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Editorial statement

The *Asia-Pacific Development Journal* is published twice a year by the Economic and Social Commission for Asia and the Pacific.

Its primary objective is to provide a medium for the exchange of knowledge, experience, ideas, information and data on all aspects of economic and social development in the Asian and Pacific region. The emphasis of the *Journal* is on the publication of empirically based, policy-oriented articles in the areas of poverty alleviation, emerging social issues and managing globalization.

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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.

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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.

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MYANMAR'S NON-RESOURCE EXPORT POTENTIAL AFTER THE LIFTING OF ECONOMIC SANCTIONS: A GRAVITY MODEL ANALYSIS

Koji Kubo*

The easing of economic sanctions against Myanmar by Western countries in 2012 augmented the prospect that Myanmar would expand its exports. However, a sharp rise in natural resource exports during the time sanctions had been applied raises concern about the so-called Dutch disease. This study forecasts Myanmar's export potential by calculating counterfactual export values using a gravity model that takes into account the effects of natural resource exports on non-resource exports. Without taking into consideration the effects of natural resource exports, the counterfactual predicted values of non-resource exports during the period 2004-2011 are more than five times larger than those of actual exports. If these effects are taken into account, however, the predicted values are lower than those of actual exports. The empirical results imply that Dutch disease is more of a risk in Myanmar than it is in any other South-East Asian country.

I. INTRODUCTION

During the 2000s, Canada, the European Union and the United States of America imposed general or specific import bans on goods from Myanmar in response to actions by the country's ruling junta. The tightening of sanctions by the

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United States in July 2003 hit Myanmar's apparel industry especially hard. In 2002, Myanmar's apparel exports to the United States were valued at $318.8 million, equal to 11.3 per cent of total exports; in 2004, exports dropped to zero.[1] The subsequent stagnant performance of Myanmar's exports may be partially associated with the economic sanctions. Following efforts by President Thein Sein's Government to reconcile with the democratization movement, the above-mentioned Western countries lifted most of their sanctions by the end of 2012, which has enhanced Myanmar's prospects to expand its exports.

The tight economic sanctions, however, coincided with a rise in Myanmar's exports of natural resources. Full-scale production and exports of natural gas were achieved by 2002. Since then, natural gas has been the country's largest export item; it accounted for 5.4 per cent of total exports in 2000 and 48.8 per cent in 2008. Defining natural resource exports as the sum of goods categorized in Standard International Trade Classification code 2 (crude materials, inedible, except fuels) and code 3 (mineral fuels, lubricants and related materials), the share of natural resource exports jumped from 31.8 per cent in 2000 to 69.4 per cent in 2008.

Such a sharp rise in resource exports increases concern about the effects of Dutch disease. Natural resource exports could exert adverse effects on the competitiveness of non-resource exports by a real appreciation of the local currency and by movements of labour and capital to the resource and non-tradable sectors (Corden, 1984). Assuming that the non-resource sector has positive externalities on the productivity of the economy, its slower growth due to Dutch disease effects would reduce the rate of overall economic growth.

An issue is whether Myanmar can follow the economic growth path of Indonesia, Malaysia and Thailand, which managed to achieve economic diversification and high GDP growth regardless of their resource abundance. According to Gylfason (2001) and van der Ploeg (2011), the high growth rates of these Asian economies are rather exceptional as the majority of resource-rich developing countries had only modest growth rates. In addition, the emergence of China in the global economy as a large supplier of labour-intensive manufactured goods and a large consumer of natural resources might have affected the comparative advantage of Myanmar and of other South-East Asian countries (Coxhead, 2007). An important policy issue is whether Myanmar's resource abundance will lead to its resource dependence or not.

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[1]   Kudo (2008) provided an anecdotal account of the impact of sanctions by the United States on Myanmar's apparel industry.

Against this backdrop, this study projects Myanmar's export potential of non-resource goods. Myanmar's per capita exports have remained the lowest among members of the Association of Southeast Asian Nations (ASEAN) during the past two decades. Per capita exports of goods and services in 2010 were $159, or less than half the $359 reported for the Lao People's Democratic Republic. Furthermore, Myanmar's exports have been concentrated in natural resources, such as natural gas. Taking into account the possible adverse effects of resource exports, this paper forecasts Myanmar's non-resource export potential after the lifting of economic sanctions.

This study measures trade potential with the theoretically predicted trade value by using an augmented gravity model. The counterfactual export values of the sanction period are estimated with a gravity model using the data of 10 neighbouring countries in South Asia and South-East Asia. A novel feature of the present study is the use of an augmented gravity model that takes into account, if any, the Dutch disease effects of natural resource exports on non-resource exports. In addition to the forecasting of Myanmar's export performance, this allows for an examination of the extent of the Dutch disease effects on Asian economies.

The remainder of this study is structured as follows: section II presents a brief history of economic sanctions against Myanmar and the composition of exports by destination and commodity during the sanctions; section III contains a review of the literature of trade analyses that employ gravity models, focusing on studies of economic sanctions and projections of trade potential; section IV provides an illustration of the study's empirical methods, summarizes the results and draws policy implications promoting non-resource exports; section V provides a conclusion.

II. SANCTIONS AND TRADE STRUCTURE IN MYANMAR
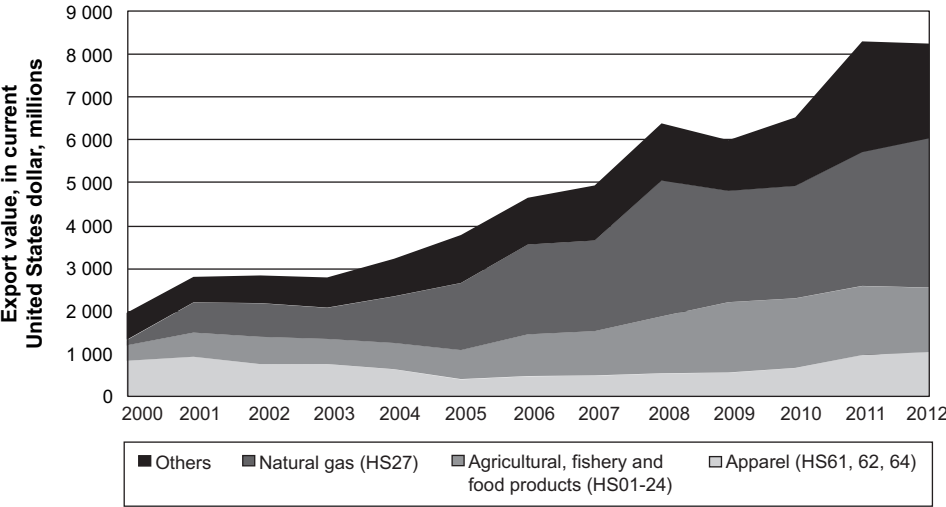
Western countries initiated sanctions against Myanmar after its suppression of anti-government protests and the subsequent establishment of a junta in August 1988. The United States imposed the most severe sanctions, followed by Canada and the European Union.[2] The sanctioning Governments enjoined their citizens and corporations from engaging in specific economic activities with Myanmar. The United States and Canada imposed general import bans on goods from Myanmar in July 2003 and December 2007, respectively. In February 2008, the European Union enacted specific import bans on timber and timber products, coal and metals, and precious and semi-precious stones.

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[2]   Australia imposed an arms embargo against Myanmar but never implemented general trade and investment sanctions.

After the inauguration of the new Government in April 2011, led by President Thein Sein, the West began to ease its economic sanctions. In April 2012, Canada announced the lifting of the general import ban. In May 2012, the European Union also suspended sanctions. In November 2012, the United States Department of State and Department of the Treasury announced a waiver of the ban on imported goods from Myanmar, except for jadeites and rubies. Thus, the majority of the sanctions were lifted by the end of 2012.

To help in tracing the impacts of economic sanctions on Myanmar's exports, figure 1 provides a summary of the trend in exports for the period 2000-2012. Total exports exhibit an increasing trend, which is largely due to natural gas exports to Thailand. In contrast, the exports of apparel, the main destination of which had been the United States, stagnated in the 2000s. As a result, the proportion of natural gas exports to total exports increased from 5.4 per cent in 2000 to nearly 50 per cent in 2008, while the proportion of apparel exports declined from 42.0 per cent to 8.1 per cent in the same period.

Figure 1. Trend of Myanmar's exports, 2000-2012

Source: United Nations Commodity Trade Statistics Database.

Note: Apparel refers to HS61 (articles of apparel and clothing accessories, knitted or crocheted), HS62 (articles of apparel and clothing accessories, not knitted or crocheted), and HS64 (footwear, gaiters and the like; parts of such articles). Natural gas refers to HS27 (mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes). For the descriptions of agricultural, fishery and food products (HS 01-24), see the website of the World Customs Organization. Available from www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs_nomenclature_2012/hs_nomenclature_table_2012.aspx.

A comparison of destinations of apparel from Myanmar and its peers indicates more clearly the impact of sanctions. Table 1 lists major export destinations. The United States and the European Union were among the top export destinations for apparel from Myanmar and its peers in 2001, and they continued to be top destinations for Myanmar's peers. However, after the tightening of sanctions in July 2003, Myanmar's apparel exports to the United States subsequently dropped to zero. Japan and the Republic of Korea became the major destinations of apparel exports from Myanmar. Nonetheless, they did not fully make up for the lost exports to the sanctioning countries. As table 1 shows, Myanmar is the only country whose apparel export value was lower in 2010 than it was in 2001.

Table 1. Major export destinations of apparel from Myanmar and its peers

(Millions of United States dollars, in current terms)

		2001		**2005**		**2010**
Bangladesh	Total	5 091	Total	8 165	Total	17 020
	EU 25	2 758	EU 25	4 981	EU 25	10 102
	United States	2 044	United States	2 423	United States	4 073
	Canada	100	Canada	362	Canada	723
Cambodia	Total	1 573	Total	2 861	Total	4 757
	United States	971	United States	1 807	United States	2 329
	EU 25	478	EU 25	732	EU 25	1 538
	Japan	60	Canada	107	Canada	340
Lao People's Democratic Republic	Total	135	Total	187	Total	199
	EU 25	124	EU 25	169	EU 25	131
	United States	4	Canada	6	United States	34
	Norway	3	United States	3	Japan	15
Myanmar	Total	909	Total	383	Total	647
	United States	435	EU 25	250	Japan	259
	EU 25	375	Japan	88	EU 25	189
	Canada	29	Republic of Korea	8	Republic of Korea	126
Viet Nam	Total	4 095	Total	9 777	Total	19 385
	EU 25	2 757	EU 25	4 123	United States	7 795
	Japan	592	United States	3 601	EU 25	6 489
	United States	192	Japan	720	Japan	1 413

Source: United Nations Commodity Trade Statistics Database.

Notes: Apparel refers to HS61 (articles of apparel and clothing accessories, knitted or crocheted), HS62 (articles of apparel and clothing accessories, not knitted or crocheted) and HS64 (footwear, gaiters and the like; parts of such articles).

EU 25 refers to Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovenia, Slovakia, Spain, Sweden, and the United Kingdom of Great Britain and Northern Ireland.

Table 2 summarizes per capita exports from Myanmar and its peers, and the composition of exports using the two-digit codes of goods classification under the Harmonized Commodity Description and Coding System (HS). For example, in 2001, the value of exports per capita from Myanmar was $57, and the three largest export items and their share of total exports were HS27 (25.3 per cent), HS61 (18.8 per cent) and HS44 (15.0 per cent). The share of apparel exports (the sum of exports of HS61, HS62 and HS64) were high for Myanmar's peers: for example, in 2010, exports of apparel accounted for 83.1 per cent of Cambodia's total exports, 82.3 per cent of Bangladesh's, and 25.5 per cent of Viet Nam's. Along with the information on destinations of apparel exports in table 1, the information in table 2 confirms that the United States and the European Union were the most important markets of the countries listed, especially Bangladesh and Cambodia.

Table 2. Per capital exports and composition of exports by goods classification from Myanmar and its peers

	2001				2005				2010			
	Per capita exports (US$)	Export composition in HS code and its share (%)			Per capita exports (US$)	Export composition in HS code and its share (%)			Per capita exports (US$)	Export composition in HS code and its share (%)		
		Largest	2nd largest	3rd largest		Largest	2nd largest	3rd largest		Largest	2nd largest	3rd largest
Bangladesh	49	HS62 44.6	HS61 31.1	HS03 4.9	72	HS61 39.4	HS62 38.9	HS03 4.3	136	HS61 45.3	HS62 36.0	HS63 3.9
Cambodia	142	HS61 41.7	HS62 38.8	HS64 8.0	244	HS61 48.9	HS62 34.0	HS64 4.9	402	HS61 53.9	HS62 19.4	HS64 9.1
Lao People's Democratic Republic	60	HS44 36.1	HS62 23.6	HS61 16.1	105	HS44 28.1	HS61 15.7	HS62 13.9	311	HS74 23.4	HS26 21.0	HS44 16.3
Myanmar	57	HS27 25.3	HS61 18.8	HS44 15.0	75	HS27 41.6	HS44 21.5	HS07 8.3	126	HS27 40.4	HS07 15.2	HS44 13.1
Viet Nam	177	HS27 24.2	HS64 17.3	HS62 8.8	408	HS27 23.7	HS64 14.3	HS62 9.0	858	HS85 11.5	HS64 10.8	HS27 9.7

Sources: United Nations Commodity Trade Statistics Database; and International Financial Statistics, International Monetary Fund.

Note: HS03 – fish and crustaceans, molluscs and other aquatic invertebrates; HS07 – edible vegetables and certain roots and tubers; HS26 – ores, slag and ash; HS27 – mineral fuels, mineral oils, and products of their distillation, bituminous substances, mineral waxes; HS44 – wood and articles of wood, wood charcoal; HS61 – articles of apparel and clothing accessories, knitted or crocheted; HS62 – articles of apparel and clothing accessories, not knitted or crocheted; HS63 – other made up textile articles, sets, worn clothing and worn textile articles, rags; HS64 – footwear, gaiters and the like, parts of such articles; HS74 – copper and articles thereof; HS85 – electrical machinery and equipment and parts thereof, sound recorders and reproducers.

Through the Generalized System of Preferences (GSP), the European Union and the United States suspend tariffs on imports from designated low-income countries in order to promote their exports and economic growth.[3] Under the Everything but Arms initiative, the European Union admits duty-free and quota-free imports of goods except arms from least developed countries, provided the goods satisfy rules of origin. This scheme has been applied to Bangladesh, Cambodia and the Lao People's Democratic Republic. The United States provides Bangladesh and Cambodia with similar preferential treatment.[4] These schemes helped Myanmar's peers to expand exports, especially those of apparel.

In April 1989, the United States suspended the GSP benefits it had offered Myanmar since 1976. The European Union withdrew those preferences in March 1997, citing the junta's widespread use of forced labour.[5] Thus, Myanmar was placed in a disadvantageous position compared with that of its peers.[6]

Since the establishment of the new Government, Myanmar's relations with the European Union and the United States have improved. In July 2013, the European Union reinstated Myanmar into the GSP scheme and applied the Everything but Arms initiative retroactively from June 2012. In April 2013, the United States was reported to be considering the resumption of the GSP initiative with Myanmar. Tariff exemptions in European Union and United States markets will give impetus to Myanmar exports.

Another interesting trend seen in table 2 is the fact that Viet Nam achieved export diversification by 2010 in comparison with the other low-income countries. Electrical machinery and equipment (HS85) became the largest export item, while the exports of fuels and oils (HS27) continued modest growth in terms of absolute value. Such a growth pattern was observed in Malaysia and Thailand in the late 1980s and

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[3]   Collier and Venables (2007) illustrated how trade preferences of industrialized countries promote manufacturing exports of low-income countries, with particular reference to African countries.

[4]   The United States has conducted normal trade relations with Viet Nam since December 2001. For example, its import duty on ordinary men's cotton shirts from Viet Nam is 19.7 per cent whereas it is 0 per cent for shirts from Bangladesh and Cambodia. The European Union applies the Generalized System of Preferences scheme for Viet Nam, which is less preferential than the Everything but Arms initiative: its import duty on ordinary men's cotton shirts is 9.6 per cent, discounted from the 12 per cent most-favoured-nation tariff rate but much higher than the 0 per cent that is applicable to other least developed countries.

[5]   Japan was exceptional among industrialized countries in maintaining the Generalized System of Preferences scheme, providing duty-free and quota-free market access for goods from Myanmar.

[6]   According to Anukoonwattaka and Mikic (2012), the proportion of Myanmar's agricultural exports that received duty-free treatment in 2006-2009 was about 16 per cent of total agricultural export values, whereas the proportion exceeded 40 per cent for other low-income countries.

the 1990s (Reinhardt, 2000). In contrast, Myanmar registered a decline in exports of manufactured goods during the same period.

III. LITERATURE REVIEW

This study projects Myanmar's export potential by calculating theoretically predicted trade value using an augmented gravity model. In the extensive literature on trade analyses using gravity models, two lines of inquiry are relevant to this study's objective. One is the projection of trade potential in the event of a policy change, and the other is the analysis of the effects of economic sanctions on bilateral trade flows.

First, studies generally interpret the trade value predicted by gravity models as a country's trade potential. Furthermore, they generally interpret the gap between a country's predicted trade values and actual trade values as unexhausted trade potential. Numerous studies, especially in the 1990s, projected trade potential for former communist economies when they started economic integration with market economies.

In formulating sample sets for projecting the trade potential of former communist economies, Egger (2002) classified studies into two approaches. One approach is to estimate a gravity model that excludes former communist economies from the sample. Instead, a gravity model is estimated using the sample set of market economies, and its estimated parameters are used to calculate the counterfactual trade of the countries considered, an approach referred to as "out-of-sample projection".[7] The other approach is to estimate a gravity model by including countries under consideration in the sample set. Then the residual of the estimated model – the gap between the actual values and the fitted values – is interpreted as unexhausted trade potential. This approach is referred to as "in-sample projection".[8] Egger (2002) argued that in-sample projection produces biased estimates of trade potential. For a consistent and efficient estimator, the residuals of a gravity model should be white noise. Systematic, large, positive errors should not necessarily be regarded as unexhausted trade potential but as indications of model misspecification.

Second, there are studies that analyse effects of economic sanctions with a dummy variable in the gravity model. A negative coefficient for a dummy is regarded as evidence that sanctions reduced trade volume.[9]

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[7]   Such applications are found in Wang and Winters (1992) for Eastern Europe, and Montenegro and Soto (1996) for Cuba.

[8]   Such applications are found in Baldwin (1994) and Nilsson (2000).

[9]   Examples of such studies include Evenett (2002), Hufbauer and Oegg (2003), Yang and others (2004) and Caruso (2005).

Few trade analyses examine Myanmar using a gravity model. Nu Nu Lwin (2009) examined the impact of economic sanctions against Myanmar using bilateral trade data of Myanmar, employing a dummy variable for sanctioning countries in a gravity model. A drawback of this approach is that the indirect effects of sanctions on trade between Myanmar and a third country such as Japan cannot be captured properly.

Ferrarini (2014) studied Myanmar's export potential using the out-of-sample approach. Myanmar's counterfactual export value is projected with the parameters of the gravity model estimated using export data of 6 ASEAN members with their 35 major trade partners. He found that Myanmar's actual exports surpassed their projected potential from 2000 to 2007. However, since then the country's export potential has grown rapidly; in 2010, it was four times greater than actual exports. Following Ferrarini (2014), this study uses the out-of-sample approach.

Since an accurate projection requires that the estimated parameters be consistent and efficient, two econometric issues require close attention. The first is the treatment of multilateral resistance (Anderson and van Wincoop, 2003) in a gravity model. The second is the omission of observations where bilateral trade is zero (Santos Silva and Tenreyro, 2006).[10]

First, the literature presents several ways to control for multilateral resistance in a conventional gravity model. A conventional specification of a gravity model is

$$\ln(x_{ij}) = \alpha_1 + \alpha_2 \ln(y_i) + \alpha_3 \ln(y_j) + \alpha_4 \ln(d_{ij}) + \varepsilon_{ij} \tag{1}$$

where x_{ij} refers to exports from country (i) to country (j); y_i and y_j are the GDP of each country, and d_{ij} is the distance between the countries. One way to control multilateral resistance is to add to the conventional gravity model the fixed effects for each exporter and importer (Anderson and van Wincoop, 2003). If a cross-section dataset is used with one observation of trade value for each pair of exporter and importer, it is necessary to drop the GDP of exporters and importers as they are perfectly collinear with the fixed effects. This is not a suitable option for the purpose of predicting Myanmar's export potential with the out-of-sample approach; since it is not possible to estimate the exporter fixed effect for Myanmar, predictions for Myanmar cannot be obtained.

If pooled data are employed with multiple observations of trade values for each pair of exporter and importer, the fixed effects for each exporter and importer can be included without dropping the GDP variables from the gravity model. However,

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[10] Shepherd (2013) offered intuitive guides on these issues.

changes must be controlled in multilateral resistance over time. Vandenbussche and Zanardi (2010) added the bilateral real exchange rate (RER) for each pair of exporter and importer in their gravity model to control changes in multilateral resistance over time. This study follows the approach of Vandenbussche and Zanardi (2010).[11]

Second, the present study employs the Poisson pseudo-maximum likelihood (PPML) method with the trade values in level, not in log. Santos Silva and Tenreyro (2006) proved that PPML provides efficient estimators when the conditional variance is proportional to the conditional mean, which is particularly the case for a gravity model.[12]

IV. EMPIRICAL ANALYSIS

Dataset and model specification

In the formulation of its dataset, this study differs from that of Ferrarini (2014) in two aspects. First, it focuses on non-resource exports, whereas Ferrarini (2014) considered total exports including natural resources. This study employs non-resource exports as the dependent variable in its gravity model. Resource exports are defined by Standard International Trade Classification codes 2 and 3. These categories are subtracted from total exports.

Second, projections of export potential using the out-of-sample approach might be influenced by the choice of exporters in the dataset. Ferrarini's (2014) dataset consisted of exports from 6 ASEAN members (Cambodia, Indonesia, Malaysia, the Philippines, Thailand and Viet Nam) to 35 major trading partners. That selection of exporters is skewed to middle-income countries with high export performance. Ferrarini's choice of exporters in the dataset was constrained by the patchy export data of low-income developing countries, and he dropped the Lao People's Democratic Republic, for example, although it is geographically proximate to Myanmar. In this regard, this study employs data on imports from these countries reported by their trade partners. This allows for the addition of four other low-income and lower-middle-income countries (Bangladesh, the Lao People's Democratic Republic, Nepal and Sri Lanka) as exporters in the dataset. These four countries are regarded as Myanmar's peers by the International Monetary Fund (2012; 2013).

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[11]   Strictly speaking, even with this approach, it is not possible to obtain an estimate of the exporter fixed effect for Myanmar. For a prediction of Myanmar's export potential, it is necessary to assume that it is the same as the exporter fixed effect for one of exporters in the sample.

[12]   Applications of the Poisson pseudo-maximum likelihood method to trade analysis are found in Chen and others (2011), and in Kucharcukova, Babecky and Raiser (2012).

They are considered to have an economic structure similar to that of Myanmar. The sample consists of the exports of these 10 countries to 157 countries and regions. Once the parameters of the gravity model are obtained, Myanmar's data are interpolated to derive counterfactual export potential.

Figure 2 depicts total exports and the proportion of resource exports of these 10 countries and of Myanmar. The figure shows the total average exports and the average proportion of resource exports from 2004 to 2011. For total exports, the countries are divided into two groups. One group consists of countries with total export values above $50 billion (Indonesia, Malaysia, the Philippines, Thailand and Viet Nam). The other group consists of countries with total export values of less than $20 billion. Regarding the proportion of resource exports to total exports, Myanmar's score is the highest.

Sources of the data for the regression analysis are as follows. Trade data are from the United Nations Commodity Trade Statistics Database on the World Bank's World Integrated Trade Solution website.[13] This study employs data on imports from

Figure 2. Total exports and the proportion of resource exports of selected South Asian and South-East Asian countries, average for 2004-2011

Source: United Nations Commodity Trade Statistics Database.

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[13]   http://wits.worldbank.org/wits/.
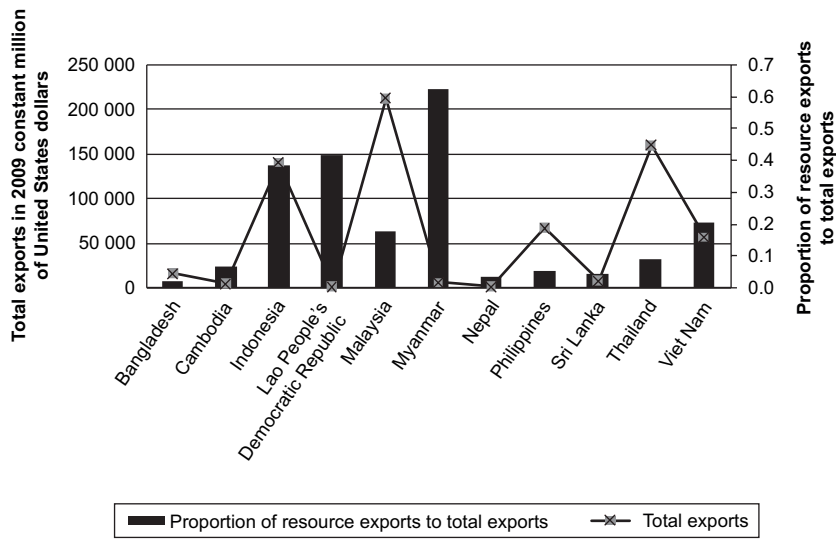
Myanmar and the 10 countries listed in figure 2 as reported by their trade partners. GDP data are from the World Economic Outlook database (April 2013) of the International Monetary Fund. Distance data are from the CEPII database.[14] The bilateral RER for each pair of exporter and importer is calculated with data from International Financial Statistics of the International Monetary Fund.[15]

The sample spans eight years, from 2004 to 2011. Following the tightening of the United States sanctions against Myanmar in July 2003, they reached their full impact in 2004. Myanmar's GDP data, however, are available up to 2011, which restricts the analysis period.

The specification of the gravity model is as follows:

$$X_{ijt} = \exp \{c + \alpha_i + \alpha_j = \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(dist_{ij}) + \beta_4 \ln(RER_{ijt})$$

$$+ \beta_5 \, RATIO_{it} + \beta_6 \, ASEAN_{ij} + \beta_7 \, Year_t\} + \varepsilon_{ijt} \qquad (2)$$

where X_{ijt} refers to imports of non-resource goods from country (i) (i $\in$ 10 countries) reported by country (j) (j $\in$ 157 countries, j $\neq$ i) in year (t). c is a constant. α_i and α_j denote fixed effect dummies for each exporter (i) and importer (j). GDP_i and GDP_j denote the GDP of exporters (i) and importers (j). $dist_{ij}$ is the distance between two countries. RER_{ij} is the RER of the exporter's currency vis-à-vis the importer's currency. A rise in RER_{ij} indicates the real depreciation of the exporter's currency. Each value of RER_{ij} in 2004 is normalized to unity.

A characteristic of the present model is the inclusion of $RATIO_{it}$, which refers to the proportion of natural resource exports to total exports of exporter (i) in year (t). It should be noted that $RATIO_{it}$ is constant across all importers of goods from country (i) for a given year. There are two purposes for the inclusion of this variable in a gravity model. One purpose is to evaluate the Dutch disease effects of resource exports on non-resource exports. The other purpose is to adjust the GDP of an exporter; the GDP of an exporter in a conventional gravity model is associated with the supply capacity of the country to the export market. As the dependent variable of the gravity model is non-resource exports, the supply capacity variable has to be adjusted accordingly. The variable $RATIO_{it}$ is expected to make the adjustment. In any case, the expected sign of the coefficient for this variable is negative.

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[14]   www.cepii.fr/.

[15]   As Myanmar had a multiple exchange rate regime during the sample period, a time series of a parallel exchange rate of the local currency, kyat, per United States dollar compiled by a foreign mission in Myanmar is employed instead of the official exchange rate.

Finally, to capture the enhanced intra-ASEAN trade flows (Elliot and Ikemoto, 2004), an ASEAN dummy that takes 1 when both the exporter and the importer are members of ASEAN, and 0 otherwise, is included. $Year_t$ is a set of year dummies.

Potential for export growth

Using the PPML method, the gravity model is estimated by pooling samples for the eight indicated years. For the purpose of comparison, gravity models are estimated not only with non-resource exports, but also with total exports as dependent variables. Table 3 summarizes the estimation results of gravity models. It should be noted that the fixed effect dummies for importers and the year dummies are included in regressions, but they are not reported in the table. In addition, the exporter fixed effect dummy for Bangladesh is dropped in each regression to avoid perfect multicollinearity. In other words, Bangladesh is treated as the benchmark, and its exporter fixed effect is set to zero. Switching the benchmark from Bangladesh to any other country does not affect regression results or the size order of exporter fixed effects among the 10 exporter countries in the sample.

In table 3, the regression results with and without the $RATIO_{it}$ variable are presented. Coefficients of GDPs for exporter and importer and of distance are significant and have the expected signs. The coefficient of RER is not significant, but is positive except for Regression (3). Importantly, the coefficient of the natural resource export ratio is significant and negative for regressions of both non-resource exports and of total exports. The latter result indicates that an increase in the natural resource export ratio would accompany a decline in total exports. This implies there are Dutch disease effects among the 10 Asian countries.

Furthermore, the exporter fixed effects dummies are significant for Indonesia, Malaysia, Nepal, the Philippines, Thailand and Viet Nam. As Bangladesh is the benchmark in the regressions, the results indicate that the export performances of these countries are significantly different from that of Bangladesh. The results are consistent with the observations of total exports in figure 2. Bangladesh's export performance in terms of the exporter fixed effects, which is set to zero by definition, is better than those of Cambodia, the Lao People's Democratic Republic, Nepal and Sri Lanka, whereas the performance gap is not statistically significant with Cambodia or Sri Lanka.

When Myanmar's export potential is projected with the parameters of gravity models, the exporter fixed effect of Bangladesh is chosen from those of the 10 countries in the sample. This selection is based on the fact that Bangladesh and

Table 3. Estimates of gravity models

Dependent variable	(1) Non-resource exports	(2) Non-resource exports	(3) Total exports	(4) Total exports
GDP exporter (log)	0.351	0.435 *	0.427	0.499 *
	(0.2277)	(0.2290)	(0.2617)	(0.2646)
GDP importer (log)	0.616 ***	0.535 ***	0.674 ***	0.636 ***
	(0.1842)	(0.1836)	(0.1582)	(0.1589)
Distance (log)	-0.603 ***	-0.603 ***	-0.537 ***	-0.537 ***
	(0.0563)	(0.0553)	(0.0426)	(0.0428)
Bilateral real exchange rate	0.040	0.299	-0.075	0.048
	(0.2757)	(0.2737)	(0.2838)	(0.2872)
Resource export ratio		-3.060 ***		-1.609 ***
		(0.6977)		(0.5948)
ASEAN (1, 0)	2.347 ***	2.351 ***	2.251 ***	2.253 ***
	(0.1347)	(0.1356)	(0.1313)	(0.1318)
Exporter: Cambodia (1, 0)	-0.630	-0.275	-0.436	-0.190
	(0.5455)	(0.5572)	(0.6246)	(0.6326)
Exporter: Indonesia (1, 0)	1.091 ***	2.118 ***	1.403 ***	1.895 ***
	(0.3974)	(0.4213)	(0.4566)	(0.4998)
Exporter: Lao People's Democratic Republic (1, 0)	-2.204 ***	-0.704	-1.430 *	-0.552
	(0.6948)	(0.8084)	(0.8018)	(0.8557)
Exporter: Malaysia (1, 0)	1.999 ***	2.431 ***	2.092 ***	2.295 ***
	(0.2192)	(0.2232)	(0.2456)	(0.2607)
Exporter: Nepal (1, 0)	-2.402 ***	-2.165 ***	-2.259 ***	-2.084 ***
	(0.5108)	(0.5162)	(0.5811)	(0.5864)
Exporter: Philippines (1, 0)	1.085 ***	1.190 ***	1.027 ***	1.062 ***
	(0.1719)	(0.1684)	(0.1829)	(0.1850)
Exporter: Sri Lanka (1, 0)	-0.376	-0.180	-0.317	-0.195
	(0.2413)	(0.2489)	(0.2794)	(0.2830)
Exporter: Thailand (1, 0)	1.757 ***	1.923 ***	1.726 ***	1.781 ***
	(0.2625)	(0.2567)	(0.2908)	(0.2950)
Exporter: Viet Nam (1, 0)	0.907 ***	1.459 ***	1.069 ***	1.358 ***
	(0.1192)	(0.1762)	(0.1202)	(0.1650)
Observations	11 768	11 768	11 768	11 768
Pseudo log-likelihood	-4.89E+08	-4.79E+08	-5.47E+08	-5.44E+08

Source: Author's calculations.

Notes: Semi-robust standard errors are in parentheses.

*** indicates 1 per cent significance level; * indicates 10 per cent significance level.

Regressions are performed by STATA with the command "ppml". STATA drops 712 observations for the existence of estimates. The dropped observations are importers with zero trade values for the whole sample period.

Myanmar share land borders and have a similar level of per capita GDP.[16] In addition, as shown in figure 2, both Bangladesh and Myanmar are in the lower performing exporter cluster, which also consists of Cambodia, the Lao People's Democratic Republic and Sri Lanka. Furthermore, the exporter fixed effect of Bangladesh, set to zero by definition, is the highest among the countries in the lower cluster. Therefore, using the exporter fixed effect of Bangladesh produces a rather overvalued projection of Myanmar's export potential.

To see the fit of the models, table 4 contrasts the actual exports with the predicted values of the gravity models by exporter-year. As for non-resource exports, theoretically predicted values are calculated by Regression (2) including the natural resource export ratio as a control variable. As for total exports, predicted values are calculated by Regression (3) without the natural resource export ratio. Both Regression (2) of non-resource exports and Regression (3) of total exports accurately predict the trade values, in particular for Indonesia, Malaysia and Thailand.

Table 4 includes the actual and counterfactual predicted export values for Myanmar. Predictions are calculated using the exporter fixed effect of Bangladesh. There is a stark contrast between the predictions of non-resource exports and those of total exports. For non-resource exports, the actual-to-prediction ratio is above 1, implying that there is little room for growth in non-resource exports even after the lifting of sanctions. In contrast, for total exports, the actual-to-prediction ratio is approximately 0.50, implying that total exports could have doubled without the sanctions. Such a gap is attributable to the possible Dutch disease effects. If the counterfactual prediction values of non-resource exports are calculated with Regression (1), which does not include the resource export ratio as a control variable, the actual-to-prediction ratio falls to 0.17 as the average for the period 2004-2011. These results imply that Dutch disease effects are a real threat for Myanmar.

Table 5 lists Myanmar's actual and predicted non-resource exports as well as total exports by destination for an average of eight years, from 2004 through 2011. Actual exports to the United States were negligible during the sanctions, whereas the United States is projected to be Myanmar's largest potential export destination. As a result, the United States accounts for the largest proportion of Myanmar's unexhausted export potential.

The above results indicate that restored access to the United States market after the lifting of sanctions will help Myanmar to increase exports to the United States, notably apparel exports. It is crucial for Myanmar's new Government to

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[16] According to the World Economic Outlook database (April 2013), in 2011 the per capita GDP in current United States dollars was $767 for Bangladesh and $824 for Myanmar.

Table 4. Actual and predicted exports by exporter-year, 2004-2011

	Non-resource exports (Prediction *with* consideration on "Dutch disease" effects)								Total exports (Prediction *with* consideration on "Dutch disease" effects)								(Prediction *without* consideration on "Dutch disease" effects)	
	2004	2005	2006	2007	2008	2009	2010	2011	2004	2005	2006	2007	2008	2009	2010	2011	2010	2011
Bangladesh																		
Actual	10 838	10 871	13 394	13 972	16 325	16 500	19 464	24 904	10 966	11 072	13 654	14 254	16 691	16 907	19 870	25 504		
Predicted	12 005	12 936	14 554	15 616	17 635	14 500	18 279	21 415	13 127	13 806	14 660	15 822	17 433	15 300	18 674	20 834		
Actual to prediction	0.90	0.84	0.92	0.89	0.93	1.14	1.06	1.16	0.84	0.80	0.93	0.90	0.96	1.11	1.06	1.22		
Cambodia																		
Actual	3 132	3 302	3 972	4 417	4 677	4 146	5 166	6 840	3 301	3 492	4 177	4 678	4 958	4 563	5 586	7 443		
Predicted	3 218	3 631	4 296	4 701	5 271	3 762	5 048	5 921	3 496	3 903	4 350	4 801	5 465	4 528	5 504	6 332		
Actual to prediction	0.97	0.91	0.92	0.94	0.89	1.10	1.02	1.16	0.94	0.89	0.96	0.97	0.91	1.01	1.01	1.18		
Indonesia																		
Actual	67 092	68 920	76 251	85 067	94 119	79 300	98 013	112 405	99 505	108 706	122 867	137 052	158 511	127 400	165 298	204 655		
Predicted	69 560	68 594	77 095	86 403	93 414	82 200	99 792	105 622	98 730	107 184	125 504	137 669	153 170	129 000	171 918	201 554		
Actual to prediction	0.96	1.00	0.99	0.98	1.01	0.96	0.98	1.06	1.01	1.01	0.98	1.00	1.03	0.99	0.96	1.02		
Lao People's Democratic Republic																		
Actual	286	377	677	841	939	804	890	1 169	469	642	1 082	1 164	1 400	1 405	1 958	2 802		
Predicted	535	559	758	1 130	1 127	669	618	667	932	1 030	1 214	1 339	1 549	1 317	1 692	1 981		
Actual to prediction	0.53	0.68	0.89	0.74	0.83	1.20	1.44	1.75	0.50	0.62	0.89	0.87	0.90	1.07	1.16	1.41		
Malaysia																		
Actual	146 973	156 537	169 799	177 737	186 424	153 000	194 643	212 213	166 831	179 909	199 435	214 825	236 104	187 200	244 539	275 005		
Predicted	145 851	159 798	174 018	179 791	187 432	153 000	188 715	212 213	159 314	176 104	195 111	215 750	241 848	189 000	244 045	282 951		
Actual to prediction	1.01	0.98	0.98	0.99	0.99	1.00	1.03	1.00	1.05	1.02	1.02	1.00	0.98	0.99	1.00	0.97		
Myanmar																		
Actual	1 582	1 375	1 751	1 734	1 900	2 293	2 409	3 351	3 553	4 023	4 818	4 970	6 321	5 896	6 335	7 947		
Predicted	1 275	1 080	1 394	1 499	1 559	1 635	2 126	2 812	7 530	8 188	9 256	11 096	13 906	12 100	16 006	18 411		
Actual to prediction	1.24	1.27	1.26	1.16	1.22	1.40	1.13	1.19	0.47	0.49	0.52	0.45	0.45	0.49	0.40	0.43		
Nepal																		
Actual	754	727	625	758	932	623	749	771	763	741	648	791	964	659	772	791		
Predicted	565	606	654	688	833	621	868	1 070	571	626	680	740	832	698	899	1 050		
Actual to prediction	1.33	1.20	0.96	1.10	1.12	1.00	0.86	0.72	1.34	1.18	0.95	1.07	1.16	0.94	0.86	0.75		

Table 4. *(continued)*

Non-resource exports
(Prediction *with* consideration on "Dutch disease" effects)

	2004	2005	2006	2007	2008	2009	2010	2011
Philippines								
Actual	59 462	63 593	67 814	72 225	66 911	48 500	65 408	62 792
Predicted	49 253	53 266	57 479	62 156	72 554	57 700	72 522	79 362
Actual to prediction	1.21	1.19	1.18	1.16	0.92	0.84	0.90	0.79
Sri Lanka								
Actual	6 207	6 586	6 971	7 358	7 882	6 610	7 449	8 700
Predicted	5 244	5 878	6 662	7 236	8 344	6 555	8 278	9 436
Actual to prediction	1.18	1.12	1.05	1.02	0.94	1.01	0.90	0.92
Thailand								
Actual	104 901	116 316	129 722	146 915	164 255	140 000	174 882	186 050
Predicted	110 398	120 664	132 886	151 025	160 224	136 000	170 930	184 112
Actual to prediction	0.95	0.96	0.98	0.97	1.03	1.03	1.02	1.01
Viet Nam								
Actual	23 336	26 850	32 378	40 068	50 687	49 800	63 629	79 943
Predicted	27 263	28 481	34 276	41 506	48 067	45 600	65 704	77 715
Actual to prediction	0.86	0.94	0.94	0.97	1.05	1.09	0.97	1.03

Total exports
(Prediction *without* consideration on "Dutch disease" effects)

	2004	2005	2006	2007	2008	2009	2010	2011
Philippines								
Actual	61 019	65 688	71 558	76 861	70 616	50 961	69 503	68 566
Predicted	48 916	53 592	60 326	67 191	74 872	61 200	77 363	88 180
Actual to prediction	1.25	1.23	1.19	1.14	0.94	0.83	0.90	0.78
Sri Lanka								
Actual	6 431	6 807	7 248	7 669	8 192	6 911	7 849	9 357
Predicted	5 464	6 117	6 774	7 324	8 446	7 060	8 826	10 272
Actual to prediction	1.18	1.11	1.07	1.05	0.97	0.98	0.89	0.91
Thailand								
Actual	113 764	125 991	142 800	160 682	183 200	151 600	192 074	211 341
Predicted	122 291	132 622	148 706	164 381	178 363	146 000	185 751	209 306
Actual to prediction	0.93	0.95	0.96	0.98	1.03	1.04	1.03	1.01
Viet Nam								
Actual	30 784	36 432	43 195	51 554	65 186	59 668	73 167	92 986
Predicted	41 175	45 765	50 834	55 581	64 593	54 400	66 594	77 908
Actual to prediction	0.75	0.80	0.85	0.93	1.01	1.10	1.10	1.19

Sources: United Nations Commodity Trade Statistics Database and author's calculations.

