equation 6). All the co-efficients are significant at 5 per cent as well as 1 per cent levels of significance, indicating strong ARCH and GARCH effects of volatility in each of the markets. This implies that significant spillover of volatility from its own past values exists and that the persistence of such volatility is very high for all the markets, including India.

**Table 6. Choice of lag for estimation of VAR**

	VAR (1)	VAR (2)	VAR (3)
Akaike Information Criteria	<b>57 062.47</b>	57 154.22	57 197.92
Schwarz Criteria	<b>57 062.65</b>	57 154.57	57 198.43

Table 7. Joint VAR (1) – diagonal BEKK (1,1) model

Panel A: Mean Equation estimated as VAR (1)							
	INDIA	JAPAN	UK	USDJ	HK	SK	SING
INDIA (-1)	0.075*	0.059*	0.017	0.004	0.036*	0.067*	0.059*
p-value	0.000	0.000	0.122	0.761	0.010	0.001	0.000
JAPAN (-1)	-0.01599	-0.093*	-0.009	-0.0229	-0.112*	-0.124*	-0.055*
p-value	0.510	0.000	0.602	0.162	0.000	0.000	0.002
UK (-1)	0.039	0.175*	-0.204*	0.031**	0.129*	0.093*	0.062*
p-value	0.125	0.000	0.000	0.096	0.000	0.002	0.002
USDJ (-1)	0.187*	0.362*	0.302*	-0.0569*	0.382*	0.463*	0.325*
p-value	0.000	0.000	0.000	0.006	0.000	0.000	0.000
HK (-1)	-0.043	0.011	-0.007	-0.015	-0.023	0.012	-0.024
p-value	0.106	0.628	0.709	0.403	0.367	0.687	0.274
SK (-1)	0.035**	-0.004	0.003	0.037**	0.013	0.019	0.001
p-value	0.060	0.770	0.797	0.007	0.408	0.360	0.960
SING (-1)	0.025	0.029	-0.012	-0.026	0.038	0.022	-0.021
p-value	0.403	0.175	0.527	0.130	0.126	0.537	0.376
C	0.001066*	0.00004	0.00014	0.000379*	0.000458*	0.00058*	0.000375*
p-value	0.000	0.867	0.361	0.012	0.026	0.048	0.039
Adj. R-squared	0.04	0.13	0.09	0.00	0.17	0.12	0.11

Panel B: Transformed variance co-efficients with covariance specification as BEKK

$$H_t = \delta \delta' + A \varepsilon_{t-1} \varepsilon_{t-1}' A' + B H_{t-1} B'$$

	INDIA	JAPAN	UK	USDJ	HK	SK	SING
INDIA	0.0000089*						
p-value	0						
JAPAN	0.0000011*	0.0000001*					
p-value	0	0.0001					
UK	0.0000006*	0.0000001*	0.00000004*				
p-value	0	0.0003	0.0247				
USDJ	0.0000002**	0.00000003*	0.000000	0.000000			
p-value	0.0778	0.0844	0.13	0.3675			
HK	0.0000012*	0.0000002*	0.00000001*	0.00000003**	0.0000002*		
p-value	0	0	0.0003	0.0876	0.0001		
SK	0.0000002*	0.00000002*	0.00000001*	0.00000004**	0.0000002*	0.0000004*	
p-value	0	0	0.0001	0.0812	0	0	
SING	0.0000001*	0.00000001*	0.00000001*	0.00000002**	0.0000001*	0.0000002*	0.0000001*
p-value	0	0	0.0006	0.095	0	0	0.0003
A1	0.261911*	0.128444*	0.23215*	0.153515*	0.142866*	0.109547*	0.161099*
p-value	0	0	0	0	0	0	0
B1	0.947255*	0.992158*	0.976336*	0.989195*	0.990443*	0.993438*	0.988101*
p-value	0	0	0	0	0	0	0

Notes:  $\delta \delta' = M$  is a rank one matrix  
Estimation method: ARCH maximum likelihood (BHHH); Convergence achieved after 66 iterations.  
\* significant at 5%, \*\* significant at 10%.

The conditional variance plots of each return series are presented in figure 8. The conditional volatility for India shows continuous ups and downs with some sharp increases in a few instances. The conditional volatilities of Japan, the Republic of Korea, Singapore and Hong Kong, China show a perceptible declining trend over the sample period considered.

Since the main concern of the study is to find the relationship among the volatility of returns in the seven stock markets, the bi-variate conditional correlation obtained from the model must be studied. Figure 9 presents figures showing a conditional correlation between India and other stock markets. It should be noted that in most cases, the conditional correlations are not constant, but time-varying. In all the figures except those of the USDJ, it is observed that the correlation of the Indian market return with that of other markets has a perceptible positive trend, very distinct in cases of Japan, Singapore, the United Kingdom, the Republic of Korea and Hong Kong, China. The correlation between India and Japan has consistently increased over the sample period. This clearly indicates that volatility spillover does take place between Indian market return and all the Asian majors included in the study, with Japan being the most significant. However, volatility spillover from/to the United States is not that strong.

Figure 10 displays the plot of residuals from the estimated model. It is quite evident from the plot that the residuals corresponding to each of the return series are stationary.

## V. CONCLUSION

This paper explores the relationship between equity market volatility in India and that in other specified markets. Based on a daily data set from nearly a decade, such associations are analysed by estimating a joint VAR (1)-MGARCH (1,1) model. The uniqueness of this paper lies in its method of combining the VAR and multivariate GARCH models to explore the possibility of volatility transmission to India from markets like Japan, the United Kingdom and the United States, as well as emerging markets such as Singapore, the Republic of Korea and Hong Kong, China.

The analysis yields some very interesting findings: (a) Indian market return is significantly influenced by the past returns of its own and also of the Republic of Korea and of the United States positively and that of Hong Kong, China negatively; (b) there is evidence that the past returns of the Indian market have also significantly impacted the returns of Japan, the Republic of Korea, Singapore and Hong Kong, China. This can be linked to the findings of Mukherjee and Bose (2008) that were based on an older data set; (c) the Indian return volatility spillovers from/to Japan as well as other Asian markets are further confirmed by the time-varying trend of