Notes: Actual and predicted export values are in constant 2009 United States dollars, millions.

Predictions of non-resource exports are calculated by Regression (2) in table 3, and predictions of total exports by Regression (3).

Table 5. Myanmar's actual exports and predicted exports by importer, 2004-2011 average

Importer	Non-resource exports (Prediction *with* consideration on "Dutch disease" effects)			Total exports (Prediction *without* consideration on "Dutch disease" effects)		
	Actual	Predicted	Actual to prediction	Actual	Predicted	Actual to prediction
1 United States	0	286	0.00	0	1 750	0.00
2 China	245	237	1.03	633	1 788	0.35
3 Japan	296	142	2.08	325	1 363	0.24
4 Thailand	158	100	1.59	2 550	694	3.68
5 Singapore	49	85	0.58	88	677	0.13
6 Germany	103	71	1.45	109	436	0.25
7 Hong Kong, China	49	68	0.72	52	432	0.12
8 Malaysia	94	66	1.42	164	472	0.35
9 Netherlands	12	46	0.27	15	281	0.05
10 United Kingdom	78	46	1.70	79	274	0.29
11 Republic of Korea	88	40	2.20	115	486	0.24
12 India	518	39	13.23	874	358	2.44
13 Australia	15	32	0.47	16	299	0.05
14 France	31	31	0.98	35	194	0.18
15 Viet Nam	18	30	0.60	68	218	0.31
16 Mexico	6	28	0.21	6	166	0.04
17 Indonesia	30	26	1.14	31	238	0.13
18 Canada	6	23	0.25	6	144	0.04
19 Philippines	7	20	0.34	7	146	0.05
20 Italy	14	20	0.70	28	138	0.21
The rest	29	29	0.99	278	1 503	0.18
Total	1 846	1 466	1	5 479	12 056	0.45

Sources: United Nations Commodity Trade Statistics Database and author's calculations.

Note: Counterfactual predictions of non-resource exports are calculated by Regression (2) in table 3, and those of total exports by Regression (3). The values are deflated by United States GDP deflator to constant 2009 United States dollars (in millions).

improve diplomatic relations with the United States to restore its GSP status. Once the Dutch disease effects are taken into account, however, the lifting of sanctions does not necessarily lead to a significant increase in the sum of non-resource exports to the world.

Also, the empirical results suggest that Dutch disease effects have been a real threat in Asian economies during the sample period. A higher ratio of resource exports to total exports coincided with not only lower non-resource exports but also lower total exports. However, the gravity models do not show the causality or the mechanism of the adverse effects of natural resource exports on non-resource exports. In addition, RER, although having the expected sign is not statistically significant. Further studies are necessary to examine Dutch disease effects among these countries.

V.   CONCLUSION

After the easing of economic sanctions by Western countries in 2012, Myanmar is enjoying increased prospects for growth in exports. However, the proportion of natural resource exports to total exports had risen above 60 per cent during the sanctions period, raising concerns about Dutch disease effects on non-resource exports. By calculating counterfactual exports with the augmented gravity model, taking into account the Dutch disease effects, this paper has projected Myanmar's potential to export non-resource goods.

The counterfactual prediction values of Myanmar's non-resource exports vary substantially if the possible Dutch disease effects of natural resource exports are taken into account. If these effects are taken into consideration, the counterfactual prediction values are less than the actual non-resource exports, implying limited room for non-resource export growth even after the lifting of sanctions. In contrast, if they are not taken into account, the ratio of actual to predicted values is 0.17 as an average for the period 2004-2011, implying that there is considerable room for non-resource export growth. In any case, the United States accounts for the largest share of Myanmar's unexhausted export potential.

The lifting of sanctions restored access to United States markets, and the reinstatement of GSP benefits by the European Union are expected to enhance to a certain degree Myanmar's exports to these destinations. Apparel, including footwear, will be an important item for export to the United States and to the European Union in the immediate future. However, once the potential Dutch disease effects of natural resource exports are taken into consideration, the lifting of sanctions does not necessarily translate into a sharp rise in the sum of non-resource exports to the world.

Considering Dutch disease effects, Myanmar may not follow the growth path of other resource-rich South-East Asian countries that achieved economic diversification despite their abundant natural resources, such as Indonesia, Malaysia and Thailand. Dutch disease effects would be more severe for Myanmar than for any other South-East Asian country as Myanmar has the highest ratio of natural resource exports to total exports. Since the gravity model does not indicate the direction of causality, that is, how natural resource exports could dampen non-resource exports, further studies are necessary to identify such a mechanism.

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FOREIGN AID IMPERATIVES IN THE GREATER MEKONG SUBREGION: CASE STUDIES OF AUSTRALIAN, JAPANESE AND THAI AID COORDINATION

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Although Australia and Japan are among the largest aid donors in the Greater Mekong Subregion (GMS), there is limited academic research on their activities as donors and on their relationships with recipient countries in the region. In this study, the aid activities of Australia, Japan and Thailand (an aid recipient/donor) within the region are investigated, with a particular focus on aid coordination practices. The empirical results show that bilateral aid coordination and cooperation are highly elusive and have been further complicated by the emergence of new donor countries that are supportive of the South-South cooperative model rather than of the traditional North-South model.

JEL Classification: O19, O2, O5.

Key words: Aid, official development assistance, Greater Mekong Subregion, Australia, Japan, Thailand, aid coordination, cooperation.

I. INTRODUCTION

Recent studies (Aldasoro, Nunnenkamp and Thiele*,* 2010; Bigsten, 2006; Emmanuel, 2010; Torsvik, 2005) have highlighted a range of problems in the coordination of foreign aid furnished to least developed countries. Aldasoro, Nunnenkamp and Thiele (2010) raised concerns regarding the overall aid effectiveness targeted at these countries as a consequence of aid proliferation and

aid coordination efforts from developed countries. Emmanuel (2010) stated that there has been a proliferation of aid by donors for reasons of self-interest rather than to target needs based on specialization, such as infrastructure development, and that the donor activities have not been geared towards economic development. The immediate effect of "aid proliferation is an increase in the transaction costs incurred by recipient governments while absorbing foreign aid" (Kimura, Mori and Sawada, 2012, p. 1). Moreover, Bourguignon and Sundberg (2007) found that, although official development assistance (ODA) agencies, international financial institutions and non-governmental organizations (NGOs) have an imperfect grasp of local knowledge and do not have control over the aid implementing policies in the recipient country, they nevertheless try to impose policy directives by insisting that certain conditions be met in order for aid to be given. The proliferation of aid donors, matched by problems with how aid is being directed, has led to the fragmentation of aid, whereby smaller aid projects result in increased administrative work for recipient countries and greater complexity in the coordination and cooperation of the aid projects (Kilby, 2011).

These problems have led to a situation in which the efficiency and performance of the recipient country has been undermined, and they are increasingly leading to difficulties in achieving not only donor objectives but also international objectives (Koeberle and others, 2005). Consequently, it is now widely recognized that there is a need to redesign delivery systems and to improve aid quality in order to improve harmonization procedures of aid (Eyben, 2007). Even within the Development Assistance Committee (DAC) countries, to which 28 of the 33 Organisation for Economic Co-operation and Development (OECD) countries are signatories, there have been calls for increased collaboration and coordination among donors (Torsvik, 2005). Evidence therefore points to a persistent lack of coordination in aid efforts among major donors (Aldasoro, Nunnenkamp and Thiele, 2010). France and Japan, which are often "berated for being selfish donors", turn out to be among the least likely to proliferate (concentrate aid), while Norway, which is widely believed to be a superior donor, is a strong proliferator (Aldasoro, Nunnenkemp and Thiele, 2010, p. 927). Bigsten (2006) stated that donors may have common interests in development but disagree on the best method to achieve it.

The existing literature highlights the importance of having a specific foreign aid framework to improve aid effectiveness and coordination (see, for example, Baulch, 2005; Eyben, 2007; Lessmann and Markwardt, 2012). The study by Bourguignon and Sundberg (2007) indicated that a new aid model is emerging. The two main features of the new model emphasize the country ownership of the development strategy as the focal point for donor alignment and the allocation of aid on the basis of performance. A literature review exploring the relationships between donors and recipients has, however, demonstrated that it is easier to get donors to agree on

policies than on goals, procedures and practices (Bigsten, 2006). This is particularly the case with aid efforts originating from both Australia and Japan, where aid coordination and the conformity of aid goals have been highlighted as areas of ongoing concern (Carroll and Hameiri, 2007; Furuoka, 2005). Therefore, in the coordination and harmonization of aid activities, the issues appear to be far greater than country ownership, donor alignment and the allocation of aid based on performance; the issues often involve value-based donor goals, intentions and procedures.

At a closer glance, Japan, for instance, has struggled to gain recognition that its aid programmes are indeed aligned specifically with its Official Development Assistance Charter, which seeks to direct foreign aid towards promoting human rights, democracy and freedom (Furuoka, 2005). Nikitina and Furuoka (2008) stated that Japan's aid priority continued to be linked with its economic interests. Similarly, Australia has received criticism of its aid programmes for being overly politicized and ideologically driven, as opposed to being practical and realistic in addressing regional developmental issues (Carroll and Hameiri, 2007). The present study thus seeks to explore donor relationships in GMS through empirical evidence. The first objective of the study is to investigate the relationships between the two donor nations (Australia and Japan) and Thailand as a regional partner in facilitating coordinated aid programmes to decrease poverty in GMS. This study does not, however, address foreign aid projects of each country in GMS but presents an overview of the cooperation and coordination efforts and mechanisms of Australia, Japan and Thailand in providing foreign aid.

The present paper is structured as follows. In section I, the introduction presents the socioeconomic background of the donor activities in GMS, the rationale for the donor partnership arrangement. This is followed by a brief history of the donor organizations. In section II, the concept of foreign aid as an instrument for human development is explored. In section III the theoretical paradigm used in the present paper is considered, while section IV presents the research methodology, emphasizing the case study as the research strategy and triangulation as the research technique. An analysis of the empirical research is given in section V, and the results are presented in section VI. In section VII, potential policy implications are discussed, along with limitations of the study. Conclusions are drawn in section VIII.

Socioeconomic background of donor activities in the Greater Mekong Subregion

In 1992, the GMS Economic Cooperation Program, commonly known as the GMS Program, was borne out of an initiative of the Asian Development Bank (ADB). This initiative brought together five countries in South-East Asia and Yunnan Province

of China, which at that time were collectively one of the least developed areas in the world. Cambodia, the Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam, which share the Mekong River, were brought together under the GMS Program to focus on achieving faster socioeconomic development in line with achieving the Millennium Development Goals of the United Nations (Dore, 2003; Krongkaew, 2004). In 2001, the Governments of the six countries or areas concerned agreed to an enabling policy, which culminated in 2008 in the Vientiane Plan of Action for GMS Development for 2008-2012, to facilitate (a) effective infrastructure linkages for cross-border trade, investment and economic cooperation, and (b) a framework for developing human resource capacity and skill competencies (ADB, 2001; 2002; 2012). Table 1 highlights the net foreign aid received by GMS countries[1] in 2012, which totalled $5.7 billion. The same year, members of DAC were the major financial contributors to ODA, contributing $127 billion in net ODA worldwide (OECD, 2014a).

Table 1. Net official development assistance and official aid received in the Greater Mekong Subregion, 2012

Country	United States dollars
Viet Nam	4 115 780 000
Cambodia	807 410 000
Myanmar	504 050 000
Lao People's Democratic Republic	408 920 000
Thailand	-134 790 000
Total	5 701 370 000

Source: World Bank, "Net official development assistance and official aid received", 2014. Available from http://data.worldbank.org/indicator/ DT.ODA.ALLD.CD. Accessed 31 August 2014.

GMS has become an area where competition for foreign aid is intense and complex (Sneddon and Fox, 2007). Table 2 illustrates the top 10 donors to, and the demographic profiles of, the GMS countries. Although they have market-based, open economies and the potential benefits of aid to the region are large, these countries have different levels of development, political stability and governance frameworks (Krongkaew, 2004). The level of complexity and the potential for accelerated economic development in the Subregion are, however, attractive to donor countries

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[1]   Although the Greater Mekong Subregion includes Yunnan Province of China, in this paper "GMS" refers mainly to Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam, the so-called CLMV.

**Table 2. Top 10 donors for each Greater Mekong Subregion country:
gross official development assistance, 2011-2012 average**

(Millions of United States dollars)

	Cambodia	Lao People's Democratic Republic	Myanmar	Thailand	Viet Nam	Total
Australia	**86**	**54**	**51**	**12**	**141**	**344**
Japan	**159**	**73**	**68**	**292**	**1 698**	**2 290**
France		16		15	241	272
Republic of Korea	60	29		4	177	270
United States of America	82		31	56	100	269
Germany	48	28		20	118	214
Sweden	32		19	9		60
Denmark			16		64	80
United Kingdom			55			55
Switzerland		23				23
Norway			21			21
Luxembourg		17				17
International Development Association (World Bank)	45	56			1 112	1 213
Asian Development Bank	101	69			346	516
European Union institutions	47	18	47	22	91	225
Global Fund	37		34	45		116
United Nations Children's Fund			16			16
United Nations High Commissioner for Refugees				8		8
Total	697	383	358	483	4 088	6 009
Net private flows	244	-69	318	-135	4 576	
Net official development assistance/gross national income (percentage)	6.10	4.70	N/A	0	3.10	
Gross national income per capita	800	1 260	504	5 210	1 400	
Population	14.9	6.6	52.8	66.8	88.8	

Source: Organisation for Economic Co-operation and Development, "Aid statistics: aid at a glance charts", 2014.
Available from www.oecd.org/dac/stats/aid-at-a-glance.htm#recipients. Accessed 22 May 2014.

with a view to better harmonizing and coordinating their support (Mekong River Commission and Ministry of Foreign Affairs of Denmark, 2007). The GMS Program provided the focus and a subregional developmental framework to initiate coordinated aid work.

The GMS Program brought together countries, some of which were once communist and others capitalist, in an area that was known for wars and conflicts. The GMS Program was part of the new sense of cooperation and development within Asia, which saw the Association of Southeast Asian Nations (ASEAN) embrace this cooperative stance and, by 1999, it expanded its membership to include Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam (Krongkaew, 2004). This was a clear indication that stability and economic development in South-East Asia among countries with diverse economic, political and social values was considered paramount to the development of the region. With the exception of China, countries in GMS are members of ASEAN. The development of the GMS Program has the potential to benefit and accelerate economic development and growth in the Subregion (Sunchindah, 2005). Notably, Thailand is a founding member of ASEAN, and its role as a senior and lead partner in the GMS Program is viewed as facilitating and strengthening the developmental goals of ASEAN (MFAT and United Nations Country Team in Thailand, 2005).

Rationale for partnership arrangement: Australia, Japan and Thailand

Foreign aid from Australia and Japan to the GMS countries is tied to their foreign relations policies, which are guided by the countries' commitment to multilateralism and regionalism, and as leading trading countries in the region. As illustrated in table 2, Japan and Australia are the two largest donors to GMS. Their interest in the Subregion and Thailand's declaration in 2003 that the country would no longer seek foreign aid but would assist other GMS countries (Pinyorat, 2003) provide the framework for the present study of foreign aid coordination and cooperation in the region.

With regard to the Millennium Development Goals, Australia currently approaches development assistance wishing to balance humanitarian aid with its own foreign policy priorities (Wesley and others, 2011). Because many countries in GMS are economically and politically fragile, Australia's strategy is to promote integration and cooperation within the region with a focus on promoting growth and stability. Australia has noted that it has broad interests, covering economic, political, security and environmental matters in GMS. Australia is also focused on supporting peace in the region and on enhancing GMS economic integration in the ASEAN subregion (DFAT, 2010). With the objective of developing sustainable economic growth in GMS,

Australia intends to support the countries in South-East Asia through investments in infrastructure (such as roads and energy generation) and facilitating cooperation by reducing barriers to trade and helping to improve the water management of the Mekong River. Aid to GMS is delivered from Australia through partnerships and joint financing with multilateral development banks, such as ADB, and subregional organizations, such as NGOs (AusAID, 2007).

Japan is a signatory to the Paris Declaration on Aid Effectiveness and has been actively engaged in the development of GMS. Since becoming a signatory in 2005, Japan has confirmed its commitment to being a leader in supporting partner countries in improving aid effectiveness, with a focus on Asia. Japan has a series of economic partnerships and bilateral investment agreements with GMS countries with the expectation that these investments will promote the maturing of markets and support the future vitalization of Japan's economic growth. Japan therefore seeks to incorporate its GMS aid initiatives with its own business interests (Japan, Ministry of Foreign Affairs, 2009a). In conjunction with ADB and under the ASEAN-Japan Plan of Action, Japan has focused on creating an East-West economic corridor that promotes economic integration by helping to facilitate the shipment of goods across GMS. A second East-West corridor within GMS is also being planned (ASEAN, 2014). Assistance has come from Japan in the form of developing port facilities, building bridges and roads, providing technical advice on investment, supporting tourism and developing manufacturing (Japan, Public Relations Office, 2010). In 2009, Japan committed 500 billion yen (US\$ 1 was then equal to about 94.7 yen) in assistance to GMS over a three-year period. To maximize this assistance, the heads of the Governments of Japan and of the GMS countries and areas adopted the Mekong-Japan Action Plan 63 for the development of the region (Japan, Ministry of Foreign Affairs, 2009a). These actions (63 action development plans) fall under the broad areas of developing infrastructure, enhancing cross-regional economic rules and systems, supporting the development of a society that values human dignity, strengthening cooperation for stability, continuing Japan's ODA, enhancing human exchanges, promoting tourism and protecting cultural heritage. As highlighted in table 2, Japan is the largest donor to GMS, with Viet Nam being the largest recipient, followed by Thailand.

Thailand was chosen as a case study because both Australia and Japan have their head offices for GMS in Bangkok. Although Australia does not provide Thailand with direct aid, it does provide the other countries in GMS with aid, and Japan provides all the GMS countries with aid. The study of Thailand provides an understanding of when and how countries in the Subregion graduate from being a recipient country to being a donor country and why countries engage in both recipient and donor activities. This also enables the study to account for the

evolving nature of North-South to South-South aid cooperation.[2] The second research objective builds on this point and is aimed at exploring the nature and acceptance of aid cooperation and coordination within a triangular partnership arrangement in GMS as an extension of the traditional bilateral donor-recipient framework.

The present study is based on focus group interviews with foreign aid officials from the Australian Agency for International Development (AusAID) and the Japan International Cooperation Agency (JICA) located in Thailand, and with representatives from the Thailand International Development Cooperation Agency (TICA). In the sections below, the philosophical and theoretical base with regard to poverty eradication and the values placed on this base by countries are explored. Specifically, the economic and social developmental values of Australia and Japan in providing foreign aid are studied. In this paper, these elements are discussed within the context of GMS. Rather than concentrating on the individual countries of the Subregion, the author addresses the role played by Thailand as both a recipient country and a donor country in providing its neighbouring countries with pivotal guidance for accelerated growth prospects, and Thailand as a country from which both Australia and Japan can garner further regional support for their activities. In this regard, the participation of Australia and Japan in providing harmonious coordinated foreign aid seems important. It is with this understanding that the relationships between AusAID, JICA and TICA are explored in this paper. In the section below, a brief history of the three donors is provided as the backdrop to understanding the complexities of cooperation between the three donors and their coordination of aid activities in GMS.

Brief history of the Australian Agency for International Development, the Japan International Cooperation Agency and the Thailand International Development Cooperation Agency

Australian aid activities commenced before the Second World War with grants generally below $100,000 made to Papua New Guinea. In 1950, the foreign ministers of the Commonwealth countries met in Colombo and launched the Colombo Plan for Cooperative Economic and Social Development in Asia and the Pacific (ABS, 2001). This was the first planned range of aid activities that the Commonwealth provided to low-income Commonwealth member countries in South Asia and South-East Asia. Under this Plan, Australia provided aid in the form of education, scholarships, technical cooperation, training and staffing assistance. In 1952, joint aid activities with

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[2]   The term North-South describes a geographical division whereby North represents the richer countries (Australia, Japan and New Zealand, and countries in Europe and North America) and South represents the poorer countries (in Africa, Asia and South America).

other countries of the Commonwealth began. However, Papua New Guinea, which was administered by Australia, was the major aid recipient of Australian aid, along with India.

In the 1960s, with the independence of many South-East Asian countries, and the strategic nature of South-East Asia to Australia, Indonesia overtook India as Australia's second-largest aid recipient. This signalled a shift from aid based purely on historical ties with the Commonwealth to aid based on national political interest. As reflected in table 3, in 2012/13, Australian aid was mainly to low-income countries in the Asian and Pacific region, with a stronger focus on partnerships with recipient countries through a country programme approach. A substantial amount of Australia's total budgeted bilateral aid went to East Asia[3] (38 per cent), followed by the Pacific (33 per cent). Indonesia was the single largest beneficiary (16 per cent), followed by Papua New Guinea (15 per cent). GMS countries received 11 per cent of total Australian aid. Based on India's preference to receive aid from fewer but larger donors and for smaller donors to channel aid through multilateral organizations and NGOs, Australia has phased out bilateral aid to India (DFAT, 2013).

Table 3. Bilateral aid from Australia, 2012/13

(Millions of Australian dollars)

East Asia (not including Indonesia)	739.70
Pacific (not including Papua New Guinea)	603.20
Indonesia	541.60
Papua New Guinea	500.70
South and West Asia	493.30
Sub-Saharan Africa	385.60
Middle East and North Africa	59.60
Caribbean and Latin America	46.80
Total	3 370.50

Source: Australia, Department of Foreign Affairs and Trade, "Countries and regions", 5 April 2012. Available from http://aid.dfat.gov.au/ countries/Pages/default.aspx. Accessed 11 April 2014.

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[3]   Although South-East Asia is not normally included under East Asia according to ESCAP definitions, the Department of Foreign Affairs and Trade of Australia includes countries in this subregion in the East Asia category.

In 1954, Japan's international aid assistance commenced when it joined the Colombo Plan and began providing mainly neighbouring Asian countries with technical cooperation (JICA, 2014a). In the 1960s, as Japan developed, it established the Overseas Technical Cooperation Agency and the Japan Overseas Cooperation Volunteers, which provided neighbouring low-income countries in Asia with knowledge and technical expertise. JICA was established in 1974 to support formally countries' technical cooperation. Initially, as Japan recovered and developed, its overseas aid was carried out by a number of institutions, which included the Overseas Economic Cooperation Operations of the Japan Bank of International Cooperation, the Ministry of Foreign Affairs and JICA. In 2008, Japan's ODA executing agencies were realigned and integrated; as a result, the activities carried out by the Japan Bank of International Cooperation and part of the grant aid provided by the Ministry of Foreign Affairs came under JICA (JICA, 2009).

Japan's experience as a recipient of a large amount of assistance to rebuild its economy after the Second World War has been the driving force behind its current aid operations in terms of grant aid, loan aid and technical support.

Japan's ODA is broadly divided into bilateral aid, through which assistance is given directly to developing countries, and multilateral aid, which is provided through international organizations. JICA provides bilateral aid in the form of technical cooperation, ODA loans and grant aid (JICA, 2014a). Unlike technical cooperation and grant aid, ODA loans are concessionary loans to developing countries that are to be repaid. Of the total value of ODA provided by Japan in 2012 (see table 4), 55 per cent went to East Asia (including South-East Asia), with GMS countries receiving the major portion – 41 per cent (JICA, 2013). This is followed by South Asia, which received 20 per cent of Japan's total aid, and of this, half (10 per cent) went to India.

Thailand has been providing its neighbouring countries in GMS with assistance through expertise in, for example, project development, programme implementation and training. It has also been providing scholarships under the Thai International Cooperation Programme since 1963, when Thailand was still a large recipient of ODA (TICA, 2009). TICA was established in 2004 and incorporated within the Ministry of Foreign Affairs of Thailand (TICA, 2013). Its purpose is to oversee the administration of Thailand's international development cooperation, with the implementation of its development cooperation programmes as its principle responsibility. The Government of Thailand administers assistance to neighbouring countries through TICA and the Neighbouring Countries Economic Development Cooperation Agency (NEDA). TICA coordinates and implements the technical cooperation programmes, while NEDA provides other developing countries with loans (JICA, 2014b).

Table 4. Official development assistance from Japan, 2012

	Millions of yen	Percentage of total ODA from Japan
East Asia (including South-East Asia)	624 129	55.18
South Asia	230 974	20.42
Africa	92 839	8.21
Middle East	81 082	7.17
Central and Eastern Europe	28 745	2.54
Central Asia and the Caucasus	24 324	2.15
South America	21 927	1.94
Central America and the Caribbean	15 049	1.33
Pacific	12 081	1.07
Total	1 131 150	100

Source: Japan International Cooperation Agency, *JICA 2013: Japan International Cooperation Agency – Annual Report* (Tokyo, 2013). Available from www.jica.go.jp/english/publications/reports/annual/2013/ c8h0vm00008m8edo-att/all.pdf. Accessed 11 April 2014.

Note: ODA – official development assistance.

ODA from Thailand is mainly directed to GMS, especially Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam, and to other regions in the world. In table 5, ODA support from Thailand is shown for 2012. A total of 60 per cent of Thailand's ODA goes towards developing GMS, followed by 18 per cent to

Table 5. Official development assistance from Thailand, 2012

	Millions of baht	Percentage of total ODA from Thailand
Cambodia, Lao People's Democratic Republic, Myanmar and Viet Nam	187.3	60.21
South Asia and Middle East	56.0	18.00
Africa	25.8	8.29
East Asia	13.5	4.34
South-East Asia	11.5	3.70
Latin America	11.4	3.66
Pacific	4.1	1.32
Commonwealth of Independent States	1.5	0.48
Total	311.1	100

Source: Thailand International Development Cooperation Agency, "TICA and ODA", 2 July 2013. Available from www.tica.thaigov.net/main/en/organize/36580-ODA.html. Accessed 13 April 2014.

Note: ODA – official development assistance.

countries in both South Asia and the Middle East (TICA, 2013). The principal engagements of TICA in recipient countries are in either bilateral or triangular cooperation arrangements.

The next section of this paper provides a discussion on the importance of foreign aid for human development and of capacity-building for alleviating poverty.

II. FOREIGN AID AS AN INSTRUMENT FOR HUMAN DEVELOPMENT

In 1945, the Marshall Plan (officially the European Recovery Programme) was implemented in war-devastated economies of Europe to rebuild those countries, and since then, with the continuing efforts of the international community, aid has been provided by wealthy countries to eradicate poverty and accelerate human development around the globe. In 2000, the Millennium Development Goals, which had been agreed to by representatives from 192 countries assembled under the auspices of the United Nations, set the framework for human development in the areas of eradicating extreme poverty and hunger, achieving universal primary education, promoting gender equality, reducing child mortality, improving maternal health, combating prevalent diseases, ensuring environmental sustainability and developing a global partnership for development (UNDP, 2011; Baulch, 2005). The Goals address human development improvements to enhance human capabilities as a means to advance the productive lives of individuals (UNDP, 2011). The philosophy behind the Millennium Development Goals is to increase the basic standards of living of people across the globe, targeting improvements in human capital (mainly nutrition, health care and education), infrastructure development (sanitation, access to clean water, energy, information and communications, sustainable farm practices, transportation facilities and sustainable environmental policies) and the economic, social and political rights of people (mainly concentrated on gender equality, political participation, inequality and security).

The Millennium Development Goals emphasize that the achievement of the Goals would be a cooperative effort of wealthy and poor countries and that their achievement would need to be specific to the individual country's needs. The idea is to avoid the "one size fits all" approach and to bring about cooperation among countries with a better understanding of the needs and capabilities of both the donor and the recipient countries. However, some researchers (see, for example, Vandemoortele, 2009) have argued that, in avoiding the "one size fits all" approach, the Millennium Development Goals have become an instrument for a certain policy framework. Vandemoortele (2009, p. 355) elaborated that the "global MDG canon" (proponents of the Millennium Development Goals) advocates a "money-metric and

donor-centric view of development, and is not ready to accept that growing disparities within countries are the main reason why the 2015 target will be missed". The Goals are therefore not without their critics. For example, Baulch (2005) reported that some donors did not distribute their aid in a manner consistent with the Goals. The criticism has been targeted at two main areas: the lack of analytical power and the justification of the objectives within broad cultural fields (Deneulin and Shahani, 2009; Vandemoortele, 2009). Measurable official indicators (for example, to determine the level of equality and empowerment of women) have therefore not been pursued in international publications. The complexity at the implementation level was expressed by Vandemoortele (2009, p. 356), who argued that the "development or policy framework belongs to the realm of sovereign policy-making at the country level".

To brace the implementation of the Millennium Development Goals, in the 2005 Paris Declaration on Aid Effectiveness, it was recognized that the "volumes of aid and other development resources must increase to strengthen both donor and recipient government commitments to aid effectiveness" (Beloe, 2005). However, Beloe (2005, p. 3) was of the view that "donor and partner governments have, in the most cases, not established effective structures and processes for determining what a local definition of aid effectiveness might be". This contention forms the thrust of the present paper, where the concept of donor partnership development is discussed within coordination and cooperation frameworks for the delivery of human development programmes in GMS. The purpose of this paper, however, is not to provide structural solutions to the cooperation and coordination problems in foreign aid disbursement, but to study a phenomenon in the context of a single region, GMS, through case study methodology.

III. THEORETICAL PARADIGM

Any theoretical base for studying a phenomenon has to begin with strong arguments that are based on values (Willig, 2001; Wood, 2003). Reflections that provide interpretative arguments originate from such a platform. Values are culture-based and as such "culture is … a purely mental phenomenon and hence a psychological phenomenon ... constrained by psychological processes of cognition and learning" (D'Andrade, 2001, p. 243). In this study, perceptions are viewed as knowledge mentally organized in the form of schema or mental structures (Singh, 2002). It is from this premise that this paper develops the reflections of the three agencies – AusAID, JICA and TICA.

The three agencies are viewed as stakeholders with an interest in poverty reduction through targeted human resource capacity development in GMS. Although their relationships have grown out of a mutual interest to provide countries in their

region with human developmental aid, the agencies may have different philosophical values for providing such aid. The areas in which their values overlap are viewed as areas of common interest and where their work relationships are supportive of each other's foreign aid engagements. In a sense, the common areas are viewed as fields in which there may be a convergence of effort in foreign aid cooperation and coordination. The common areas are therefore where maximum capacity-building between the agencies will occur. The literature suggests that countries engage in foreign aid for numerous reasons, including historical relationships, altruistic motives, reciprocity and trade development (see, for example, Dreher, Nunnenkamp and Thiele, 2011). Conditionality imposed by donor countries further complicates progress towards a common coordinating mechanism (Adam and others, 2004). Conditions are commonly attached to the provision of aid, which could include conditions to enhance aid effectiveness, such as anti-corruption measures. They could also include austerity measures, such as the privatization of public service agencies, which are frequently opposed by recipient countries. Some countries place ex ante conditionality on aid, which requires a country to meet certain conditions and prove it can maintain them before it would receive any aid. Other countries resort to ex post conditionality, which involves the country receiving aid agreeing to conditions set by the donor, or lender, that they would carry out after receiving the aid.

This scenario has become more complex due to increased donor activities by non-DAC donor countries such as China, whose values regarding human development policies may clash with those of Western countries (Gu, Humphrey and Messner, 2007). China's increased prominence in aid activities seems to be in tandem with its growing global economic status, and the values and aspirations of China will therefore undoubtedly influence the way foreign aid is distributed. As Bergsten and others (2006, p. 1) envisaged, China may well "define the strategic future of the world for years to come".

The present paper contains a discussion on the engagement of Thailand, a country that is still a recipient of human development aid but that has taken on the role of donor within a subregional context. Telephone discussions and a research meeting in Bangkok provided the necessary personal contact for developing the relationship to enable the focus group interviews. The data were triangulated from the focus group interviews and from secondary data (both through an Internet search on the relevant government websites, as well as through information and documentation provided by government representatives). Research meetings[4] were held in Bangkok with the regional representatives from AusAID, JICA and TICA in February 2011 to

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[4]   Ethics approval granted by Swinburne University, Melbourne, and the University of the Thai Chamber of Commerce in Thailand.

discuss the framework of the research. This was followed up with separate focus group interviews with representatives from the three agencies in March 2011. The focus group transcripts were sent by e-mail to the three agencies to check for accuracy, and changes were made where necessary. After the data were analysed, a public workshop was held in April 2011 to provide stakeholders[5] with the results and an opportunity for them to learn more about the project.

IV.   RESEARCH METHODOLOGY

To scope the activities and conceptualization of current aid efforts, an initial exploratory examination of the secondary data was undertaken, along with telephone discussions with the representatives from the relevant aid agencies in Bangkok to develop an understanding of the foreign aid scene prior to the commencement of the project. Further e-mail communication took place, detailing the type and extent of aid operations under way in Thailand and GMS. This was then followed by three separate focus group interviews of approximately 90 minutes each with a total sample (N = 12) drawn from official representatives from AusAID, JICA and TICA in their respective boardrooms in Bangkok.[6] These representatives provided their professional insights into patterns of cooperation, coordination, activity selection and initiating structures for aid projects. It is recognized that the number of participants limited the generalization of this research; however, it did allow for the contextualization of the phenomenon under study, and it provides a basis from which to explore further the topic in the future. The research also allowed for a tentative exploration of the dynamics that underpin the identification, cooperation and coordination of aid activities by Australia and Japan in GMS. As official international representatives for the three countries, the representatives from AusAID, JICA and TICA were well placed to participate in this project and to provide insights into the research phenomenon being investigated.

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[5]   A public invitation was sent to the three aid agencies, the Asian Development Bank and the International Monetary Fund, and an open invitation was sent to academics, students and the general public involved with the University of the Thai Chamber of Commerce.

[6]   The participants from the Australian Agency for International Development were at the adviser Mekong Subregion level; those from the Japan International Cooperation Agency were senior advisers in evaluation, planning and project formulation; and those from the Thai International Development Cooperation Agency were senior managers from the Partnership and Development Cooperation, and the Human Resource Development, both departments within TICA. The smallest focus group comprised one participant, with four and seven participants in the other two groups, respectively. Due to ethics protocol, detailed information on the participants has not been reported.

Case study research strategy

The case study as a research strategy was chosen as it seemed appropriate when studying the operations of the three national agencies with similar phenomenological aims, that is, eradicating poverty and enhancing economic growth through human development (Yin, 2009). For this study, the case study approach was applied as a research strategy rather than as a case method. Yin (2009) stated that case study research could mean a single case study or multiple case studies that investigate a phenomenon within its real-life context. In this paper, the research strategy chosen is based on Flyvbjerg's (2006, p. 219) support for "Kuhnian insight that a scientific discipline without a large number of thoroughly executed case studies is a discipline without systemic production of exemplars, and a discipline without exemplars is an ineffective one". The majority of the case study approaches chosen to study poverty outreach outcomes and human developmental polices have mainly used published official data as the basis for developing the cases (see, for example, Tsai and Huang, 2007; Zeller and others, 2006). For the present paper, the author was mindful of the context and actor-centred epistemology and therefore chose a phenomenological approach as the most suitable link between the poverty reduction outcomes sought by the agencies and economic development, which is an overarching development target of the developing world (Wood, 2003). Further, an interpretative method of analysis was employed to triangulate the observations of the focus group participants and the documented evidence (in the form of journal and newspaper articles) supplied by the agencies (Creswell and others, 2003).

Triangulation

The interview results were triangulated into a single case study, which is presented in the results section. The results, which were based on case studies of the three agencies, were analysed and interpreted and the preliminary results were presented in a public workshop hosted by the University of the Thai Chamber of Commerce. At the workshop, representatives from civil society, the public, the Government of Thailand, aid agencies, the United Nations Volunteer Programme and ADB were present. Informed discussion responses from the public workshop provided valuable stakeholder insights, which were analysed together with the focus group interview results. The results show that informed and transparent decision-making processes between aid agencies and stakeholders improve coordination and cooperation roles to achieve the common goal of foreign aid, which is poverty reduction through human development.

This research project specifically explored the decision-making processes involved in aid cooperation and the coordination of aid activities among the three aid

agencies. Full anonymity was assured in the focus group interviews; therefore, only the names of the three agencies and the total number of respondents have been identified. The responses from the focus group interviews were used to provide a collective or consensus view and for this reason the statements are not specified to a particular, identifiable individual. To assure confidentiality and the accuracy of the information, the analysis of the transcripts was forwarded by e-mail to the participants separately (by agency) for verification.

V. CASE STUDY ANALYSIS

The framework for the analysis of the responses from the focus groups is provided in table 6. The interpretations and feedback are presented as three case studies further on in this section. The focus group interview responses were thematically clustered into two categories. The theme of the first category is cooperation and coordination, which details the procedures observed by the donor countries in advancing foreign aid in the region. The theme of the second category is the concerns related to the cooperation in, and coordination of, foreign aid in GMS as experienced by the donor country. The analysis and discussion in section V of the present paper are based on the conversations that took place during the individual focus group interviews of the representatives from the three aid agencies in Bangkok. The analysis of the three case countries is under the two categories mentioned above.

Cooperation and coordination framework

A representative from AusAID acknowledged that there was a fairly systematic process in the country's identification of priority-based and suitable foreign aid projects for the targeted aid countries. The representative noted that, for country-level projects, a situational analysis took place, involving all of the key factors – the economic, environment and health factors, public administration, the key challenges, gender equality – that a country might face. This is done every few years and updated regularly when major changes occur. In looking at this process, the representative stated that the design of a country's strategy was the more public part, meaning that the overarching procedure of the aid going to a particular country could be a public process involving consultation and engagement with other development partners, other donors and the Government.

To detail the actual process that AusAID follows in identifying and initiating aid projects at the country level, the steps observed are:

**Table 6. Analysis framework of Australia, Japan and Thailand's cooperation
and coordination in the provision of foreign aid in
the Greater Mekong Subregion**

Category	Case study 1: Australian Agency for International Development	Case study 2: Japan International Cooperation Agency	Case study 3: Thailand International Development Cooperation Agency
Cooperation and coordination	• National priority identification • Initiating aid projects • Project planning and coordination with other donors • Determining at which level coordination is most effective and why • Working with Japan	• Policy decisions and coordination • Identifying and selecting aid projects • Monitoring and evaluation of projects • Communication of project to stakeholders • Recipient country as coordinating body	• Cooperation and coordination mechanisms • Project approval process • Thailand aid relations with Australia • Thailand aid relations with Japan • Thailand – future aid cooperation and coordination
Concerns	• Where coordination can be approached differently • Concessional lending (China) • Transparency • Neighbouring Countries Economic Development Cooperation Agency • Non-governmental organizations • Risk and accountability	• Non-governmental organizations and foreign aid • Communication lapse	

(a)   Start with the strategic priorities of the recipient country;

(b)   Develop an overarching agreement with the country – the development and cooperation statement;

(c)   Make public the assistance to be provided.

The identification of aid projects within an overarching framework supporting the strategic priorities of the recipient country is a collaborative effort guided by

research and cooperation between AusAID and the recipient Government. A representative from AusAID explained that there was a significant amount of public research on development challenges in a country. A Government has its own ideas on particular challenges, and communities have their own ideas. The representative noted that there was a process to determine an agreed set of priorities and of common challenges, and afterwards the more technical project priorities would be agreed upon.

One representative from AusAID explained that major themes were identified in the development and cooperation statement, and from those themes the project's needs would emerge. The representative noted that the actual process varied from project to project in terms of where, with whom, what type of project and who the agency's partners would be; for example, their aid involved not only those activities that they funded and managed directly, but also work that they financed and the Asian Development Bank or World Bank, for example, implemented. In these cases, AusAID is clearly involved in its own project planning processes, that is, the general process identification. A representative from AusAID stated that the project identification and approval process involved an internal peer review procedure, combined with an independent expert appraisal, which occurred for all projects over a certain funding threshold. Normally, however, this meant most projects.

A representative from AusAID noted that the projects were assessed against a set of criteria, including effectiveness, efficiency, sustainability, gender and equality. Based on the peer review, the projects fall into one of three categories: a formal agreement to proceed; not to proceed; or amend the concept. If there is an agreement to proceed, the design phase follows, which is where the more detailed work occurs. This process can take months. It is in this phase that there is often more detailed consultation with other development partners, including other donors. A representative noted that an independent expert appraisal would follow.

One representative from AusAID stated that, as a standard part of any project's internal approval process, a consultation with other donors to discuss their priorities in that sector would be undertaken. This consultation normally happens at the country-office level before the project stage. However, in the case of Japan, a representative from JICA explained that there was an agreed commitment at the leaders level to cooperate more on aid. A representative from AusAID cautioned that the process might not be as smooth as expected, stating that there could be differences, often at the country level, on what they should and should not be working on together. It was further expressed that there was often tension between those involved in the formalized macro-level cooperation agreements undertaken at high-level meetings, and those on the ground. However, a representative from AusAID said that this was not the case with every country partner.

Japan has a slightly different approach towards foreign aid intervention in GMS. While Australia engages more often in bilateral arrangements with countries in GMS, Japan appears to engage actively in both bilateral and trilateral partnership arrangements (including with Thailand). A representative from JICA explained that cross-border cooperation was seen by Japan as an important element in the development of GMS, and that Japan's involvement in trans-border cooperation was an economic regional matter led by the Ministry of Industry and Economics. Projects in this field are raised initially by Japan for the countries in the region. Once decided upon at the policy level, the implementation is done through an agency, such as JICA. These regional cooperation initiatives also have to reflect Japan's international aid policies.

Aid project identification starts in August of each year, when JICA announces the start of the aid project proposal identification process to various ministries in the recipient countries. Before compiling the different project proposals of the recipient countries, Japan's priority areas are made known to the coordinating organization in the recipient country. For example, in Thailand, the proposals submitted by the relevant ministries involved in aid and development are initially screened by TICA. Submissions to JICA from TICA are then screened according to Japan's core policy for Thailand, its global policy and any other circumstances important to the selection of projects. The screened results are then forwarded to the head office in Japan for further screening based on criteria important to Japan's national criteria.

In designing projects, JICA establishes the project design matrix, where measures for the overall goal, the objectives, the conditions and the expected output are stated. The project design matrix is used at various stages of the project and at its completion in order to review the progress and to determine whether the project was successful. A representative from JICA explained that there was a monitoring information system with a midterm evaluation, a termination evaluation done six months before the end of the project, and sometimes post evaluation done three years after the completion of the project. A representative noted that, as a general rule, there was no coordination with other groups during the implementation of projects; however, information was sometimes exchanged.

Information dissemination on projects is in Japanese and in English on the JICA websites, where the reports are summarized in brief. The focus of the coordination efforts is either directed at individual country stakeholders, such as TICA, or, if it is more relevant to engage with a range of country stakeholders, the consultation is extended. One representative from JICA noted that the stakeholders were those who were directly involved in the projects, which in Thailand was TICA, and if there was a wide range of stakeholders, such as other government agencies, they were not involved in project coordination.

The main theme is that the recipient country is the key coordinating body. For example, according to a representative from JICA, in Cambodia in the 1990s, the officials from the Government of Cambodia found coordination difficult due to a lack of capacity. The representative said that this was no longer the case, even though they were continuing to build capacity, and that Japan respected the will of the recipient Government to coordinate aid projects in the country. In many cases, such as aid coordination with the Lao People's Democratic Republic, coordination mechanisms are co-chaired by the national government representatives and the donor.

A representative from TICA identified two principal levels of aid coordination in undertaking foreign aid projects – internal and external. Different departments and agencies oversee Thailand's aid coordination and cooperation activities. NEDA and TICA are the two principal agencies involved in external and internal aid coordination, while other government departments and agencies are also involved when they have specific expertise relevant to a project.

Under the authority of the Ministry of Finance, NEDA is responsible for providing all the aid loans, which are mainly soft loans. Although NEDA operates within another ministry, it invites representatives from other areas, including TICA, to be involved in the approval process for the work plans of different projects. TICA, on the other hand, is the central coordinating body for technical cooperation. TICA operates under, and is managed by, the Ministry of Foreign Affairs. It is responsible chiefly for bilateral cooperation, with the Ministry of Foreign Affairs coordinating regional cooperation and delegating trilateral cooperative projects to TICA. TICA focuses solely on managing government-to-government cooperation, with the limited involvement of NGOs or large businesses in development and aid coordination.

Problems in aid coordination have been identified regarding Thailand's internal arrangements, not only within Thailand but also by third countries where the aid is dispersed. One representative from TICA noted that the aid policy coordination was often difficult because different ministries were involved. This suggests that greater congruence could be achieved in the overall strategy among the different ministries in managing aid coming into and going out of Thailand. Nevertheless, when examining the specific aid project coordination and what procedures are put in place to coordinate the aid activities in which Thailand is involved, a representative from TICA highlighted a distinct project approval process.

In determining which projects to undertake and to ensure that the aid activities fit with all of the other existing aid projects taking place in countries where Thailand provides aid support, TICA carries out a needs assessment before a project is approved. This involves examining the broader development objectives of the

recipient country. A representative from TICA emphasized that support was driven by the recipient country's needs, which were identified through macro-level planning undertaken by the recipient country. Recipient countries are therefore expected to look at their country needs, convey their needs to TICA, and then officials from TICA look at their own expertise. Thailand attempts first and foremost to match its particular aid projects with the recipient country's needs. This allows the process to be driven by the recipient country, and the responsibility for the coordination of the aid projects also falls to the recipient country.

Once a country has proposed a project, TICA ensures that the activities to be undertaken in the recipient country are not duplicated by other donors, or vice versa. It does so through a comprehensive examination of what types of aid activities are already taking place in the recipient country before the project is approved. TICA also relies on the agencies or ministries that have particular expertise relevant to the specified aid project (for example, the Ministry of Agriculture for agricultural projects). Each project implemented by TICA undergoes an iterative monitoring and evaluation process. The in-country coordination that TICA is involved in also tends to occur through coordination meetings organized for donors by the recipient country. These coordination meetings take the form of a round-table coordination meeting among donors, and a representative from TICA attends the meeting. These meetings are viewed as external coordination mechanisms among donors and the recipients of aid projects in recipient countries.

The round-table scenario tends to be a common technique used in coordinating aid projects within GMS, with different donors invited to attend forums established principally by aid recipients. Round-table events are aimed at creating opportunities for donors and recipients to meet and for donors to discuss what they have done in the recipient country and what they plan to do in the future. Round-table meetings are also initiated by multilateral agencies or organizations such as the World Bank or the United Nations Development Programme (UNDP) to coordinate the aid coming through particular countries. UNDP has been particularly active in seeking to promote trilateral cooperation between countries. This has been done by organizing round-table meetings in other countries, such as the Lao People's Democratic Republic or Viet Nam, to help to promote communication between donors.

Although the round-table events are aimed at having communication between various donor countries and recipient countries, a representative from TICA noted that they did not provide detailed information on the projects. The implication is that general information pertaining to a particular country project rather than detailed information is provided by the aid agencies at these meetings. Forward planning is limited to discussions about each donor country's national plans, with time frames of under two years, thereby limiting the possibility of more long-term strategic actions

with regard to aid coordination taking place. It is felt that more effective and coordinated cooperation between donors and between donor countries and recipient countries must take place.

The round-table event was identified as not being the most effective way to achieve cooperation between different donor countries and agencies. However, a representative from TICA noted that the meetings were better than nothing because, although they did not facilitate the process of coordinating aid activities, they created an opportunity for further communication between participating countries. In between these meetings, donor countries or agencies are responsible for project coordination.

In 2002, Australia announced the appropriation of 21.6 million Australian dollars for a new trilateral aid partnership with Thailand to implement jointly activities in third countries in GMS (DFAT, 2002). However, there has not been any progress, and a representative from TICA said that there had not been much activity with AusAID, implying that AusAID was still considering whether to go ahead with the partnership. More recently, in 2010, a consent paper was developed between the two countries, signalling the possibility of trilateral cooperation. Aid cooperation between AusAID and TICA, however, has been described as being disjointed, with divergent agendas for the same aid activities. A representative from TICA noted that this was why it took three to five years for negotiations between Thailand and Australia to establish an aid partnership policy. This suggests that commitment at the national policy level alone is not sufficient, that commitment and support have to be provided at the operational levels – that is, through cooperation between AusAID and TICA in Thailand – for partnerships to develop.

Direct aid from Australia to Thailand has not stopped completely, but there has been a shift away from the government-to-government level. During the focus group interview, a representative from TICA noted that AusAID did not want to provide Thailand with government-to-government aid. Rather, aid from AusAID – and all NGO aid from Australia – has been redirected to reach specifically the likely recipient, at the micro level. For example, the support of Australian universities in providing students from Thailand with competitive scholarships, such as the Endeavour Awards Scholarships, is an ongoing aid programme that Australia provides in the region.

Despite the shift in Thailand's aid status, Japan has continued to maintain its support for domestic aid to Thailand. Although Thailand announced that it was not an aid recipient country, it was noted in the TICA focus interview that the Government accepted technical cooperation, not financial assistance, from other countries. Japan has therefore been able to continue providing technical cooperation, with some 20 projects currently under way in Thailand. Although the overall leadership responsibility

is with the implementing agency (TICA or NEDA), all aid projects coming into Thailand need TICA approval.

In discussing the future of aid cooperation and coordination, a representative from TICA noted that the Agency would continue providing technical assistance but also work with traditional donors on trilateral cooperation. The representative emphasized the importance of trilateral cooperation and of drawing in traditional donors, including Australia, to aid their technical cooperation. The representative stated that they would talk more with officials from AusAID to convince them to participate in trilateral cooperation. The way forward would thus be to look further at the 2010 consent paper on trilateral cooperation, which was discussed between representatives from Australia and Thailand. This situation also highlights the potential for Japan to extend its current trilateral cooperation with Thailand.

Concerns

The growth of the ASEAN subregion – one of the fastest developing areas in the world but one that is comprised of countries at different levels of economic development – creates opportunities for donor countries to assist in the growth of ASEAN, especially in the least developed countries in GMS. A representative from AusAID noted that this in itself created problems, stating that, at the ASEAN level, regional cooperation and coordination was quite difficult, particularly within the trade sector. There are a number of Governments that fund different programmes that may not necessarily be aligned to the same objectives. The representative noted that it was ultimately up to the members of ASEAN to agree on priorities and to tell donors if they (the members of ASEAN) were funding the same projects in least developed countries such as in GMS.

In reference to GMS, an AusAID representative explained that, in the Subregion, there were regular high-level meetings between all donors and Governments, often chaired by the heads of the Governments or the deputy heads. The high-level meetings with the donors are relatively new; they have taken place in the last few years and they relate to the DAC principles and their effectiveness. A representative expressed concern about concessional lending, or soft loans, which were provided by donors at a lower-than-market rate or for longer repayment periods. However, there is confusion among countries about what constitutes effective aid, as DAC is not clear on whether this type of loan assistance can be considered ODA (Hubbard, 2007).

China's entry to the aid donor "market" has brought greater complexity to the aid cooperation and coordination scene. China is currently an aid recipient and an aid donor. The Government of China has a large number of infrastructure projects in GMS

funded through its concessional lending. One AusAID representative noted that China was the largest aid donor in GMS, but that the aid was mainly in the form of concessional lending, not grants. The representative noted that, although China received aid, it was an emerging global power, and the world's second largest economy. The representative went on to say that China was engaging in aid activities in GMS, as the Subregion was seen as being in its backyard and therefore of importance to the country.

A representative from AusAID stated that Chinese aid was tied to the projects delivered by Chinese companies or State-owned enterprises, but that this type of donor support was not limited to China. The representative from AusAID noted that the Koreans and the Japanese used the same approach, but that the Australians did not. The representative stated that Australia did not tie their aid in that way and that aid allocation to projects was always done through internationally competitive bid processes.

Transparency and governance are important principles of DAC. When aid is provided with linked benefits to donor countries, compromises can take place. A representative from AusAID explained that one should never expect a donor to apply principles of transparency beyond what they had in their own domestic situation. The representative said that it was illogical to think that China would have large public consultations, and that if they behaved a certain way towards their domestic constituency it would not make sense for them to act towards a foreign country constituency in a different way. The representative from AusAID added, however, that the situation was changing and that China's policies were improving. The representative noted that, in Africa in particular, China has had some bad experiences with projects failing, and the Chinese officials realized this had damaged China's reputation, and as a result they were changing their practices.

A pertinent point was voiced by a representative from AusAID regarding the complexity involved in implementing the DAC principles. According to the representative, the DAC principles were best practice and agreed to by all DAC signatories, but not even all of the members of DAC always adhered to those standards. The representative went on to state that the principles were an objective and that there were aid donors that were not part of DAC, who may or may not be working towards the principles.

A representative from AusAID reflected on the role of NGOs mainly as consultants, noting that the responsibility for consulting with them could occasionally be a very sensitive issue, varying from country to country. The representative said that, in Cambodia and in the Lao People's Democratic Republic, NGO involvement in activities led by the Government did not always go smoothly; when a country was at

a certain stage of political development or governance – not as it was in Australia – it could be complex, particularly on more contentious issues such as resettlements of populations to carry out infrastructure projects.

In countries such as Cambodia and the Lao People's Democratic Republic, there is therefore a tendency for NGOs to work directly with AusAID. A representative from AusAID noted that, generally, it was not unusual for NGOs to meet directly with the embassy, or AusAID, but that consultations with NGOs took place at different times during a project's implementation. The representative went on to say that the consultations were sometimes formal and sometimes more informal, and at times, as in the case of Australia, an NGO was part of a forum on a particular issue, organized by an NGO, a Government or another donor.

A representative from AusAID noted that about 15 per cent of Australia's aid was implemented through NGOs. Concern was raised by some recipient countries regarding the NGO voice in the internal appraisal process, even though the NGOs clearly participated in the aid work in the recipient countries. The representative stated that the process was quite different in Australia, where there were formal procedures for NGOs to follow when consulting on aid project opportunities. The AusAID representative explained that the opportunity for NGOs to engage in aid consultation was also extended to aid activities in the region. It was further noted that AusAID valued the input provided by NGOs, and if an NGO disagreed strenuously about projects or project outcomes, their concerns were taken seriously. The representative stated that NGOs were often quite happy to use the media as a means to criticize, but that this was acceptable.

Corruption and accountability were raised as areas of concern. The concerns included the financial risks of working in countries with less developed systems of accountability, and not having public access to published financial management data. The representative from AusAID added that it was an ever-present risk that some funds would be misused, but that there were many ways to reduce such occurrences. It was noted that, as part of the initial assessment of a project, there was an assessment of the financial risks regarding the capacity of the partner to manage the funds effectively, whether they were judged to be an effective partner. Such assessments are also made on an ongoing basis.

AusAID works with different partners and risk is assessed in different ways. A representative from AusAID noted that the World Bank, for example, had extremely vigorous criteria in a country such as Cambodia for tracking the use of funds within government agencies, and that it was not uncommon – if there seemed to be a problem – for the disbursement of funds to stop. There would be an investigation, and every person involved would be dismissed if necessary. It was also noted that there was always tension during tracking.

VI.   RESULTS

The results of the present study incorporate a number of outcomes that provide a holistic understanding of the phenomenon of aid cooperation and coordination by three aid agencies in GMS. In particular, in the design of the research strategy, two approaches involving the representatives from the aid agencies and public feedback were incorporated. First, one-on-one interviews with the 12 representatives from the 3 agencies – AusAID, JICA and TICA – formed the basis of the inquiry into foreign aid delivery in GMS. Second, a workshop was held in Bangkok to present the initial results and to provide stakeholders with a "public voice" at an open dialogue session. The outcome from these two research approaches, together with the support of the existing literature, provided the basis for the interpretation of the results.

The central theme of the discourse generated from the case studies was the coordination and cooperation of aid delivery in GMS. Thus, cooperation and coordination in the delivery of foreign aid in GMS and the concerns arising from this delivery formed the basis of the narrative inquiry[7] in the case studies presented in this paper. The case studies highlight a commitment and a desire of all three agencies to engage in the development of GMS, which is seen as crucial for stability and security in the region, and is therefore important to their national interests. The three countries are also important to GMS, as Japan and Australia are the largest aid donor countries, and Thailand, having achieved the status of a middle-income country, is now working in partnership with other donors, providing countries in GMS with technical aid assistance.

The discussions on the coordination and cooperation of aid delivery in GMS are categorized in table 7. Although Thailand is a non-DAC country, it does report to DAC[8] (Dreher, Nunnenkamp and Thiele, 2011). The results suggest that the two main donors, Japan and Australia, and Thailand, as both a recipient and a donor of foreign aid, have different approaches to identifying at the national level the delivery of foreign aid to recipient countries. For example, Australia approaches its delivery mainly through bilateral engagement and has not actively undertaken partnership arrangements. Japan is engaged in bilateral aid with Thailand, and is in a triangular

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[7]   The present study uses case study methodology. Clandinin and Huber (2010) described the case study methodology as employing the narrative inquiry format, through which experiences of the participants provide explanations regarding the phenomenon being studied.

[8]   There are a growing number of countries that are not members of the Development Assistance Committee (DAC) but that provide development finance. However, not all non-DAC countries providing development finance report to DAC. See www.oecd.org/dac/stats/non-dac-reporting.htm for the list of non-DAC countries that report to DAC.

Table 7. Results from the cooperation and coordination focus group interviews and discussions

	Case study 1: AusAID	Case study 2: JICA	Case Study 3: TICA
National priority identification (policy decisions)	• Mainly bilateral • Situational analysis: country factors – economic, environment and health, public administration, all key challenges, gender equality; done every few years with updates when major changes occur	• Bilateral and partnership arrangements • Cross-border/trans-border cooperation	• Bilateral cooperation • TICA and Neighbouring Countries Economic Development Cooperation Agency coordination • Macro-level planning based on needs of recipient country
Identifying aid projects	• Collaborative effort guided by research and cooperation between AusAID and the aid recipient Government, based on strategic priorities of the recipient country • Identification of priorities based on government and public interest; common interests based on themes in the development and cooperation statement	• Bilateral and regional cooperation initiatives coordinated with Japan's international aid policies • Japan's priorities are made known to coordinating organizations in recipient countries and to ministries in recipient countries • Ministries in the recipient country submit proposals to coordinating organization • Coordinating organization submits proposals to JICA	• Request from recipient country • Needs assessment by TICA, examining broader development objectives of recipient country • Project needs are matched to the availability of internal Thai expertise
Assessing aid projects	• Against set criteria, including effectiveness, efficiency, sustainability, gender and equality • Peer review • Make public "what we are going to do to assist"	• Japan's core policy for the country • Japan's global policy • Japan's national criteria	• Assessment against project activities by other donors • Cooperates with relevant recipient country agencies or ministries

Table 7. *(continued)*

	Case study 1: AusAID	Case study 2: JICA	Case Study 3: TICA
Designing aid projects	• Consultation with development partners • Other donors • Independent expert appraisal • NGO involvement	• Development of project design matrix for monitoring progress • Bilateral and partner engagement	• Recipient engagement
Monitoring and evaluation	• Project reports on a progressive basis, depending on project length	• Project design matrix for monitoring progress • Midterm review • Six months before project completion • Some post-evaluation (e.g.,three years after project completion)	• Not discussed
Communication with stakeholders	• Project report summaries on AusAID website	• Report briefs on JICA website • Communiqué with coordinating organization	• Round-table meetings (e.g., initiated by multilateral agencies such as World Bank and UNDP)
Recipient country coordination	• With NGOs and multilateral organizations such as World Bank, Asian Development Bank and UNDP	• Recipient country is key coordinating body of project	• Round-table meetings led by recipient country with different donors invited to attend forums

Note: AusAID – Australian Agency for International Development; JICA – Japan International Cooperation Agency; NGO – non-governmental organization; TICA – Thailand International Development Cooperation Agency; UNDP – United Nations Development Programme.

aid relationship with Thailand in GMS; in this sense, Japan is seen to advance Millennium Development Goal 8 (global partnership for development). As a donor country, especially related to technical cooperation in GMS, Thailand relies on the national priority interest identified by the recipient country, and the need assessment is done within the context of the recipient country's broader developmental objectives. In the context of development aid to GMS, TICA manages government-to-government cooperation. The approval to proceed with a project is determined by Thailand's ability to support the project, especially with regard to technical aid. It is seen as problematic that Thailand's internal activities relating to aid allocation and administration are shared by two agencies operating in two different ministries – NEDA functions within the Ministry of Finance and TICA operates within the Ministry of Foreign Affairs. This highlights the fact that, while attention is paid to donor and recipient problems regarding coordination and cooperation, very little is known about the problems related to aid coordination processes within a country.

Table 7 highlights the coordination difficulties that result from not having a common base among the three aid agencies for identifying aid projects. Prior to advancing bilateral aid funds, which are based on the recipient country's strategic priorities, Australia, in support of transparency and good governance, has aid selection criteria. These criteria include "soft" factors, such as gender equality and humanitarian values. Although Japan is not stringent regarding soft conditions, it has its own prescriptive approach, which includes domestic and international developmental priorities, in deciding on aid engagement. Mutual economic benefit is often a criterion for Japan's aid engagement. In the South-South cooperation approach, which is advocated by Japan and many other Asian economies including Thailand, donor countries share their experiences of economic development with recipient countries. Given that their recent experiences include being an aid recipient, many of these donor countries' developmental experiences are dissimilar from those of traditional donor countries (Aldasoro, Nunnenkamp and Thiele, 2010). Because they are familiar with the complexities involved in the progress from recipient to donor, many Asian donor countries shy away from conditionalities, especially those of transparency and governance (Nikitina and Furuoka, 2008).

For aid projects, Australia's bilateral engagement is based on both government-to-government engagement (at the policy level), and on projects, which are mainly coordinated by NGOs and multilateral organizations. During the early stages, consultations take place with recipient countries, other donors, NGOs and multilateral organizations, such as the World Bank, ADB and UNDP, to establish priority areas of need. This process differs from that of Japan, where projects are initiated at the policy level with the relevant ministry in the recipient country and then,

if the project will proceed, its implementation is through an agency, such as JICA.[9] A similar process is followed when Japan engages in trans-border aid disbursement if more than one recipient country is involved. To coordinate the activities, a "master plan" – the project design matrix – is developed for each project, where objectives, conditions and outcomes are established, monitored and evaluated. Again, at the design and implementation stages, there is a difference between Japan's approach and Australia's approach. Japan's approach is closely associated with the recipient country, while Australia engages with independent organizations, which administer, monitor and evaluate the aid projects. During the implementation phase, the agencies do not view the coordination of projects as being important, except to exchange information as and when necessary. The general discourse that took place during the forums highlighted the fact that there does not seem to be a formal mechanism publicizing the progress of projects during the implementation stage. It is only upon the completion of the projects that project briefs are posted on agency websites.

Agency websites seems to be the most popular venue for communicating with stakeholders. Both AusAID and JICA are fairly transparent in publicizing project summaries and briefs on their websites. While Japan engages directly with TICA and considers TICA to be a stakeholder and partner in the development of GMS, Australia deals on a project-to-project basis with organizations in the individual aid recipient countries in GMS. This decreases the engagement of AusAID with TICA and the necessity to update TICA on project development in the region. The use of round-table forums in GMS where recipient countries engage in dialogues with donors seems unique to the region. Though TICA sees this as an external coordination mechanism for aid projects in recipient countries in GMS, the agency has expressed some doubt regarding its effectiveness. The round-table forums address the projects but no details on coordination are provided, nor are any coordinated long-term strategic plans addressed. The importance of the round-table meetings, however, is to facilitate further communication between recipient and donor countries. Whether this happens is a question of due diligence, which needs to be addressed by both the recipient and the donor countries.

This research set out to explore both the relationships between Australia, Japan and Thailand in providing coordinated aid programmes, and the support for partnership arrangements in GMS. The findings suggest that there is a lack of coordination in aid activities, which generally arises due to the different approaches taken by the three aid agencies. The philosophical base on which aid disbursement is

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[9]   Japan has two government agencies involved in dispersing foreign aid: the Japanese International Cooperation Agency and the Japanese Bank for International Cooperation. The latter is the agency that oversees all concessional loans.

built has implications for this lack of coordination between the agencies. The South-South approach, where the donor and recipient countries engage, has a commercial and experiential dimension, while the Western-orientation or traditional North-South approach has poverty reduction alone as the overarching philosophy for foreign aid transactions. Therefore, countries on either side of this divide working towards the common objective of providing foreign aid will have problems in the coordination of their activities. Australia follows the traditional, or North-South, approach, while Japan and Thailand have strong leanings towards the South-South philosophy.

VII. POTENTIAL POLICY IMPLICATIONS

Potential policy implications for aid development

The increasing shift in the global economies towards Asia and the concomitant increase in the number of non-DAC members engaging in foreign aid activities raise several questions regarding foreign aid coordination. The consensus reached by the OECD countries on the DAC principles for effective aid (OECD, 1992) took place at a time when Western countries had dominance over global development. It is possible to argue that the consensus was largely based on Western developmental values, as it took place prior to the emergence of Asian economies as aid donors. Many of the current Asian donors have now accumulated experiences as recipient countries and further acquired developmental experiences as they progressed through the various stages of economic development. Expanding on this premise, one could ask (a) whether the DAC principles for effective aid, and the Paris Declaration in particular, need to be adjusted to reflect the aspirations of non-DAC countries regarding aid imperatives, and (b) whether the philosophical base that enshrines poverty eradication as an international public good could also benefit donor countries and raise the total welfare in recipient countries. Based on these arguments, multiple approaches to aid disbursement may therefore be needed. Kaul (2013) stated that, as developing countries have become increasingly active partners in global policymaking, their concerns with fairness and justice in fostering a better balance between growth and development, as well as between public and private interests, would intensify.

Potential policy implications for aid coordination and cooperation for the alleviation of poverty

The intense competition and proliferation of aid donors and the engagement of new non-DAC aid providers have become concerns that need to be addressed. These issues were discussed at the Fourth High Level Forum on Aid Effectiveness, held in Busan, Republic of Korea, in November and December 2011. Evidence from

the present study suggests that even the existing DAC partners have different philosophical stances when it comes to aid delivery. The differences in their positions arise from an understanding based on experiences, which seem to guide the Japanese involvement in GMS. Australia, on the other hand, is more in tune with the guidelines of the DAC principles. Unless there is either a broadening of the scope for participation to include both DAC and non-DAC players or an acceptance by the new players of the established DAC principles, the coordination and cooperation of aid and its effectiveness is elusive.

Based on the analysis and discussion above, there are policy implications for each donor with regard to the coordination of and cooperation in aid activities to alleviate poverty in GMS, which is a common objective.

Australia's objective to support economic progress and development to alleviate poverty is closely aligned with the DAC principles for aid effectiveness. This study, though exploratory in nature, suggests that the role played by the donor in the traditional sense is one of power and, as competition among recipient countries to receive aid has grown, this notion of donor dominance has been accentuated and seen negatively by aid recipients. With the increases in aid and in competition to deliver aid, the notion of a true partnership between players is becoming important. DAC countries such as Australia, although altruist in their approach, are yet to explore fully true partnerships with developing countries, and more so with countries that are transiting from recipient to donor. The notion of shared experience and skills and mutual development, rather than one of helper and being helped, should provide the basis of shared ownership among partners.

Japan's experience as a recipient and a donor has provided the foundation for a politically motivated and economically gainful relationship with recipient countries. Japan has sought an aid framework in which a partnership that eventually provides economic benefits to the recipient and to Japan is fostered. This is part of the South-South aid thrust that seems to be gaining momentum, especially during the last two decades, with a greater flow of aid taking place between one developing country and another, rather than from developed to developing countries (UNCTAD, 2005).

The policy implication this phenomenon has for aid effectiveness is enormous. When aid goals are set by the North and when the goal priorities in the South may differ, approaches to the provision of aid become complicated and aid effectiveness is questionable. This dilemma has to be addressed, not at operational levels but at top policy levels.

Limitations of the study

In hindsight, there are some limitations to the study, and if they have been avoided, the quality of the present paper would have increased. As one reviewer suggested, the study would have benefited from some demographic information about the respondents, such as their qualifications, experience and position held. However, because the sample was small, this personal information may have compromised the confidentiality of the participants. The small sample size may also have compromised the quality of the responses. This limitation was unavoidable, as the total population was small. An extended study that could have included in-country interviews in Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam may have added greater value to the results and the findings. This is a recommendation for future studies.

VIII. CONCLUSIONS

Coordination and cooperation among aid providers has been an ongoing issue that has been widely written about and regularly addressed at international forums. In the present paper, coordination and cooperation among aid providers was investigated within a triangular aid framework involving the foreign aid support in GMS of two developed countries and of a developing middle-income country. A number of countries, including Thailand, have graduated into the middle-income country category, and seek to actively participate in the development of low-income countries, especially those located in their subregion. Their participation, however, is often limited to technical support and the procurement of machinery to support economic development projects. By contrast, developed countries, such as Australia and Japan, provide foreign aid support for larger projects, including substantial infrastructure developments.

Aid coordination becomes an issue when the countries that have interests in the development of the region have different approaches to aid delivery. Although Australia and Japan are members of DAC, and Thailand has a role in reporting to DAC, all three countries have not only operational differences in their aid distribution but also philosophical differences regarding how aid should be identified at the national level. Australia is heavily involved in bilateral aid initiatives, through NGOs such as World Vision, and through international financial institutions such as ADB and the World Bank. Japan also engages in bilateral efforts, and through international financial institutions for foreign aid delivery; however, in recent years Japan has increasingly been involved in partnership arrangements for its aid distribution. What this says is that formalizing structures to coordinate the activities and achieving operational common grounds could become problematic. The application and the

combination of the different aid structural forms, in a philosophical sense, therefore require a framework to optimize foreign aid impacts in developing countries.

Different philosophical stances to foreign aid disbursement have created separate pathways where the divide is increasing rather than narrowing the gap between the different donor country's coordination and cooperation activities. Australia's stance on good governance and transparency as criteria for aid support is much more stringent than Japan's liberal stance in support of mutual economic benefits. The South-South cooperative approach to aid intervention has further complicated aid coordination activities in developing countries. The traditional North-South approach to aid is increasingly supplemented by South-South cooperation. The proliferation of donors has further complicated coordination activities in developing countries.

The widening of the aid delivery gap between traditional donor countries and new donors will become an area of contention, where the developing countries will benefit the least. Aldasoro, Nunnenkamp and Thiele (2010) stated that a series of high-level meetings organized by OECD with repeated calls for coordination (Monterrey, Mexico, in 2002), harmonization (Rome in 2003), effectiveness, alignment and mutual accountability (Paris in 2005), and an accelerated pace of change (Accra in 2008) has achieved little. Concerns relating to proliferation and competition among DAC and non-DAC donor countries were raised at the Fourth High Level Forum on Aid Effectiveness, but it appears that the world is not any closer to solving the differences between these two "camps". The concerns regarding the lack of cooperation and coordination in foreign aid activities among donor countries will therefore remain major factors that detract from the spirit of poverty alleviation in the developing world as an international public good of the highest order.

Therefore, discussions on the allocation of foreign aid to developing countries, which have generally focused on economic growth, the reduction of extreme poverty and policy that supports economic management (Baulch, 2005; Burnside and Dollar, 2000; Collier and Dollar, 2002) must have a wider appeal. The discussions need to include the following considerations:

(a)   Is the relationship between economic development, poverty reduction and improvement in human values sustainable in the current context of the foreign aid environment?

(b)   Do the philosophical bases of the Millennium Development Goals, the Paris Declaration on Aid Effectiveness and the 2008 Accra Agenda for Action need to be revised in the context of non-DAC donor participation and of countries that seem to emphasize mutual benefits in the framework of aid delivery?

In the present paper, it is concluded that, unless these differences in values between the traditional DAC donors and the donors who emphasize aid activities from a position of mutual benefit, especially the non-DAC donors, are addressed, the optimization of aid effectiveness and efficiency through well-coordinated foreign aid activities among donor countries will remain questionable.

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FOCUS GROUP INTERVIEW GUIDELINES

Exploring the role of coordinated aid programmes in the Greater Mekong Subregion

Thank you for agreeing to participate in this research project. Your generosity in giving your valuable time is greatly appreciated. Before I begin our discussion, I would like to draw your attention to the informed consent form, which provides you with information and choices about your participation.

The international community has been presented with a dilemma regarding how it achieves important developmental objectives as envisaged by Development Assistance Committee countries and targets for poverty alleviation set through multilateral declarations, including the United Nations Millennium Development Goals. In this pilot study, we are interested in exploring the relationship between the aid donors supporting the development of the Mekong Subregion. The purpose of our discussion today is to explore and collect your professional and personal opinions about these relationships. We would also like you to illustrate this with examples from your professional/personal experience.

With this in mind, I would like to start by asking the following questions:

1. "Help them to help themselves". What are your views?

2. Does aid effectively stimulate sustainable economic activities? If so, how? If not, why not?

3. How do you identify, monitor the development of, evaluate and report on aid projects?

4. How are these activities (question number 3) coordinated with other aid agencies?

5. What are your guiding principles in providing aid?

    a. Do you seek fiscal and budgetary reforms as a condition of aid support?

    b. Do you seek democratic governance reforms as a condition of aid support?

    c. What other factors apply as conditions of aid support?

6. How important are the United Nations Millennium Development Goals and the Development Assistance Committee Guidelines of the Organisation for Economic Co-operation and Development in the selection of your aid project support?

7.   What other factors need to be considered in supporting coordinated sustainable economic development initiatives to alleviate poverty in the Greater Mekong Subregion?

8.   Based on your experience, do you have a personal or professional "vision" for achieving poverty reduction in the Greater Mekong Subregion?

SHOULD AGRICULTURE BE EXEMPT FROM TRADE POLICY REFORMS IN SOUTH ASIA?

*Sumudu Perera, Mahinda Siriwardana and Stuart Mounter**

Contracting parties to the Agreement on South Asian Free Trade Area (SAFTA) are committed to trade liberalization within a fixed time frame. Most contracting parties have kept agriculture out of their tariff liberalization commitments. A key question therefore is: should agriculture receive dispensation given the sector's important contribution to South Asia's economic structure? An enhanced multi-household framework within a multi-country computable general equilibrium (CGE) approach was used to assess the impacts on trade flows, government fiscal revenues and income distribution among households in countries that are contracting parties to SAFTA, assuming full trade liberalization and trade liberalization with the protection of the agricultural sector. The results indicate that, although both policies would facilitate economic growth and lead to a reduction in income disparity among household groups in all South Asian countries, the overall welfare gains would be greater under full trade liberalization. Hence, the removal of agricultural sector tariffs should be an important consideration in future SAFTA discussions; such a step would be a principal means for strengthening intraregional trade.

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I.   INTRODUCTION

Trade policy analysts are concerned with the overall economic benefits that a country will receive in the event that free trade treaties are successfully negotiated (Siriwardana and Yang, 2007). The South Asian Association for Regional Cooperation (SAARC) was established in 1985 by seven countries, namely Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. In 2007, Afghanistan became the eighth member. In 1993, the member countries elected to liberalize trade under successive rounds of tariff concessions, with the ultimate objective of establishing a free trade agreement. The Agreement on SAARC Preferential Trading Arrangement (SAPTA), which was launched in 1995, was the first major political breakthrough for SAARC, as it was the initial regional trading agreement on economic cooperation in South Asia (Sawhney and Kumar, 2008). SAPTA was superseded by SAFTA, which came into force on 1 January 2006, with the expectation that the full implementation of the treaty would be accomplished by 31 December 2015. One of the main objectives of forming SAFTA was to strengthen intra-SAARC economic cooperation by decreasing tariff and non-tariff barriers and structural impediments to free trade. The agreement binds all contracting States to reducing tariffs to between 0 per cent and 5 per cent by 31 December 2015.

However, the progress of cooperative efforts among the South Asian countries has been slow, and South Asia's intraregional trade as a share of total trade has not increased from the 5 per cent levels witnessed in the 1980s and 1990s (Ratna and Sidhu, 2007). The failure of the SAFTA contracting parties to expand the level of intraregional trade may be attributable to, among other reasons, the imposition of restrictive rules of origin, the inclusion of long sensitive-item lists, poor trade facilitation and continued political conflicts between India and Pakistan. The extensive sensitive-item lists declared by individual countries contain most of the agricultural goods of export interest of other members. This is a major trade policy concern, as even the Doha negotiations on tariff liberalization in agriculture have failed to reach a stage of consensus where such tariff liberalization can be implemented. The division between developed countries and developing countries is very clear, despite a recent decision on agriculture (based on updating the rules concerning public stockholding for food security) made at the ninth Ministerial Conference of the World Trade Organization, held in Bali, Indonesia, in December 2013. At the same time, the sensitivity of agriculture has been recognized by countries in the subregion (notably India) that wish to protect their large and poor rural populations (Gilbert, 2008).

Given that South Asia ranks as one of the poorest areas in the world, it is important to consider the welfare implications of trade liberalization.[1] The present paper contains an examination of the short-run and long-run effects on household income distribution among socioeconomic groups in South Asia, assuming trade liberalization with and without agricultural sector protection.[2] The paper also contains estimates of changes in government revenue for each contracting party from the implementation of the alternative trade liberalization scenarios. This information, in addition to providing estimates of the overall costs and benefits of full SAFTA implementation, is useful in identifying key areas in which policy interventions may be warranted.

In recent years, CGE models have been used extensively to address the impacts of trade liberalization in developing economies, as they readily incorporate various channels through which trade reforms affect different groups in society (Gilbert, 2008). In the present paper, a multi-country CGE model for South Asia, based on the Global Trade Analysis Project (GTAP) model, is formulated. The CGE model links the major South Asian trading partners with the rest of the world. One of the shortcomings of the GTAP model is its representative-household specification, which restricts a detailed analysis of the welfare implications associated with various policy options. The CGE model employed in this study addresses this shortcoming through the inclusion of a multi-household framework, which is disaggregated by income classifications and geographical areas in the South Asian economies.