Figure 8. Conditional Variance

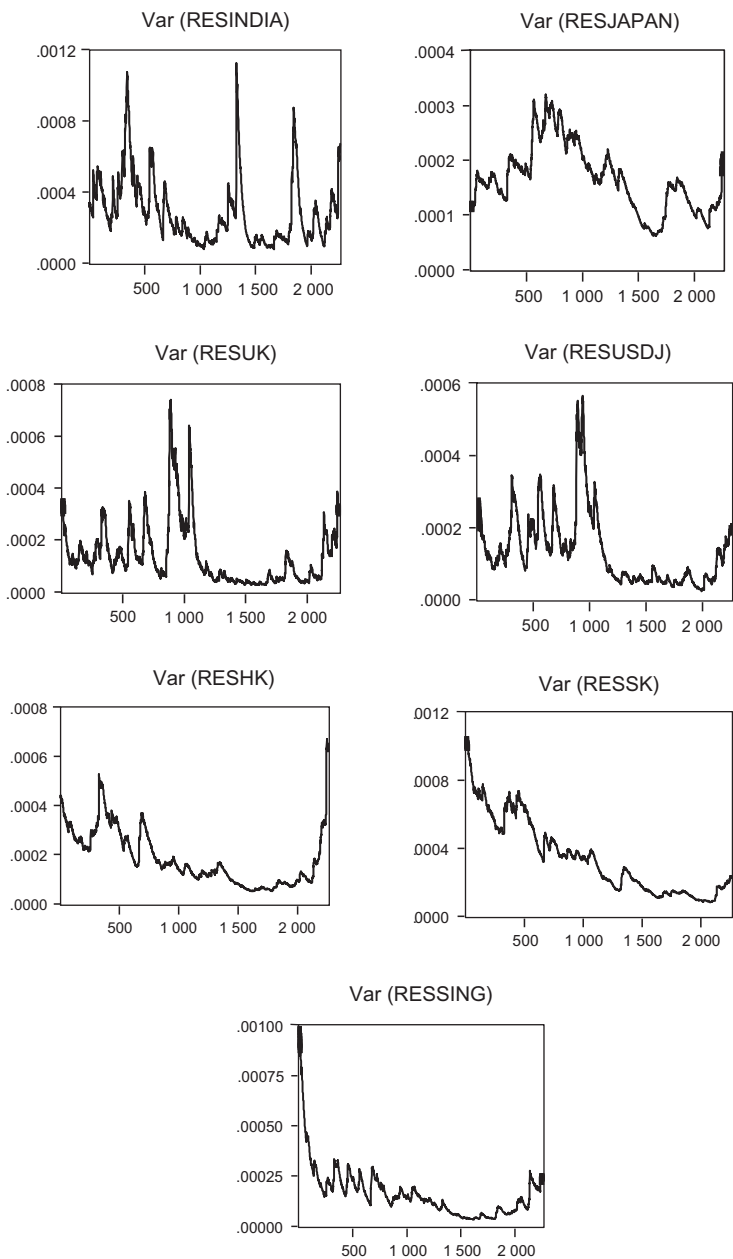
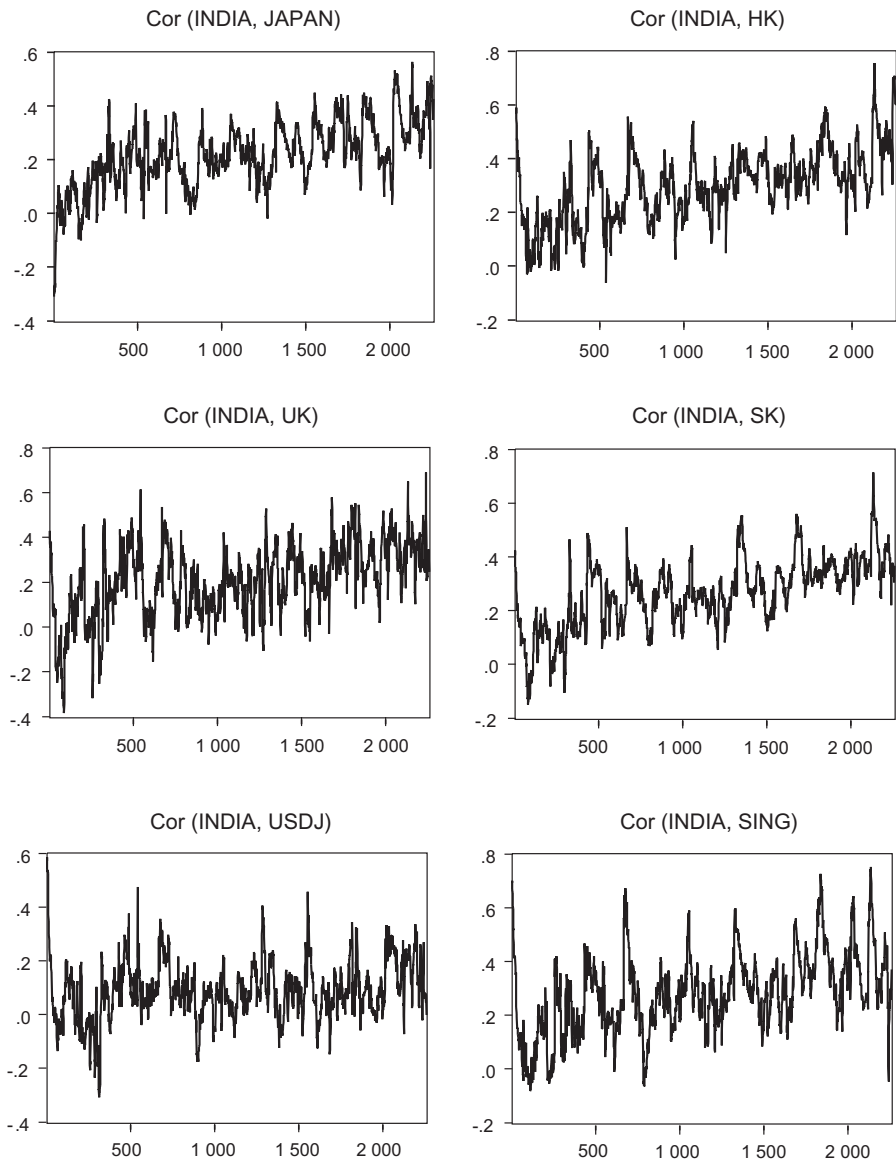
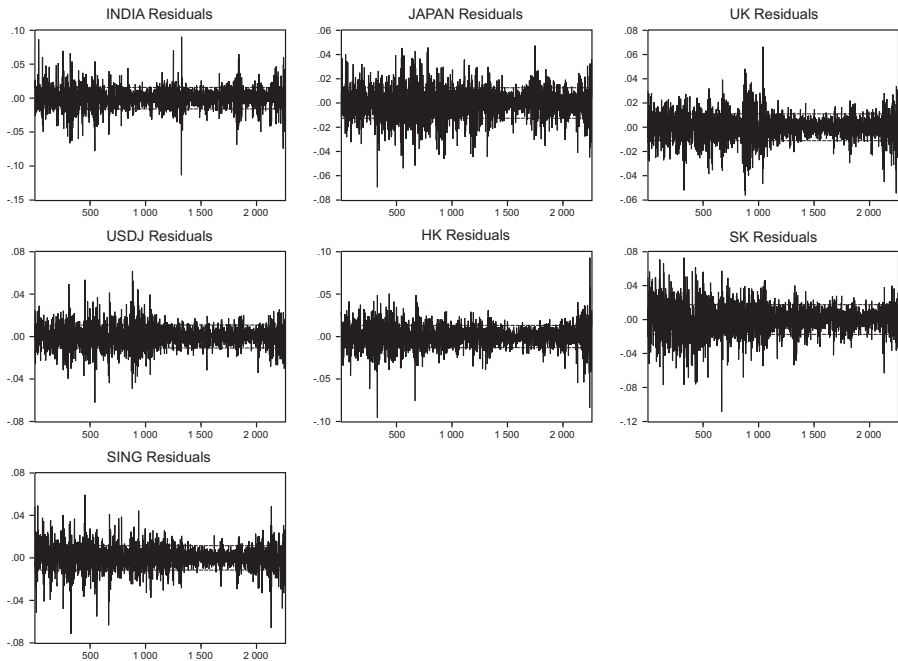


Figure 9. Conditional correlation between India and other markets



**Figure 10. Plots of residuals**

conditional correlations. The correlations show a clear positive trend over time, implying that they have increased over the years; and (d) unlike other Asian markets, the volatility in the Indian equity market does not exhibit any positive or negative trend in conditional volatility, but has evidenced some spikes over the past nine years.

Evidence suggests that Japan is the leader and has a unique role in the integration of Asian markets (Mukherjee and Bose, 2008). Since it has been observed that returns in the Indian market affect those of Japan, the United Kingdom, the United States, and Hong Kong, China, and that there is evidence of volatility spillovers from/to India to/from the Asian markets, it may not be improbable to consider India as another leader in the integration of capital markets in the Asian region in the near future. India might also have a decisive role in the integration of Asian markets in the future. The increased conditional correlations in the Asian region point towards more future integration of the Indian market with other Asian markets.

From the results shown in this study, there are some policy implications for an emerging market like India, which is yet to achieve the depth and width of a developed market. With international investors investing globally, markets have



become more integrated and their switching of funds between different markets has led to increased volatility in some markets. In India, positive trends in conditional correlation with other markets over the sample period have been observed, indicating more integration. Given the fact that India is also one of the favourite destinations of international investors in this region, it is quite possible that FII have contributed to this distinction. Whatever the reasons, there are two policy implications. One is to strengthen the domestic investor base. This is important because stock market participation by the majority of savers in India is quite low. One of the reasons is malpractice (see National Stock Exchange, 2001, in this context). A Securities and Exchange Board of India-National Council of Applied Economic Research (SEBI-NCAER) survey showed that alleged malpractices such as insider trading and low confidence in brokers, sub-brokers, company management and auditors were the main reasons for the lack of domestic savers' confidence in equity markets. Further regulatory authorities would need to look into alleged restrictive practices by FIIs such as the price rigging that has been suggested by Samal (1997). Strengthening the domestic investor base will act as a cushion against the uncertainty created by volatility in the market through the FII route. This may be achieved through the harmonization of corporate governance, accounting and listing, as well as other standard rules and practices followed in other international financial centres.

The second policy implication is keeping a constant watch on FIIs as containing volatility of such flows will contain the market volatility to a great extent. The occasional sudden increases in volatility observed in this study may have some relation to the volatility of foreign investment flows due to sudden withdrawals of funds by international investors. Volatility of portfolio flows is negatively influenced by the depth of domestic stock markets, the size and competitiveness of the domestic banking system and economic growth (Broto and others, 2008). Hence, policies should focus on these areas. For example, provision of better information on corporate and banking accounts will help investors assess the true risks and perhaps reduce herding behaviour, which is very often observed among FIIs.<sup>13</sup> Apart from that, whether or not to impose restrictions<sup>14</sup> on such investors can be considered by policy makers as the two-way volatility linkage implies more vulnerability for the not-very-developed Indian market compared to its developed counterparts.

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<sup>13</sup> Batra (2003) researched such behaviour among FIIs investing in India.

<sup>14</sup> For example, Malaysia imposed controls on foreign investment outflows in September 1998. These included, among other measures, limits on investments abroad (prior approval being required), control of offshore markets in the ringgit (residents were previously allowed to borrow ringgit from non-resident banks), and all ringgit earnings had to be held in the domestic currency for a year until conversion was allowed. By February 1999, however, Malaysia had modified the quantitative controls on capital to a price based system by adopting exit taxes.