The present paper is divided into five main parts. In section I, an introduction is given. In section II, the contextual setting is provided by highlighting relevant characteristics of the South Asian economies. In section III, the structure of the model, the database development and the experimental design of the study are described. The results of the alternative trade policies are presented and discussed in section IV. Concluding remarks on policy implications are given in section V.

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[1]   According to the World Bank, more than half the world's poor live in South Asia (844 million people). See World Bank, *World Development Report 2010: Development and Climate Change* (Washington, D.C., 2010).

[2]   The focus of this study is limited to tariff reforms, as they are considered to be one of the most widely used trade policy instruments. See R.M.A.K.B. Naranpanawa, "Trade liberalisation and poverty in a computable general equilibrium (CGE) model: the Sri Lankan case", PhD dissertation, Griffith University, 2005. The study does not consider non-tariff barriers or other impediments to free trade.

II. SOUTH ASIAN OUTPUT, TRADE AND POVERTY PATTERNS

Key characteristics of the South Asian economies

The *World Development Report 2010* (World Bank, 2010) indicated that the South Asian subregion has approximately 23 per cent of the world's population and 15 per cent of the world's arable land, but contributes only about 2.7 per cent of global gross GDP, 1.8 per cent of global trade and less than 4 per cent of global foreign investment flows. The South Asian subregion is tremendously diverse in terms of country size, economic and social development, geography, political systems, languages and cultures.

South Asia consists of a single large country, India, which is surrounded by a number of smaller countries, including Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka. India's dominance in the subregion is apparent; the country accounts for more than 78 per cent of the subregion's GDP and 73 per cent of its population (World Bank, 2010). India also commands a leading position in international trade while maintaining a relatively low level of trade openness (35.5 per cent) with the rest of the world. Today, South Asia as a subregion is generally characterized by low per capita incomes, high incidence of poverty and poor infrastructure. Bhutan, India, Maldives and Sri Lanka are classified as lower-middle-income countries, and Afghanistan, Bangladesh, Nepal and Pakistan are low-income countries (World Bank, 2010).

Economic growth and sectoral compositions of GDP

Recent economic growth in South Asia has been impressive. From 1995 to 2004, the subregion's GDP grew at a rate of 6 per cent per annum – nearly twice the growth rate of the global economy (World Bank, 2005). Between 2004 and 2009, average GDP growth in South Asia was 7.1 per cent, which was higher than that in South-East Asia (5.6 per cent) but below that in East Asia (10.4 per cent) (World Bank, 2009a). Much of this surge in growth can be attributed to increasing globalization and the opening up of South Asian markets to the rest of the world (World Bank, 2009b).

Concomitant with this growth have been changes in the sectoral contributions to GDP in each economy. As indicated in table 1, all five countries listed have experienced similar adjustments. The importance of the service sectors in each economy has increased considerably, while the contributions of the agricultural sectors have declined, particularly in the last two decades.

Table 1. Sectoral composition of GDP, 1980, 1990 and 2012

Country	Agriculture as a percentage of GDP			Manufacturing as a percentage of GDP			Services as a percentage of GDP		
	1980	1990	2012	1980	1990	2012	1980	1990	2012
Bangladesh	32	30	18	14	13	29	48	48	53
India	36	31	17	17	17	26	40	41	57
Nepal	62	51	37	4	15	16	26	34	47
Pakistan	30	26	24	16	17	22	46	49	54
Sri Lanka	28	26	11	18	15	32	43	48	57
South Asia	**35**	**31**	**18**	**16**	**16**	**26**	**41**	**43**	**56**

Source: World Bank, World Development Indicators database (2012).

Note: South Asia refers to Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka for 1980 and 1990, and for these countries plus Afghanistan for 2012.

These figures, however, belie the indispensable role the agricultural sector plays in South Asia, particularly in employing the vast majority of the labour force. The World Bank (2010) reported that, in 2009, almost 55 per cent of the labour force was engaged in the agricultural sector.

Average tariff rates in South Asia

Historically, South Asia has been a relatively protected subregion, with individual countries imposing high tariff barriers in order to foster industrial development through import-substitution policies (Bandara, 2011). Sri Lanka was the pioneer in South Asian trade liberalization in the late 1970s, and by the early 1990s all of the countries in the subregion had, to various extents, begun implementing trade liberalization policies. A number of these countries have demonstrated a commitment to tariff reductions.[3] For example, the simple average ad valorem tariff in India fell from 35 per cent in 2002/03 to 15 per cent in 2007, while in Bangladesh the average protective rate fell by 20 per cent over the same period (WTO, 2007). Simple average 2013 tariff rates for the individual South Asian countries presented in table 2 indicate that tariffs were the lowest in Afghanistan and the highest in Bhutan.

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[3]   Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka remain committed to freer multilateral trade as members of the World Trade Organization.

Table 2. Simple average tariff rates in South Asia, 2013

Country	All products		Agricultural products		Non-agricultural products	
	Bound	MFN applied	Bound	MFN applied	Bound	MFN applied
	Percentage		Percentage		Percentage	
Afghanistan	N/A	5.9	N/A	7.1	N/A	5.7
Bangladesh	169.2	14.4	192.0	17.2	37.3	14.0
Bhutan	N/A	21.9	N/A	40.0	N/A	22.0
India	48.6	13.7	113.1	33.5	34.5	10.4
Maldives	36.9	20.5	48.1	18.3	35.1	20.8
Nepal	26.0	12.3	41.5	13.9	23.7	12.0
Pakistan	59.9	13.5	95.5	15.5	54.6	13.2
Sri Lanka	30.2	9.9	50.0	25.8	19.7	7.5

Sources: World Trade Organization, Statistics database (2013). Available from http://stat.wto.org/Home/ WSDBHome.aspx (accessed 10 January 2014); and United Nations Conference on Trade and Development, UNCTADstat database (2013). Available from http://unctadstat.unctad.org/wds/ ReportFolders/reportFolders.aspx (accessed 10 January 2014).

Notes: The latest tariff data available for Bhutan are from 2007 and those for Bangladesh are from 2011.

MFN – most favoured nation.

The 2007 simple average bilateral tariff rates on selected traded commodities presented in table 3, and the 2009 average effective bilateral tariff rates on agricultural products listed in table 4 highlight that agricultural products are typically subjected to high levels of protection.

It is evident from the tables that there is a reluctance by South Asian countries to instigate commensurate tariff cuts on agricultural commodities. Agricultural trade in the subregion is characterized by similar export and import commodities, with high concentrations of a few products. The top five export commodities account for more than 60 per cent of total agricultural sector exports from South Asian economies. For example, milled rice, frozen beef and sugar are among India's top five agricultural exports (World Bank, 2010). India's applied tariff rates on these products are 70 per cent, 33 per cent and 60 per cent, respectively (Serletis and Allen, 2009). Such heavy weightings of agricultural exports with their high import tariff rates seriously inhibit intraregional trade (Sawhney and Kumar, 2008), as does the increasing prevalence of non-tariff barriers, including sanitary and phytosanitary measures (Hoekman and Nicita, 2008; Nanda, 2012; Bellanawithana, Wijerathne and Weerahewa, 2009; Keane and others, 2013; Mohan, Khorana and Choudhury 2012). Furthermore, as

Table 3. Simple average bilateral tariff rates on selected traded commodities in South Asia, 2007

Commodity	India (IND)				Pakistan (PAK)				Sri Lanka (LKA)				Bangladesh (BGD)				Rest of South Asia (XSA)			
	PAK	LKA	BGD	XSA	PAK	LKA	BGD	XSA	PAK	LKA	BGD	XSA	PAK	LKA	BGD	XSA	PAK	LKA	BGD	XSA
Rice (paddy and processed)	0.00	24.60	4.97	0.00	0.00	25.40	5.00	2.23	0.00	0.00	0.00	11.80	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
Wheat, cereal and grains	8.67	7.28	0.42	0.25	100.00	3.00	5.00	2.5	0.00	0.00	0.00	15.00	0.00	9.98	0.00	0.00	0.00	5.88	0.00	0.00
Vegetables and fruits	7.53	4.61	16.20	12.80	28.20	9.04	19.90	7.98	0.40	0.48	5.67	15.00	39.20	0.00	0.00	2.50	16.00	14.40	0.00	25.00
Oilseeds and vegetable oils	9.02	9.12	1.34	0.20	28.90	19.10	0.79	3.5	0.00	1.82	10.20	9.87	23.80	0.00	0.00	0.00	45.60	6.11	0.00	0.00
Plant-based fibres and crops	5.40	23.40	8.32	5.16	27.30	7.77	1.06	4.04	0.03	0.18	23.60	19.60	7.55	5.46	0.00	2.50	19.40	5.01	27.60	24.90
Sugar	10.00	21.60	13.50	2.47	0.00	21.90	0.00	4.87	0.00	0.00	0.00	1.61	10.00	0.00	25.80	0.00	25.30	0.00	0.00	0.00
Dairy products and milk	23.90	17.50	24.90	1.67	0.00	0.00	0.00	8.49	0.00	0.00	0.00	10.80	20.70	0.00	0.00	0.00	25.80	0.00	0.00	0.00
Fish	5.00	12.90	24.80	6.12	30.00	13.20	0.00	2.5	0.00	0.00	23.70	19.70	0.11	0.00	0.00	0.00	0.00	0.00	12.30	0.00
Meat	5.11	21.50	13.40	2.58	23.10	0.00	20.80	6.22	0.00	0.00	0.00	19.80	7.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food products necessaries	18.30	14.80	15.20	8.51	32.90	11.40	14.60	4.6	0.00	4.90	13.80	16.20	23.20	11.80	14.40	42.40	35.80	15.00	11.60	25.00
Beverages and tobacco	24.60	158.00	23.90	8.24	54.90	143.00	0.00	16.9	67.10	0.00	25.00	23.20	22.70	0.00	0.00	40.50	32.50	0.00	0.00	0.00
Textiles	12.80	0.25	15.40	3.99	14.20	0.795	18.70	7.02	11.40	4.32	22.50	26.10	6.82	10.20	1.06	24.50	7.53	21.70	0.54	0.00
Wearing apparel	22.90	4.43	24.00	10.80	14.30	10.1	23.30	10.2	10.20	17.70	24.00	23.30	7.49	18.00	10.20	28.40	0.00	0.00	14.20	0.00
Metal products	9.34	2.20	8.67	4.83	16.00	4.76	12.00	3.43	0.00	3.35	18.10	22.50	11.50	13.60	11.30	17.70	6.99	12.50	20.20	0.00

Source: Center for Global Trade Analysis, GTAP database, version eight (2012).

Note: XSA – rest of South Asia (Bhutan, Maldives and Nepal).

Table 4. Average effective bilateral tariffs on agricultural products, 2009

(Percentage)

Exporting country	Importing country							
	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Afghanistan	–	19.50	–	34.69	–	–	11.54	15.00
Bangladesh	4.38	–	36.67	37.36	23.93	19.29	12.22	24.78
Bhutan	–	24.05	–	1.07	–	22.50	15.88	–
India	5.57	14.48	44.48	–	15.51	11.29	9.16	19.60
Maldives	–	–	–	65.00	–	–	31.43	25.15
Nepal	–	11.34	46.00	39.17	25.00	–	8.67	13.66
Pakistan	6.61	17.76	–	27.29	14.13	8.91	–	11.02
Sri Lanka	7.13	18.27	–	9.13	15.48	18.33	15.93	–

Sources: World Bank, World Integrated Trade Solution database (2012). Available from http://wits.worldbank.org/ (accessed 28 December 2013); and N. Nanda, "Agricultural trade in South Asia: barriers and prospects", SAWTEE Working Paper, No. 03/12 (Kathmandu, South Asia Watch on Trade, Economics and Environment, 2012). Available from www.scribd.com/doc/195408373/Agricultural-Trade-in-South-Asia (accessed 28 December 2013).

Note: The tariff figures are simple averages of effective tariffs.

Samaratunga, Karunagoda and Thibbotuwawa (2007) noted, South Asian trade negotiations have yielded relatively fewer opportunities for agricultural trade compared with non-agricultural trade because of its politically sensitive nature.

Poverty and income distribution in South Asia

After sub-Saharan Africa, South Asia is home to the world's largest concentrations of poverty. Notwithstanding its strong economic growth in recent years, the subregion is still home to about 65 per cent of the poor living in the Asian and Pacific region (World Bank, 2010). This is despite the progress made in poverty reduction following the trade liberalizing reforms instigated in the 1990s.[4] The percentages listed in table 5 demonstrate the poverty and income inequality profiles of the South Asian countries.

The poverty headcount measure indicates the share of the population with a standard of living below the poverty line. The Gini coefficient is the most commonly used measure of income inequality. The coefficient varies between 0, which reflects

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[4] Poverty in the South Asian subregion fell from 52 per cent in 1996 to about 33 per cent in 2006 (World Bank, World Development Indicators database, 2009).

**Table 5. Poverty and income inequality profiles
in South Asia**

Country	Year	Headcount $1/day (percentage)	Gini coefficient
Bangladesh	2005	35.3	33.2
India – rural	2005	40.2	30.5
India – urban	2005	19.6	37.6
Nepal	2004	24.7	47.3
Pakistan	2005	9.0	31.2
Sri Lanka	2002	5.8	40.2

Source: John Gilbert, "Trade policy, poverty, and income distribution in CGE
            models: an application to SAFTA", Department of Economics and
            Finance Working Paper Series, No. DEFWP2008-02 (Logan, Utah,
            Huntsman School of Business, Utah State University, 2008).
            Available from ftp://repec.bus.usu.edu/RePEc/uth/wpaper/
            DEFWP2008-02.pdf (accessed 2 June 2010).

complete equality, and 1, which indicates complete inequality (in complete inequality, one person has all the income or consumption while all of the others have none) (Coudouel, Hentschel and Wodon, 2002, pp. 35-48).

As an example, Sri Lanka has the lowest incidence of poverty but ranks high in terms of income inequality. As can be seen in table 5, poverty is significantly higher in the rural areas of India than in its urban areas, as is the case in the other South Asian countries.[5] This underlines the importance of understanding the likely welfare impacts from tariff reductions on agricultural products, given the high dependence of the working population on the agricultural sector.

III.   THE MODEL AND THE DATA

The present study uses the South Asia multi-country CGE model (SAMGEM), which links countries and regions globally through trade and investment. A distinguishing feature of SAMGEM is the inclusion of a multi-household framework that disaggregates the household sector into different income groups in different geographical areas of Bangladesh, India, Pakistan and Sri Lanka.

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[5]   Four fifths of all extremely poor people in South Asia live in rural areas. See United Nations, Statistics Division, "International agencies". Available from http://unstats.un.org/unsd/methods/inter-natlinks/sd_intstat.htm (accessed 8 April 2012).

Database

The data used in this study were the same as those in GTAP (version seven),[6] which are indicative of the global economy in 2004 (Narayanan and Walmsley, 2008). For the SAMGEM specification, these data are aggregated into 16 countries and areas, 30 sectors and 4 primary factors (see table A.1).

The household sector in Sri Lanka is divided into 30 household groups, consisting of 10 rural groups, 10 urban groups and 10 estate sector groups,[7] disaggregated according to income deciles and geographical regions. For India, the household sector is split into 24 groups, consisting of 12 rural groups and 12 urban groups, disaggregated according to monthly per capita consumer-expenditure classes. For Pakistan, the disaggregation comprises 10 household groups, consisting of 5 rural groups and 5 urban groups, based on income quintiles. The Bangladesh household sector is divided into 38 groups, consisting of 19 rural groups and 19 urban groups, based on monthly per capita consumer expenditure.

Additional data on household income and expenditure were sourced from the Central Bank of Sri Lanka (*Consumer Finances and Socio Economic Survey 2003/04*), the National Sample Survey Organization of India (*Household Consumer Expenditure Survey in India*), the Pakistan Bureau of Statistics (*Household Income and Expenditure Survey 2004/05*) and the Bangladesh Bureau of Statistics (*Household Income and Expenditure Survey 2004/05*). Data for 2003/04 and 2004/05 were used for consistency with the 2004 GTAP database. The commodity groups in the household survey data for each of the South Asian countries were matched and categorized under the 30 SAMGEM aggregated industries. Household income was proportionally allocated among the different factors within the model based on the proportions calculated from the household survey data of the respective South Asian economies and on the sources of income received by the households.

The survey results for each country provide some key insights into household income patterns. In summary, they indicate that unskilled labour income and land and natural resources are the main income sources for rural households. In Bangladesh, India and Pakistan, the majority of the rural poor household groups are engaged in agricultural farming. In Sri Lanka, many rural households and urban low-income households are employed in the garment industry, choosing to abandon the

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[6]   GTAP version eight had not been released at the time of the construction of the SAMGEM database.

[7]   The estate sector is considered to be part of the rural sector. Large plantations for growing tea, rubber and coconut were established in Sri Lanka during the British colonial period. These plantations are included in the estate sector, which comprises 5 per cent of the total population of Sri Lanka. See World Bank, *World Development Report 2009: Reshaping Economic Geography* (Washington, D.C., 2009).

agricultural sector following the launch of the 200 Garment Factory Programme in 1990 (Kelegama, 2005). Hence, the income derived from land in the rural household sector in Sri Lanka (with the exception of the estate sector) is proportionately less than it is in the other South Asian economies. The survey results also reveal that the income received from skilled labour and capital is proportionately greater in urban sector households than it is in rural sector households in all of the South Asian economies.

Most of the elasticity values in the model are taken from the GTAP (version seven) database. The income or expenditure elasticity values for different household groups were obtained from previous empirical estimates (Rajapakse, 2011; Majumder, 1986; Yen and Roe, 1986; Burney and Khan, 1991).

Model

In SAMGEM, private households own the factors of production. Household income, which consists of labour income and capital income, is allocated to savings and consumption using exogenous shares calculated from the household survey data for each country.[8] Labour income is defined as wages and salaries. Capital income is profit from household investments and the income received from land and natural resources. Households receive fixed proportions of sectoral capital income based on their initial supply of capital services. Labour income is determined by the household supply of labour in each industry and the corresponding wage rates. It is expected that the household composition of sectoral labour income would change as labour moves between industries in response to trade liberalization. The structure of the regional household activities in SAMGEM is illustrated in figure 1.[9]

Household consumption demand is determined using a linear expenditure system function. This is one of the key differences between the GTAP model and SAMGEM. The household consumption equations in SAMGEM follow the ORANI-G multi-household framework (Centre of Policy Studies, 2004), whereas consumption in the GTAP model is determined using a constant difference elasticity function. The optimum allocation among the consumption of commodities by households is determined by maximizing the Stone-Geary utility function or linear expenditure

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[8]   The proportions of household consumption data are calculated from the household surveys mentioned above and are matched to the Global Trade Analysis Project household consumption data.

[9]   Factor markets in the model are assumed to be perfectly competitive.

Figure 1. Structure of consumer behaviour
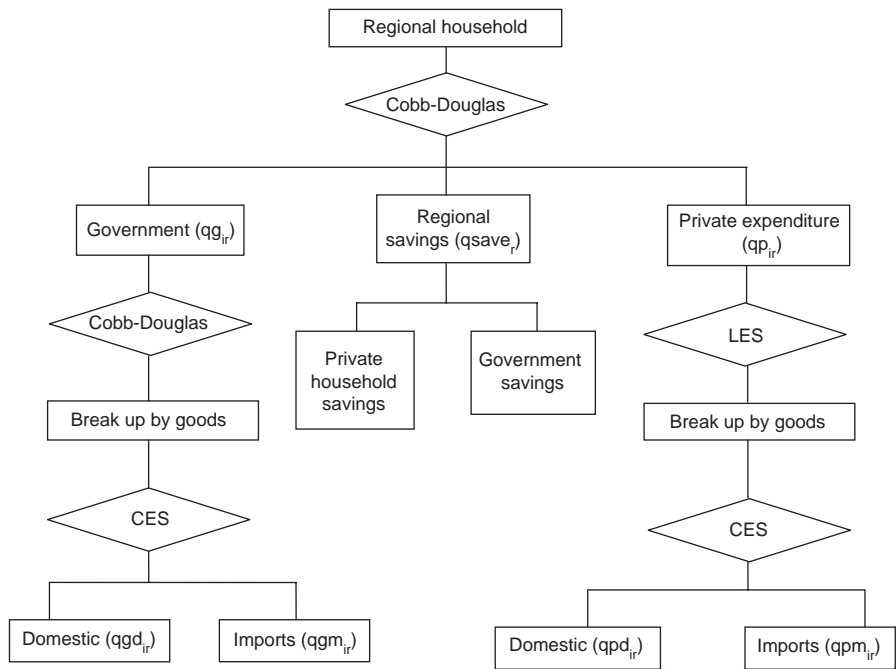
Note: CES – constant elasticity of substitution; LES – linear expenditure system; qg_{ir} – total quantity of goods consumed by government (both domestic and imported); $qsave_r$ – savings in real terms; qp_{ir} – total quantity of goods consumed by private households (both domestic and imported); qgd_{ir} – quantity of domestically produced goods consumed by government; qgm_{ir} – quantity of imported goods consumed by government; qpd_{ir} – quantity of domestically produced goods consumed by private households; qpm_{ir} – quantity of imported goods consumed by private households.

system function subject to the budget constraint (that is, disposable income spent on consumption).[10]

Regional governments intervene in their own markets by imposing taxes and subsidies. The revenue received from taxes, tariffs and transfers from households are allocated among consumption and government savings. Eight types of taxes and subsidies were specified in each country model: tariffs; export duties; production

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[10]   The linear expenditure system, introduced by Stone (1954), incorporates subsistence consumption and is therefore more appropriate for issues related to income distribution and poverty. See R. Stone, "Linear expenditure systems and demand analysis: an application to the pattern of British demand", *Economic Journal,* vol. 64, No. 255, pp. 511-527 (1954).

taxes and output subsidies; taxes on intermediate inputs; sales taxes imposed on consumer and public goods; factor taxes; and income taxes. All of the equations related to production, investment, transportation and trade in SAMGEM are based on the standard GTAP model.

Policy simulations and model closure

The two policy simulations described below are analysed in both short-run and long-run frameworks. The model distinguishes four factors of production: land; capital; skilled labour; and unskilled labour. The factors are considered to be perfectly mobile across sectors. Labour and land are immobile across international borders, while capital is traded internationally up to the point of real return equalization.

In the short run, real wages are held constant with employment adjusting in each industry. The capital stock in each country is also held constant, with rates of return to capital adjusting endogenously. Furthermore, the trade balance is fixed, with real consumption, investment and government spending moving together to accommodate it (Horridge, 2000).

In the long run, the capital stock in each country is allowed to vary while the labour supply remains constant. This allows for capital adjustment over time with economies operating at their natural rates of unemployment. Hence, the price of labour can vary while the price of capital remains fixed. The supply of land is assumed to be fixed in both the short run and long run, while the rental rate varies according to the corresponding demand. In the long run, the trade balance, real consumption, government consumption and investment are all endogenous. Since the model can only be solved for (n-1) prices, one price is set exogenously and all other prices are evaluated relative to this numéraire (Brockmeier, 2001). Accordingly, as in the standard GTAP model, the global average return to primary factors is specified as the numéraire in the model.

Simulation 1: South Asia forms a free trade area (SAFTA-1)

This simulation considers the full implementation of SAFTA, where all SAARC countries eliminate tariffs on all products among members while maintaining their existing tariff barriers with the rest of the world.

Simulation 2: Agricultural sector protection (SAFTA-2)

This second simulation models the implementation of SAFTA with agricultural sector most-favoured-nation applied tariffs maintained (as in table 2). Existing tariff barriers with the rest of the world are also maintained.

IV. SIMULATION RESULTS

The results of the two trade liberalization scenarios for the South Asian economies are discussed in terms of the estimated short-run and long-run impacts on GDP, employment, trade, household income, government revenue and economic welfare. The preferable policy outcomes are determined on the basis of equivalent variation.

Macroeconomic impacts

The short-run and long-run macroeconomic implications of the two trade liberalization scenarios in South Asia are presented in table 6. Several important points emerge from these projections. Under both policies, there are short-run and long-run increases in real GDP in all of the South Asian economies. Noticeably, the real GDP gains are higher with full trade liberalization (SAFTA-1). For India, Pakistan and Sri Lanka, the long-run gains are greater than the short-run gains, while the opposite is true for Bangladesh and for the "rest of South Asia" grouping.

The changes in real GDP can be analysed from either the expenditure (demand) side or the income (supply) side. In terms of expenditure, real GDP consists of real household consumption, real investment, real government expenditure and the net trade volume. The income side is composed of tax payments and total payments to factors of production. In the short run, the level of capital stock, technology and real wages remain unaffected by the policy shocks. However, aggregate employment varies, as it is endogenous in the model.

In the long run, economic activity increases significantly in all of the South Asian economies, especially in the larger economies in the subregion, as overall price levels fall as a result of tariff cuts. On the income side, real wages adjust as economies are operating at their natural rates of unemployment. As long-run capital expansion occurs, the substitution of capital for labour is possible with real returns on capital remaining fixed.

The results indicate that employment increases in all the South Asian economies, particularly in the unskilled labour sector, when tariffs on all products are eliminated among those economies. Furthermore, the removal of quantitative restrictions encourages a shift of resources from the production of import-substitution products to the production of export-oriented goods. With the South Asian countries tending to specialize in agricultural and labour-intensive manufacturing products, an increased demand for labour is likely to occur in such industries as rice (paddy and processed), wheat, cereal and grains, vegetables and fruits, textiles, wearing apparel, leather and wood products. Approximately 55 per cent of South Asia's labour force is

(Percentage)

Table 6. Macroeconomic performance under SAFTA-1 and SAFTA-2

Macroeconomic variable	India (IND)		Pakistan (PAK)		Sri Lanka (LKA)		Bangladesh (BGD)		Rest of South Asia (XSA)	
	Short run	Long run	Short run	Long run	Short run	Long run	Short run	Long run	Short run	Long run
SAFTA -1										
Change in real GDP	0.108	0.115	0.171	0.194	0.994	1.611	0.979	0.725	2.930	2.019
Change in terms of trade	0.263	0.275	0.186	0.165	0.167	-0.324	-1.115	-1.062	-0.703	-0.179
Change in volume of exports	0.989	0.964	1.694	1.821	5.698	8.551	8.151	7.718	10.842	8.768
Change in volume of imports	1.027	1.016	1.151	1.215	4.499	6.313	5.737	5.427	5.173	4.381
Change in per capita utility	0.249	0.255	0.294	0.354	0.055	0.154	0.505	0.187	3.035	1.879
Change in employment – unskilled	0.170	–	0.223	–	2.456	–	1.424	–	5.027	–
Change in employment – skilled	0.132	–	0.161	–	3.022	–	1.241	–	3.890	–
Change in capital	–	0.293	–	0.519	–	8.282	–	2.113	–	3.412
SAFTA -2										
Change in real GDP	0.106	0.111	0.133	0.156	0.632	1.004	0.485	0.396	1.802	1.495
Change in terms of trade	0.176	0.178	0.101	0.082	0.343	0.044	-0.687	-0.674	-0.823	-0.600
Change in volume of exports	0.728	0.737	0.771	0.893	3.494	5.241	4.895	4.754	6.605	5.863
Change in volume of imports	0.741	0.750	0.533	0.596	2.944	4.055	3.431	3.326	2.948	2.684
Change in per capita utility	0.092	0.124	0.130	0.184	0.031	0.042	0.384	0.276	1.696	1.202
Change in employment – unskilled	0.169	–	0.167	–	1.654	–	0.587	–	2.754	–
Change in employment – skilled	0.129	–	0.166	–	1.980	–	0.481	–	2.459	–
Change in capital	–	0.366	–	0.438	–	5.290	–	0.923	–	2.412

employed in the agricultural sector (World Bank, 2010); thus, the liberalization of the agricultural sector is potentially an important policy consideration for reducing unemployment in the subregion.[11]

India, Pakistan and Sri Lanka benefit from terms of trade improvements under both policy scenarios in the short run. However, there is a noticeable deterioration in Sri Lanka's terms of trade in the long run under SAFTA-1, which is due to a reduction in export prices relative to import prices.[12] This suggests that long-run trade liberalization would see Sri Lanka losing international export competitiveness against the larger economies in the subregion, such as India and Pakistan, which trade in similar products.[13] However, with agricultural tariffs maintained, Sri Lanka benefits from long-run terms of trade improvement due to a reduction in agricultural imports from the other South Asian countries.

Sectoral trade impacts

The percentage changes in sectoral exports and imports of the principal traded commodities are listed in tables 7 and 8. Without internal trade impediments (SAFTA-1), there are positive adjustments in most traded commodity groups in all countries. As expected, the proportionate changes are greater in magnitude for agricultural products than for manufactured goods, given the proportionately higher agricultural tariff rates prevailing prior to trade liberalization (see table 3). Consistent with expectations, there are also noticeable increases in exports and imports of agricultural commodities of relative importance to each economy. For example, paddy rice is one of India's main agricultural export commodities (Bank of India, 2010) and it is an important food import for both Bangladesh and Sri Lanka (Central Bank of Bangladesh, 2010; Central Bank of Sri Lanka, 2011). Indian paddy rice exports are estimated to increase by more than 10 per cent, with import increases of 50 per cent plus projected for Bangladesh and Sri Lanka.

The smaller South Asian economies are more dependent on the agricultural sector in comparison with the larger economies in the subregion. The inclusion of the agricultural sector in tariff elimination is particularly advantageous for such export industries as vegetables and fruits, oilseeds and vegetable oils, and milk and other dairy products in countries such as Bangladesh and Sri Lanka.

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[11] Employment impacts on informal labour markets are not considered in this study.

[12] A decomposition of the terms of trade effects is available from the authors upon request.

[13] These products include textiles and wearing apparel.

The contracting parties to SAFTA currently maintain the most-favoured-nation tariff rates for their sensitive-item lists, which contain mostly agricultural products. Keeping these tariffs intact greatly inhibits intraregional trade, as indicated in the lower half of tables 7 and 8 (SAFTA-2).

Household income impacts

As discussed in section III, private households in the South Asian countries are grouped according to per capita income. Total factor income is distributed among the different household groups based on the shares calculated from the household survey data for each country. The total factor incomes of the household groups differ depending on the degrees of factor ownership.

Tariff cuts typically reduce the domestic price of imported manufactured goods that are used as inputs, as well as reduce the prices of imported consumer goods. Therefore, tariff elimination may lead to an increase in competition in the domestic market and create greater incentives to reduce costs and to increase efficiency. This may lead to a fall in the consumer price index and an increase in real factor returns. However, a change in nominal household income depends on both the changes in factor employment and their respective nominal returns. It is expected that, in the short run, with real wages held fixed, a reduction in the consumer price index would lead to a corresponding decrease in nominal wages. Hence, the impact on skilled and unskilled labour income depends on the net effect of changes in nominal wages and total employment, whereas capital income in the short run depends on the change in nominal returns to the rental rate based on the demand for capital in each industry.

In the long run, the supply of labour is exogenous. Therefore, nominal wages determine the demand for labour in each industry and hence determine skilled and unskilled labour income. Conversely, the stock of capital is endogenous in the long run, and nominal rental rate decreases are necessary to maintain a fixed real-capital rental rate when reductions occur in the consumer price index. For this reason, income accruing to capital owners depends on the net effects of changes in nominal rental returns and capital stock. Nevertheless, expectations are that total household income will increase in the long run due to the better utilization of resources. With full employment, capital and labour can move from less efficient sectors to more efficient sectors, thereby increasing the efficiency of factor allocations.

The resulting percentage changes in labour income (both skilled and unskilled), capital income and rental income on land (including income from natural resources) for households located in different geographical areas in the South Asian countries are presented in annex figures A.1 to A.5. It is worth noting that all sources of household income increase in India and Pakistan under both trade policy options in

Table 7. Percentage change in exports under SAFTA-1 and SAFTA-2

Commodity	Short run (percentage change)					Long run (percentage change)				
	India	Pakistan	Sri Lanka	Bangladesh	XSA	India	Pakistan	Sri Lanka	Bangladesh	XSA
SAFTA-1										
Paddy and processed rice	11.43	1.33	2.63	4.49	1.23	11.21	1.37	2.42	5.21	-2.92
Wheat, cereal and grains	1.32	8.98	1.83	117.58	7.42	1.45	9.03	2.42	117.76	1.01
Vegetables and fruits	4.79	17.98	23.31	6.36	68.27	4.70	17.84	22.77	6.33	63.38
Oilseeds and vegetable oils	2.10	-0.27	117.03	120.58	100.48	1.95	-0.36	121.50	121.13	98.48
Plant-based fibres and crops	5.44	3.69	11.07	28.83	44.21	5.28	3.24	9.96	28.99	36.22
Sugar	24.81	11.33	4.90	5.67	15.73	24.89	11.43	4.73	4.65	9.91
Dairy products and milk	24.06	34.92	24.51	34.48	9.36	23.85	34.51	28.61	34.40	3.14
Fish	-0.01	-0.61	0.41	1.56	-0.01	-0.05	-0.62	1.91	2.09	-0.71
Meat	-2.19	5.27	41.68	11.79	9.39	-2.42	4.89	45.92	12.01	2.62
Food products necessaries	-0.14	8.46	0.99	3.28	17.07	-0.24	8.18	3.51	4.02	16.82
Beverages and tobacco	7.69	-2.50	2.48	3.64	57.58	7.65	-2.44	5.50	4.08	57.64
Textiles	1.19	2.56	4.64	7.77	12.52	0.96	2.78	9.74	6.99	7.06
Wearing apparel	-1.15	-1.23	-2.58	9.44	12.52	-1.50	-0.98	1.06	9.01	9.10
Metal products	1.50	0.38	86.16	31.70	49.10	1.51	0.09	88.22	30.96	46.60
SAFTA-2										
Paddy and processed rice	2.61	-0.29	-0.60	0.97	2.20	2.37	-0.24	-0.79	1.30	0.14
Wheat, cereal and grains	-14.64	-32.86	-3.74	39.68	-95.55	-14.72	-32.85	-3.43	39.81	-99.15
Vegetables and fruits	-0.16	-4.88	6.49	2.89	2.49	-0.34	-4.98	6.13	2.88	-0.29
Oilseeds and vegetable oils	-4.78	-52.46	-7.20	73.28	-20.73	-5.06	-52.49	-4.33	73.57	-21.48
Plant-based fibres and crops	-6.45	-14.75	1.41	-26.47	-72.93	-6.77	-15.08	0.66	-26.34	-77.44
Sugar	5.01	-27.26	-24.68	0.02	3.58	4.92	-27.15	-24.81	-0.39	0.38

Table 7. (continued)

Commodity	Short run (percentage change)					Long run (percentage change)				
	India	Pakistan	Sri Lanka	Bangladesh	XSA	India	Pakistan	Sri Lanka	Bangladesh	XSA
					SAFTA-2					
Dairy products and milk	7.88	-20.44	-44.62	-4.70	-114.75	7.74	-20.68	-42.01	-4.66	-118.07
Fish	-0.40	-0.21	-0.59	-21.36	0.61	-0.46	-0.21	0.36	-21.09	0.28
Meat	-1.89	-4.59	-12.04	-7.08	-23.66	-2.28	-4.88	-9.39	-6.98	-27.40
Food products necessaries	-1.05	-4.61	-4.35	-1.47	-10.50	-1.12	-4.80	-2.78	-1.15	-10.33
Beverages and tobacco	7.88	-2.25	1.96	2.92	56.61	7.88	-2.19	3.87	3.14	57.18
Textiles	1.78	2.82	4.38	4.29	12.06	1.54	3.01	7.54	4.00	9.46
Wearing apparel	-0.57	-0.64	-2.68	7.22	12.41	-0.87	-0.40	-0.43	7.07	11.00
Metal products	1.84	0.67	86.08	30.00	49.38	1.97	0.56	87.33	29.75	48.42

Note:　XSA – rest of South Asia (Bhutan, Maldives and Nepal).

Table 8. Percentage change in imports under SAFTA-1 and SAFTA-2

Commodity	Short run (percentage change)					Long run (percentage change)				
	India	Pakistan	Sri Lanka	Bangladesh	XSA	India	Pakistan	Sri Lanka	Bangladesh	XSA
SAFTA-1										
Paddy and processed rice	1.83	21.55	70.61	55.95	0.12	1.92	21.51	70.79	55.39	0.25
Wheat, cereal and grains	1.34	1.10	1.22	3.21	3.21	1.21	1.27	4.65	3.18	5.21
Vegetables and fruits	4.46	4.00	15.81	11.17	1.98	4.43	3.98	16.16	11.11	2.17
Oilseeds and vegetable oils	2.91	2.32	4.81	3.90	4.42	3.01	2.63	7.12	3.50	4.41
Plant-based fibres and crops	8.73	4.76	16.26	3.93	5.36	8.58	5.00	17.36	3.39	6.27
Sugar	8.15	2.84	0.43	-0.24	-0.05	8.21	2.85	1.37	0.10	0.30
Dairy products and milk	1.69	2.54	0.27	14.56	5.24	1.68	2.78	-0.28	14.17	5.36
Fish	2.36	1.23	1.41	22.08	1.89	2.53	1.41	0.57	21.88	1.85
Meat	1.88	1.35	-0.30	-1.27	3.25	1.93	1.53	-1.56	-1.48	3.72
Food products necessaries	4.53	4.76	1.33	4.57	3.57	4.58	6.01	1.17	4.02	3.22
Beverages and tobacco	4.03	0.72	1.87	5.82	-2.94	4.06	0.75	0.64	5.28	-2.98
Textiles	2.65	1.88	-1.20	10.75	6.60	2.63	1.92	1.74	10.67	6.55
Wearing apparel	5.23	0.95	6.49	16.87	-0.23	5.12	0.91	5.55	16.95	-0.24
Metal products	0.85	0.96	14.36	4.47	11.05	0.79	1.04	14.99	4.19	9.32
SAFTA-2										
Paddy and processed rice	-4.10	-17.36	22.56	12.50	-5.03	-3.92	-17.43	22.66	12.17	-4.97
Wheat, cereal and grains	-6.88	-0.15	-3.07	-8.75	-12.30	-6.85	-0.01	-1.00	-8.76	-11.05
Vegetables and fruits	0.35	0.16	2.57	0.89	-1.51	0.44	0.19	2.79	0.85	-1.38
Oilseeds and vegetable oils	0.37	-0.64	-3.40	0.55	-10.46	0.56	-0.37	-2.03	0.45	-10.47
Plant-based fibres and crops	-6.21	-1.76	-0.87	-1.52	-4.10	-6.14	-1.55	-0.19	-1.71	-3.52
Sugar	-9.27	0.88	-1.14	-0.11	-8.16	-9.09	0.89	-0.55	0.05	-7.94

Table 8. *(continued)*

Commodity	Short run (percentage change)					Long run (percentage change)				
	India	Pakistan	Sri Lanka	Bangladesh	XSA	India	Pakistan	Sri Lanka	Bangladesh	XSA
					SAFTA-2					
Dairy products and milk	-3.11	0.71	0.62	7.56	-0.72	-3.00	0.90	0.27	7.44	-0.53
Fish	-24.53	0.07	-1.97	9.32	-0.64	-24.28	0.23	-2.51	9.26	-0.62
Meat	-1.21	0.10	0.54	-0.53	-2.57	-1.00	0.25	-0.24	-0.60	-2.25
Food products necessaries	-0.73	1.47	-2.45	1.76	-0.58	-0.66	2.56	-2.55	1.55	-0.75
Beverages and tobacco	3.38	0.46	2.07	4.20	-2.96	3.76	0.48	1.29	4.08	-2.98
Textiles	2.24	1.86	-1.28	10.27	6.49	2.38	1.89	0.53	10.25	6.53
Wearing apparel	3.69	0.74	6.49	17.22	-0.28	4.35	0.71	5.90	17.26	-0.29
Metal products	0.95	0.77	14.27	4.34	8.55	0.89	0.85	14.65	4.23	7.97

Note: XSA – rest of South Asia (Bhutan, Maldives and Nepal).

the short run and in the long run. Most of the other South Asian countries import agricultural goods from India and Pakistan so it is not surprising that the gains to rural landholders in India and Pakistan are greater when tariffs are eliminated on agricultural commodities. The main gains in rural sector income are from land and from unskilled labour, but the gains are much smaller under SAFTA-2, when levels of agricultural protection are maintained. Urban household gains occur from increases in skilled labour and capital income, which mainly result from an increased demand for labour-intensive manufacturing goods.