Finally, if India indeed does have a role to play in the integration of the Asian region, as indicated by this study, then other countries will also have to be aware of the movement and volatility of the Indian market. In addition, there is a possible extension of this study. One can examine the route through which such volatility transmission is taking place. Whether the transmission is due primarily to international investors or to other reasons, further investigation is required, as this becomes important for policy makers.

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## ESTIMATION OF THE IMPACT OF RURAL ROADS ON HOUSEHOLD WELFARE IN VIET NAM

Nguyen Viet Cuong\*

*There is a consensus on the importance of rural roads when increasing economic growth and household welfare. However, little is known regarding the positive effect these roads will have on the welfare of households in Viet Nam. This paper aims to measure that effect. It is known that rural roads help households increase per capita income and working hours. The estimated impact of these roads on expenditure, the share of non-farm income, and children's schooling rate is not statistically significant.*

*JEL Classification:* O12, O22, R20.

*Key words:* Rural roads, impact evaluation, household welfare, household survey, Viet Nam.

### I. INTRODUCTION

Rural roads play a crucial role in the socio-economic development of rural areas (WB, 1994; Gannon and Liu, 1997; Lipton and Ravallion, 1995; Jalan and Ravallion, 2001). Jalan and Ravallion (2001) pointed out that rural roads are a necessary element for fostering rural income growth and reducing poverty. Rural roads can increase household income, including both farm and non-farm income. They increase agricultural productivity by reducing transportation costs, increasing access to advanced technology, increasing capital and enabling the employment of labour from outside local areas. Farmers also have better access to a greater number of markets, which facilitates the selling of goods. In addition, rural roads can also increase non-farm production and non-farm employment opportunities for local

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\* Researcher, Institute of Public Policy and Management, National Economics University, Hanoi, Viet Nam, E-mail: c\_nguyenviet@yahoo.com. Acknowledgement: The author would like to thank the two anonymous reviewers of the Asia-Pacific Development Journal, whose useful comments and suggestions greatly assisted in the preparation of this paper.

people. Increased income leads to an increase in consumption expenditure and a reduction in poverty. Additionally, rural roads result in an increased education level for children as the availability of a reliable road system reduces education costs and improves travel to and from schools.

There are several studies that measure the impact of roads on household welfare. Most find a positive connection between rural roads and non-farm income. Kwon (2000) found that in Indonesia economic growth has a larger effect on poverty reduction in areas with good roads. Roads are also found to have a positive effect on wage and employment. According to Balisacan and others (2002), roads have a remarkable direct and indirect effect on the welfare of the poor in the Philippines. Fan and others (2002) examined the effect of a variety of infrastructure projects on poverty reduction in China. They found that the effect of rural roads on poverty reduction is larger than the effect of other infrastructures. Other positive effects of roads on household income are found in Nicaragua and Peru (Corral and Reardon, 2001; Escobar, 2001).<sup>1</sup>

Viet Nam is a developing country with more than two-thirds of the population living in rural areas. Although Viet Nam is very successful in promoting economic growth and reducing poverty, poverty remains very high in rural areas, especially in the mountain regions. In 2006, 20 per cent of the poverty stricken population of Viet Nam lived in rural areas, while 36 per cent resided in the Northern mountainous regions (Viet Nam, 2006). State and international agencies work continuously to improve and maintain infrastructures, including roads. According to Donnges and others (2007), Viet Nam had a rural road network consisting of approximately 175,000 kilometres in 2007. Around 80 per cent of the population has access to an all-weather road (according to Viet Nam Household Living Standard Survey in 2006). This all-weather road can reach about 84 per cent of all rural cities and villages. In addition, nearly 54 per cent of provincial roads and 21 per cent of district roads are paved (Donnges and others, 2007).

The importance of rural roads in economic growth and household welfare is clear. However, there is little specific information regarding their impact upon household welfare in Viet Nam. Their impact on living standards is often mentioned in qualitative studies. Perhaps the two exceptions are Van de Walle and Cratty (2002) and Mu and Van de Walle (2007), who examined the effect of rural road rehabilitation projects on household welfares using data collected from the projects. They found that rural roads improve transportation to and from local markets in Viet Nam.

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<sup>1</sup> A review on empirical studies of the impact of rural roads can be found in Ali and Pernia (2003).

This paper particularly investigates the impact of rural roads on household welfare in Viet Nam. Welfare indicators include household income and consumption expenditure, working effort, non-farm income and the education rate and level of children. Unlike Van de Walle and Cratty (2002) and Mu and Van de Walle (2007), who measured the effect of specific road projects, this paper examines the effect of roads in rural Viet Nam using nationally representative data from Viet Nam Household Living Standard Surveys (VHLSSs) of 2004 and 2006. Therefore, estimates can be representative for the rural areas. In addition, the data sets used in this study are more recent than those used by Van de Walle and Cratty (2002) and by Mu and Van de Walle (2007) (who used data surveys before 2000). The condition and effect of a road system can change remarkably over time. Therefore, more recent data are required for capturing the current effect of rural roads. Two estimation methods employed in this study include fixed-effect regressions and difference-in-differences with propensity score matching, using panel data from VHLSSs 2004 and 2006.

The paper is structured into six sections. Section II introduces the data sets that were used in this analysis. Section III presents the definition of rural roads and discusses their availability in Viet Nam. Section IV presents estimation methods. Estimation results are presented in section V, showing the impact assessment of rural roads on household welfare. Finally, section VI provides the paper's conclusion.

## **II. DATA SOURCE**

This study relies on data from the Viet Nam Household Living Standard Surveys (VHLSSs) conducted in 2004 and 2006 by the General Statistics Office (GSO) of Viet Nam. The surveys contain household data which include basic demography, employment and labour force participation, education, health, income, expenditure, housing, fixed assets and durable goods, participation of households in poverty alleviation programs, and especially information on access to different sources of water for drinking and daily use. The surveys also contain commune data, which consist of demography and general situation of communes, general economic conditions and aid programs, non-farm employment, agriculture production, local infrastructure and transportation, education, health, and social affairs. Commune data can be merged with household data.

The samples of the 2004 and 2006 VHLSSs covered 9,188 and 9,189 households respectively. Information on commune characteristics was collected from 2,181 rural communes and was representative of the urban and rural areas of eight regions. The two surveys set up a panel data set of 4,216 households. This paper focuses on 3,204 of those households, which belong to 1,068 communes. It should be noted that in VHLSS, each village is sampled from each commune.

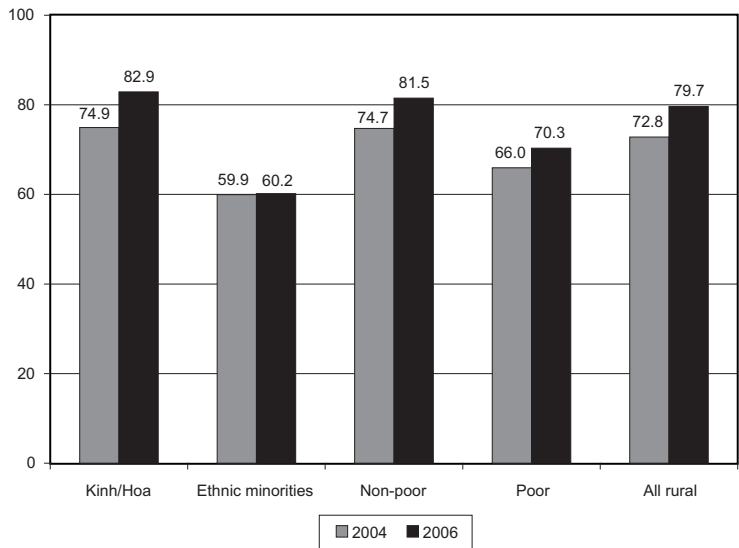


Therefore, the number of villages in this sample is also 1,068, and there are 3 households per village.

III. RURAL ROADS IN VIET NAM

Viet Nam has a highly dense population. The country is approximately 331,688 square kilometres in size, but had a population of nearly 86 million in 2009. Currently, Viet Nam is divided into 63 provinces, with each province further divided into districts. Smaller administrative units are called communes and villages. In 2009, there were 685 districts, 10,987 communes, and 125,710 villages. The average population of a village is around 685. In 2006, 97 per cent of rural communes contained an internal road that was passable by cars. However, the proportion of villages that could be reached by cars, in other words, having a connecting road that was passable by cars was lower. The proportion of households living in rural villages with a road which could be driven year round was 72.8 per cent in 2004 and 79.7 per cent in 2006 (see figure 1).<sup>2</sup>

Figure 1. Percentage of households living in villages with a good road



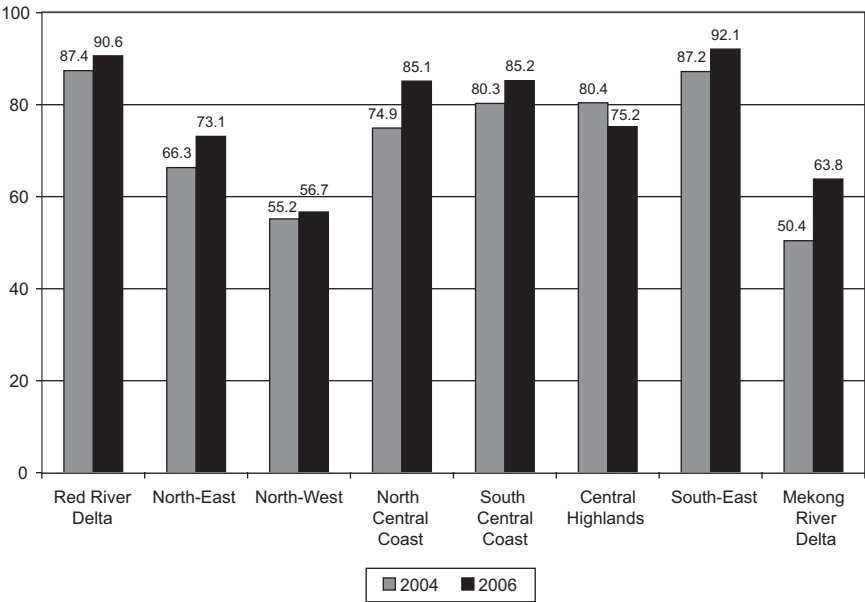
Source: Author's estimation from VHLSSs 2004 and 2006.

<sup>2</sup> In the VHLSSs, there is a question: 'For how many months during the past year was the road passable by cars?' The answers are coded from 1 month to 12 months. In this study, we define a village having a good road if the road is passable for 12 months.

Although the proportion of people living in a village with a good road increased between 2004-2006, there was still a large disparity in accessing a road between different groups (figure 1). In 2006, the proportion of households living in a village with access to a good road was 82.9 per cent for Kinh and Hoa and 60.2 per cent for ethnic minorities. The figure for the non-poor and the poor was 81.5 per cent and 70.3 per cent respectively. It should be noted that while the percentage of people accessing a road in villages increases for all household groups, the difference between the poor and the non-poor as well as the Kinh/Hoa and ethnic minority households tended to be larger between 2004 and 2006.

The proportion of households living in villages with roads varies spatially (figure 2), and the percentage of households living in a village with a passable road is much lower in the mountainous regions such as the North-East and the North-West than in delta regions such as the Red River Delta and the South-East.

**Figure 2. Percentage of households living in villages with a good road by regions**



Source: Author's estimation from VHLSSs 2004 and 2006.

#### IV. ESTIMATION METHOD

In this study, we use two methods to estimate the effect of rural roads on household welfare. This section describes these methods.

##### Fixed-effects regression

We use a similar specification for estimating the effect of rural roads on per capita income, per capita expenditure, work efforts, the share of non-farm income, and on children's education enrollment:

$$Y_{ijt} = \beta_0 + X_{ijt}\beta_1 + D_{jt}\beta_2 + C_{jt}\beta_3 + u_{ij} + v_j + \varepsilon_{ijt}, \quad t = 1, 2 \quad (1)$$

Where  $Y$  is a vector including income per capita, expenditure per capita, and other household welfare indicators, the subscripts  $i$ ,  $j$  and  $t$  refer to household  $i$  in village  $j$  at time  $t$  respectively.  $X$  is a vector of household variables.  $D$  is a dummy variable indicating whether a village has a good road.  $C$  is a vector of control variables with village characteristics.  $u_{ij}$  and  $v_j$  are unobserved time-invariant household and village characteristics respectively.  $\varepsilon_{ijt}$  is an error term. The summary statistics of dependent and independent variables is presented in annex tables A.1 and A.2. The impact of availability of a rural road in a village on household welfare is measured by  $\beta_2$ .

A common problem during an impact evaluation of rural households is the endogeneity of roads (Van de Walle, 2002). Households in an area with a large number of roads obviously have better conditions. It is more difficult to separate the effect of rural roads from the effect of other unobserved simultaneous factors at work. Technically, unobserved variables in regressions are correlated with rural roads. A standard method to deal with the endogeneity is instrumental variables regression. However, finding a valid instrument which is correlated with rural roads but not household welfare is a difficult task. We tried a variable of historic road network as the instrument for current rural roads, but this instrument does not work. Therefore, in this study we use fixed-effects regressions to estimate equation number 1. In fixed-effects regressions, the time invariant household and commune characteristics, including  $u_{ij}$  and  $v_j$  which are correlated with the rural road, are dropped from the model. It is expected that unobserved variables which are time-variant are not correlated with rural roads in the household welfare equation.

Time-invariant observed variables, like regional dummies, are also removed in fixed-effects regressions. To control time-invariant variables, we can interact these time-invariant observed variables with other time-variant observed variables and control these interactions in the fixed-effects regression.

### Difference-in-differences with propensity score matching

In addition to the fixed-effects regressions, we also used the difference-in-differences with propensity score matching. This method is ideally applied to evaluate the impact of a program when we have data on the treatment and control before and after the program implementation. For the impact of rural roads, the 2004 VHLSS was not clean baseline data since there were many households living in villages with a good road in 2004. In addition, there were a number of households in a village in which there was a good road in 2004 but not in 2006 due to the deterioration of road quality. To apply the difference-in-differences estimator, we limited our sample to households who lived in a village without a good road in 2004. This sample consisted of 686 households, of these households there were 281 households living in villages with a good road in 2006 and 405 households living in villages without a good road in 2006. The 281 households set up the treatment group, while the 405 households set up the control group.

These control and treatment groups can be used to measure the effect of rural roads. The difference-in-differences estimator can be expressed as follows:

$$\hat{ATT} = (\bar{Y}_T^{2006} - \bar{Y}_C^{2006}) - (\bar{Y}_T^{2004} - \bar{Y}_C^{2004}), \quad (2)$$

where  $\bar{Y}_T^{2004}$  and  $\bar{Y}_C^{2004}$  is the mean of a welfare indicator of interest of the treatment group (households living in villages with a good road in 2006) and the control group (households living in villages without a good road in 2006) in the year 2004 respectively.  $\bar{Y}_T^{2006}$  and  $\bar{Y}_C^{2006}$  are the welfare means of the treatment group and the control group in 2006 respectively.

The above parameter of the program impact is Average Treatment Effect on the Treated, which is most popular parameter in impact evaluation (Heckman and others, 1999). This is the expected impact of the rural roads on the treatment group. To remove the difference in welfare between the treatment and control groups, due to observed variables, we combined the difference-in-differences estimator with propensity score matching. The control group was constructed in a way so that it is similar to the treatment group. In order to construct a comparison group that was similar to the treatment group in observed characteristics, matched each household in the treatment group (participants) with households in the control group (non-participants) based on the similarity of observed characteristics. There were a large number of characteristic variables and finding "close" non-participants to match with a participant was not straightforward. A widely-used way to find the matched sample is the propensity score matching, which is the probability of being assigned into the program (Rosenbaum and Rubin, 1983). In this study, the matching based on the

propensity score is proposed to be employed.<sup>3</sup> The propensity score is often estimated using a probit or logit regression. Once the scores are estimated, participants are matched with non-participants according to the closeness of estimated scores. Standard errors of the estimator given by equation (2) can be estimated using bootstrap.

Compared with the fixed-effects regressions, the difference-in-differences with propensity score matching has an advantage in that it does not rely on the assumption of the functional form of welfare outcomes. However, in this study since we restricted our sample when using the difference-in-differences with propensity score matching, estimates from this method should be interpreted for this restricted sample, not for the entire population.

## V. ESTIMATION RESULTS

Table 1 presents the coefficient of rural roads in regressions of different household welfare indicators. Four models were used: ordinary least squares (OLS), random-effects, fixed-effects without and fixed-effects with interactions between regional dummies and household demographic variables. OLS and random-effects models are presented for comparison and examination of potential biases caused by unobserved time-invariant variables. For income and expenditure, in addition to linear models presented by equation number 1, we also use semi-log functions. Table 1 reports only the estimates of rural roads, and the full regressions are reported in annex tables A.3 to A.9.

It shows that rural roads have a positive effect on household income. The estimates of the impact on income are quite similar in different models. According to fixed-effect linear regression with interactions, rural roads increase per capita income by around VND<sup>4</sup> 858,000. The fixed-effect regressions log of per capita income indicates an increase of approximately 8.8 per cent. It should be noted that income and expenditure of 2004 are adjusted to reflect those of 2006.