Conversely, landowners in Bangladesh and Sri Lanka lose under free intraregional trade, as imported agricultural product prices fall. In Bangladesh, there are positive income gains to landholders if agricultural tariffs remain in place, as imports of agricultural goods from neighbouring trading partners are restricted. In aggregate, household incomes in the smaller economies (the "rest of South Asia" grouping) are significantly higher when all tariffs are abolished, as the agricultural sectors constitute a major part of GDP in these economies. A key outcome among household groups in all the South Asian economies is that long-run trade liberalization would lead to reductions in income disparities due to increased efficiencies in the utilization of factor inputs. In Sri Lanka, there is little benefit to rural unskilled workers who are engaged in the agricultural sector. The poor estate-sector household groups are also vulnerable to liberalization, as they are heavily dependent on the agricultural sector. Unskilled labour income in Sri Lanka's urban sector increases, which is most likely a migration response as unskilled workers move from rural to urban areas to gain employment.
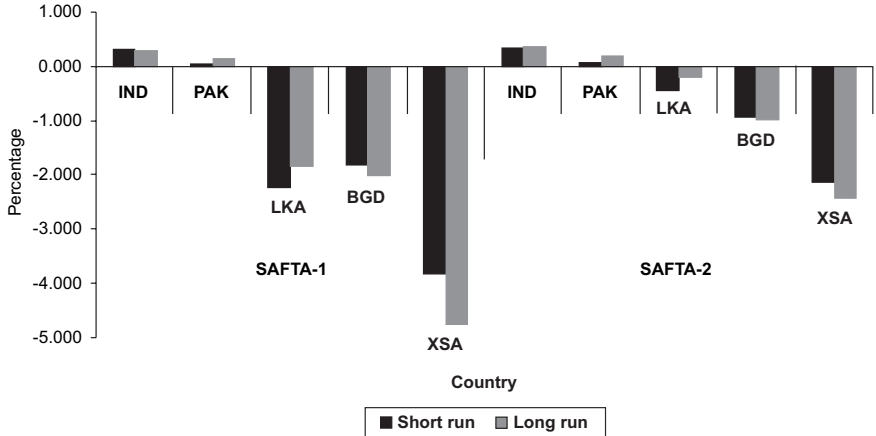
Government revenue impacts

The percentage changes in total government revenues for the South Asian economies under each trade option are illustrated in figure 2. Excluding India and Pakistan, the elimination of all import tariffs would reduce government revenues in all of the South Asian economies. As expected, the magnitudes of the reductions are smaller with agricultural protection status quo. The marginal increases in total government revenues in India and Pakistan are most likely attributable to the significant volumes of trade in which both economies engage with countries outside the subregion.

Welfare impacts

Equivalent variation is used to assess the welfare implications of each policy option. Equivalent variation is an absolute monetary measure of welfare improvement in terms of income that results from a fall in import prices when tariffs are reduced or eliminated.

**Figure 2. Percentage change in government revenue under
SAFTA-1 and SAFTA-2**

Note: BGD – Bangladesh; IND – India; PAK – Pakistan; LKA – Sri Lanka; XSA – rest of South Asia
            (Bhutan, Maldives and Nepal).

The overall welfare measures and their proportions of total regional income (household income and government revenues) are listed in table 9. In absolute terms, the gains to India are significant under both trade liberalization scenarios. These findings are not dissimilar from the conclusions of Bandara and Yu (2003), who found that the potential absolute gains to India from SAFTA were considerable. However, as depicted in table 9, in relative terms the smaller economies (namely Bangladesh and the countries in the "rest of South Asia" grouping) benefit more than the larger economies under the same trade policy options. For instance, under SAFTA-1, real GDP gains in India and in the "rest of South Asia" grouping are 0.24 per cent and 2.78 per cent, respectively. This result stems from the smaller economies having higher overall pre-liberalization levels of protection in comparison with those in India, Pakistan and Sri Lanka (see table 2).

It is also evident that the gains to all the South Asian countries are higher under SAFTA-1 than they are under SAFTA-2. For the smaller economies, the short-run gains outweigh the long-run gains under both policy options; this is consistent with the percentage changes in real GDP in these countries (see table 6). The smaller economies, which have less supply capacity than the larger economies, are subjected to the long-run competitive pressures exerted by their larger regional and global trading partners. The gains for Sri Lanka are quite small compared with those for the other countries as a result of reductions in household income (landowners), especially in the rural sector.

Table 9. Projected equivalent variations under SAFTA-1 and SAFTA-2

Country/region/area	SAFTA-1				SAFTA-2			
	Short run		Long run		Short run		Long run	
	Millions of United States dollars	Percentage of regional income	Millions of United States dollars	Percentage of regional income	Millions of United States dollars	Percentage of regional income	Millions of United States dollars	Percentage of regional income
India	1 457.8	0.24	1 521.7	0.25	537.2	0.09	725.4	0.12
Pakistan	255.8	0.27	307.6	0.32	112.7	0.12	159.6	0.17
Sri Lanka	12.0	0.06	29.7	0.15	5.9	0.03	8.2	0.04
Bangladesh	256.6	0.46	95.1	0.17	194.9	0.35	140.1	0.25
Rest of South Asia	386.6	2.78	239.4	1.72	216.1	1.55	153.2	1.10
United States of America	-187.2	0.00	-38.2	0.00	-232.7	0.00	-59.8	0.00
Canada	-12.3	0.00	-1.4	0.00	-13.4	0.00	0.2	0.00
European Union	-276.1	0.00	-120.7	0.00	-315.0	0.00	-194.3	0.00
ASEAN-6	-87.5	-0.01	-54.1	-0.01	-64.9	-0.01	-70.3	-0.01
High-income Asia	-89.7	-0.01	-61.4	-0.01	-97.6	-0.01	-72.4	-0.01
Japan	-150.5	0.00	-53.3	0.00	-166.3	0.00	-69.9	0.00
China	-116.3	-0.01	-84.6	-0.01	-118.8	-0.01	-93.4	-0.01
Rest of Middle East	-67.9	-0.01	-72.0	-0.01	-45.7	-0.01	-58.8	-0.01
Australia and New Zealand	-32.2	0.00	-12.7	0.00	-11.0	0.00	-5.7	0.00
Russian Federation and rest of former Union of Soviet Socialist Republics	-3.3	0.00	10.4	0.00	3.4	0.00	-5.3	0.00
Rest of world	-163.7	0.00	-63.8	0.00	-101.1	0.00	-78.0	0.00

Notes: ASEAN-6 – Indonesia, Malaysia, Philippines, Thailand, Singapore and Viet Nam.

High-income Asia – Hong Kong, China; Republic of Korea; and Taiwan Province of China.

Rest of former Union of Soviet Socialist Republics – Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Ukraine and Uzbekistan.

Rest of Middle East – Bahrain, Iraq, Islamic Republic of Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates and Yemen.

Rest of South Asia – Bhutan, Maldives and Nepal.

In relative terms, the short-run and long-run welfare differences are not huge. There are a few reasons for this. The first reason is the low level of intraregional trade among the South Asian countries. Industrial countries continue to assume a major share of the subregion's trade, while developing countries outside South Asia have been the second-most important group (IMF, 2009). As noted in section I, this is a serious impediment to cooperation and economic integration in the subregion, and it underpins the importance of identifying and implementing appropriate policy measures to improve intraregional trade among SAARC members. Numerous countries have also entered into bilateral trade agreements with deeper commitments that further restrict intraregional trade. India's bilateral agreements with Afghanistan, Bhutan, Nepal and Sri Lanka, and Pakistan's agreements with Afghanistan and Sri Lanka are worthy of mention in this context. Second, the calculated welfare measures reflect only the changes in formal employment, as data on informal labour are not readily available. Reddy (2013) noted that South Asia would be one of the subregions that would witnesses a very fast growth in the size of its labour force and that the majority of agricultural labour was found in the unorganized sector. Therefore, the liberalization of the agricultural sector in particular is a key element in attempting to reduce the wedge between the formal and informal labour sectors. Third, the static nature of the model means that dynamic adjustments from the short run to the long run are not fully captured in terms of capital and labour force growth.

V. CONCLUDING REMARKS

In summary, the two trade policies analysed in this paper would facilitate economic growth in all of the South Asian countries. However, the potential gains are considerably smaller with zero tariff exemptions for agricultural products. There are likely long-run welfare gains for all of the South Asian countries, although for Bangladesh and the countries in the "rest of South Asia" grouping, the short-run gains outweigh the long-run gains. The results indicate that employment would increase in all the South Asian countries under both policy options, although the rate of increase would be greater under SAFTA-1.

Industry level results indicate that the South Asian countries can foster trade among SAFTA contracting parties by eliminating tariffs, particularly in the agricultural sector. This would lead to substantial increases in exports of such agricultural products as paddy rice and processed rice; wheat, cereals and other grains; and vegetables and oilseeds, particularly in India and Pakistan, and to significant increases in imports of agricultural goods in the smaller economies (Bangladesh, Sri Lanka and the "rest of South Asia" grouping). Thus, it seems pertinent that the contracting parties revise their sensitive-item lists. The removal of both tariffs and non-tariff barriers in the agricultural sector should expedite the development of intraregional trade.

The findings from this study also reveal that all sources of household income would increase in India and Pakistan under both trade policy options. Therefore, the initiation of appropriate policies to more productively utilize agricultural land and the large labour endowments in both countries would further augment the production and exports of agricultural commodities.

However, landowners in Bangladesh are worse off with uniform tariff elimination, and in Sri Lanka there are negative impacts on income from land under both policy options. That being the case, the Governments of these economies may also need to consider policies to increase productivity in the agricultural sector, as a large percentage of the poor are dependent on this sector for their livelihood. Governments could introduce compensation policies as a temporary measure to smooth consumption in the most vulnerable households to enable them to adjust to interim employment or income losses. Nevertheless, this is a short-term solution and appropriate long-term policies are needed to enhance competitiveness in the agricultural sectors. For example, one of the main problems the rural populations in these economies encounter is water scarcity, and most farmers do not have access to sufficient water resources to undertake their agricultural activities (World Bank, 2010). Hence, actions are needed to improve and to expand irrigation and water conservation systems. Moreover, it is essential to improve the investment climate and marketing infrastructure (for example, upgrading rural roads to facilitate easier market access), and to develop services to enhance market efficiency. Rural farmers are mostly dependent on informal financial-sector arrangements and are unfamiliar with formal banking systems. Developing improved agricultural credit facilities and increasing the education of the rural poor are key policies that would help to alleviate poverty in the subregion.

The analyses presented in the present paper are subject to certain qualifications. First, SAMGEM is a comparative static version of the GTAP model and does not capture any of the dynamic effects of trade liberalization. Second, the assumptions of the model do not make allowances for imperfect competition, which may exist in commodity and factor markets. Third, the model does not consider the bilateral free trade agreements that have been negotiated between the member countries of SAARC. Finally, the model's results are based solely on tariff reforms, and non-tariff barriers are assumed to be absent in all policy simulations. As discussed in section I, tackling non-tariff barriers and restrictive rules of origin are important issues that need to be addressed to promote intraregional trade in South Asia. However, incorporating these issues within a single model poses significant challenges because of their diverse and complex nature, and because of the lack of available evidence, particularly on non-tariff barriers. These are considered priority areas for future research.

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ANNEX

Table A.1. SAMGEM aggregation
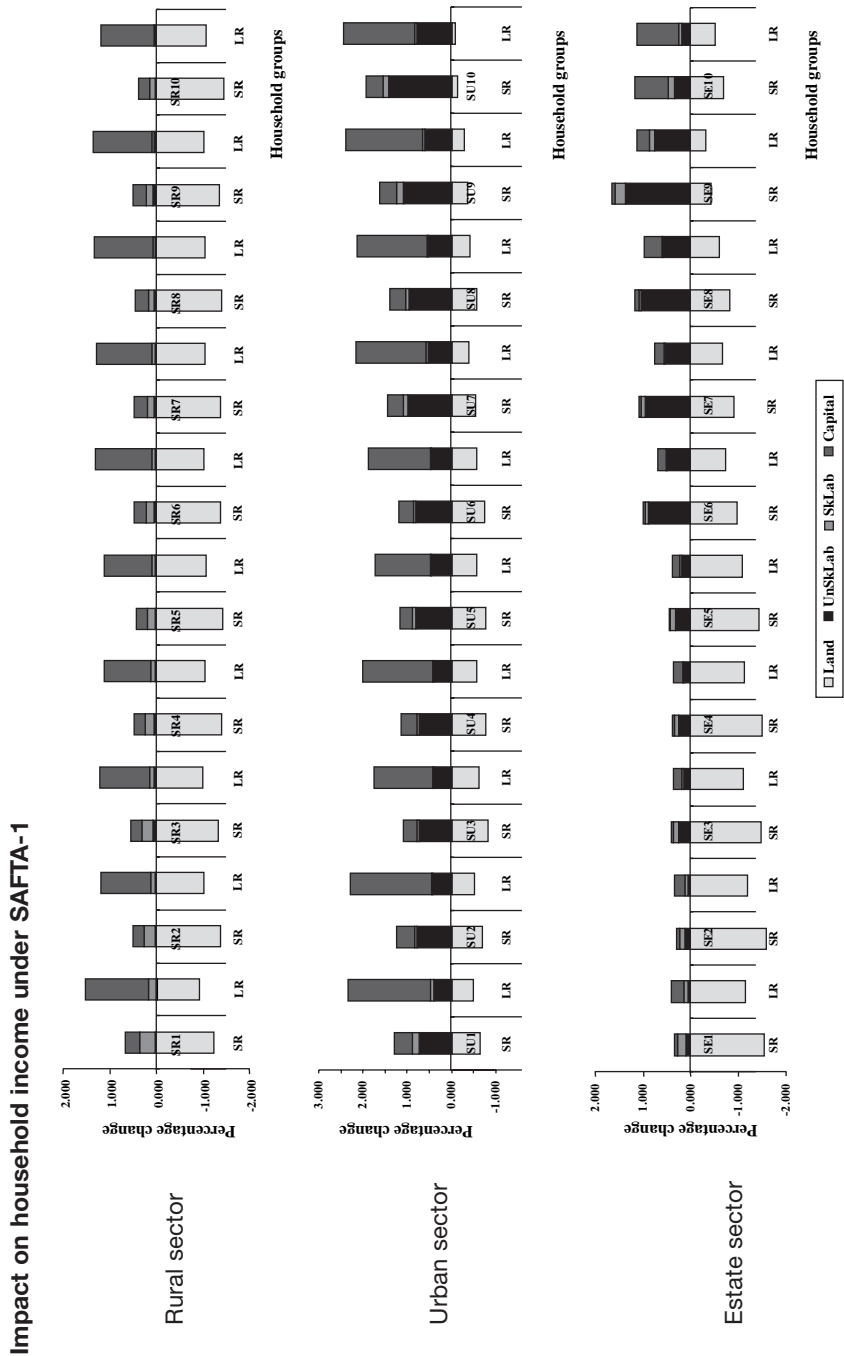
Country/region/area	Sector
India	Rice (paddy and processed)
Sri Lanka	Wheat, cereal and grains
Pakistan	Vegetables and fruits
Bangladesh	Oilseeds and vegetable oils
Rest of South Asia	Plant-based fibres and crops
United States of America	Sugar
Canada	Dairy products and milk
European Union	Fishing
ASEAN-6	Meat
High-income Asia	Food products necessaries
Japan	Beverages and tobacco products
China	Textiles
Rest of Middle East	Wearing apparel
Australia and New Zealand	Leather, wood products
Russian Federation and rest of former Union of Soviet Socialist Republics	Paper products
Rest of the world	Chemicals, rubber and plastic products
	Metal products
Primary factors	Electronic equipment
Land (including natural resources)	Machinery and equipment
Skilled labour	Manufacturing necessaries
Unskilled labour	Motor vehicles and transport equipment
Capital	Petroleum and coal
	Gas manufactures and distributers
	Tradable services
	Non-tradable services
	Other primary products
	Trade and construction

Table A.1. *(continued)*

Country/region/area	Sector
	Electricity
	Water and air transport
	Oil and natural resources
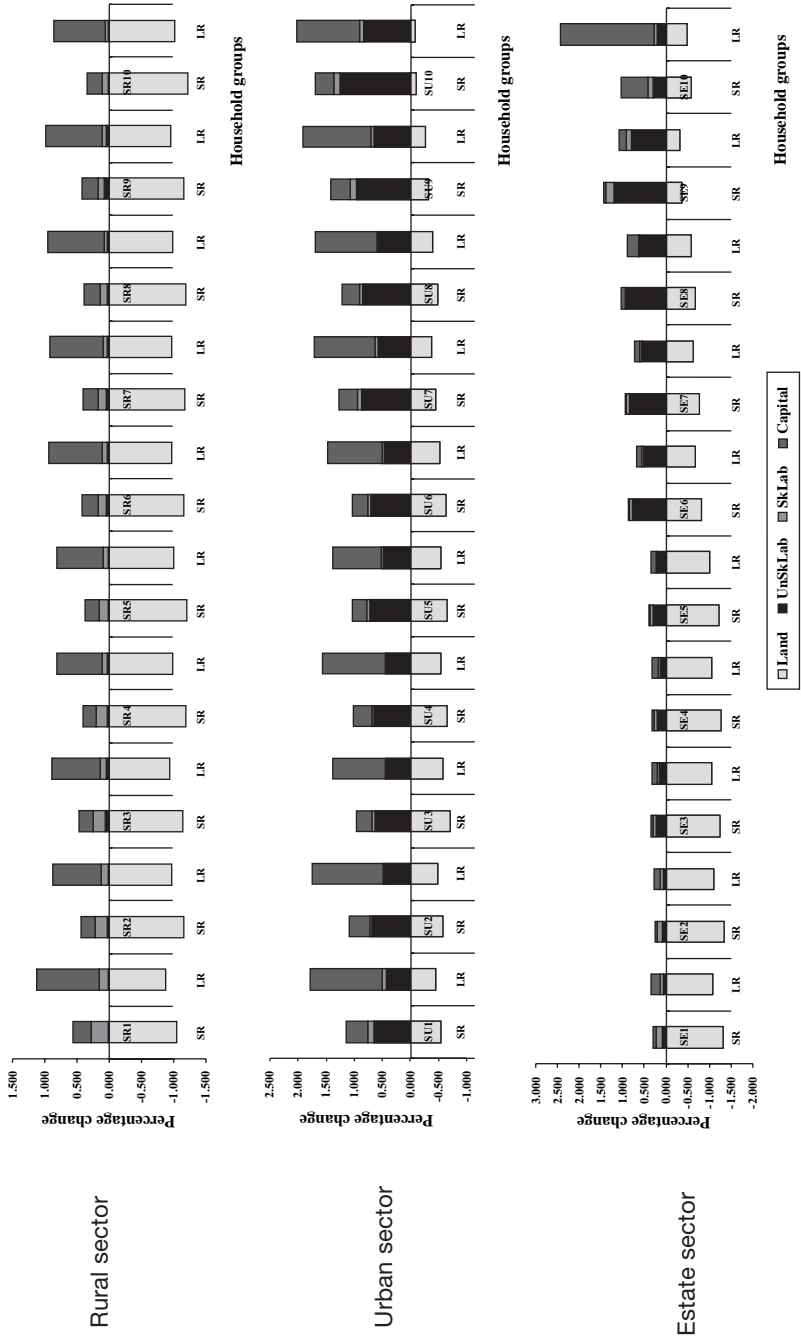
Notes: SAMGEM – South Asia multi-country computable general equilibrium model.

ASEAN-6 – Indonesia, Malaysia, Philippines, Thailand, Singapore and Viet Nam.

High-income Asia – Hong Kong, China; Republic of Korea; and Taiwan Province of China.

Rest of former Union of Soviet Socialist Republics – Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Ukraine and Uzbekistan.

Rest of Middle East – Bahrain, Iraq, Islamic Republic of Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates and Yemen.

Rest of South Asia – Bhutan, Maldives and Nepal.

Figure A.1. Impact on household income under SAFTA-1 and SAFTA-2: Sri Lanka

Notes: SR – short run; LR – long run; UnSkLab – unskilled labour; SkLab – skilled labour.

           SR1-SR10 – rural household groups; SU1-SU10 – urban household groups; SE1-SE10 – estate sector household groups.

Impact on household income under SAFTA-2

Rural sector

Urban sector

Estate sector

Notes:　SR – short run; LR – long run; UnSkLab – unskilled labour; SkLab – skilled labour.

SR1-SR10 – rural household groups; SU1-SU10 – urban household groups; SE1-SE10 – estate sector household groups.

Figure A.2. Impact on household income under SAFTA-1 and SAFTA-2: India

Impact on household income under SAFTA-1

Rural sector
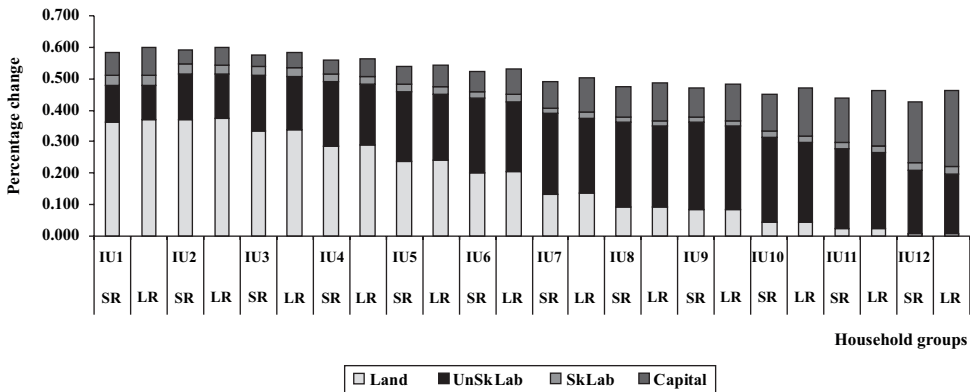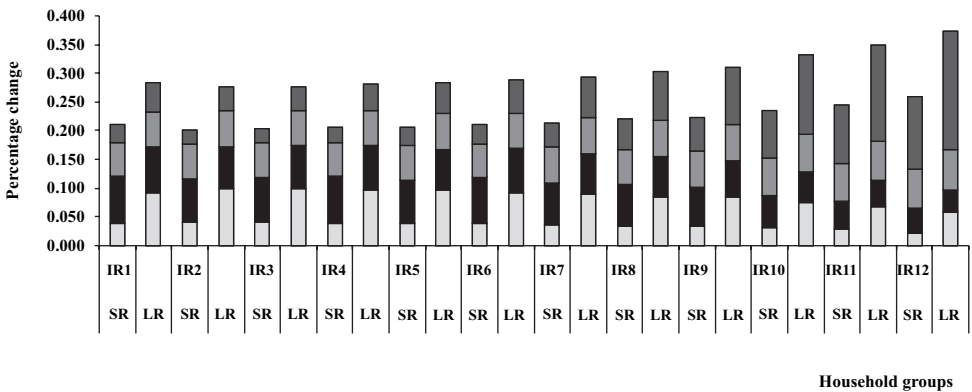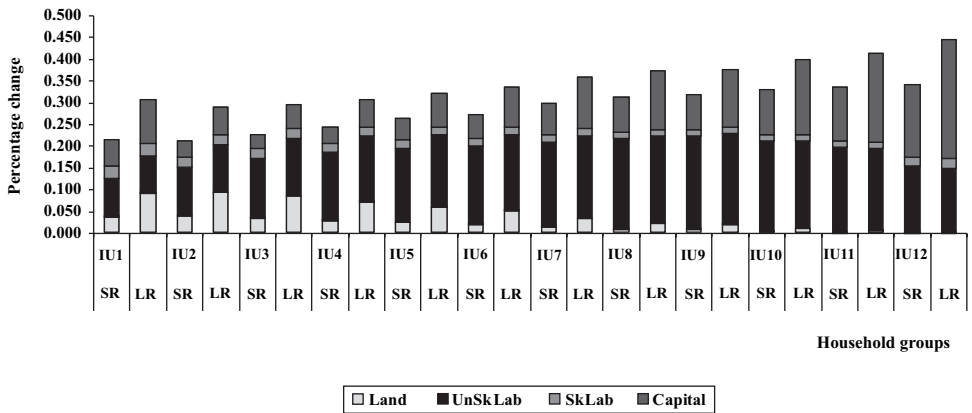
Urban sector

Figure A.2. *(continued)*

Impact on household income under SAFTA-2

Rural sector

Urban sector

Notes: SR – short run; LR – long run; UnSkLab – unskilled labour; SkLab – skilled labour.
IR1-IR12 – rural household groups; IU1-IU12 – urban household groups.

Figure A.3. Impact on household income under SAFTA-1
and SAFTA-2: Pakistan

Impact on household income under SAFTA-1

Rural sector
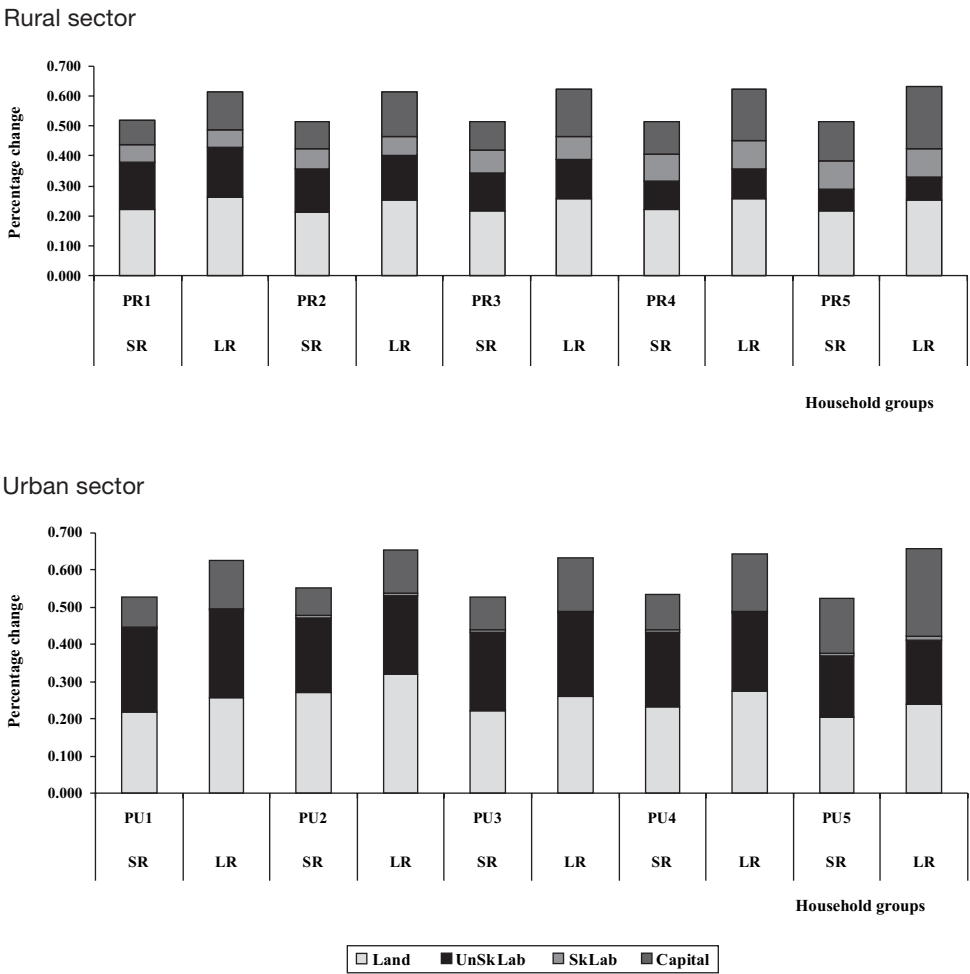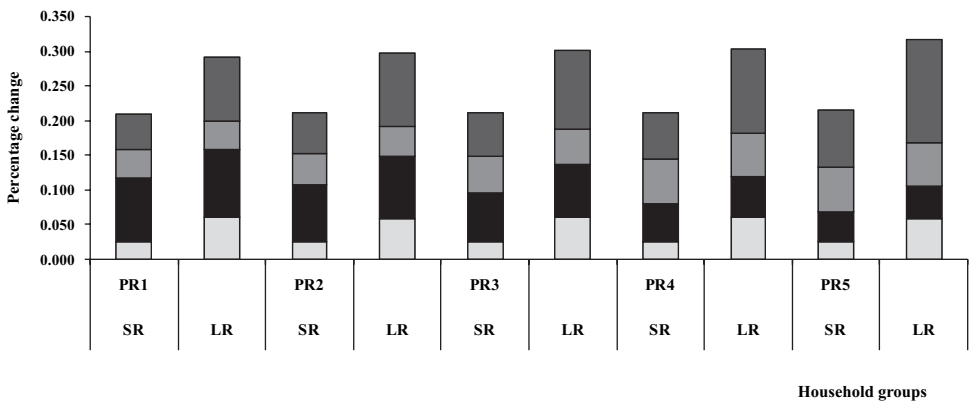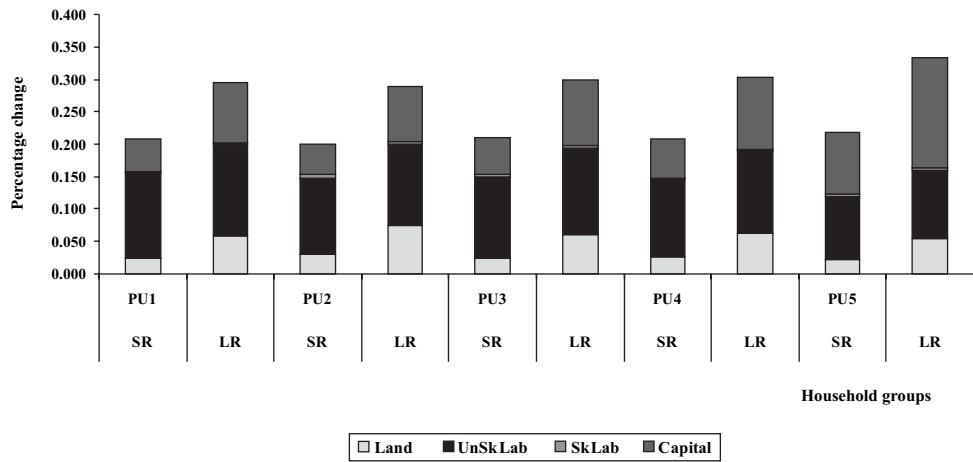
Urban sector

Figure A.3. *(continued)*

Impact on household income under SAFTA-2
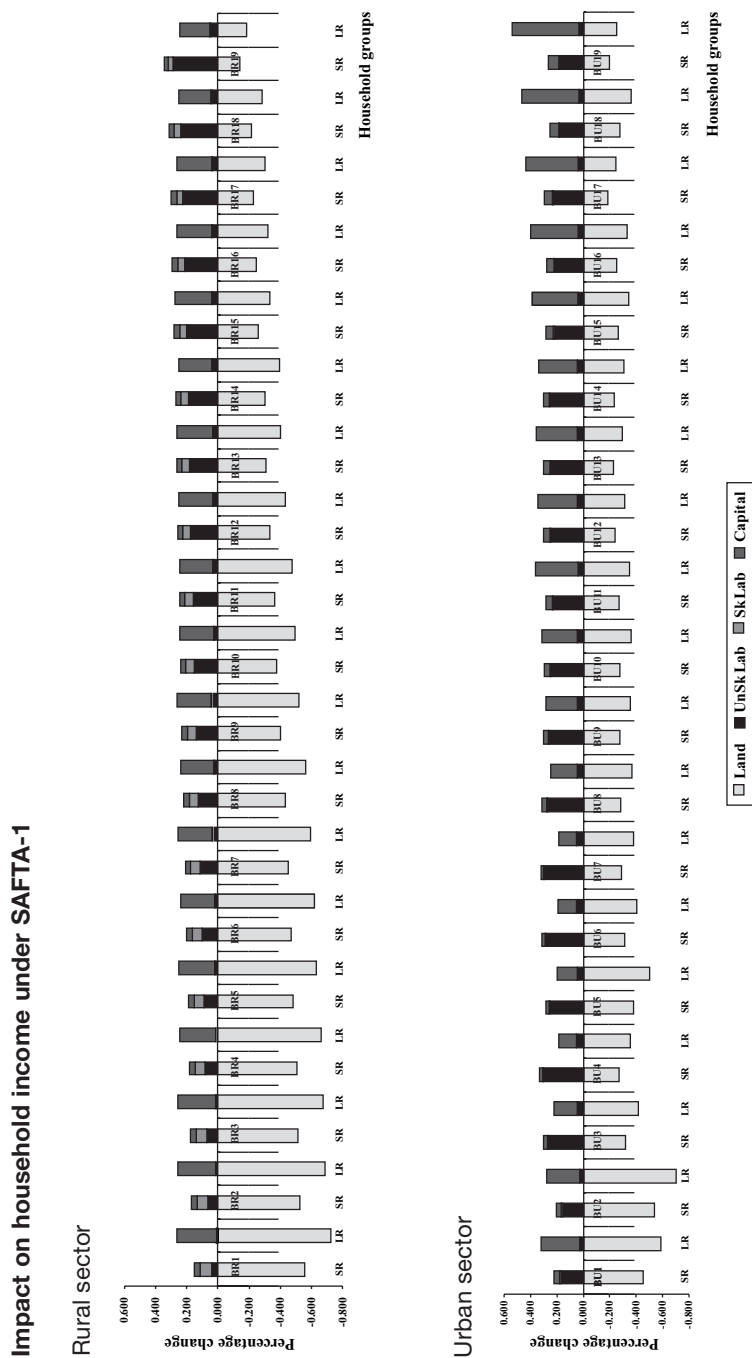
Rural sector

Urban sector

Notes: SR – Short run; LR – Long run; UnSkLab – unskilled labour; SkLab – skilled labour.

PR1-PR5 – rural household groups; PU1-PU5 – urban household groups.

Figure A.4. Impact on household income under SAFTA-1 and SAFTA-2: Bangladesh

Impact on household income under SAFTA-1

Rural sector

Urban sector

Notes: SR – short run; LR – long run; UnSkLab – unskilled labour; SkLab – skilled labour.
BR1-BR19 – rural household groups; BU1-BU19 – urban household groups.

Figure A.4. (*continued*)

Impact on household income under SAFTA-2
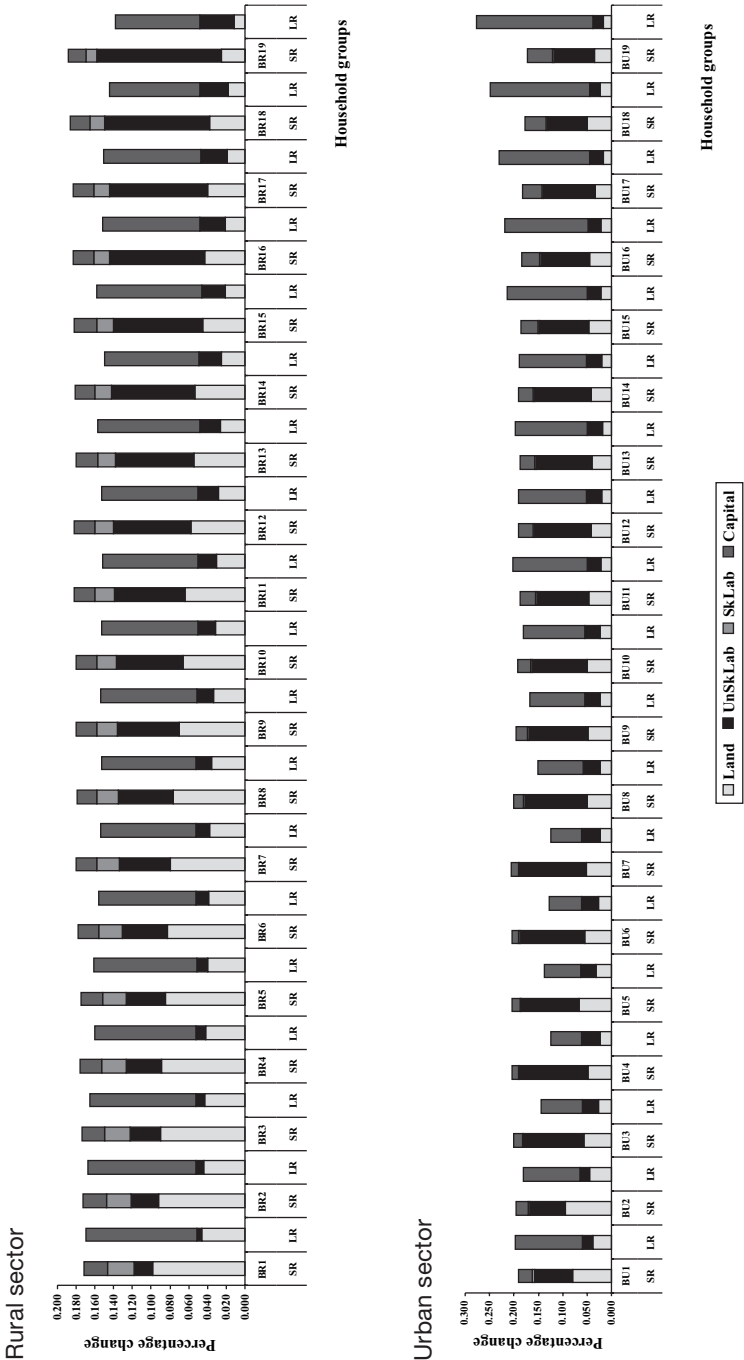
Rural sector

Urban sector

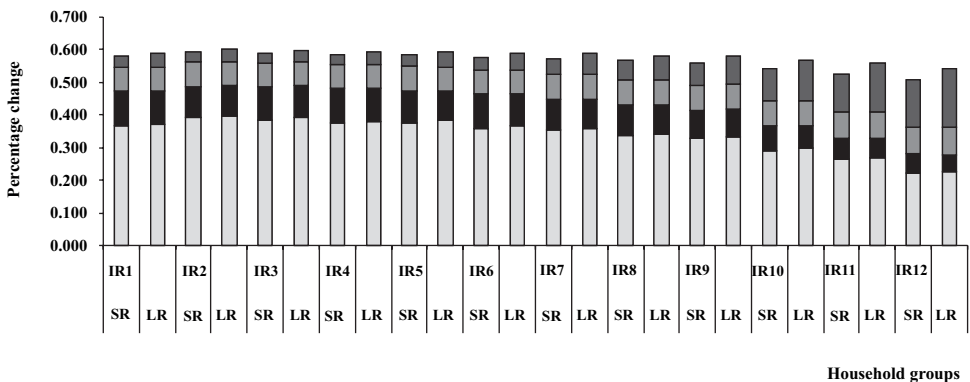Legend: ☐ Land ■ UnSkLab ▨ SkLab ▨ Capital

Notes: SR – short run; LR – long run; UnSkLab – unskilled labour; SkLab – skilled labour.

BR1-BR19 – rural household groups; BU1-BU19 – urban household groups.