The impact on per capita expenditure is positive, but not statistically significant in fixed-effect regressions. The point estimate of the impact on expenditure is much lower than the estimate on income. It implies that rural roads have positive effects on households' investment and saving. In addition, expenditure is less fluctuated than income. Households with low income still have to keep

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<sup>3</sup> Other matching methods can be subclassification (see, e.g., Cochran and Chambers, 1965; Cochran, 1968) and covariate matching (Rubin, 1978; 1979).

<sup>4</sup> Viet Nam Dong.

consumption expenditure at a sufficient level. Thus, rural roads can have a minimal impact on expenditure.

Households in a village with a good road are more likely to have higher working hours per person than those without one. Although the effect estimated at around 37 hour per person per year is small, it implies the importance of rural roads in increasing employment. The effect of rural roads on the share of non-farm income in total household income and the schooling rate of children between the ages of 6 and 17 is not statistically significant.

**Table 1. The estimates of the impact of rural using regressions**

Dependent variables (outcome variables)	Regression models			
	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Per capita income (thousand VND)	527.6*** [189.4]	666.3*** [183.7]	867.2*** [273.8]	858.0*** [278.4]
Log of per capita income (thousand VND)	0.091*** [0.019]	0.100*** [0.017]	0.091*** [0.021]	0.088*** [0.021]
Per capita expenditure (thousand VND)	227.3*** [86.6]	228.9*** [82.9]	205.4 [144.0]	214.4 [146.8]
Log of per capita expenditure (thousand VND)	0.056*** [0.016]	0.042*** [0.014]	0.014 [0.019]	0.014 [0.019]
Annual working hours per capita	40.28*** [14.02]	38.02*** [13.76]	34.34* [18.69]	37.13** [18.84]
The share of non-farm income	0.040*** [0.010]	0.023*** [0.009]	0.004 [0.010]	0.002 [0.010]
Proportion of children attending school	0.010 [0.011]	0.001 [0.011]	0.002 [0.020]	-0.025 [0.020]

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: In fixed-effects models with interactions, we interacted regional dummies with three demographic variables of households, including size, proportion of members under 16 and proportion of members over 60. There are 21 interaction terms controlled in the fixed-effects models.

Income and expenditure data of the 2004 VHLSS are deflated to the 2006 price for comparison.

Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

As mentioned in section III, most communes have a road which leads to the commune center. The impact of a village road can depend on the closeness of a village to its commune road. In the VHLSS, we did not have data on the distance. Although the distance between village and commune road can increase or mitigate the actual effect of the road, it does not make our estimate biased as the distance from village to commune road is assumed to be fixed during the time of the study, 2004 to 2006, and can therefore be eliminated by the fixed-effects regressions.

The second method to measure the impact of rural roads is the difference-in-differences with propensity score matching. The first step is to predict a propensity score using a probit regression. Annex table A.10 presents this regression. The dependent variable is a binary one indicating whether or not a household lived in a village with a good road in 2006. The explanatory variables are the characteristics of households in 2004. The estimated propensity score is presented in annex figure A.1, which indicates a large common support between the treatment and control groups. It means that we were able to select similar households from the control group to match households in the treatment group.

The second step is to construct the control group. Depending on the number of non-participants matched with participants, there can be nearest-neighbours matching and kernel matching. Since standard errors computed by bootstrap can be invalid for the nearest-neighbours matching (Abadie and Imbens, 2006), we used kernel matching with a bandwidth of 0.05. Kernel matching, using other bandwidths such as 0.01 and 0.03, produces similar estimates, but they are not represented here. Table 2 presents the estimates from the difference-in-differences with propensity score matching. It shows very similar estimates as the fixed-effects regressions. Living in a village with a good road can increase household income and working hours. The effect on consumption and child education is positive, but not statistically significant.

## VI. CONCLUSIONS

Viet Nam has achieved remarkable economic growth and poverty reduction over the past 20 years, with the average annual rate of economic growth of approximately 7 per cent. The poverty rate decreased from 58 per cent in 1993 to 37 per cent in 1998 and then to 16 per cent in 2006. Household living standards have been also steadily improved. Infrastructures, especially roads, have been playing important roles in increasing household welfare in Viet Nam. Using VHLSS data, this paper makes an effort to estimate the impact of rural roads on household welfare and shows that they have a positive effect on household income. Rural roads increase per capita income by around VND 858,000, or equivalently 8.8 per cent of mean

**Table 2. The estimates of the impact of rural using difference-in-differences with propensity score matching (kernel matching with bandwidth of 0.05)**

Dependent variables (outcome variables)	2004			2006			Diff-in-diff
	Treatment	Control	Diff	Treatment	Control	Diff	
	(1)	(2)	(3)=(1)-(2)	(4)	(5)	(6)=(4)-(5)	(7)=(6)-(3)
Per capita income (thousand VND)	5 619.0*** [306.9]	4 758.4*** [176.4]	860.6** [347.8]	7 454.0*** [552.6]	5 739.5*** [210.0]	1 714.6*** [568.4]	854.0** [422.6]
Per capita expenditure (thousand VND)	4 032.9*** [169.5]	3 327.3*** [112.8]	705.6*** [211.4]	4 770.1*** [214.8]	3 862.9*** [104.1]	907.1*** [364.4]	201.5 [140.6]
Annual working hours per capita	865.4*** [26.7]	946.0*** [30.7]	-80.6* [43.1]	912.3*** [30.3]	919.6*** [29.7]	-7.3 [45.2]	73.3* [42.1]
The share of non-farm income	0.316*** [0.019]	0.326*** [0.019]	-0.010 [0.023]	0.321*** [0.018]	0.333*** [0.019]	-0.011 [0.021]	-0.001 [0.019]
Proportion of children attending school	0.484*** [0.030]	0.475*** [0.029]	0.010 [0.020]	0.451*** [0.029]	0.439*** [0.029]	0.011 [0.022]	0.002 [0.014]

Notes: (i) Income and expenditure data of the 2004 VHLSS are deflated to the 2006 price for comparison.

(ii) Standard errors are indicated by brackets and are calculated using bootstrap with 500 replications.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

income. However, the impact on per capita expenditure is much lower. The estimated amount is positive, but not statistically significant in fixed-effect regressions. It implies that rural roads have positive effects on households' investment and saving. It is interesting that households living in a village with a good road are more likely to have longer working hours per person than households living in a village without a rural road. The effects of rural roads on the percentage of non-farm income or level of education in total household income are not statistically significant.

The findings suggest several policy implications for Viet Nam. As noted, rural roads are an important factor for economic growth. At the household level they increase employment and income. Thus, policies geared towards improving household access to these roads are important. However, at least in the short-term a rural road policy is not effective in reducing poverty if said poverty is measured based on a consumption indicator. Finally, roads are not effective at increasing the share of non-farm income and the level of education. The implication is that improving rural roads simply increases access of people to public services and markets. Improving rural roads alone is not enough as other infrastructures, such as markets and schools, need to be upgraded.



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## APPENDIX

Annex table A.1. Summary statistics of variables in 2004

Variable	Type	Households living in a village with good road		Households living in a village without good road	
		Mean	Std. Dev.	Mean	Std. Dev.
Per capita income (thousand VND)	Continuous	5 892.3	4 983.9	5 382.4	4 744.3
Per capita expenditure (thousand VND)	Continuous	4 231.8	2 709.8	3 846.0	2 756.8
Annual working hours per capita	Continuous	923.1	507.3	868.5	462.6
Proportion of non-farm income	Continuous	0.3859	0.3197	0.3120	0.3200
Proportion of children attending school	Continuous	0.5246	0.4920	0.5395	0.4850
Household size	Continuous	4.3487	1.6931	4.6653	1.8194
Proportion of members under 16	Continuous	0.2553	0.2192	0.2688	0.2147
Proportion of members over 60	Continuous	0.1262	0.2578	0.1083	0.2285
Proportion of members having technical diploma	Continuous	0.0524	0.1386	0.0312	0.1146
Proportion of members having post-secondary diploma	Continuous	0.0157	0.0785	0.0080	0.0553
Annual crop land (10 000m <sup>2</sup> )	Continuous	0.3581	0.6324	0.5416	0.8524
Perennial crop land (10 000m <sup>2</sup> )	Continuous	0.1281	0.6440	0.1159	0.5298
Forestry crop land (10 000m <sup>2</sup> )	Continuous	0.0955	0.6055	0.2776	2.0903
Water surface (10 000m <sup>2</sup> )	Continuous	0.0134	0.1255	0.0717	0.3794
Living in a village with market	Dummy	2.5283	4.4057	4.3043	8.7499
Red River Delta	Dummy	0.2700	0.4441	0.0903	0.2868
North-East	Dummy	0.1441	0.3512	0.1817	0.3858
North-West	Dummy	0.0354	0.1847	0.0850	0.2791
North Central Coast	Dummy	0.1233	0.3288	0.1360	0.3430
South Central Coast	Dummy	0.0990	0.2987	0.0584	0.2347
Central Highlands	Dummy	0.0645	0.2457	0.0393	0.1945
South-East	Dummy	0.1140	0.3179	0.0436	0.2042
Mekong River Delta	Dummy	0.1498	0.3570	0.3656	0.4818
Number of observations		2 263		941	

Source: Author's estimation from VHLSSs 2004 and 2006.

Note: Income and expenditure data of the 2004 VHLSS are deflated to the 2006 price for comparison.

**Annex table A.2. Summary statistics of variables in 2006**

Variable	Type	Households living in a village with good road		Households living in a village without good road	
		Mean	Std. Dev.	Mean	Std. Dev.
Per capita income (thousand VND)	Continuous	7 383.2	7 209.3	6 407.9	5 461.9
Per capita expenditure (thousand VND)	Continuous	4 917.9	3 042.9	4 268.3	2 652.0
Annual working hours per capita	Continuous	947.2	530.5	894.6	517.8
Proportion of non-farm income	Continuous	0.4048	0.3326	0.2959	0.3072
Proportion of children attending school	Continuous	0.4841	0.4946	0.4770	0.4868
Household size	Continuous	4.2343	1.6534	4.6657	1.9128
Proportion of members under 16	Continuous	0.2237	0.2106	0.2459	0.2150
Proportion of members over 60	Continuous	0.1346	0.2666	0.1208	0.2417
Proportion of members having technical diploma	Continuous	0.0561	0.1438	0.0333	0.1150
Proportion of members having post-secondary diploma	Continuous	0.0160	0.0802	0.0107	0.0719
Annual crop land (10 000m <sup>2</sup> )	Continuous	0.3765	0.7608	0.6339	0.9231
Perennial crop land (10 000m <sup>2</sup> )	Continuous	0.1322	0.5624	0.1588	0.6150
Forestry crop land (10 000m <sup>2</sup> )	Continuous	0.1478	1.3430	0.3138	2.0670
Water surface (10 000m <sup>2</sup> )	Continuous	0.0252	0.3463	0.0750	0.3942
Living in a village with market	Dummy	2.5423	4.3902	5.8114	12.9226
Red River Delta	Dummy	0.2535	0.4351	0.0882	0.2838
North-East	Dummy	0.1431	0.3503	0.1977	0.3986
North-West	Dummy	0.0340	0.1812	0.1067	0.3089
North Central Coast	Dummy	0.1379	0.3449	0.0882	0.2838
South Central Coast	Dummy	0.0952	0.2935	0.0583	0.2345
Central Highlands	Dummy	0.0560	0.2299	0.0612	0.2398
South-East	Dummy	0.1100	0.3129	0.0341	0.1817
Mekong River Delta	Dummy	0.1703	0.3760	0.3656	0.4819
Number of observations		501		703	

Source: Author's estimation from VHLSSs 2004 and 2006.

Note: Income and expenditure data of the 2004 VHLSS are deflated to the 2006 price for comparison.

**Annex table A.3. Regressions of per capita income (thousand VND)**

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Living in a village with good road	527.6*** [189.4]	666.3*** [183.7]	867.2*** [273.8]	858.0*** [278.4]
Proportion of members under 16	-2 242.8*** [356.6]	-2 196.9*** [394.5]	-521.4 [1 067.6]	7 127.70 [6 778.3]
Proportion of members over 60	-2 185.0*** [299.8]	-2,180.6*** [343.4]	-1 445.2* [857.0]	28 494.6** [13 281.2]
Household size	-885.4*** [130.5]	-1 009.1*** [142.3]	-1 592.3*** [270.5]	-1 413.6** [588.4]
Household size squared	24.9** [11.5]	34.3*** [12.5]	78.0*** [20.2]	98.6*** [29.6]
Proportion of members having a technical diploma	7 904.3*** [503.2]	6 707.9*** [516.4]	2 827.7*** [937.9]	2 696.5*** [956.2]
Proportion of members having post-secondary diploma	15 147.6*** [879.9]	12 625.1*** [933.3]	3 021.70 [2 934.1]	3 048.50 [2 956.7]
Annual crop land (10 000 m <sup>2</sup> )	1 524.6*** [93.8]	1 548.3*** [103.0]	1 776.1*** [478.5]	1 818.2*** [492.4]
Perennial crop land (10 000 m <sup>2</sup> )	1 792.4*** [116.6]	1 407.7*** [123.6]	-95.5 [570.7]	-53 [583.3]
Forestry crop land (10 000 m <sup>2</sup> )	113.1** [48.1]	107.2** [49.1]	94.9 [112.2]	100.3 [114.5]
Water surface (10 000 m <sup>2</sup> )	1 659.3*** [222.0]	1 450.6*** [216.8]	856.1*** [266.9]	864.4*** [278.6]
Living in a village with market	-54.1*** [10.7]	-36.5*** [10.1]	-9.5 [7.0]	-8.7 [7.3]
Red River Delta	Omitted			
North-East	-800.7*** [227.9]	-834.2*** [274.8]		
North-West	-2 574.8*** [356.8]	-2 820.2*** [426.5]		
North Central Coast	-947.0*** [235.6]	-1 001.3*** [286.4]		
South Central Coast	-635.3** [266.4]	-660.0** [324.3]		
Central Highlands	-1 020.4*** [331.2]	-897.2** [398.6]		

Annex table A.3. (continued)

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
South-East	1 316.5*** [264.2]	1 439.5*** [320.5]		
Mekong River Delta	742.6*** [215.3]	753.5*** [257.5]		
Time dummy (2006 = 1)	1 151.8*** [132.9]	1 151.0*** [97.8]	1 209.8*** [109.1]	1 195.1*** [108.4]
Interactions between regions and household characteristics	No	No	No	Yes
Constant	8 416.6*** [418.4]	8 715.0*** [453.7]	9 897.8*** [740.7]	9 703.6*** [784.1]
Observations	6 408	6 408	6 408	6 408
R-squared	0.23	0.23	0.11	0.12
Number of households	3 204	3 204	3 204	3 204

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Annex table A.4. Regressions of log of per capita income**

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Living in a village with good road	0.091*** [0.019]	0.100*** [0.017]	0.091*** [0.021]	0.088*** [0.021]
Proportion of members under 16	-0.561*** [0.035]	-0.506*** [0.039]	-0.202*** [0.077]	1.09 [0.983]
Proportion of members over 60	-0.324*** [0.030]	-0.319*** [0.034]	-0.228** [0.101]	2.329 [1.776]
Household size	-0.068*** [0.013]	-0.100*** [0.014]	-0.187*** [0.029]	-0.197*** [0.054]
Household size squared	-0.001 [0.001]	0.001 [0.001]	0.008*** [0.002]	0.011*** [0.003]
Proportion of members having a technical diploma	1.003*** [0.050]	0.787*** [0.049]	0.330*** [0.068]	0.321*** [0.070]
Proportion of members having post-secondary diploma	1.509*** [0.087]	1.234*** [0.090]	0.476*** [0.136]	0.481*** [0.140]
Annual crop land (10 000 m <sup>2</sup> )	0.120*** [0.009]	0.127*** [0.010]	0.154*** [0.017]	0.154*** [0.017]
Perennial crop land (10 000 m <sup>2</sup> )	0.147*** [0.012]	0.118*** [0.012]	0.041** [0.019]	0.044** [0.019]
Forestry crop land (10 000 m <sup>2</sup> )	0.013*** [0.005]	0.009* [0.005]	0.005 [0.008]	0.006 [0.008]
Water surface (10 000 m <sup>2</sup> )	0.181*** [0.022]	0.145*** [0.020]	0.089** [0.036]	0.089** [0.037]
Living in a village with market	-0.009*** [0.001]	-0.005*** [0.001]	-0.001 [0.001]	-0.001 [0.001]
Red River Delta	Omitted			
North-East	-0.092*** [0.023]	-0.106*** [0.028]		
North-West	-0.432*** [0.035]	-0.489*** [0.043]		
North Central Coast	-0.164*** [0.023]	-0.177*** [0.029]		
South Central Coast	-0.089*** [0.026]	-0.098*** [0.033]		
Central Highlands	-0.064* [0.033]	-0.077* [0.041]		

Annex table A.4. (continued)

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
South-East	0.170*** [0.026]	0.175*** [0.033]		
Mekong River Delta	0.124*** [0.021]	0.118*** [0.026]		
Time dummy (2006 = 1)	0.171*** [0.013]	0.172*** [0.009]	0.177*** [0.009]	0.177*** [0.009]
Interactions between regions and household characteristics	No	No	No	Yes
Constant	8.789*** [0.041]	8.867*** [0.044]	9.025*** [0.081]	8.983*** [0.085]
Observations	6 407	6 407	6 407	6 407
R-squared	0.34	0.34	0.23	0.24
Number of households	3 204	3 204	3 204	3 204

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.