Figure A.5. Impact on household income under SAFTA-1 and SAFTA-2: Rest of South Asia
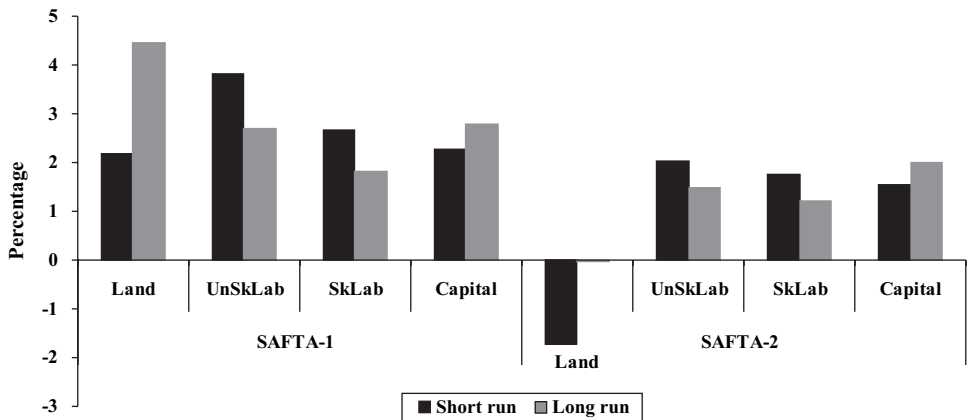
Note: UnSkLab – unskilled labour; SkLab – skilled labour.

RURAL LABOUR MARKETS: INSIGHTS FROM INDIAN VILLAGES

A. Amarender Reddy*

In this paper, labour market behaviour in rural India is examined, with the objectives of assessing the structure of the work status among sample individuals and of testing segmented labour market theory. Simple regression techniques and an estimated modified Mincer equation to determine earnings are used in the paper, followed by the application of multinomial regression analysis. Labour markets are segmented based on social background to some extent, which is in line with segmented labour market theory based on caste, sex and assets. Most of the more highly educated remain unemployed due to a lack of sufficient employment opportunities, even though higher education increases the probability of being engaged in regular employment. However, households invest heavily in children's education in the hope that they will obtain regular employment. Policies that promote asset ownership, household savings and skills development would increase people's chances of obtaining regular employment with higher earnings.

JEL Classification: J01, J31, J43.

Key words: Labour economics, wage level and structure, wage differentials, agricultural labour markets.

I. INTRODUCTION

The segmentation of labour markets has long been a subject of debate for labour and development economists. In his well-known survey, Cain (1976) summarized the challenges raised by the theories on segmented labour markets to the classical and neoclassical schools of labour economics, which go back until the

end of the1980s. He quoted John Stuart Mills as one of the first economists to acknowledge the segmentation of labour markets together with the existence of persistent wage differentials among different groups of workers. Many researchers have attempted to understand labour markets in developing countries in terms of segmentation.

Labour market segmentation can be characterized as a situation in which people working in some jobs experience differences in earnings, levels of employment protection and opportunities. To have labour market segmentation, however, this situation has to be "rigid", that is, these differences must persist and it must be difficult for disadvantaged workers to move to "good" jobs or segments of the market. Thus, segmentation translates into dramatically different levels of vulnerability, which makes some individuals much more likely to end up in a state of poverty and deprivation than others, especially in less developed countries, as labour is the main source of income for most poor people in the developing world (Fields, 2006).

If labour markets are becoming more segmented, the increase in segmentation is likely to affect negatively the most vulnerable groups of workers. Women are one of these groups. In fact, research has shown that women tend to be more vulnerable than men, with lower participation rates and, even when they do enter the labour market, to earn less and to advance more slowly in their careers (Sundaram and Vanneman, 2008; Heath, 2012; Reddy and Kumar, 2011). It is also relevant for Indian rural labour markets, where discrimination in employment based on caste is prevalent. The social groups that had been discriminated against in the past are still disadvantaged in many socioeconomic areas including the labour market. Scheduled castes and scheduled tribes are two groups of historically disadvantaged people that are recognized in the Constitution of India. "Other backward classes" is a collective term used by the Government of India to classify castes with populations who are educationally and socially disadvantaged but who are better off than the scheduled caste and scheduled tribe populations. Forward castes are educationally and socially better off than others. Of the total population of India, scheduled castes comprise 16.6 per cent, scheduled tribes 8.6 per cent and other backward classes 52.0 per cent. The remaining 22.8 per cent belongs to forward castes. One of the main goals of planning in India is the socioeconomic development of the scheduled castes, scheduled tribes and other backward classes. However, there is a significant difference between scheduled castes and scheduled tribes: the populations of the former are mostly casual labourers, while those of the latter possess more land and are often self-employed in the agricultural sector.

There are very few studies on the analysis of caste and gender discrimination in rural labour markets in India. Although employment opportunities in highly productive, non-farm sectors in urban areas are increasing employment prospects for

the educated youth, the rural population has not been able to take advantage of such opportunities. Most rural employment remains in the informal sector, in low-productivity and low-paying jobs. Recently, however, there has been some dynamism in rural labour markets: there have been increases in rural-urban linkages and non-farm employment, and a higher share of the educated labour force is in rural labour markets. All of these changes have resulted in a higher rate of rural-urban migration of men and skilled workers (leaving behind women and unskilled workers in rural areas). In addition, the increase in demand for workers in the non-farm sector has raised wage rates in some occupations. At the same time, there have been technological changes in rural and agricultural sectors, farm mechanization has taken place, and social security programmes, such as the National Rural Employment Guarantee Act 2005, have been implemented.

Despite these changes, income and employment opportunities have increased for only a very few well-endowed workers, while a large proportion of the workforce has remained in low-productive, informal employment. The result is a widening gap in wage rates between the rural sector and the urban sector, and between agricultural and non-agricultural employment, which is in line with segmented labour market theory. Many rural, illiterate, unskilled and less-resourceful persons, especially those from socially disadvantaged groups (scheduled castes and scheduled tribes), are stuck in perpetual poverty. In general, poverty is higher in rural areas than in urban areas. The poverty level in rural India is 33.3 per cent. It is highest among farm labourers (49.4 per cent), followed by non-farm labourers (39.6 per cent), those self-employed in the non-agricultural sector (28 per cent), those self-employed in the agricultural sector (26.2 per cent) and those with regular employment[1] (14.4 per cent) (Krishna and Shariff, 2011). The wide disparities in the level of poverty in rural India are also an indication of the segmentation of labour markets.

Over the last decade, there has been a revival of research on informal employment and labour market segmentation in developing countries, generating a lively debate on the nature of informal employment. It has been suggested in many studies that occupational diversification has played a key role in reducing rural poverty since the early 1990s. In developing countries, the labour market consists of a small number of labour market segments or sectors linked to one another by the actual or potential mobility of workers or firms (Dixit, 1973; Basu, 1997; Fields, 2007). Different segments are required because some parts of the labour market operate in a qualitatively different manner than others. A study by Elder and Schmidt (2004) found that, "in most economies, women still earn 90 per cent or less of what their men co-workers earn".

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[1] Regular employees are those whose employment is close to permanent and who receive a monthly salary, unlike paid labourers, who work on a day-to-day basis.

It is necessary to have models that put together these various segments because conditions in one segment affect and are affected by conditions in other segments. Path-breaking work on multisectoral labour market models in the context of economic development was done by Lewis (1954) and Kuznets (1955), who showed that economic growth was marked by the gradual shift of workers out of the lower-paying segments into the higher-paying ones. They also concluded that the main development problem was not unemployment but rather low incomes in the poorer parts of the economy. They argued that the same worker would earn quite a different amount depending on where he or she was located.

With regard to human capital theory, which was developed by Schultz (1961) and Becker (1964), attempts were made to examine labour markets. According to their version of the human capital model, education and training would improve workers' skills, enabling them to work in different economic sectors and to earn more. There is a fundamental duality within the informal sector, whereby some people work in a lower tier because they can do no better, while others work in an upper tier into which entry is restricted because of human capital and financial capital requirements (Fields, 1990). Krugman and Obstfeld (2003) proposed an integrated labour market model, starting with two or more sectors but assuming that all of the equilibrating forces that apply to a single labour market with market clearing also apply to a labour market with a multiplicity of sectors, so that wages equalize across sectors (Harris and Todaro, 1970). Alternatively, the crowding model assumes that any worker who is not employed in the high-wage sector of the economy takes up employment in the low-wage sector of the economy; the Lewis and Kuznets models mentioned above can be considered crowding models. Finally, some models propose that workers choose occupations that maximize their current and future returns, but because of imperfect capital markets, occupations that require high levels of investment cannot be entered into by persons with low initial wealth. The distribution of workers across different occupations evolves over time as individuals invest their time and money in increasing their wealth or the wealth of their children (Banerjee and Newman, 1993).

Studies analysing microdata enable researchers to examine the different socioeconomic and cultural factors that determine the nature of employment. This type of data analysis is at the core of most contemporary research studies on labour markets, and the amount of literature using such data is correspondingly vast. However, these studies suffer from the limitations of a small sample, with only a small number of socioeconomic variables. They do not include nutrition- or health-related data and are focused on economic activities only, not on equally important non-economic activities such as domestic functions or education.

There is evidence of a high level of discrimination in wage rates and employment conditions against lower caste workers, women and landless labourers

in rural labour markets. Educated workers, higher caste workers and men receive favourable treatment in terms of wage rates and employment conditions. There are many socioeconomic constraints (such as a low asset base or a low level of skills) and other cultural restrictions (such as the caste system) that deter people in the lower socioeconomic strata from entering into higher paid jobs. Research on informal employment in developing countries has been very limited, above all because of a lack of appropriate data. There is a large gap in the literature on understanding rural labour markets through a holistic and multidisciplinary perspective, mostly due to the lack of individual-level data that would integrate the socioeconomic, nutritional and local factors. The present paper includes what is likely the first attempt to analyse jointly labour market segmentation and the gender wage gap in the context of a developing country. Using data collected from 18 villages in India, there is an attempt in the present paper to identify the work participation rate, wage rates and occupational structure among men and women and among different social groups in an effort to establish the extent to which the rural labour market is segmented by sex and social group.

This paper is focused on the following specific objectives:

- To assess the labour supply and its determining factors in various economic and non-economic activities in rural India

- To examine the influence of different socioeconomic and personal characteristics of workers on men's and women's wage rates

- To examine the determinants of labour market segmentation in different occupations.

II. DATA

The data used in this paper were obtained from a larger research project entitled "Village dynamics studies in South Asia". Under the project, a research team from the International Crops Research Institute for the Semi-arid Tropics collected a range of data from households in 18 selected villages in 5 states (Andhra Pradesh, Maharashtra, Madhya Pradesh, Gujarat and Karnataka). Those villages represented broad agro-climatic subregions in the semi-arid tropics of India. The data were collected every 15 days by resident field investigators through personal interviews with each individual in the household in each village by using a standard questionnaire.[2]

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[2]   With regard to the "Employment schedule of Village dynamics studies in South Asia" questionnaire, data collection methods and the data are available from http://vdsa.icrisat.ac.in/.

The sample households were selected based on the stratified random sampling method to represent the landless (owning 0.0 to 0.1 hectares), small-scale farmers (with 0.1 to 1.0 hectares), medium-scale farmers (with 1.01 to 2.0 hectares) and large-scale farmers (with more than 2 hectares) in proportion to the total population in each village. All individuals between 15 and 65 years of age were selected for the study. The present paper examines the labour supply, wage rates and occupational structure among 948 men and 631 women in the 18 villages in 2010. To take advantage of the high frequency of the data, variations in hours worked and in wage earnings by sex, level of education, economic activity (self-employed in agriculture, rearing livestock, self-employed in non-agricultural work) and non-economic activity (domestic duties) were analysed. The paper also examines the segmentation of labour among major occupations (based on time spent on activities in 2010), namely:　(a) self-employed in agriculture; (b) non-farm labour; (c) rearing livestock; (d) regular employment (receiving a monthly salary); (e) attending educational institutions; (f) attending to household domestic duties; (g) small business work; and (h) farm labour.

III.　METHODOLOGY

Labour supply model

The data were collected at a high frequency for one year to record the number of hours spent on each economic and non-economic activity. The data were collected for each day of the year; hence, there is a record for 365 days. The economic activities are:　(a) paid work (farm and non-farm, with a wage rate); (b) self-employed in agriculture (c) rearing livestock; and (d) self-employed in non-agricultural work (for example, having a small business, such as making textiles). The non-economic activities are:　(a) attending to domestic duties (such as cleaning utensils, washing clothes, cooking and preparing children for school); (b) being seriously ill; and (c) being unemployed. Because information on the number of hours spent attending educational institutions was not available, this category has not been included here. To estimate the labour supply in each economic activity, four regressions were used, with the number of hours spent on each activity in 2010 as the dependent variable. After aggregating the hours spent on all economic activities, a pooled regression was also employed. The independent variables used in the regressions and the rationale for inclusion are explained in table 1. A simple regression equation was used after correcting the sample selection bias.

Mincer equation

The modified Mincer equation was used only for workers who were engaged in paid work, as the wage rates data were available for this category only. Paid work includes both farm work and non-farm work. Given the absence of labour productivity data in rural India, actual wage rates were used as a proxy for labour productivity. In the modified Mincer equation, the log of wage rates per day was used as the dependent variable with the set of explanatory variables given in table 1 to determine the influence of human and physical capital and socioeconomic factors on the wage rates.

Table 1. Explanatory variables included in the various regression analyses

Variable	Rationale for inclusion	Average	Standard error	Labour supply	Mincer equation	Multinomial regression model
Hours worked per year		2 008	822.5	Dependent variable		
Wage rate (Rs/day)	To determine supply of labour	154.63	229.9	√	Dependent variable	
Farm size (acres)	Indicator for physical capital, source of employment on own farm	1.68	5.2	√	√	√
Irrigated area (acres)	Indicator for land productivity	0.58	2.51	√	√	√
Value of assets (Rs 1 000)	Economic status of households	24.57	64.9	√	√	√
Value of residence (Rs 1 000)	Long-run socioeconomic status of households	23.99	42.4	√	√	√
Borrowings (Rs 1 000)	Indicator of household needs	42.27	76.9	√	√	√
Caste dummies	Indicator of social discrimination			√	√	√
Other backward classes	(Reference group)	0.55	0.33	√	√	√
Scheduled tribes		0.12	0.33	√	√	√
Scheduled castes		0.17	0.38	√	√	√
Forward castes		0.16	0.37	√	√	√

Table 1. *(continued)*

Variable	Rationale for inclusion	Average	Standard error	Labour supply	Mincer equation	Multinomial regression model
Religion dummies	Discrimination based on religion			√	√	√
Muslims	(reference group)	0.08	0.18	√	√	√
Christians	Include Christians	0.10	0.17	√	√	√
Hindus	Majority	0.82	0.23	√	√	√
Marital status (0 = married, 1= unmarried)	Household responsibilities	0.7	1.2	√		√
Sex (0 = women, 1 = men)	Gender discrimination	0.60	0.49	√		
Years of schooling	Human capital through education	5.67	4.9	√	√	√
Work experience	Human capital through experience	16.38	12.2	√	√	√
Age squared	To represent reduction in employment in old age	417.43	485.3	√	√	√
Height (cm)	Physical capacity to work	158.07	10.3	√	√	√
Weight (kg)	Physical capacity to work	51.36	11.2	√	√	√
Arm circumference (cm)	Physical capacity to work	23.97	3.7	√	√	√
Main occupation	Occupational choice			√	√	Dependent variable
Self-employed in agriculture	(Reference group)	0.32	0.34	√	√	
Non-farm labour		0.11	0.31	√	√	
Rearing livestock		0.02	0.15	√	√	
Regular employment		0.09	0.28	√	√	
Attending educational institutions		0.05	0.22	√	√	
Domestic duties		0.03	0.17	√	√	
Small business		0.12	0.33	√	√	
Farm labour		0.26	0.44	√	√	

Source:　　Village Dynamics in South Asia database.

Note:　　Rs (₹) represents rupees (US$ 1 = about ₹ 60); 1 acre is equivalent to about 4,047 m^3, or 0.4 hectares.

Multinomial regression analysis

There are eight major occupational categories, which are based on the time spent by the respondents on each activity: (a) self-employed in agriculture; (b) non-farm labour; (c) rearing livestock; (d) regular employment; (e) attending educational institutions; (f) attending to household domestic duties; (g) small business work; and (g) farm labour. Multinomial regression analysis was used to analyse the choice of the occupation. The dependent variable was a categorical variable (occupational category, with eight categories) with more than two categories (in this case, eight categories of occupations) and it was regressed upon a set of independent variables. In the multinomial model, one occupational category (in this model, farm labour) out of eight categories of occupations was taken as the reference category (Reddy and Kumar, 2006). This implies that parameter estimates for each category should be interpreted as indicators of the strength of the association of a particular explanatory variable with the respective category relative to the same explanatory variable with the reference category. Separate multinomial logit models were run for men and women.

Model specification

The general form of a multinomial logit model is:

$$Y_{ij} = B_j X_i + U_{ij} \tag{1}$$

Where Y_{ij} is the ith individual's utility of the jth choice and X_i is a vector of values of the ith individual on the independent variables. The model estimates a set of regression coefficients for each of the alternatives (except for the choice option that has been defined as the reference category); hence, the subscript in B_j (Decoster, 2009).

(*Occupational category*) = *f(physical capital of workers, human capital of workers,*
social group, personal and work-related variables,
location-specific variables)

The independent variables included in the occupational choice model were the same as those listed in table 1. In the multinomial regression, "farm labour" was used as the reference category, as this category is the most prevalent type of occupation; historically, with economic development, workers tried to move out of this occupation to other occupations (Poterba and Summers, 1995; Lee, 1983; Boskin, 1974).

Multinomial logistic regression is used when the nominal response variable (dependent variable) has more than two categories. Multinomial logit models are multi-equation models. A categorical variable with k+1 categories will generate k equations. Each of these k equations is a binary logistic regression comparing

a group with the reference group. Multinomial logistic regression simultaneously estimates the k logits. Furthermore, it displays coefficients only for the k categories. Thus, the coefficient β_i represents the log odds of being in the target groups relative to the reference group. Thus, a simplified multinomial logit model has the following form:

$$p_j = \frac{\exp\left(\beta_j X\right)}{\Sigma_j \exp\left(\beta_j x\right)} \quad \text{for } j = 1,..., k+1$$

Exp $(\beta_j X)$ stands for the exponential function and x is the vector of independent (or explanatory) variables.

β_{k+1} can be set to 0 (zero vector) as a normalization and thus:

$$P_{k+1} = \frac{1}{\Sigma_j \exp\left(\beta_j x\right)}$$

As a result, the j logit has the following form:

$$\log \frac{P_j}{P_{k+1}} = \beta_j x \text{ for } j = 1,..., k$$

The slope coefficient represents the change in the log odds of being in the k category of employment versus the reference category with an increase in one unit of the independent variable. The significance of the parameter estimates can be determined through the usual t-test. However, the most common way of interpreting a logit is to convert it (log odd ratios) to an odds ratio using the exponential (β) function – referred to from this point on as $\exp(\beta)$. The closer the odds ratio $\exp(\beta)$ is to 1.0, the lesser is its influence in choosing between the k category of occupation versus the reference category, with 1.0 representing full statistical independence. For instance, if the odds ratio, $\exp(\beta)$ is 2.0, when the independent variable increases by 1 unit, the odds that the dependent = k increases by a factor of 2.0 compared with the reference category (farm labour). The best-fit model is chosen based on the pseudo-R^2 for the multinomial regression.

IV. RESULTS

Labour supply and earnings

In table 2, the number of hours the survey respondents spent on work (economic activities and attending domestic duties), being seriously ill and being unemployed, by sex, is shown. Men reported spending a total of 2,221 hours on the work listed, of which the greatest number of hours were spent as a paid worker (49 per cent), followed by self-employed in agriculture (20 per cent) and then domestic duties and rearing livestock (15 per cent each). The surveyed women reported spending a total of 2,569 hours on work, of which they spent the greatest number of hours on domestic duties (53 per cent), followed by paid work (25 per cent), self-employed in agriculture (10 per cent) and rearing livestock (10 per cent). Overall, men reported spending more hours on economic activities (85 per cent) than did women (only 47 per cent). If both economic (paid work and self-employment) and non-economic activities (domestic duties) are considered, women worked more hours than men.

Regarding paid work, the average wage rate for women was only ₹ 12 per hour, while that of men was ₹ 25 per hour. Hence, the annual average income for women was only ₹ 7,920, compared with ₹ 27,000 for men. If the self-employed hours of men are imputed at ₹ 25 per hour, and of women at ₹ 12 per hour, the annual income gap between men and women is reduced from 241 per cent to 77 per cent. If the value of self-employed work and domestic duties is imputed at the average wage rate of women (at ₹ 12 per hour), then the gap between men's and women's imputed income is further reduced to 29.1 per cent. This indicates that, if the value of domestic duties of both men and women are imputed, the gap in annual incomes between men and women is drastically reduced from 241 per cent to just 29 per cent. These figures demonstrate that the number of hours spent on non-paid work, such as domestic duties and self-employment, was higher for women than for men. Women's lesser involvement in paid work is in part due to social barriers in rural society. However, the lower educational level of women (the average was only fifth standard) compared with that of men (the average was eighth standard) was one of the reasons for women's lower wage rates.

The time allocated to paid work was much lower in rural areas than in urban areas (see table 2). Men spent more hours on paid work than women did. Of the total hours spent on economic activities, men and women spent approximately 57.5 per cent and 53.2 per cent, respectively, on paid work. Significantly, this indicates that the remaining 42.5 per cent and 46.8 per cent were spent on self-employment activities by men and women, respectively. The higher proportion of self-employment activities

Table 2. Average number of hours spent on activities in 2010, women and men

Variable	Women (average number of hours)	Men (average number of hours)	Percentage over women
(I) Economic activities (total)	1 201	1 882	56.7
Paid work	640	1 082	69
Self-employed in agriculture	270	442	62
Rearing livestock	265	328	24
Self-employed in non-agricultural work	26	31	33
(II) Non-economic activity (domestic duties)	1 368	338	-75
(III) Being seriously ill	47	31	-33
(IV) Unemployed	46	88	83
I+II (economic and non-economic activities)	2 569	2 220	**-13.61**
Wage income (₹/year)	7 920	27 000	241
Wage rate (₹/hour)	12	25	102
Imputed income ₹, if income from self-employment and domestic duties are imputed at ₹ 25 for men and ₹ 12 for women per hour	32 967	58 400	77
Imputed income ₹, if income from self-employment and domestic duties for both men and women are imputed at ₹ 12/hour	32 967	42 551	29.1
Average level of education (years)	5	8	

(such as self-employment in agriculture, rearing livestock or small business activities) among women was also due to their greater involvement in livestock rearing activities. Women spent fewer hours on paid farm work, with its lower wage rates, while men spent more hours on paid non-farm work at a comparatively higher wage rate, which is another indication of the segmentation of labour markets by sex (see table 3).

Men's involvement in paid work increased as their level of education increased, up to middle-level education. Among women, paid work decreased as their level of education increased. This indicates that employment opportunities in paid work were higher for men with a middle-level education, but not for educated women. This is

Table 3. Average number of paid hours, 2010, men and women

Sex	Type of work	Average paid hours in 2010	Average wage rate/day (₹/8 hours)	Total average annual paid wage income (₹/annum)
Men	Non-farm	812	222	22 530
	Farm	271	132	4 470
	Total	1 082	200	27 000
Women	Non-farm	267	107	3 550
	Farm	373	94	4 363
	Total	640	99	7 920

a reflection of the segmentation of labour based on sex in respect of education. It should be noted that, in rural areas, employment was available for only semi-skilled men, in such positions as carpenters, repairmen in a two-wheeler/agricultural implement repair shop, electricians, bricklayers or cleaners. Women found it difficult to find paid employment appropriate to their higher education due to entry barriers in terms of social rigidities and traditions. It should be noted that the head of the household (mostly men) largely determined whether or not women participated in paid work. Educated women did not participate in casual paid work, as it is seen as inferior employment; heads of households viewed such work as adversely affecting the dignity of the household (see table 4).

Wage structures indicate that respondents with an education up to the intermediate level (12 years of education) did not have a significantly higher wage rate than those with less education, but there was a steep increase in wage rates for both men and women with an education above this level. The total reported work-hours, including for both economic and non-economic activities, are inversely related to education: in rural areas, respondents with a higher level of education had fewer work opportunities. This indicates that most rural employment is informal, inferior, not organized and semi-skilled, and it does not require a higher education. People with a higher level of education prefer to be unemployed rather than to engage in inferior employment. In addition, the skill sets of the educated rural youth do not match the local needs, and they lack the entrepreneurial skills required to start new businesses in rural areas. Recruiting local youth for such positions as teachers, nurses or health workers would reduce the poor conditions of the rural youth in India.

Table 4. Work-hours and wage rates by level of education, 2010

Sex/level of education	Economic activity					Non-economic activity		Others	Total hours (2010)
	Paid work	Self-employed in agriculture	Rearing livestock	Self-employed in non-agricultural work	Total	Domestic duties	Being seriously ill	Unemployed	
Men									
Illiterate	1 100	473	499	26	2 098	365	26	134	2 623
Primary (up to 5 years of schooling)	1 110	478	427	26	2 041	355	26	103	2 525
Middle (6-8 years of schooling)	1 182	473	421	26	2 102	396	26	103	2 627
High (9-10 years of schooling)	1 059	421	267	46	1 793	308	21	87	2 209
Intermediate (11-12 years of schooling)	997	391	175	41	1 604	272	21	57	1 954
Graduate or above (more than 12 years of schooling)	977	370	195	21	1 563	334	21	41	1 959
Total	1 064	442	324	26	1 856	350	26	93	2 325
Women									
Illiterate	833	319	344	31	1 527	1 239	57	57	2 880
Primary (up to 5 years of schooling)	714	329	236	31	1 310	1 578	31	62	2 981
Middle (6-8 years of schooling)	535	293	242	26	1 096	1 470	51	51	2 668
High (9-10 years of schooling)	416	211	211	26	864	1 388	46	26	2 324
Intermediate (11-12 years of schooling)	391	206	144	21	762	1 254	41	0	2 057
Graduate or above (more than 12 years of schooling)	257	62	144	31	494	1 018	31	46	1 589
Total	627	262	262	26	1 177	1 336	51	51	2 615

Traditionally, rural society has been divided on the basis of landholdings. Land is an important asset, and possessing land has a positive influence on employment opportunities, especially self-employment in agriculture, which in turn provide better wages and a higher socioeconomic status. The spillovers spread to the labour market, as the landless are discriminated against when they attempt to acquire skills or employment. Land ownership has a positive association with hours spent being self-employed in agriculture and rearing livestock, but it has a negative association with paid labour. It has a positive impact on wage rates, as it will raise reservation wage rates by increasing employment and earnings from the land owned and by enhancing bargaining power in the labour market. The ownership of irrigated land has similar effects on employment opportunities and wage rates.

In rural areas, it is not simply land ownership that is important, but whether the land is irrigated or not. If the land is irrigated, it is more productive and the owner's social status is improved, and employment opportunities are created. Irrigated land is also an indication of a higher household income. As was shown in the study, having irrigated land increases the number of hours spent on one's own farm, livestock and other domestic activities for both men and women, while simultaneously decreasing the number of hours spent on paid work. When working as paid labourers, those who possessed irrigated land received higher wages than those who did not possess irrigated land. This may be due to the fact that these workers might have been doing higher skilled work or they may have been working only when the local wage rates were higher, such as during the peak harvest season.

Among women, those from scheduled tribes reported working the most hours (paid work and self-employment), followed by those from scheduled castes, then women belonging to other backward classes and finally those from forward castes. It is interesting to see that the higher-educated forward caste women preferred not to work as paid workers, due to the stigma attached to involvement in paid work, and were mostly engaged in domestic duties, compared with lower caste women. Among men there is no clear trend. Overall, forward caste men and women worked fewer hours as paid workers, while scheduled caste men and women spent more hours on paid work (see table 5). Overall, in rural India, scheduled caste women and men work mostly as paid casual labourers.

In India, about 80.5 per cent of the Indian population is Hindu; the rest belong to other religions, such as Islam or Christianity. It is a constitutional obligation to protect the interests of these minorities (Muslims, Christians and others). Many studies have reported that minorities, especially Muslim women, are at a disadvantage in the labour market. The results of the present survey showed that, overall, Muslim women spent fewer hours on economic activities compared with Hindu women. In 2010, the average number of work-hours spent on economic

Table 5. Average work-hours by social group (men), 2010

| Social group | Economic activity | | | | | Non-economic activity | Others | | Average reported hours (2010) |
	Paid work	Self-employed in agriculture	Rearing livestock	Self-employed in non-agricultural work	Total	Domestic duties	Being seriously ill	Unemployed	
Caste group									
Other backward classes	1 100	433	334	26	1 893	360	26	94	2 372
Scheduled tribes	918	448	292	47	1 705	334	21	136	2 195
Scheduled castes	1 361	203	229	21	1 814	297	21	89	2 221
Forward castes	959	605	396	21	1 981	302	21	21	2 325
Religious group									
Muslim	1 549	532	214	10	2 305	318	26	26	2 675
Christian	1 392	318	501	10	2 221	344	26	52	2 643
Hindu	1 069	443	323	21	1 856	349	21	94	2 320

activities was higher for Muslim and Christian men compared with Hindu men. In general, there was less land ownership among the populations belonging to minority religions, and they depended mostly on a small business or on self-employment in non-farm occupations, such as tailoring or making textiles, for income. As expected, Muslim and Christian women worked more hours on domestic duties compared with Hindu women due to cultural restrictions (in the case of Muslims), and these households had less land (in the case of Christians). Hindu women worked more hours self-employed in agriculture and rearing livestock. There is a need to increase the participation of Muslim and Christian women in self-employment in agriculture through the distribution of government surplus land to these women for cultivation. The results show that workers belonging to minority communities (Muslims and Christians) and socially disadvantaged castes (especially scheduled castes and tribes) are to some extent constrained from entering into higher-wage economic activities.

Labour supply model (hours worked per year)

To know the determinants of labour supply (hours worked) for each economic activity (paid work, self-employed in agriculture, rearing livestock and self-employed in non-agricultural work, as well as the total), separate labour supply equations were used with total hours worked during the year 2010 as the dependent variable. The results are presented in table 6. Both ordinary least squares and maximum likelihood estimates were used; however, only ordinary least squares results are presented, as both give similar results. The pseudo R^2 (which is an indicator of the goodness of fit of the model) ranges from 0.24 to 0.37 per cent, indicating that the explanatory variables included in the model explain approximately 24 to 37 per cent of the variation in the choice of occupation among the respondents.

The average respondent spent 1,499 hours on paid work, 267 hours self-employed in agriculture, 230 hours rearing livestock and 12 hours self-employed in non-agricultural work. The hours spent on total economic activities were 2,008. The labour supply to paid work was positively influenced by the wage rate. However, the labour supply to self-employment in agriculture and to rearing livestock did not significantly increase with an increase in the wage rate. Labour supply to self-employment in agriculture and to rearing livestock were positively influenced by farm size. A 1 acre increase in farm size increased self-employment in agriculture by 9.64 hours and rearing livestock by 3.56 hours during the year. Overall, an additional acre of land increased the time spent per worker on economic activities by 13.09 hours during the year. If the average household has 5 workers, a 1 acre increase in farm size would increase the number of hours spent on economic activities by 65 hours per annum per household after controlling for other factors. In recent years, farmers have

Table 6. Determinants of hours spent on different work categories in 2010 (labour supply model)

Explanatory variable	Paid work		Self-employed in agriculture		Rearing livestock		Self-employed in non-agricultural work		Total of all economic activities	
	Coefficient	t	Coefficient	t	Coefficient	t	Coefficient	t	Coefficient	t
Wage rate	0.55	3.4	0.01	0.2	-0.11	-1.2	0.03	1.8	0.65	1.7
Farm size	0.18	0.0	9.64	4.4	3.56	1.4	-0.30	-0.6	13.09	2.6
Irrigated area	-21.33	-1.5	4.39	0.7	-8.19	-1.0	-0.75	-0.5	-34.65	-2.3
Value of assets	-0.35	-1.0	0.55	3.2	1.15	5.5	0.07	1.8	1.42	3.6
Value of residence	-0.16	-0.3	0.23	0.9	-0.12	-0.4	-0.11	-1.8	-0.15	-0.3
Borrowings	0.87	3.1	0.26	2.0	-0.14	-0.9	-0.04	-1.3	0.94	3.1
Caste dummies (reference category = other backward classes)										
Scheduled tribes	-59.04	-1.1	-25.53	-1.0	-57.55	-1.9	13.99	2.3	-128.13	-2.2
Scheduled castes	-34.57	-0.6	-72.23	-2.9	-55.92	-1.9	13.06	2.2	-149.65	-2.6
Forward castes	-104.98	-1.9	14.78	0.6	48.86	1.6	-2.29	-0.4	-43.64	-0.8
Religion dummies (reference category = Muslim)										
Hindu	-251.50	-1.6	35.03	0.5	305.53	3.5	-10.24	-0.6	78.82	0.5
Christian	-80.90	-0.7	-92.48	-1.8	42.17	0.7	7.50	0.6	-123.71	-1.0
Marital status	9.93	1.4	-4.23	-1.3	-1.88	-0.5	-0.21	-0.3	3.60	0.5
Sex (men = 1; women = 0)	132.74	2.6	96.65	4.1	154.09	5.4	-3.08	-0.5	380.39	6.9
Years of schooling	-8.96	-1.8	0.83	0.4	-9.00	-3.3	-0.43	-0.8	-17.57	-3.4
Work experience	13.03	2.0	8.80	3.0	3.48	1.0	-0.33	-0.5	24.97	3.6
Age squared	-0.33	-2.3	-0.23	-3.4	-0.06	-0.8	0.00	0.2	-0.62	-4.0

Table 6. *(continued)*

Explanatory variable	Paid work		Self-employed in agriculture		Rearing livestock		Self-employed in non-agricultural work		Total of all economic activities	
	Coefficient	t	Coefficient	t	Coefficient	t	Coefficient	t	Coefficient	t
Height (cm)	**4.28**	**2.0**	-0.28	-0.3	**2.35**	**1.9**	0.02	0.1	**6.36**	**2.7**
Weight (kg)	-1.13	-0.5	-1.93	-1.8	**-4.50**	**-3.4**	**0.71**	**2.7**	**-6.85**	**-2.7**
Arm circumference (cm)	**18.54**	**2.8**	0.82	0.3	**12.50**	**3.4**	**-3.78**	**-5.1**	**28.08**	**4.0**
Constant	107.83	0.3	**648.65**	**3.8**	-194.28	-0.9	65.60	1.6	627.80	1.6
Pseudo R^2	0.33		0.37		0.24		0.29		0.27	

Note: If the "t" value is more than 2.58, the coefficient is significant at 1 per cent; if it is between 1.96 and 2.58, it is significant at 5 per cent; if it is between 1.65 and 1.96, it is significant at 10 per cent. The significant regression coefficients are expressed in bold.

replaced human labour with machines on irrigated agricultural land. The negative association between irrigation and labour supply may also be due to the wealth effect, as farmers with irrigated land earn more income from agriculture. A higher value of assets owned (other than land) had a negative influence on the number of hours spent on paid work, as people with greater assets shift to self-employment, such as rearing livestock or owning a business, which is a positive sign.

More years of education had a significant negative influence on the number of hours spent on rearing livestock, as it is considered to be the most inferior type of work. Work experience (age minus the number of years of schooling) had a significant positive influence on hours spent on paid work and self-employed in agriculture, as most of the older and more experienced respondents stayed in the more traditional areas of self-employment in agriculture or paid work. The younger respondents were more likely to engage in non-agricultural work.

Among the physical capability indicators, arm circumference and height had significant positive influences on hours spent on paid work and rearing livestock, as they require more manual work. Weight had a significant negative influence on rearing livestock, as such work requires bending the body, which may not be as easy for people of greater weight.

Respondents from scheduled castes and scheduled tribes were positively associated with hours spent self-employed in non-agricultural work, but negatively associated with rearing livestock and total economic activities. Workers from scheduled castes spent fewer hours self-employed in agriculture and rearing livestock but more hours self-employed in non-agricultural work. Hindus were more likely to spend time rearing livestock, and Christians were less likely to spend time self-employed in agriculture compared with Muslims. Married respondents were more likely to spend greater time self-employed in agriculture than unmarried respondents, who could take up any activity. Men were more likely to spend more hours than women on all economic activities.

Mincer equation (labour market segmentation in wage rates)

A modified Mincer equation was estimated only for paid wage earners. The dependent variable is the wage rate per day in log form. The explanatory variables included in the model explained approximately 19 per cent of the variation in the wage rate among women and about 29 per cent of the variation among men as indicated from the adjusted R^2. Women were mostly engaged as casual labourers in agriculture, in which the human, physical and social background of the workers had little impact on wage rates. By contrast, among men, educated workers with more assets or land, who belonged to forward castes or the Christian religion, or who had

a greater weight and arm circumference received significantly more wages per day compared with the other respondents. Male workers engaged in non-farm labour, regular employment or small business activities also received higher wage rates than those in the other occupational groups (see table 7). Generally, while women were engaged mostly in low-paying casual labour in the agricultural sector, men worked in various occupations, in which they received higher wage rates. Wages were even higher for workers with physical assets, although social background also played a significant role.

Occupational segmentation

In table 8, the respondents' main occupations are presented, based on the maximum number of days spent in the occupation for one year (2010). Of the 948 men between 15 and 65 years of age in the sample, 40 per cent were self-employed in agricultural, 14 per cent were attending educational institutions, 12 per cent were engaged in non-farm labour, 10 per cent were engaged in farm labour, 8 per cent were participating in regular employment (mostly government servants and salaried employees) and another 8 per cent were engaged in small business activities (such as tailoring or textile making), 3 per cent were involved in rearing livestock and another 3 per cent were engaged in a traditional caste occupation (such as a washerman or goldsmith), and only 1 per cent were engaged in domestic duties. This shows that self-employment in agriculture remains a major economic activity for men in villages, followed by non-farm labour and farm labour. It is interesting to see that a number of male members of the households (14 per cent) were attending higher education institutions.

Of the 631 women between 15 and 65 years of age in the sample, the main occupations were: self-employed in agriculture (29 per cent); attending to domestic duties (21 per cent); farm labourer (21 per cent); and rearing livestock (11 per cent). Farm labour and rearing livestock were the dominant activities among the illiterate, while literates were mostly self-employed in the agricultural sector. Although most non-farm labourers had received a middle-level education (6 to 8 years of schooling), the spread was up to 12 years of schooling. Many of the women with regular employment (monthly salaried) or engaged in small business work were educated up to the graduate level or above. Farm labourers and non-farm labourers were mostly landless and much younger than women who were self-employed in agriculture or engaged in domestic duties. Women with regular employment or engaged in small business work were mostly in middle age or old age. Women from scheduled castes were working mostly as farm labourers or non-farm labourers, although some were self-employed in agriculture. Respondents from scheduled tribes were mostly self-employed in agriculture, or engaged as farm labourers or in rearing livestock. The majority of female workers from other backward classes or from forward castes were

Table 7. Determinants of the log of wage rates (modified Mincer equation), women and men

Variable	Women			Men		
	Coefficient	t	Mean	Coefficient	t	Mean
Farm size	-0.010	-1.7	1.979	**0.015**	**3.5**	3.071
Irrigated area	0.024	1.4	0.605	**0.023**	**1.8**	1.109
Value of assets	**0.001**	**2.7**	21.941	**0.002**	**4.6**	26.320
Value of residence	0.000	0.0	23.788	**0.002**	**3.9**	24.126
Borrowings	0.000	0.0	38.151	**0.001**	**4.8**	45.017
Caste (reference category = other backward classes)						
Scheduled tribes	**-0.092**	**-1.7**	0.109	0.089	1.6	0.135
Scheduled castes	-0.018	-0.4	0.189	-0.043	-0.7	0.159
Forward castes	0.053	1.0	0.132	**0.204**	**3.8**	0.178
Religion (reference category = Muslim)						
Hindu	0.065	0.5	0.956	0.173	1.6	0.937
Christian	-0.085	-0.5	0.024	**0.428**	**2.9**	0.034
Years of schooling	**-0.016**	**-3.2**	3.611	0.001	0.2	7.041
Work experience	-0.005	-0.9	17.515	**0.024**	**4.3**	15.624
Age squared	0.000	0.5	449.729	**-0.001**	**-4.3**	395.891
Height (cm)	**-0.008**	**-2.6**	150.891	0.002	1.2	163.306
Weight (kg)	**0.018**	**6.4**	46.144	**0.007**	**3.1**	55.160
Arm circumference (cm)	**-0.020**	**-3.1**	23.256	**0.016**	**2.2**	24.497
Main occupation (reference category = self-employed in agriculture)						
Non-farm labour	0.029	0.3	0.052	**0.135**	**2.2**	0.148
Rearing livestock	0.120	1.2	0.030	-0.044	-0.3	0.021
Regular employment	0.013	0.1	0.039	**0.237**	**3.3**	0.116
Attending educational institution	-0.135	-1.4	0.046	-0.145	-1.5	0.058
Domestic duties	-0.089	-1.2	0.072	0.097	0.3	0.004
Small business	-0.115	-1.5	0.060	**0.351**	**6.1**	0.166
Farm labour	0.046	1.1	0.425	0.037	0.7	0.154
Constant	5.309	11.3		3.280	9.1	
Adjusted R^2		0.14			0.29	

Note: If the "t" value is more than 2.58, the coefficient is significant at 1 per cent; if it is between 1.96 and 2.58, it is significant at 5 per cent; if it is between 1.65 and 1.96, it is significant at 10 per cent. The significant regression coefficients are expressed in bold.