**Annex table A.5. Regressions of per capita expenditure (thousand VND)**

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Living in a village with good road	227.3*** [86.6]	228.9*** [82.9]	205.4 [144.0]	214.4 [146.8]
Proportion of members under 16	-2 462.5*** [163.0]	-2 321.9*** [180.5]	-1 182.8*** [324.1]	3 675.60 [2 655.9]
Proportion of members over 60	-871.1*** [137.1]	-910.1*** [157.8]	-786.4 [530.4]	13 126.6* [7 182.1]
Household size	-451.5*** [59.7]	-554.2*** [65.0]	-931.9*** [162.3]	-982.8*** [306.2]
Household size squared	14.0*** [5.3]	20.5*** [5.7]	42.6*** [13.2]	49.6*** [13.9]
Proportion of members having technical diploma	4 664.4*** [230.0]	3 545.8*** [234.4]	539.3 [448.8]	475.8 [446.9]
Proportion of members having post-secondary diploma	7 621.0*** [402.2]	6 173.9*** [425.0]	878.8 [1 341.7]	845.8 [1 275.8]
Annual crop land (10 000 m <sup>2</sup> )	283.5*** [42.9]	258.1*** [47.1]	181.0** [86.6]	169.3* [88.5]
Perennial crop land (10 000 m <sup>2</sup> )	435.8*** [53.3]	419.5*** [56.3]	326.3*** [90.1]	318.5*** [89.8]
Forestry crop land (10 000 m <sup>2</sup> )	1.1 [22.0]	-15.9 [22.3]	-51.6*** [18.7]	-50.7** [21.2]
Water surface (10 000 m <sup>2</sup> )	458.2*** [101.5]	341.9*** [97.9]	103.4 [201.5]	150 [177.4]
Living in a village with market	-28.6*** [4.9]	-16.9*** [4.6]	-3.1 [3.5]	-0.9 [3.6]
Red River Delta	Omitted			
North-East	-428.6*** [104.2]	-475.6*** [127.2]		
North-West	-1 052.9*** [163.1]	-1 205.2*** [197.2]		
North Central Coast	-470.2*** [107.7]	-524.8*** [132.7]		
South Central Coast	74.8 [121.8]	34.3 [150.2]		
Central Highlands	-36.5 [151.4]	-119.5 [184.4]		

Annex table A.5. (continued)

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
South-East	1 285.1*** [120.8]	1 268.2*** [148.4]		
Mekong River Delta	722.6*** [98.4]	677.0*** [119.1]		
Time dummy (2006 = 1)	496.1*** [60.8]	502.9*** [43.4]	531.4*** [48.1]	538.1*** [48.5]
Interactions between regions and household characteristics	No	No	No	Yes
Constant	5 851.9*** [191.3]	6 222.7*** [207.4]	7 455.7*** [490.6]	7 200.7*** [527.7]
Observations	6 408	6 408	6 408	6 408
R-squared	0.30	0.29	0.12	0.05
Number of households	3 204	3 204	3 204	3 204

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Annex table A.6. Regressions of log of per capita expenditure

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Living in a village with good road	0.056*** [0.016]	0.042*** [0.014]	0.014 [0.019]	0.014 [0.019]
Proportion of members under 16	-0.609*** [0.030]	-0.556*** [0.032]	-0.324*** [0.056]	0.753 [0.539]
Proportion of members over 60	-0.222*** [0.025]	-0.219*** [0.029]	-0.169** [0.075]	1.966 [2.069]
Household size	-0.053*** [0.011]	-0.079*** [0.012]	-0.135*** [0.024]	-0.174*** [0.052]
Household size squared	-0.001 [0.001]	0.000 [0.001]	0.004* [0.002]	0.006*** [0.002]
Proportion of members having technical diploma	0.843*** [0.042]	0.566*** [0.041]	0.077 [0.062]	0.071 [0.063]
Proportion of members having post-secondary diploma	1.226*** [0.073]	0.870*** [0.075]	0.074 [0.135]	0.052 [0.128]
Annual crop land (10 000 m <sup>2</sup> )	0.053*** [0.008]	0.051*** [0.008]	0.053*** [0.014]	0.051*** [0.015]
Perennial crop land (10 000 m <sup>2</sup> )	0.095*** [0.010]	0.082*** [0.010]	0.054*** [0.013]	0.053*** [0.014]
Forestry crop land (10 000 m <sup>2</sup> )	0.002 [0.004]	-0.005 [0.004]	-0.013*** [0.003]	-0.012*** [0.004]
Water surface (10 000 m <sup>2</sup> )	0.096*** [0.019]	0.062*** [0.017]	0.018 [0.026]	0.024 [0.024]
Living in a village with market	-0.009*** [0.001]	-0.004*** [0.001]	0 [0.001]	0.001 [0.001]
Red River Delta	Omitted			
North-East	-0.137*** [0.019]	-0.157*** [0.024]		
North-West	-0.405*** [0.030]	-0.469*** [0.037]		
North Central Coast	-0.153*** [0.020]	-0.170*** [0.025]		
South Central Coast	-0.044** [0.022]	-0.056* [0.029]		
Central Highlands	-0.108*** [0.028]	-0.133*** [0.035]		

Annex table A.6. (continued)

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
South-East	0.186*** [0.022]	0.185*** [0.028]		
Mekong River Delta	0.112*** [0.018]	0.096*** [0.022]		
Time dummy (2006 = 1)	0.123*** [0.011]	0.125*** [0.007]	0.130*** [0.007]	0.130*** [0.007]
Interactions between regions and households characteristics	No	No	No	Yes
Constant	8.533*** [0.035]	8.629*** [0.037]	8.757*** [0.070]	8.710*** [0.072]
Observations	6 408	6 408	6 408	6 408
R-squared	0.38	0.36	0.19	0.11
Number of households	3 204	3 204	3 204	3 204

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Annex table A.7. Regressions of annual working hours per capita**

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Living in a village with good road	40.28*** [14.02]	38.02*** [13.76]	34.34* [18.69]	37.13** [18.84]
Proportion of members under 16	-881.6*** [26.401]	-852.8*** [29.075]	-719.9*** [63.226]	-414.40 [839.42]
Proportion of members over 60	-1 342.3*** [22.196]	-1 337.7*** [25.177]	-1 338.4*** [86.393]	1 148.69 [1 913.6]
Household size	-37.39*** [9.660]	-41.70*** [10.508]	-59.308** [26.404]	-109.56* [62.564]
Household size squared	1.247 [0.852]	1.546* [0.923]	2.984 [2.089]	5.003* [2.841]
Proportion of members having technical diploma	75.985** [37.251]	98.613** [38.437]	173.734*** [65.082]	156.021** [65.494]
Proportion of members having post-secondary diploma	212.08*** [65.138]	256.81*** [69.181]	461.027** [200.812]	434.952** [193.530]
Annual crop land (10 000 m <sup>2</sup> )	-18.945*** [6.943]	-16.449** [7.595]	2.225 [16.086]	-3.178 [16.858]
Perennial crop land (10 000 m <sup>2</sup> )	-7.613 [8.634]	-2.059 [9.166]	27.789** [12.870]	25.863* [13.469]
Forestry crop land (10 000 m <sup>2</sup> )	-1.483 [3.558]	0.132 [3.655]	8.841 [6.984]	10.121 [6.808]
Water surface (10 000 m <sup>2</sup> )	-1.651 [16.434]	22.280 [16.232]	77.400*** [27.350]	74.405*** [28.738]
Living in a village with market	-1.522* [0.794]	-1.223 [0.762]	-0.389 [1.074]	-0.326 [1.098]
Red River Delta	Omitted			
North-East	77.163*** [16.871]	74.054*** [19.984]		
North-West	41.188 [26.415]	34.568 [31.045]		
North Central Coast	-60.084*** [17.439]	-61.001*** [20.807]		
South Central Coast	-54.799*** [19.726]	-56.339** [23.555]		
Central Highlands	11.369 [24.521]	4.205 [28.997]		

Annex table A.7. (continued)

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
South-East	58.875*** [19.561]	56.229** [23.287]		
Mekong River Delta	-72.26*** [15.94]	-74.99*** [18.74]		
Time dummy (2006 = 1)	10.212 [9.840]	10.479 [7.506]	9.889 [8.234]	12.104 [8.370]
Interactions between regions and household characteristics	No	No	No	Yes
Constant	1 418.4*** [30.972]	1 421.6*** [33.487]	1 404.4*** [82.036]	1 457.6*** [95.273]
Observations	6 408	6 408	6 408	6 408
R-squared	0.42	0.42	0.4	0.18
Number of households	3 204	3 204	3 204	3 204

Source: Author's estimation from VHLSSs 2004 and 2006

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Annex table A.8. Regressions of the share of non-farm income**