Table 8. Distribution of individuals by main occupation (percentage)

	Self-employed in agriculture	Non-farm labour	Rearing livestock	Caste occupations	Regular employment	Attending educational institutions	Attending domestic duties	Small business	Farm labour	Total
Sex										
Men	40	12	3	3	8	14	1	8	10	100
Women	29	3	11	1	2	10	21	2	21	100
Education										
Illiterate	42	8	10	3	1	0	9	2	25	100
Primary (1-5 years of schooling)	44	6	6	2	1	0	14	6	21	100
Middle (6-8 years of schooling)	39	9	9	2	4	2	14	5	16	100
Higher (9-10 years of schooling)	30	9	6	2	5	19	11	9	10	100
Intermediate (11-12 years of schooling)	26	7	1	2	10	32	10	8	5	100
Graduate or above (more than 12 years of schooling)	15	1	1	1	22	43	7	7	2	100
Landholdings										
Medium	45	7	6	1	5	12	10	4	10	100
Large	51	2	8	1	6	14	11	3	3	100
Landless	8	13	6	6	7	10	10	8	31	100
Age group (years)										
Below 15	3	4	0	0	0	82	6	0	5	100
15 to 24	17	10	4	2	5	36	10	4	11	100
25 to 60	42	7	8	2	6	1	10	6	18	100
Above 60	45	6	7	3	1	0	26	5	7	100
Caste group										
Other backward classes	37	8	6	3	4	12	8	5	16	100
Scheduled tribes	38	6	10	0	7	11	10	4	14	100
Scheduled castes	18	15	4	2	8	11	9	5	28	100
Forward castes	35	3	7	0	7	14	20	7	6	100
Total	35	8	7	2	5	12	11	5	15	100

self-employed in the agricultural sector. Caste occupations (traditional occupations such as making pottery or alcohol) had been dominant over the past 50 years, but recently they have been replaced by work in small businesses in modern sectors. Hence, caste occupations are merged with small business multinomial regression analysis to increase the sample size in each category and to keep the similarity in both occupations.

The results of the multinomial regression analysis for men are presented in table 9. The pseudo R^2 is 0.27, indicating the explanatory variables included in the model explain the 27 per cent of variation in the occupational choice of men. The odds ratios, $\exp(\beta)$, were given along with z-values to test the significance of the regression coefficients. Among men, the probability of being engaged in self-employment in agriculture increased with an increase in the amount of irrigated area and years of education. The probability of being self-employed in agriculture was higher for scheduled tribes and for forward caste workers. The probability of being engaged in non-farm labour increased with an increased value of the residential house and with arm circumference. Neither social group, nor religious group nor education determinedthe choice of being engaged in non-farm labour or in farm labour.

The probability of being engaged in rearing livestock was higher among Hindus than among Muslims or Christians, and also increased with a greater irrigated area, value of assets or arm circumference (an increase in arm circumference equals greater physical capability). The probability of being engaged in regular employment increased with a larger irrigated area, a higher value of the residence and more years of education, which are indicators for increased labour productivity in rural areas. Regular employment was also significantly higher among respondents from scheduled tribes and forward castes. Along the same line, the probability of being engaged in small business activities increased with having a larger irrigated area and more years of education. Respondents from scheduled castes were less likely to be engaged in small business activities.

Individuals with a large farm or a residential house of greater value, or who were married, older or less educated had a higher probability of being engaged in domestic duties. However, workers with more assets (other than a house) and greater physical capability (with regard to height, weight and arm circumference) or who were more educated were less likely to be engaged in domestic duties. The probability of attending educational institutions was positively influenced by a larger irrigated area and the value of the residence, which are, in general, indicators of wealth. Regarding physical assets, owning irrigated land had a positive influence on choosing to be self-employed in agriculture, or on having a traditional occupation or regular employment. Social status also had a significant influence on the choice of

occupation; for example, members of scheduled castes were more likely to be engaged as farm labourers, while members of forward castes were more likely to be engaged in regular employment (receiving a monthly salary). Attending higher educational institutions and participating in domestic duties were less frequent activities among men compared with women in rural areas.

Among men, a 1 acre increase in irrigated area from the mean farm size increased the probability of being self-employed in agriculture by 60 per cent, while an increase in education by 1 year increased the probability of being self-employed in agriculture by 10 per cent compared with being engaged in farm labour, after controlling for other factors (see table 9). Compared with other backward class workers, scheduled tribe workers and forward caste workers were 2.8 times and 2.3 times more likely to be self-employed in agriculture, respectively. A 1 year increase in work experience in agricultural activities reduced the probability of being engaged as a non-farm labourer by 20 per cent. A 1 cm increase in arm circumference increased the workers' probability of being engaged in non-farm labour by 30 per cent and increased the probability of being engaged in rearing livestock by 50 per cent. A 1 acre increase in irrigated area increased the workers' probability of being engaged in regular employment by 50 per cent after controlling for other factors. An additional year of schooling increased the workers' probability of being engaged in regular employment by 30 per cent. A 1 acre increase in irrigated area increased the workers' probability of being engaged in a small business by 60 per cent. One year of additional schooling increased the workers' probability of being engaged in a small business by 20 per cent.

The explanatory variables included in the model explained approximately 30 per cent of the variation in the occupational choice of the female respondents as indicated by pseudo R^2 (see table 10). Among women, the probability of being self-employed in agriculture increased with an increase in the size of the farm owned by the family. Owning large pieces of land creates employment opportunities for women. Generally, Indian women living in rural areas are underweight; hence, an increase in body weight means women are better able to participate in economic activities, especially self-employment in agriculture. The probability of being engaged in rearing livestock increased with an increase in the size of irrigated area. Hindhu women were more likely to be engaged in rearing livestock than Muslim women (Muslim women were the reference group). The probability of being engaged in domestic duties increased with an increase in the level of education, after controlling for other variables. The probability of being engaged in regular employment increased with an increase in irrigated area, years of schooling, work experience, height and weight. Women's probability of being engaged in small business activities rose with an increase in the value of assets (other than the residential house) and an increase in

Table 9. Determinants of men respondents' main occupation (farm labour as the reference category)

Explanatory variable	Self-employed in agriculture		Non-farm labour		Rearing livestock		Regular employment		Attending educational institutions		Attending domestic duties		Small business		Farm labour
	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	RRR
Farm size	1.1	1.2	1.0	-0.1	0.9	-1.1	1.0	0.0	1.1	1.4	**3.4**	**3.7**	0.9	-1.3	1.0
Irrigated area	**1.6**	**2.6**	1.3	1.0	**8.0**	**2.0**	**1.5**	**2.2**	**1.8**	**1.8**	0.01	0.1	1.6	2.4	1.0
Value of assets	1.0	0.1	1.0	-1.6	1.0	1.9	1.0	-0.9	1.0	-2.5	**0.9**	**-3.4**	1.0	-0.1	1.0
Value of residence	1.0	1.2	**1.0**	**2.5**	1.0	-0.4	**1.0**	**2.2**	1.1	4.0	**1.3**	**6.3**	1.0	1.0	1.0
Caste dummies (reference category = other backward classes)															
Scheduled tribes	2.8	2.9	1.8	1.2	2.1	0.9	**6.1**	**3.5**	4.2	2.0	0.0	0.1	1.5	0.9	1.0
Scheduled castes	0.5	-2.1	1.3	0.6	0.7	-0.5	2.1	1.5	0.6	-0.6	0.0	.0.1	0.2	-2.7	1.0
Forward castes	**2.3**	**2.1**	1.4	0.7	0.7	-0.3	**5.2**	**3.2**	0.6	-0.6	**8.0**	**11.9**	1.4	0.8	1.0
Religion dummies (reference category = Muslim)															
Christian	0.8	-0.3	1.3	0.2	**8.0**	**2.4**	0.9	-0.1	0.5	-0.4	0.0	.	2.6	0.9	1.0
Hindu	1.9	1.0	1.8	0.9	**8.0**	**2.6**	3.2	1.0	0.9	-0.1	8.0	1.5	1.2	0.3	1.0
Marital status	**0.8**	**-3.7**	0.9	-1.7	1.0	-0.1	1.0	-0.2	**3.9**	**7.0**	**25.2**	**17.7**	**0.9**	**-2.2**	1.0
Years of schooling	**1.1**	**2.0**	1.0	-0.4	0.9	-1.7	**1.3**	**5.8**	**2.2**	**5.2**	**0.1**	**-12.6**	**1.2**	**6.0**	1.0
Work experience	1.0	-0.5	**0.8**	**-3.6**	0.8	-1.2	1.0	-0.7	0.2	-1.4	**19.8**	**16.7**	0.9	-1.1	1.0
Age squared	1.0	0.9	**1.0**	**3.2**	1.0	1.4	1.0	1.2	1.0	-0.1	**0.9**	**-15.9**	1.0	1.4	1.0
Height (cm)	1.0	-0.7	1.0	-1.8	1.0	-0.3	1.0	0.0	1.0	-0.7	**0.6**	**-6.3**	1.0	-0.3	1.0
Weight (kg)	1.0	0.5	1.0	-0.8	0.9	-1.7	1.1	2.3	0.9	-2.3	**0.5**	**-5.2**	1.0	1.9	1.0
Arm circumference (cm)	1.1	1.0	**1.3**	**4.8**	**1.5**	**3.7**	1.1	0.8	1.1	0.4	**0.1**	**-8.0**	1.0	0.7	1.0
Pseudo R²	0.27														

Note: If the "z" value is more than 2.58, the regression coefficient is significant at 1 per cent;if it is between 1.96 and 2.58, it is significant at 5 per cent; if it is between 1.65 and 1.96, it is significant at 10 per cent. Bold figures indicate that the regression coefficients are statistically significant.

years of education. Regular employment, attending higher educational institutions and non-farm labour were less common occupations of the female respondents.

Among the female respondents, with 1 additional acre of land, the probability of being self-employed in agriculture increased by 10 per cent, and the probability of being engaged in non-agricultural labour decreased by 20 per cent. The probability of scheduled caste women being engaged in non-farm labour was 240 per cent higher than it was for other backward class women. The probability of being engaged in rearing livestock increased by 290 per cent with a 1 acre increase in the area being irrigated, or increased by 10 per cent with a 1 kg increase in body weight. The probability of being engaged in regular employment increased by 330 per cent with a 1 acre increase in irrigated area, by 50 per cent with an additional year of schooling, by 30 per cent with an additional year of work experience, or by 10 per cent with a 1 kg increase in body weight and a 1 cm increase in height. With an additional year of schooling, the probability of being engaged in a small business increased by 20 per cent, of being engaged in regular employment by 50 per cent and of being engaged in domestic duties by 40 per cent.

Conclusions and policy options

Historically in rural India, men participated mostly in economic activities, while women took part mostly in non-economic activities, such as domestic duties. Of the economic activities, men's participation in paid work was higher. As a result, there was a vast gap in monetary income between men and women, even though women worked more hours if both economic and non-economic activities are taken into account. The lower participation of women in paid work was mainly due to social rigidities (such as the caste system in India) rather than their lack of skills, education or physical capabilities. The segregation of the rural labour market by sex was particularly visible in rural labour markets in India, with men shifting to non-farm occupations with higher wage rates and women still depending on farm work (either self-employed or as casual labourers). The higher wage rates for men in non-farm occupations, women's greater involvement in the less-remunerative agricultural sector, the greater involvement of women in domestic duties, and higher unemployment among educated women are some of the indicators pointing to the discrimination against women in rural labour markets in India, which supports the segmented labour market theory.

It is interesting to see that, in rural India, the number of hours spent on economic activities increases with an increase in land ownership and assets rather than with education. Levels of education and levels of work experience have little influence on the choice of occupation or the quality of employment, especially among women. Most employment continues to be found in such traditional areas as

Table 10. Determinants of female respondents' main occupation (farm labour as the reference group)

Explanatory variable	Self-employed in agriculture		Non-farm labour		Rearing livestock		Regular employment		Attending educational institutions		Attending domestic duties		Small business		Farm labour
	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	Exp(β)	Z	RRR
Farm size	**1.1**	**2.3**	**0.8**	**-1.8**	0.8	-1.2	0.8	-1.2	1.3	1.4	1.1	1.3	1.1	0.9	1.0
Irrigated area	1.2	0.8	1.9	1.6	**3.9**	**2.3**	**4.3**	**2.6**	0.6	-1.2	1.0	0.1	0.8	-0.7	1.0
Value of assets	1.0	1.1	1.0	-0.8	1.0	-0.3	1.0	-1.5	**1.1**	**1.9**	1.0	0.7	**1.0**	**2.5**	1.0
Value of residence	1.0	-0.9	1.0	0.5	1.0	0.3	1.0	1.6	1.0	-0.4	1.0	-0.8	**1.0**	**-2.0**	1.0
Borrowings	**1.0**	**4.4**	1.0	-0.1	**1.0**	**-2.2**	1.0	0.8	1.0	0.2	1.0	0.0	1.0	-0.3	1.0
Caste group															
Scheduled tribes	**0.5**	**-1.8**	0.3	-1.1	1.7	0.8	1.0	0.0	0.5	-0.7	0.4	-1.2	0.0	.	1.0
Scheduled castes	**0.6**	**-1.7**	**3.4**	**2.5**	0.3	-0.9	4.4	1.6	1.9	0.7	0.8	-0.4	0.6	-0.8	1.0
Forward castes	1.4	1.0	0.0	.	2.5	1.3	**4.7**	**2.1**	0.0	.	**2.6**	**1.7**	1.3	0.4	1.0
Religious group (reference category = Muslim women)															
Christian	0.0	.	0.0	.	0.0	.	0.0	.	0.0	.	0.4	-0.7	0.0	.	1.0
Hindu	3.8	1.2	0.4	-1.2	**8.0**	**3.0**	**8.0**	**3.3**	**8.0**	**6.3**	0.3	-1.0	**0.1**	**-2.6**	1.0
Marital status	1.0	-0.9	1.1	1.6	0.8	-1.5	**1.3**	**3.6**	**5.3**	**6.7**	**0.9**	**-1.9**	0.9	-1.6	1.0
Years of schooling	1.1	1.4	1.1	1.3	1.0	0.2	**1.5**	**4.9**	**1.5**	**2.5**	**1.4**	**5.5**	**1.2**	**4.2**	1.0
Work experience	1.1	1.4	1.2	1.7	0.9	-0.5	**1.3**	**2.6**	**0.0**	**-5.8**	0.9	-1.5	1.0	-0.5	1.0
Age-squared	1.0	-1.3	1.0	-1.9	1.0	0.5	**1.0**	**-1.8**	**1.2**	**5.2**	**1.0**	**2.1**	1.0	1.3	1.0
Height (cm)	1.0	1.5	1.0	0.1	**1.1**	**2.3**	**1.1**	**1.9**	0.9	-0.8	1.0	0.0	1.0	-0.8	1.0
Weight (kg)	**1.0**	**1.8**	1.0	-1.6	1.0	1.0	**1.1**	**1.9**	1.0	-0.3	1.0	1.2	**1.1**	**2.3**	1.0
Arm circumference (cm)	1.0	-0.4	**1.2**	**2.3**	0.9	-1.4	**0.8**	**-1.9**	0.8	-1.4	**0.9**	**-1.7**	1.0	-0.5	1.0
Adjusted R²	30.0														

Note: If the "z" value is more than 2.58, the regression coefficient is significant at 1 per cent; if it is between 1.96 and 2.58, it is significant at 5 per cent; if it is between 1.65 and 1.96, it is significant at 10 per cent. The significant coefficients are highlighted in bold.

agriculture and to some extent in traditional caste occupations. Even most non-farm employment, such as that found in small businesses (self-employment), retail shops, agro-processing, the repair and maintenance of agricultural implements, transport and construction, requires only semi-skilled workers with little education. The quality of work was significantly better among only a small number of the respondents, namely more highly educated men and women with regular employment as, for example, teachers, nurses, record keepers or health workers. Most of the higher educated youth remained unemployed. Most of the educated women were engaged in domestic duties due to both the lack of local employment opportunities and the sociocultural restrictions that prevent them from taking jobs in distant places.

The traditional rural labour markets in India were highly segmented based on caste, sex and traditional occupations; however, these factors are slowly having less influence on labour market outcomes. The driving forces behind the changes have been the increase in employment opportunities for semi-skilled men with a middle-level education, along with the development of the rural non-farm sector. Semi-skilled workers have gained employment and increased wages in emerging non-farm sectors, such as mobile telephones, electronics and computers, and in other occupations, such as tractor drivers. A few more highly educated respondents were also able to earn incomes in nearby urban areas by working in non-farm occupations, such as construction workers. The demand for certain traditional occupations, such as traditional toddy tapping (that is, producing alcohol from palm) and cleaning clothes, is increasing in towns; this work is done by rural men and women with a middle-level education.

Some of the policy prescriptions emerging from the present study call for the following: (a) enhancing the ownership of such assets as land and irrigated areas by providing loans, which would increase the number of hours that people living in rural areas spend on economic activities; (b) enhancing the skills and education of workers living in rural areas, so they can take advantage of growing employment opportunities in the services sector and emerging occupations, such as the repair of mobile telephones and electric motors, and work in computer centres; and (c) increasing women's empowerment by reducing social rigidities in order to enhance women's participation in economic activities.

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AN EMPIRICAL ANALYSIS OF ENERGY SHORTAGE IN PAKISTAN

Mubashir Qasim and Koji Kotani*

In this paper, the electricity shortage in Pakistan is addressed through an examination of data over the period 1971-2010 with a time-series analysis. The novelty of the study lies in characterizing energy shortages using both an index comprising the demands for electricity, gas and oil, and information on the public electricity supply. This index allows for a simple empirical approach where energy shortages cannot be directly measured as data. The main findings are as follows: first, end consumers adjust their energy demands to prices only in the long run; second, the underutilization of installed power-generation capacity encourages fossil fuel consumption for private electricity; third, an uninterrupted electricity supply could be attained by regulating private electricity generation; and fourth, the relative demand for electricity increases with an increase in real income and then starts to decrease as income increases beyond the threshold of $1,127. Overall, the results of the study suggest that the price adjustment tactics adopted by the Government of Pakistan are not an effective policy to deal with power shortages in the short run. Rather, the Government should focus on improving the utilization rate of installed power plants and on rechannelling the use of oil and gas for public electricity generation. Otherwise, energy shortages will worsen with economic growth in Pakistan.

JEL Classification: Q57, Q58.

Key words: Energy shortage, energy consumption index, electricity prices, oil prices.

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I. INTRODUCTION

Energy is the mainstay of an economy in the contemporary world. Power shortages may harm the overall welfare of a country in a number of ways, for example, by decreasing the total output of energy-intensive sectors (Kessides, 1993). In recent decades, Pakistan has failed to meet the increasing demand for energy for various reasons, including an overreliance on fossil fuels for power generation, swelling oil prices, climate variation, inadequate alternative energy sources and insufficient technological advancement (Kucukali and Baris, 2010; Chaudhry, 2010; Hasan, Subhani and Osman, 2012). In 2011, the total energy shortfall exceeded 6,000 megawatts (MW) compared with a shortfall of 4,000 MW in 2004 (Amer and Daim, 2011). Extended power outages in urban areas reached 8-10 hours in the course of a day, while there were blackouts in rural areas for more than 20 hours in duration (Khan and el Dessouky, 2009; Hasan, Subhani and Osman, 2012; Lodhi and Malik, 2013; Lodhi, Siddiqui and Habiba, 2013). The literature has shown that energy consumption is directly linked with industrial production, economic expansion and the standard of living in Pakistan. Persistent power shortages may retard the economic growth of the country if the issue remains unsolved (Siddiqui, 2004; Bhutto and Karim, 2007; Khan and Ahmed, 2009; Aqeel and Butt, 2001).

Numerous studies have shown that private electricity generation using backup power generators is an obvious indicator of a power shortage because it is generally more expensive than the electricity bought from public power plants. This relationship has been confirmed by several researchers in developing countries facing electricity shortages (Beenstock, 1991; Beenstock, Goldin and Haitovsky, 1997; Adenikinju, 2005; Steinbuks and Foster, 2010). In the context of Pakistan, there are two principal factors governing private electricity production: first, Pakistan is an energy-deficient country; and second, domestic power production, using small backup generators for private consumption, is not regulated by the Government. Pasha, Ghaus and Malik (1989) found that the energy crisis in Pakistan in the 1980s resulted in enormous investment in backup generators. Today, the availability of sophisticated and affordable backup generators has made private electricity generation a habitual practice for even a middle-income family.

With regard to Pakistan, the existing literature has focused on investigating the dynamics of electricity consumption, while the key supply-side determinants have not been considered in the analyses. For instance, Khan and Ahmed (2009) examined energy demand at the disaggregate level (coal, electricity and gas) using annual time-series data for the period 1972-2007. Their regression model was composed of per capita energy consumption, per capita real income and energy prices. Their study highlighted that the demand for electricity and coal is positively correlated with real

income and negatively correlated with price in the short run only. The income and price elasticities of gas are higher than those of coal and electricity. Jamil and Ahmad (2010) studied the relationship between electricity consumption, its prices and real income in Pakistan using annual time-series data for the period 1960-2008 and vector error correction models. Their research showed a unidirectional causality running from economic output to electricity consumption and price for the national, residential and manufacturing levels in the long run, and a bidirectional causality between production level and electricity consumption (and price) in the short run for the manufacturing and agricultural sectors.

Chaudhry (2010) employed panel data from 63 countries during the period 1998-2008 to study the relationship between electricity consumption, real per capita income and electricity prices. Findings of this research suggested that electricity consumption at both the household and national levels increases with real per capita income in Pakistan. An output function analysis showed that an electricity shortage would cut the production of small-scale industries that did not have their own electricity generation capacity, whereas it would increase the cost of production for large firms that own electricity production using expensive inputs. None of these studies, however, provided empirical evidence of the underlying problem, that is, the cause of the electricity shortages.

Only one recent study – by Hasan, Subhani and Osman (2012) – investigated the dynamics of electricity shortages, using power outage data from the Karachi Electric Supply Corporation for Karachi, Pakistan. They employed monthly data from January 2009 to December 2011 using Pearson correlation, vector auto-regressive and Tobit models to explore inefficiencies in the power sector. This study confirmed the existence of a vast power shortfall that is increasing over time, harming economic activity; it highlighted the fact that long power breakdowns cannot reduce the shortfall. The study further underscored the fact that past electricity shortages determine current price levels. However, the approach used in the study cannot be adopted to conduct a study at the national or more aggregate levels due to the absence of power outage data.

There are several works that examine from a microeconomic perspective the energy shortage or power outage problems that have occurred in Pakistan. Sanghvi (1982; 1983), Beenstock (1991), Tishler (1993), and Beenstock, Goldin and Haitovsky (1997) introduced an analytical framework to quantify the cost of electricity interruptions or power outages by focusing on microeconomic behaviours of energy consumers. Using this framework with survey data, Serra and Fierro (1997) estimated the economic costs of electricity outages in Chile through a "willingness to pay" measurement. There are other papers that quantify the costs of electricity interruptions by employing the same types of "willingness to pay" measurements in

Austria and Sweden (Carlsson and Martinsson, 2008; Carlsson, Martinsson and Akay, 2011; Reichl, Schmidthaler and Schneider, 2013).

Another group of works that analyse power shortages is focused more on production functions of firms or the ownership of backup generators. This approach quantifies the cost of power shortages by measuring lost production, lost leisure time and the cost of using backup generators. De Nooij, Koopmans and Bijvoet (2007) and de Nooij, Leishout and Koopmans (2009) identified the total cost of lost production and lost leisure time using regional data in the Netherlands. Wijayatunga and Jayalath (2008) and Szakonyi and Urpelainen (2013) estimated the impact of power outages on economic activities by explicitly introducing the role of backup generators in Bangladesh and India, respectively.

There are few studies that directly examine the causes of power shortages at the national level considering both the demand and supply sides of electricity within a single framework.[1] Although some researchers have made useful policy recommendations using descriptive analysis to curb the energy crisis in Pakistan, the following empirical questions remain:

- How do energy end users behave in response to changes in the supply side and other socioeconomic factors?

- What is the cause of the power shortages?

- What policy would be effective in solving the energy shortage problem?

Since the existing literature on energy focuses more on energy demand, income and price levels, a new aspect of analysis is addressed in this paper – that is, the supply side of electricity in Pakistan – together with the key variables of price and income. More specifically, the authors have sought to answer the above-mentioned questions by analysing the relative demand for electricity, oil and gas with the key variables of the supply side.

The analysis clarifies the determinants of electricity shortages in Pakistan at the aggregate and sectoral levels (for the household, industrial and agricultural sectors). As a proxy for electricity deficiency, a unique energy consumption index (ECI) was developed and employed. ECI reflects the demand for fossil fuels compared with that of electricity. The index is obtained by dividing the sum of oil and gas consumption by electricity consumption. In this calculation, various energy consumption measurements are converted into a single unit (that is, tons of oil

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[1]   A straightforward assessment of power shortages is not possible due to the unavailability or unobservability of the relevant power outage data at the national level.

equivalent, or TOE). Under an ideal situation of adequate power supply, ECI should follow a steady pattern of growth over time. In a situation of acute power shortage, when oil and gas are used as a substitute for electricity, ECI fluctuates in both the short run and the long run in the context of Pakistan. Under these assumptions, ECI is a reliable indicator for capturing electricity shortages.[2]

In the study, an Engle and Granger two-step approach and an error correction model were employed to assess the factors responsible for electricity shortages in Pakistan. Using annual data on electricity, gas and oil consumption, electricity and oil prices, real GDP per capita, the utilization of installed capacity (percentage) for electricity production, and electricity production from thermal (fossil fuels and coal) and non-thermal (hydroelectric and nuclear) sources, the following main findings emerged from the present study. First, end consumers adjust their energy demands to prices only in the long run. Second, the underutilization of the installed power-generation capacity encourages fossil fuel consumption for private electricity. Third, an uninterrupted electricity supply could be attained by regulating private electricity generation. Fourth, the relative demand for electricity increases and then decreases with real income in relation to gas and oil. Overall, the findings imply that the price adjustment tactics adopted by the Government are not an effective policy to deal with power shortages in the short run. Rather, the Government should focus on improving the utilization rate of installed power plants and rechannelling the use of oil and gas for public energy generation. Otherwise, energy shortages will worsen with economic growth in Pakistan.

The rest of this paper is structured as follows. In section II, the supply and the demand of energy in Pakistan are described, along with the country's electricity shortages. There is a brief overview of the electricity, oil and gas sectors of Pakistan. The model, methodology and data are discussed in section III. The empirical results and their interpretation are discussed in section IV, while the conclusion, policy implications and recommendations are presented in the final section.

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[2]   The energy consumption index (ECI) fluctuates when electricity shortages and blackouts occur in Pakistan because people use self-generators using oil and gas to back up the supply of electricity. When there is no blackout or no electricity shortage, this means that power plants are providing sufficient electricity. The use of oil and gas when there is no blackout or shortage should be relatively smooth so that ECI must be smooth as well. Therefore, a fluctuation of the energy consumption index is considered to be attributed to the heavy use of backup generators when electricity shortages and blackouts occur in Pakistan.

II. OVERVIEW OF THE ENERGY SECTOR IN PAKISTAN

The shortage of energy and its related problems have continued to restrict Pakistan's economic growth severely due to the country's underdeveloped, inefficient and poorly managed infrastructure.[3] The Government of Pakistan reportedly has not made serious efforts to expand electricity generation capacity to support the country's rapid economic growth during the past decade (Khan and Ahmed, 2009). Consequently, when power demand is greater than the supply, the Government adopts load management through load-shedding and price-increasing tactics. As an immediate attempt to remedy the national power crisis, the Government of Pakistan installed several rental power plants (RPPs) with a generation capacity of about 1,156.1 MW in 2008 and 2009 (Transparency International – Pakistan, 2010).[4] The thermal power expansion of RPPs was criticized by many researchers from the beginning of the project. The Asian Development Bank (2010) claimed that the programme would not be sufficient to eradicate load-shedding; rather, it would exert upward pressure in power production costs. Under RPP scenarios, the end user bears an 80 per cent increase in the tariff. Reports published by the National Electric Power Regulatory Authority show that per unit production costs (of particular RPPs) have exceeded 40 Pakistan rupees (PR) (US\$ 1 = currently about 99 PRs), whereas the average selling price per unit is PR 7 (Pakistan, National Electric Power Regulatory Authority, 2004; 2013).

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[3]   Power theft, bribes and corruption are common in the energy sector in Pakistan, and many utilities continue to receive subsidies. See M.A. Khan and U. Ahmed, "Energy demand in Pakistan: a disaggregate analysis", MPRA Paper, No. 15056 (Munich, University Library of Munich, 2009).

[4]   The Government of Pakistan approved the acquisition of 2,700 MW of rental power plants (RPPs) as an immediate measure to narrow the electricity supply-demand gap. However, by December 2009, no RPP had come on stream. Different stages of the RPP programme were approved on the basis of procurement through international competitive bidding. A total of three tenders were floated by the Private Power and Infrastructure Board and six by the Pakistan Electric Power Company to implement the programme. As a result, 14 RPPs were built. In addition, five unsolicited RPPs were approved by the Economic Coordination Committee of Pakistan. There are currently 19 RPPs, with a total capacity of 2,734 MW at various stages of power processing (ADB, 2010). According to most sources, by the end of 2011, only 1 of the 19 RPPs had come on stream, adding to the national grid only 62 MW of electricity against the target of 2,700 MW. On the basis of the figures presented to the Supreme Court of Pakistan, the RPPs contributed on average 118 MW between March 2011 and February 2012, which is less than 1 per cent of the total installed capacity without RPPs. According to Pakistan Water and Power Development Authority statistics, the current energy available from RPPs is 250 MW with 285 MW installed capacity. See Supreme Court of Pakistan, Human rights case Nos. 7734-G/2009 and 1003-G/2010, Islamabad, 2010. Available from www.supremecourt.gov.pk/web/user_files/File/HRC7734-G_1003-GOF2009[AllegedCorruptionInRentalPowerPlants].pdf.; and S. Ahmad, "Myth and reality of rental power plants", *Pakistan Observer,* 1 December 2010.

Despite a hefty increase in electricity prices after 2008, there still exists a significant gap between power generation costs and actual recovery. The Government of Pakistan therefore has to subsidize PR 30 per unit (for some RPPs) to keep the price stable (ADB, 2010).[5] In 2012, only three years after the RPP programme's implementation, it turned out to be a multimillion dollar corruption scam.[6] In 2010, primary energy availability per capita dropped significantly, by 5.26 per cent, as shown in table 1. There has been no major recovery since 2011/12. On the consumption side, all of the types of energy consumption decreased in 2008/09 except gas consumption, as shown in figure 1. In the period 2011/12, oil consumption remained at the same level, whereas gas consumption slightly decreased and electricity consumption slightly increased. These figures suggest that

Table 1. Primary energy supply and per capita availability

| Year	Energy supply		Per capita	
	Million (TOE)	Change (%)	Availability (TOE)	Change (%)
2000	43.19	3.51	0.32	1.28
2001	44.40	2.82	0.32	0.36
2002	45.07	1.50	0.32	-1.25
2003	47.06	4.41	0.32	2.86
2004	50.85	8.06	0.34	5.25
2005	55.58	9.26	0.36	6.45
2006	58.06	4.18	0.37	2.48
2007	60.62	4.33	0.38	2.61
2008	62.92	3.78	0.39	2.86
2009	62.55	-0.58	0.38	-2.27
2010	63.09	0.86	0.36	-5.26
2011	64.52	2.3	0.36	0.00
2012	64.73	0.32	–	–

Source: Pakistan, Ministry of Finance, *Pakistan Economic Survey 2012-13* (Islamabad, 2013).

Note: TOE – tons of oil equivalent.

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[5]   The authors initially tried to incorporate the gap in their analysis. This, however, was not possible due to the unavailability of the corresponding data.

[6]   See Asian Development Bank, *Islamic Republic of Pakistan: Rental Power Review* (Manila, 2010); Mir Shakil-ur-Rahman, ed.,"Summary of SC judgment in rental power plants case", *News International*, 31 March 2012. Available from www.thenews.com.pk/Todays-News-6-100407-Summary-of-SC-judgment-in-Rental-Power-Plants-case; and Pakistan, Ministry of Finance, *Economic Survey 2009-10* (Islamabad, 2010).

Figure 1. Share of energy consumption by source in Pakistan
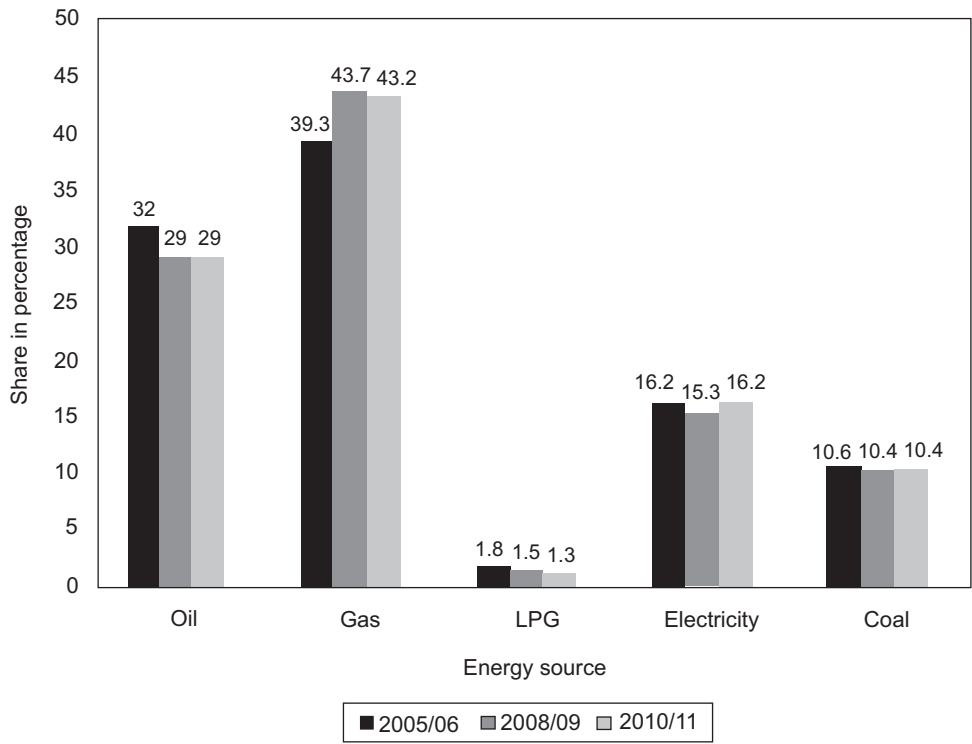
a large share of energy consumption is from oil and gas, which are used to generate electricity with back-up generators.

Why is there an electricity shortage in Pakistan?

The inefficiencies, strengths and challenges of the power sector in Pakistan have been studied by several scholars, although there are few empirical works that characterize the issue. Many scholars have noted that the power production, management and consumption sides are responsible for the current electricity shortages. In Pakistan, production and distribution inefficiencies include more than 20 per cent transmission and distribution losses, an overreliance on thermal power production and the underutilization of installed capacity for power production

(Pakistan, Ministry of Water and Power, 2013). However, the impact of key supply-side variables on energy shortages has been quantified in only a few studies.

Yazdanie and Rutherford (2010) criticized the central structure of the power generation sector. In Pakistan, 66 per cent of the total electricity produced comes from expensive thermal sources,which use 42.8 per cent oil and 28.1 per cent gas of the gross domestic consumption. On the other hand, of the total energy produced in the United States of America, 50 per cent is from coal, 25 per cent from natural gas and the remaining 25 per cent from mixed source (Younos, Hill and Poole, 2009). Scholars have proposed different solutions to overcome the electricity shortage. For instance, Yazdanie and Rutherford (2010) advocated the expansion of renewable power generation capacity. Jamil and Ahmad (2010) emphasized the development of hydroelectric power production capacity. However, Amer and Daim (2011) concluded that there was no single ideal solution that would meet the national energy demand. Pakistan needs a combination of suitable alternative technologies to ensure countrywide energy security.

Government strategies to tackle the electricity shortfall by introducing breakdowns (load-shedding) and increasing electricity prices have been criticized by many scholars because these power cuts not only exacerbate power availability but also play a vital role in determining future electricity prices for both domestic and industrial users (Kessides, 2013). For instance, in 2008, when Pakistan was confronting its worst power shortfall, the Government announced an increase of 62 per cent and 71 per cent in electricity prices for domestic and industrial users, respectively (Hasan, Subhani and Osman, 2012). Meanwhile, the Karachi Electricity Supply Company (KESC) was unwilling to produce electricity from furnace oil due to an increase in the price of oil.[7] In the following years, both power shortfalls and electricity demand stretched a great deal. By the end of 2010, daily electricity demand in Pakistan surpassed 20,000 MW, with an average shortfall of 2,000-4,000 MW per day (Mills, 2012; Zeshan, 2013; Pakistan, Ministry of Water and Power, 2013). Consequently, a considerable number of small- and medium-scale production units shut down due to high energy costs and frequent power shortfalls.

The most prominent feature of energy consumption in Pakistan is that the household sector is the largest consumer of electricity. This sector alone represents more than 46.5 per cent of the country's total electricity consumption, while the industrial sector consumes only 27.5 per cent of the total energy consumed (Pakistan, Ministry of Finance, 2013). In contrast, in developed countries, 15 to 20 per cent of

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[7]   See, for example, M.W. Bhatti, "KESC fears backlash over hike in furnace oil prices", *News International*, 17 August 2012; and A. Ahmadani, "KESC decides to convert two power plants from oil to coal", *Nation,* 11 September 2013.

total energy is consumed by households (Dzioubinski and Chipman, 1999). Dzioubinski and Chipman (1999) indicated that per capita household energy consumption in North America was much higher in the early 1970s, and it eventually decreased over time. In contrast, energy consumption is moving in the opposite direction in Pakistan, where the usage of energy-efficient electronic appliances is not common.

Electricity sector of Pakistan

The main electricity producers in Pakistan are the Water and Power Development Authority (WAPDA), KESC and the Pakistan Atomic Energy Commission. WAPDA supplies electricity for all of Pakistan with the exception of Karachi, while KESC covers the city of Karachi and its surrounding areas. WAPDA was bifurcated into two separate entities in October 2007, that is, WAPDA and the Pakistan Electric Power Company (PEPCO). WAPDA is responsible for water and hydropower development, whereas PEPCO manages the affairs of 14 different public limited companies in the areas of thermal power generation, transmission, distribution and billing.