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Living in a village with good road	0.040*** [0.010]	0.023*** [0.009]	0.004 [0.010]	0.002 [0.010]
Proportion of members under 16	0.009 [0.019]	-0.029 [0.020]	-0.106*** [0.037]	-0.308 [0.238]
Proportion of members over 60	-0.267*** [0.016]	-0.246*** [0.018]	-0.184*** [0.045]	-0.982 [0.714]
Household size	0.059*** [0.007]	0.071*** [0.007]	0.106*** [0.013]	0.028 [0.023]
Household size squared	-0.003*** [0.001]	-0.004*** [0.001]	-0.006*** [0.001]	-0.006*** [0.001]
Proportion of members having technical diploma	0.204*** [0.027]	0.154*** [0.025]	0.083** [0.041]	0.077* [0.040]
Proportion of members having post-secondary diploma	0.457*** [0.047]	0.382*** [0.046]	0.235*** [0.077]	0.235*** [0.077]
Annual crop land (10 000 m <sup>2</sup> )	-0.116*** [0.005]	-0.094*** [0.005]	-0.038*** [0.010]	-0.038*** [0.011]
Perennial crop land (10 000 m <sup>2</sup> )	-0.071*** [0.006]	-0.054*** [0.006]	-0.021** [0.009]	-0.021** [0.009]
Forestry crop land (10 000 m <sup>2</sup> )	-0.012*** [0.003]	-0.009*** [0.002]	-0.003* [0.002]	-0.004** [0.002]
Water surface (10 000 m <sup>2</sup> )	-0.092*** [0.012]	-0.055*** [0.010]	-0.019*** [0.007]	-0.024*** [0.008]
Living in a village with market	-0.004*** [0.001]	-0.003*** [0.000]	-0.001** [0.000]	-0.001** [0.000]
Red River Delta	Omitted			
North-East	-0.096*** [0.012]	-0.114*** [0.015]		
North-West	-0.091*** [0.019]	-0.138*** [0.024]		
North Central Coast	-0.081*** [0.013]	-0.089*** [0.016]		
South Central Coast	0.099*** [0.014]	0.092*** [0.018]		
Central Highlands	-0.057*** [0.018]	-0.091*** [0.022]		

Annex table A.8. (continued)

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
South-East	0.142*** [0.014]	0.130*** [0.018]		
Mekong River Delta	0.065*** [0.011]	0.041*** [0.014]		
Time dummy (2006 = 1)	0.024*** [0.007]	0.023*** [0.004]	0.022*** [0.004]	0.024*** [0.004]
Interactions between regions and household characteristics	No	No	No	Yes
Constant	0.235*** [0.022]	0.216*** [0.023]	0.092** [0.040]	0.078* [0.043]
Observations	6 407	6 407	6 407	6 407
R-squared	0.26	0.26	0.11	0.12
Number of households	3 204	3 204	3 204	3 204

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.



**Annex table A.9. Regressions of proportion of children attending school**

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
Living in a village with good road	0.010 [0.011]	0.001 [0.011]	-0.023 [0.020]	-0.025 [0.020]
Proportion of members under 16	-0.016 [0.028]	-0.039 [0.030]	-0.127* [0.071]	-0.543 [0.615]
Proportion of members over 60	0.091** [0.038]	0.077* [0.043]	-0.126 [0.159]	3.918 [19.707]
Household size	0.000 [0.009]	-0.002 [0.010]	0.013 [0.031]	-0.071 [0.059]
Household size squared	-0.001 [0.001]	-0.001 [0.001]	0.000 [0.002]	-0.001 [0.002]
Proportion of members having technical diploma	0.135*** [0.043]	0.113** [0.045]	0.062 [0.071]	0.06 [0.076]
Proportion of members having post-secondary diploma	0.078 [0.084]	0.067 [0.092]	0.003 [0.054]	-0.012 [0.061]
Annual crop land (10 000 m <sup>2</sup> )	-0.002 [0.005]	-0.003 [0.006]	-0.015 [0.014]	-0.013 [0.014]
Perennial crop land (10 000 m <sup>2</sup> )	0.015** [0.006]	0.013** [0.006]	0.008 [0.008]	0.001 [0.007]
Forestry crop land (10 000 m <sup>2</sup> )	0.003 [0.003]	0.002 [0.003]	0.000 [0.001]	-0.002 [0.001]
Water surface (10 000 m <sup>2</sup> )	0.020 [0.017]	0.008 [0.017]	-0.007 [0.018]	0.002 [0.015]
Living in a village with market	-0.002*** [0.001]	-0.001** [0.001]	0.001 [0.002]	0.001 [0.002]
Red River Delta	Omitted			
North-East	0.000 [0.014]	-0.007 [0.017]		
North-West	-0.083*** [0.019]	-0.095*** [0.023]		
North Central Coast	-0.030** [0.014]	-0.034** [0.017]		
South Central Coast	-0.026 [0.016]	-0.025 [0.019]		
Central Highlands	-0.029 [0.018]	-0.032 [0.022]		

Annex table A.9. (continued)

Explanatory variables	OLS	Random effects	Fixed effects without interactions	Fixed effects with interactions
South-East	-0.078*** [0.016]	-0.082*** [0.019]		
Mekong River Delta	-0.100*** [0.014]	-0.103*** [0.016]		
Time dummy (2006 = 1)	0.004 [0.008]	0.000 [0.006]	-0.005 [0.008]	-0.003 [0.008]
Interactions between regions and household characteristics	No	No	No	Yes
Constant	0.990*** [0.034]	1.008*** [0.038]	0.950*** [0.113]	0.823*** [0.152]
Observations	3 507	3 507	3 507	3 507
R-squared	0.06	0.05	0.06	0.07
Number of households	2 003	2 003	2 003	2 003

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Annex table A.10. Probit regression of good village road**

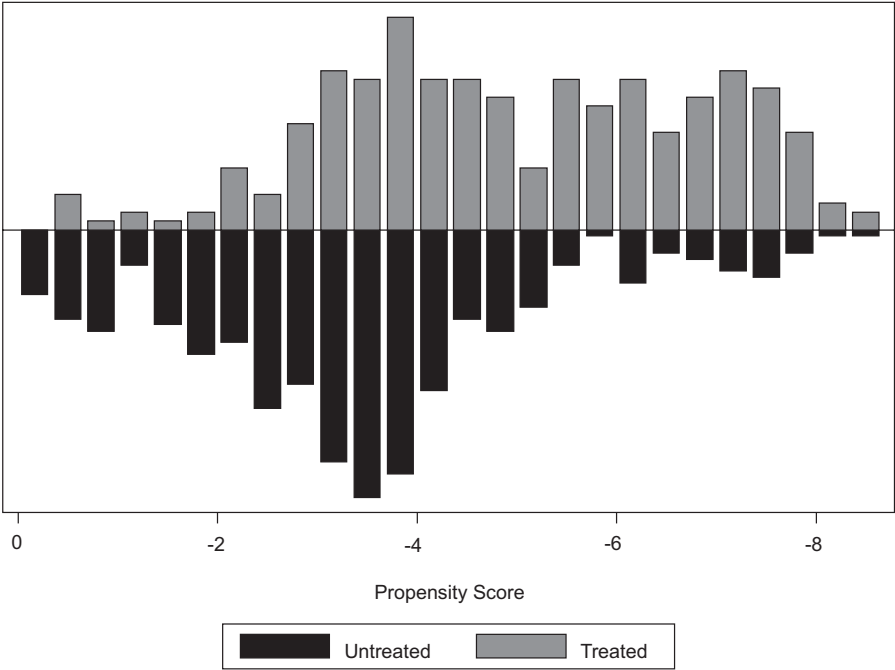
Explanatory variables	Coef.	Std. Err.	P>z
Proportion of members under 16	-0.410	0.282	0.146
Proportion of members over 60	-0.604	0.259	0.020
Household size	-0.042	0.034	0.210
Proportion of members having technical diploma	-0.190	0.486	0.696
Proportion of members having post-secondary diploma	-1.994	1.173	0.089
Annual crop land (10 000 m <sup>2</sup> )	-0.079	0.061	0.194
Perennial crop land (10 000 m <sup>2</sup> )	-0.116	0.104	0.263
Forestry crop land (10 000 m <sup>2</sup> )	-0.019	0.023	0.403
Water surface (10 000 m <sup>2</sup> )	-0.778	0.284	0.006
Living in a village with market	-0.030	0.007	0.000
Red River Delta	Omitted		
North-East	-0.626	0.213	0.003
North-West	-0.424	0.259	0.101
North Central Coast	-0.300	0.242	0.215
South Central Coast	0.128	0.247	0.605
Central Highlands	-0.320	0.299	0.284
South-East	-0.929	0.181	0.000
Mekong River Delta	0.977	0.223	0.000
Number of observations	667		
Pseudo R <sup>2</sup>	0.13		

Source: Author's estimation from VHLSSs 2004 and 2006.

Notes: Robust standard errors are shown in brackets. Standard errors are corrected for sampling weight and cluster correlation.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Annex figure A.1. Estimates of propensity score of the treatment and control groups**



Source: Author's estimation from VHLSSs 2004 and 2006.

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