Competition in the power generation sectors was introduced in the 1990s, and since then there have been 27 independent power producers contributing significantly to the national energy supply. Pakistan follows the single-buyer model of electricity supply, whereby PEPCO produces thermal power as well as buys electricity from several producers, including independent power producers and the Pakistan Atomic Energy Commission. The majority of independent power producers generate thermal power from natural gas and petroleum products. The independent power producers buy inputs from national oil and gas companies, and frequent disruptions in cash flow cause an unstable electricity supply.

In 1947, at the time of independence, Pakistan inherited 60 MW power generation capacity, which could cater to the needs of the whole population. However, with the acquisition of KESC in 1952 and the establishment of WAPDA in 1958, Pakistan's power sectors flourished rapidly. Despite the fast growth of the energy sector, energy demand has been outpacing aggregate supply due to rapid industrialization, urbanization, population growth and so forth. Electricity supply has lagged behind demand since the early 1980s. The power sector of Pakistan has been unable to maintain the required capacity due to poor governance, institutional weakness, unsuitable tariff structures and poor load management tactics to manage power shortfalls. Today, only 65 per cent of the total population receives its electricity from the main grid, which is an unreliable and highly disrupted supply of electricity.

Oil and gas sector of Pakistan

The Government of Pakistan holds a significant stake in the oil and gas sector as an owner, manager, policymaker and regulator. Oil and gas are key components of Pakistan's energy, meeting over 78 per cent of the country's energy needs. While confronting global oil price shocks, Pakistan's oil-related policies have been focused on minimizing heavy dependence on oil imports. Despite these efforts, the country experienced massive oil supply disruptions on several occasions in the past, including the Iranian boycott from 1951 to 1953, the Suez crisis in 1956, the so-called six-day war in 1967, the Arab-Israeli war in 1973, the Iranian revolution in 1979, the Iran-Iraq war in 1980, the Persian Gulf crisis in 1991 and the global financial crisis that started in 2008.

With its well-developed infrastructure, Pakistan is among the major consumers of natural gas in the region. It has sophisticated natural gas transportation, distribution and utilization systems, with a 9,480 km transmission and 104,499 km distribution network. There are two semi-State-owned gas transmission and distribution companies, namely Sui Northern Gas Pipelines Limited and Sui Southern Gas Company Limited. With more than 3,000 stations supplying compressed natural gas, Pakistan is the world's largest consumer of compressed natural gas (Shoaib, 2013; Gillani and others, 2011). Pakistan does not import or export electricity or gas. Oil is the only traded form of energy. However, two significant regional gas pipeline projects, namely the Islamic Republic of Iran-Pakistan gas pipeline project and the Turkmenistan-Afghanistan-Pakistan-India gas pipeline, are being planned.

III. METHODOLOGY

In the present study, energy shortages are examined using a unique index – ECI_t – as a dependent variable, while energy prices, real income and other supply-side factors are used as explanatory variables. Equation (1) is a mathematical representation of ECI_t for the national, industrial and household levels.[8]

$$ECI_t = \frac{Oil\ consumption_t + Gas\ consumption_t}{Electricity\ consumption_t} \tag{1}$$

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[8]   Gas consumption of the agricultural sector is a null value. This is discussed in section IV of the present paper.

To calculate ECI_t, all of the types of energy measurements are converted into a single unit (that is, TOE). It is plausible to assume that constant movements or the smooth growth of the index without many fluctuations over time reflects the ideal situation of no power shortage because this implies that the consumption of all of the types of energy follows steady patterns. For instance, if steady electricity consumption generated by thermal plants with inputs of oil and gas is made over time, ECI_t will be mostly constant or at least smooth. Put more simply, the constant consumption of oil, gas and electricity will keep the index constant.

However, the index can go up or down depending on how the replacement of traditional energy sources with alternative energy sources, such as renewable energy or hydroelectricity generation with backup generators, is made over time. For instance, when hydroelectricity generation is replaced by electricity from backup generators, the index will move up. On the other hand, when hydroelectric energy contributes more to electricity generation and reduces the reliance on backup generators, the index will go down. Thus, a fluctuation in the index is considered to be the indicator of electricity substitution with oil and gas. In the context of Pakistan, people use backup generators fuelled by oil and gas for private electricity, and thus, increases in the index and in the occurrence of blackouts are indicators of an energy shortage. Therefore, by using ECI_t as a dependent variable, it is possible to analyse which factor significantly affects energy or electricity shortages.

In summary, when ECI_t can move up and down depending on replacements of electricity with backup generators using oil and gas, this index can be considered a function of aggregate, as well as sector-wise electricity prices (EP_t), oil prices (OP_t), real gross domestic product per capita (GDP_t), the electricity production ratio from thermal and non-thermal resources ($TNTPR_t$) and the capacity utilized for power production (CU_t). Using these specifications, the following cointegrating equation was used in this study:

$$ECI_t = \beta_0 + \beta_1 EP_t + \beta_2 OP_t + \beta_3 GDP_t + \beta_4 GDP_t^2 + \beta_5 TNTPR_t \qquad (2)$$
$$+ \beta_6 CU_t + e_t$$

Where $TNTPR_t$ and CU_t are obtained from the following equations:

$$TNTPR_t = \frac{Thermal\ electricity\ production_t}{Hydroelectric\ production_t + Nuclear\ production_t} \qquad (3)$$

$$CU_t = \frac{Actual\ production_t}{Total\ installed\ capacity_t} \times 100 \qquad (4)$$

The specification follows previous literature in the sense that the consumption of oil and gas with backup generators is dependent on the various prices of oil, gas and electricity, and on GDP. Accordingly, it can be assumed that ECI_t is also dependent on the same factors. However, there are some unique features in the empirical framework of the present study in the sense that the supply-side variables of $TNTPR_t$ and CU_t are included. This inclusion is made because these variables are controlled by KESC, WAPDA and PEPCO in relation to political factors and to the financial situation of each entity, as described previously in this paper.

Based on economic theory, $TNTPR_t$ and CU_t cannot be included together with energy demand in the regression analysis. However, the supply side of the energy sector in Pakistan has not been functioning according to economic theory. More specifically, the $TNTPR_t$ and CU_t variables are mostly controlled by the public companies, and they are considered exogenous variables, which are usually determined by uncontrollable factors, such as government budgets, rather than by market forces. Therefore, the independent variables can be taken as control variables.

In other words, a change in the consumption of oil and gas through backup generators does not affect the variables of $TNTPR_t$ and CU_t. This can be supported by the fact that backup generators are used only when an electricity shortage occurs, as the electricity generated by backup generators is more costly for users than the grid electricity distributed from power plants (Pasha, Ghaus and Malik, 1989; Kessides, 2013; Lodhi and Malik, 2013). The definitions of the variables and the corresponding units of measurement used in the analysis are summarized in table 2.

Based on economic theory, holding other factors constant, an increase in OP_t, GDP_t, and CU_t should have a negative association with ECI_t. Each of these factors should reduce the use of, or reliance on, backup generators for private electricity. An increase in OP_t should reduce oil and gas consumption and lead to a decrease in ECI_t. An increase in GDP_t should decrease ECI_t because it would reduce the reliance on backup generators. However, in the field of environmental economics, certain non-linear effects, called the "Kuznets curve", are common, indicating that energy use relies more on oil and gas than on other energy sources in the initial stage of economic growth. However, as the economy grows, energy use moves to cleaner energy sources. Following this argument, a quadratic term of GDP_t is included. With respect to CU_t, it is one indicator of how the installed capacity of public electricity supplies is utilized, and its increase should reduce the use of backup generators and ECI_t accordingly. EP_t is hypothesized to be positively associated with ECI_t because its increase should reduce electricity use and ECI_t would therefore increase with a decrease in its denominator of electricity consumption.

Table 2. Definitions and descriptions of each variable in the regression analysis

Variable name	Description	Unit of measurement
ECI	Energy consumption index. This is an index obtained from the sum of oil consumption and gas consumption divided by electricity consumption. A decline in the value of ECI over time represents a higher usage of electricity compared with the aggregate consumption of oil and natural gas; an increase in the value of the index shows a higher consumption of fossils fuels. A frequent fluctuation indicates an unstable electricity supply and frequent substitution among fossils fuels and electricity.	Tons of oil equivalent
EP	Electricity price	Pakistani rupees per kWh
OP	Oil price	Pakistani rupees per litre
GDP	GDP per capita	United States dollars per person
TNTPR	Thermal and non-thermal production ratio is another index that represents the amount of electricity produced from thermal resources (oil or gas or both) divided by the sum of the electricity produced from hydroelectric and nuclear resources. At steady nuclear energy production, major changes in the value of this index occur as a result of the changes in electricity production from thermal and hydroelectric resources.	GWh
CU	Percentage of the total installed capacity utilized to produce electricity.	Percentage

The coefficient $TNTPR_t$ should provide important implications or a precise interpretation in the context of Pakistan's energy demand. In fact, it is known that the installed capacity to produce electricity from hydroelectric and nuclear sources is stable in both the short run and medium run. However, thermal energy production changes a great deal even over time due to the load-shedding strategies or

price-increasing tactics of energy suppliers in Pakistan. Therefore, a fluctuation in $TNTPR_t$ is driven mainly by changes in thermal energy production.

When the coefficient $TNTPR_t$ is inversely correlated with ECI_t, it implies that public thermal electricity production contributes to the reduction of oil and gas consumption through backup generators for private electricity. If it is positively associated with ECI_t, public thermal electricity generation induces a greater consumption of oil and gas than of electricity consumption using the same energy measurement unit (that is, TOE). This means that the existence of public thermal plants for electricity generation in Pakistan cannot be justified from an energy efficiency point of view, which should be an interesting policy question.[9]

The analysis followed the Engle and Granger two-step procedure (Engle and Granger, 1987). In cointegration tests, all variables should be non-stationary or follow a random walk process for the cointegration regression to be meaningful. To identify the order of integration, the stationarity of the variables was pretested with an augmented Dickey-Fuller test with Schwarz information criterion, and the results were double-checked with Akaike information criterion (Dickey and Fuller, 1981). In order to verify the results, the Phillips-Perron unit root test was also employed. Trend and intercept terms were used in these tests to control drift or trend in the data. From the unit root results, if non-stationary time-series data are cointegrated at the same level, it is possible to formulate an error correction model.

The error correction model provides estimates that can help to explain the short-run relationship among the variables. The existence of a cointegration relationship among the variables can be tested by the unit root test of the residual term represented by the following equation:

$$\Delta \hat{e}_t = \alpha\, \hat{e}_{t\text{-}1} + \sum_{i=0}^{n} \delta_i\, \Delta \hat{e}_{t\text{-}i} + u_t \tag{5}$$

where Δ is the difference operator, $\hat{e}_t$ is the residual from equation (5), $n \geq 0$ is the number of lags which make up the residual of the equation, and α and δ are the parameters to be estimated. The failure to reject the hypothesis, that $\hat{\alpha} = 0$, is evidence that the error term is not cointegrated. In such a case, results of simple ordinary least squares (OLS) to estimate equation (1) do not lead to spurious regression and the OLS parameters are consistent.

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[9] The price of gas was not included as an explanatory variable in the model mainly due to the fact that gas prices and oil prices move together in Pakistan. In other words, these types of fuel are perfect substitutes for each other and their prices always move in the same direction. The other reason for not including the price of gas as a covariate was the unavailability of data for the study period.

In the cointegration model, the long-run relationships are summarized and interpreted by the following parameters:

$$\frac{\partial ECI_t}{\partial EP_t} = \beta_1, \ \frac{\partial ECI_t}{\partial OP_t} = \beta_2, \ \frac{\partial ECI_t}{\partial GDP_t} = \beta_3 + \beta_4 GDP_t, \ \frac{\partial ECI_t}{\partial TNTPR_t} = \beta_5, \ \frac{\partial ECI_t}{\partial CU_t} = \beta_6$$

It should be noted that β_1 and β_2 capture the effect of the price of electricity and the price of oil on the dependent variable. The first order partial derivative of equation (1) with respect to GDP_t will help in identifying a possible non-linear effect as well as the associated turning level of real income for ECI_t if it exists. β_5 and β_6 show the relative effect of thermal and non-thermal electricity generation and the percentage of capacity utilized for electricity generation, respectively.

Finally, the associated error correction model of the cointegration relationship can be estimated by

$$\Delta ECI_t = \alpha_0 + \alpha_1 \Delta EP_t + \alpha_2 \Delta OP_t + \alpha_3 GDP_t + \alpha_4 GPD_t^2 + \alpha_5 \Delta TNTPR_t +$$

$$\alpha_6 \Delta CU_t + \alpha_7 \hat{e}_{t-1} + \varepsilon_t \tag{6}$$

A first difference of each variable in equation (6) makes I(1) integrated variables stationary. The relationship among stationary variables can be estimated to establish short-run effects among variables, which is one of the main objectives of an error correction model. Therefore, the coefficients of equation (6) are the estimates of the short-run effects of each corresponding independent variable. In addition, the coefficient of error-correction terms, α, is said to be the speed of adjustment for any shock leading to a deviation from the equilibrium in the long run. It is intriguing to note that the sign and significance level of error-correction terms are evidence of long-run equilibrium relationships among the variables in equation (6).

The aforementioned method was chosen because it is one of the simplest methods to identify the association between ECI_t and the other independent variables. To justify the use of this method, it is argued that a fluctuation in ECI_t is driven mainly by a change in oil and gas consumption through backup generators for private electricity, considering the unique contexts of Pakistan's energy consumption. That is, the use of backup generators is affected by independent variables of the regressions, but ECI_t does not directly affect the independent variable. Therefore, a time-series analysis of error correction and cointegration is employed to clarify the short-run and long-run linkage between ECI_t and the other independent variables in a simple way.
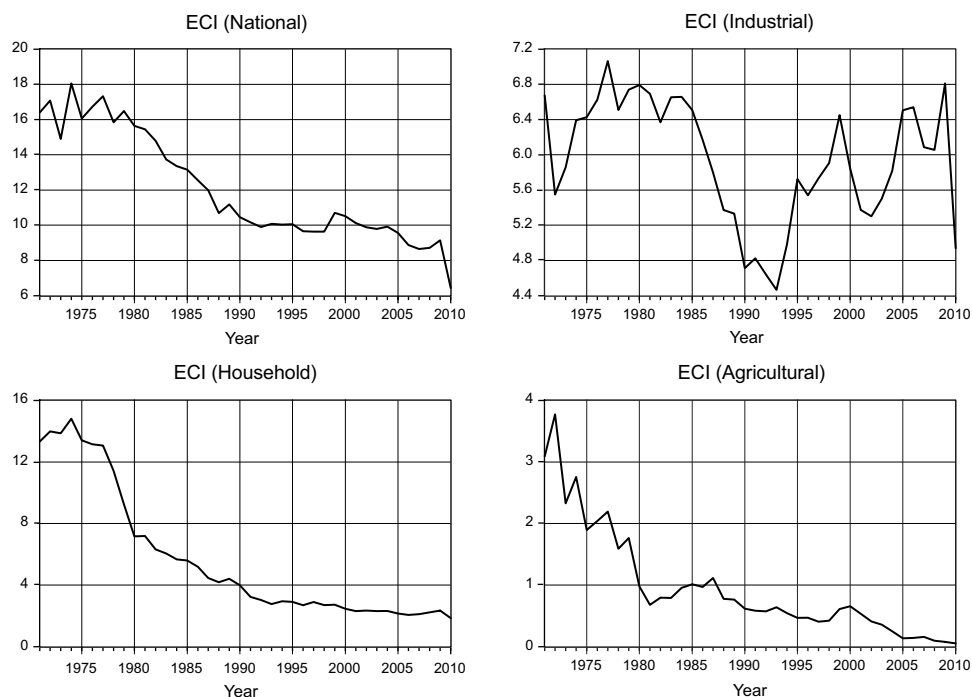
Data

Data corresponding to annual observations from 1971 to 2010 were used. The data were gathered from several sources: electricity consumption (measured in GWh) at the aggregate level and by key sectors, namely industrial, household and agricultural levels, as well as the average prices for each category (in PR/kWh), were taken from *Electricity Marketing Data* (WAPDA, 2011). There are different electricity prices in different sectors due to the different levels of subsidization administered by the Government of Pakistan. The data on oil consumption (in tons), gas consumption (in millions of cubic feet), oil prices (in PR/litre) and electric power supply-side series – electricity production from different sources (such as hydroelectric, thermal and nuclear), total electricity production and actual installed capacity – were obtained from the Ministry of Petroleum and Natural Resources and from the Hydrocarbon Development Institute of Pakistan.[10] Finally, real GDP per capita data for the national and sectoral levels were collected from the World Bank.[11]

IV. RESULTS AND DISCUSSION

In this section, the long-run and short-run dynamics of electricity fluctuations are provided along with the corresponding estimation results for sample data of Pakistan for the period 1971-2010. In figure 2, which is composed of four subfigures, time-series plots of ECI_t are depicted. Each subfigure corresponds to the national, industrial, household or agricultural sector. As shown in this figure, there is a general tendency for ECI_t to decline over time except in the industrial sector. At the same time, there is high volatility of ECI_t in the energy-intensive sectors, that is, the industrial and agricultural sectors. Especially in the industrial sector, ECI_t fluctuates and does not necessarily decline over time. This implies that oil and gas have been heavily used for backup generators by this sector in response to electricity shortages. Oil and gas consumption for backup generators in the household, agricultural and national sectors appears to have been declining over time based on these data of ECI_t. However, to characterize what has driven the reduction in ECI_t, the effects of several explanatory variables (prices, income and supply side) will be reported.

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[10]   These figures are published in the *Pakistan Economic Surveys* by the Ministry of Finance.

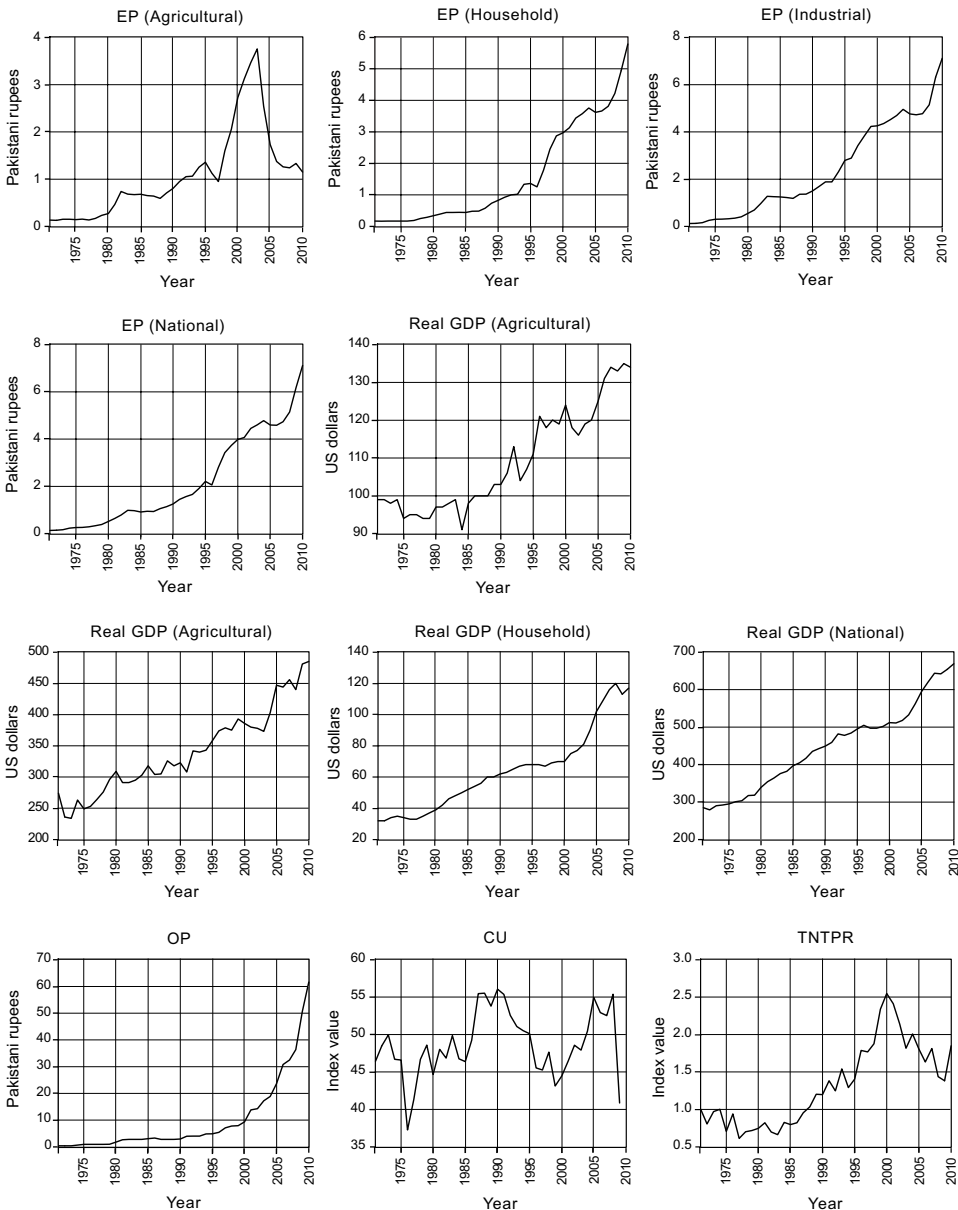[11]   See World Bank, World Development Indicators. Available from http://data.worldbank.org/country/pakistan.

Figure 2. Aggregate and sector plots of ECI$_t$ for the period 1971-2010

Note: ECI – energy consumption index.

In figure 3, the trends of the time-series data used for this study as explanatory variables are shown. As can be seen, the variables of EP$_t$, OP$_t$ and GDP$_t$ exhibit the same qualitative feature of time-series plots irrespective of the sector, that is, an upward time trend. On the other hand, it should be noted that the important supply-side variables of CU$_t$ and TNTPR$_t$ exhibit some degree of fluctuation over time. This exemplifies certain problems that Pakistan has faced in electricity generation up to the present; that is, capacity utilization and thermal power generation have not been stable in Pakistan, and this phenomenon signifies energy shortages.

Before conducting further analysis, the order of stationarity is examined. To obtain the exact level of integration, augmented Dickey-Fuller and Phillips-Perron unit root tests were employed. The results of both tests are shown in table 3. The results imply that all of the variables are integrated in order one I(1) and they are consistent with the requirement for the rest of the time-series analysis. This means that individual variables are stationary at their first differences. Hence, cointegration models are estimated with level variables and error correction models with first differences data.

Figure 3. Trends of the relevant variables for the period 1971-2010

Note: CU – capacity utilized; EP – electricity price; OP – oil price; TNTPR – thermal and non-thermal production ratio.

Table 3. Results of unit root tests

Sector and variable	Augmented Dickey-Fuller		Phillips-Perron		Order of integration
	Level	First difference	Level	First difference	
National					
ECI	-0.61	-11.27***	-0.13	-11.05***	I(1)
GDP	0.72	-4.59***	1.28	-4.59***	I(1)
EP	-0.4	-3.23*	0.40	-3.27*	I(1)
Industrial					
ECI	-2.31	-6.09***	-2.32	-6.08***	I(1)
EP	1.42	-2.73*	2.26	-2.73*	I(1)
GDP	0.61	-3.79***	1.03	-3.85***	I(1)
Household					
ECI	-2.34	-2.98**	-1.73	-4.51***	I(1)
EP	-0.17	-3.44*	-1.28	-4.50***	I(1)
GDP	0.45	-7.81***	2.39	-9.82***	I(1)
Agricultural					
ECI	-1.08	-11.91***	-2.83	-10.33***	I(1)
EP	-2.1	-3.40**	-1.61	-3.48**	I(1)
GDP	-0.04	-7.55***	0.66	-7.86***	I(1)
Other variables					
OP	0.28	-4.88***	0.32	-4.76***	I(1)
TNTPR	-1.08	-6.81***	-1.02	-6.81***	I(1)
CU	-2.46	-6.56***	-2.46	-6.59***	I(1)

Notes: ***, ** and * indicate the level of significance at 1 per cent, 5 per cent and 10 per cent, respectively.

CU – capacity utilized; ECI – energy consumption index; EP – electricity price; OP – oil price; TNTPR – thermal and non-thermal production ratio.

Table 4 shows a long-run association of ECI_t with electricity and oil prices, real income, the thermal and non-thermal power production ratio, and the percentage of capacity utilized for electric power production. In cointegration results for aggregate, industrial and household level regressions, most of the variables are significantly different from zero and the signs of the coefficients are in alignment with economic theory and the hypothesis of this study. An exception is the result for the agricultural sector, which will be discussed later in this paper.

Table 4. Results of cointegration regressions

Dependent variable: ECI	Coefficient			
Variable	National	Industrial	Household	Agricultural
Constant	43.911***	13.698***	92.265***	13.477
EP	1.073***	0.946***	1.071	-0.349
OP	-0.155***	-0.117***	-0.208**	-0.017
GDP	-0.106***	-0.141***	-0.429***	-0.167
GDPSQ	0.0001***	0.001***	0.0006***	0.001
TNTPR	-1.820***	-1.517***	-1.241	0.299
CU	-0.057*	-0.054*	-0.125**	-0.039
R^2	0.957	0.629	0.923	0.547
Adjusted R^2	0.949	0.562	0.909	0.465
Durbin-Watson statistics	1.88	1.402	1.736	0.482
t-statistics of residual in the unit root test	-5.877***	-4.568***	-6.823***	-3.117**

Notes: ***, ** and * indicate the level of significance at 1 per cent, 5 per cent and 10 per cent, respectively.

CU – capacity utilized; ECI – energy consumption index; EP – electricity price; GDPSQ – GDP squared; OP – oil price; R^2 – the coefficient of determination is a statistical measure of how well the regression line approximates the real data points; TNTPR – thermal and non-thermal production ratio.

In a long-run equation, the price of electricity is positively correlated with ECI_t. This might be due to a decrease in electricity consumption or to an increase in oil and gas consumption as substitutes. Significant coefficients of EP_t for the national and industrial sectors refer to the fact that these sectors are highly responsive to electricity prices compared with the household sector. These results are consistent with those of Khan and Ahmed (2009) and of Chaudhry (2010), with clear implications that electricity is the primary source of energy for poor households in Pakistan. Increasing electricity prices may harm standards of living by deepening poverty. Finally, the coefficient of EP_t for the agricultural sector is insignificant, the cause of which will be discussed later in this paper.

$TNTPR_t$ consistently shows negative signs for the national, industrial and agricultural sectors, two of which are statistically significant. This result suggests some useful policy implications. To understand these implications, it is essential to recall that power generation from non-thermal sources (such as nuclear and hydroelectric sources) remains steady in Pakistan. The major change in the variable of $TNTPR_t$ comes from the expansion or shrinkage of thermal power production. Negative and significant signs of the coefficients suggest that public thermal power

production for electricity can reduce the use of gas and oil for private purposes, that is, a reduction of ECI_t. In other words, an increase in the supply of electricity from public thermal power plants definitely reduces the overall consumption of oil and gas for private electricity. This is desirable because public electricity generation through power plants is more energy-efficient than privately generated electricity from backup generators.

This result further implies that there should be some governmental regulation; that is, from an energy efficiency perspective, private electricity production using backup generators should be regulated by the Government, so that the inputs of oil and gas for backup generators could be diverted to public power production. Such regulations would be consistent with policy recommendations made by Steinbuks and Foster (2010), who suggested that privately generated electricity using backup generators is very expensive and not energy-efficient due to lower fuel efficiency, compared with energy from government thermal power stations. These authors claimed that such private electricity generation must be regulated from a social planner's point of view.

Concerning the utilization of installed capacity for electricity production, the results of the present study confirm that the underutilization of this capacity is one of the major reasons for electricity shortfalls. Negative and significant coefficients of CU_t for the national, industrial and household sectors show that a higher capacity utilization would reduce ECI_t to make the country better off. In fact, Pakistan has been exploiting total power generation capacity in the range of 37 per cent to 57 per cent, as shown in figure 3 (see the CU subfigure). In 2010, only 39 per cent of the 22,263 MW of installed capacity was utilized, whereas the worst power shortfall in 2011 peaked at 6,000 MW, which is 27 per cent of total capacity (PEPCO and NTDC, 2010). The management of Pakistan's power plants could overcome this shortage by utilizing 66 per cent of this total installed capacity. The underutilization of the installed capacity supports the findings of Jamil and Ahmad (2010) in that the policies to utilize power generation capacity in an optimum way should be prioritized over policies for expanding the capacity.

Finally, with an increase in real income, negative and significant coefficients of GDP explain the fact that electricity consumption increases more than the combined consumption of oil and gas. The household sector is about four times more responsive to this change than the national and industrial sectors. This relationship seems plausible because a higher income leads to the purchase of more electronic goods, which in turn facilitate the further use of electricity. However, it should be noted that the square term of GDP_t exhibits a significant non-linear association of the positive sign with ECI_t. This means that relative electricity consumption increases faster than the combined consumption of oil and gas in GDP_t when GDP_t is not very

high, holding other factors constant. However, this effect becomes reversed once GDP_t becomes sufficiently high.

To illustrate these types of non-linear effects from the regression results, the regression result in the national sector is used. The turning point in the national sector is identified as GDP* = US\$ 1,127, indicating the threshold value below which GDP_t is negatively associated with a national ECI_t and above which GDP_t is positively associated with a national ECI_t. More specifically, this result implies that, if Pakistan does not improve the supply side of power generation, such as CU_t or $TNTPR_t$, the demand for oil and gas will be greater than the demand for electricity, as GDP_t exceeds the threshold value of the turning point. This is because people will be using these inputs to meet the demand for electricity by using backup generators. This result is another confirmation of the findings of Hasan, Subhani and Osman (2012) in that there will be a huge energy shortfall in Pakistan without an improvement in the power-supply systems.

Based on GDP projections data from the International Monetary Fund (2012), the real GDP of Pakistan is projected to grow by more than 3.5 per cent annually for the next five years. At this growth rate, real GDP per capita will reach the threshold value of \$1,127 within the next 10 years. It is therefore necessary for the planner to take timely measures to ensure a sustainable and stable supply of electricity. Pakistan is already on the verge of national-level energy insecurity, which is illustrated by the non-linear estimation result of the study.

For the agricultural sector, although some of the signs are as expected, none of the variables is significant. There could be two main reasons for this: first, the agricultural sector does not consume natural gas; second, the model used in the study did not control the key determinant of energy demand in the agricultural sector of Pakistan. For instance, a number of environmental factors, such as cyclic floods, droughts, average annual rainfall; geographical factors, such as the elevation or the slope of the land; and modes of cultivation, such as arid, semi-arid or irrigated, play vital roles in determining the energy consumption of the agricultural sector in Pakistan. Further research is needed to determine the energy consumption of the agricultural sector in Pakistan.

In table 5, the results of the error correction models for short-run dynamics are presented. These results contain error correction terms obtained from the lagged value of stochastic error terms of cointegration equations. Negative and significant coefficients of error-correct terms confirm the existence of equilibrium in the long run, and their magnitudes represent the velocity of adjustment. Overall, the effect of significant variables is lower in the short run than in the long run. According to the results, price shocks do not affect energy consumption in the short run for any sector.

Table 5. Error correction model

Dependent variable: Δ ECI	Coefficient			
Variable	National	Industrial	Household	Agricultural
Constant	0.085	-0.078	-0.286**	-0.0043
Δ EP	-0.163	0.044	0.626	-0.076
Δ OP	-0.069	-0.045	-0.051	-0.537
Δ GDP	-0.086*	0.077	-0.103***	-0.005
Δ GDPSQ	0.0001	-0.0001	0.0001***	0.00002
Δ TNTPR	-1.813***	-0.997***	-1.034**	-0.225
Δ CU	-0.063*	-0.060***	-0.045	-0.020
$\hat{e}_{t-1}$	-1.056***	-0.794***	-0.386***	-0.253**
R^2	0.631	0.588	0.37	0.243
Adjusted R^2	0.548	0.495	0.228	0.073
Durbin-Watson statistics	2.075	1.579	1.782	2.842

Notes: ***, ** and * indicate the level of significance at 1 per cent, 5 per cent and 10 per cent, respectively.

              CU – capacity utilized; ECI – energy consumption index; EP – electricity price; GDPSQ – GDP squared; OP – oil price; R^2 – the coefficient of determination is a statistical measure of how well the regression line approximates the real data points; TNTPR – thermal and non-thermal production ratio.

In fact, price changes do not affect energy demand spontaneously, which is in line with real-world observations and experiences. End consumers do not respond to sudden price changes in the short run; however, they adjust their demand in the long run. Similarly, per capita real income, $TNTPR_t$ and CU_t affect energy consumption at the national level in the long run. However, GDP_t and CU_t become insignificant in the short run at the industrial level and at the household level, respectively.

There is a high significance of the $TNTPR_t$ variable in both the long run and the short run. This result suggests the importance of thermal power production at the national level. Also, the significance of optimum electricity generation from installed capacity is confirmed in the results associated with CU_t. These results are in line with economic intuitions and illustrate that an improvement in the supply of electricity is highly linked to ECI_t in short-run and long-run perspectives.

Using the aforementioned results, it is possible to answer the questions raised in section I of this paper. The first and second questions were: "How do energy end users behave in response to changes in the supply side and other socioeconomic factors?" and "What is the cause of the power shortages?" The results suggest that end users do not respond to price changes, at least in the short run, although they

adjust their consumption in the long run. This implies that the price adjustment tactics that have been implemented by the Government are ineffective since this policy is oriented towards easing energy shortages only in the short run.

Regarding end users' responses to a change in the supply side and the cause of the power shortages, changes in CU_t and $TNTPR_t$ were the focus. As expected, an increase in CU_t comes with a reduction in ECI_t, meaning that if power suppliers utilized more of their operational capacities, it could contribute to easing power shortages or reducing the reliance on backup generators. A change in $TNTPR_t$ is mainly driven by thermal electricity generation. Historically, a decrease in $TNTPR_t$ comes with a decrease in thermal electricity generation, and an increase in $TNTPR_t$ occurs with an increase in thermal electricity generation. Considering the facts, the study results are estimated to show that ECI_t decreases in $TNTPR_t$, implying that a greater utilization of thermal plants could reduce the use of backup generators. This implication sounds counter-intuitive at first; however, it is plausible from an energy efficiency perspective. It is not questionable that large-scale thermal power plants are far more energy-efficient than backup generators per unit of oil or gas input. In other words, thermal power plants can generate more electricity per input than backup generators.

Lastly, the answer to the final question from section I ("What policy would be effective in solving the energy shortage problem?") can be provided. Given the arguments up to this point, it is recommended that the Government should focus on the greater utilization of existing power plants in terms of capacity utilization as well as total electricity generation, as illustrated by the negative coefficients of statistical significance on CU_t and $TNTPR_t$ in tables 4 and 5. Unfortunately, the Government has failed to use this type of policy; rather, it has adopted price adjustment tactics, which were shown to be ineffective in the study's estimation results. There appear to be some political and socioeconomic barriers within the energy supply preventing the implementation of the policy recommendations provided in the present paper. However, without the greater utilization of the existing power plants' installed capacities, energy shortages in Pakistan will worsen as the economy grows. Looking at contemporary energy shortage problems in many Asian countries with growing economies, such as China and India, the use of backup generators for private energy is problematic, as they are a source of emissions. The framework used in the present paper is also applicable to such countries. More specifically, the greater utilization of public power plants is necessary to reduce the use of backup generators, and some regulation must be made for private electricity generation to improve social welfare in Pakistan with respect to energy consumption.

V. CONCLUSION

The relationships between energy consumption, prices, real income, the effects of power generation from different sources and the utilization of total installed capacity for power production were investigated in this study by using cointegration and error correction models. The annual data for the national level as well as for major sectors of the economy – namely industrial, household and agricultural – were examined for the period 1971-2010. The main findings were as follows: first, end consumers adjust their energy demand to the prices only in the long run; second, the underutilization of installed power-generation capacity encourages fossil fuel consumption for private electricity; third, an uninterrupted electricity supply could be attained by regulating private electricity generation; and fourth, the relative demand for electricity shows a non-linear relationship to oil and gas.

Overall, the study results imply that the price adjustment tactics adopted by the Government of Pakistan are not effective in the short run. Rather, the Government should focus on improving the utilization rate of installed power plants and on rechannelling the use of oil and gas for public electricity generation. Otherwise, energy shortages will worsen with economic growth in Pakistan, and the economy will suffer from welfare loss. Over the past decade, the energy policy of Pakistan has been focused on expanding production capacity through RPPs to address electricity shortages. The present study suggests that policies for the optimum utilization of the existing electricity generation capacity should be prioritized over the installation of new power plants. The Government should also make the best utilization of scarce natural gas and expensive oil resources.

Finally, some limitations of this study need to be acknowledged. First, the model does not work for the agricultural sector because there could be several missing factors determining agricultural energy consumption, such as the environment, climatic conditions, different modes of irrigation and geographical characteristics. Future studies to investigate the power shortage dynamics in the agricultural sector must incorporate these important factors. In addition, the analysis done in the present study relies on the index of energy shortages from the macro level. To strengthen the findings, a further study should be conducted to analyse energy consumption behaviour in Pakistan from the micro level or the household level.

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FOREIGN AID IN SOUTH ASIA:
THE EMERGING SCENARIO

The publication *Foreign Aid in South Asia: The Emerging Scenario* is a collection of case studies examining the role that foreign aid (except military aid) has played in the economic and social development of eight countries in South Asia. The main objective of the book is to provide policies to be applied for better aid utilization in the future in that subregion. The book is superbly edited by one of the most renowned economists in South Asia, Saman Kelegama of Sri Lanka. According to Kelegama, South Asia has been receiving development aid (bilateral and multilateral) since the 1950s from various donors, particularly in the West, and through organizations such as the World Bank and the Asian Development Bank in the form of grants and loans, but the impact of the aid has not been assessed in order to determine what has worked and what has not. In the book, it is pointed out that most countries in South Asia view foreign aid as a long-term opportunity to cover their recurrent expenditures. Therefore, this book is a "must read" for policymakers, academic scholars, aid recipients and donors in the South Asian subregion. It is also an excellent asset for students who wish to know specifically about the political economy of foreign aid in the subregion.

The publication is divided into five main sections. In the first section, the aid debate on key features of the aid system, the emergence of new donors and the role of South-South cooperation in aid effectiveness are addressed. The focus is exclusively on the case of India. The relationship between aid and security in Afghanistan and Pakistan is examined in the second section, where it is noted that, between 2000 and 2007, Afghanistan was the greatest recipient in terms of aid as a percentage of gross national income (32.6 per cent) of all South Asian countries. In sections three and four, policy priorities and the role of aid in the post-conflict economies of Nepal and Sri Lanka are discussed, along with the role of aid in the least developed countries of Bangladesh and Bhutan. In the section on post-conflict economies, the author of the article on the case of Nepal suggests that there is a need for a revision of the country's policy on foreign aid. In the fifth and final section, the effect of aid on a vulnerable economy – Maldives – is discussed. This is the most intriguing section because it shows that Maldives utilized its aid more

effectively than other countries in the subregion, and as a result, the country moved from being a least developed country to being a developing country.

All data used for this publication are secondary, collected from government, multilateral and private sources. The qualitative research method was used in all countries in the subregion, with the exception of Bangladesh, India and Pakistan, where statistical and econometric analyses were used to show the effectiveness of aid and its impact on growth.

The strength of this book is that, for the first time, the trends, sources and types of foreign aid, as well as hindrances to aid effectiveness (such as a lack of absorptive capacity and weak public administration), are discussed together in one book. Even foreign aid in the individual cases of Afghanistan, Bhutan and Maldives had rarely been discussed and documented before this study. In addition, Kelegama links the issues concerning the effects of foreign aid on socioeconomic development with the Paris Declaration on Aid Effectiveness, the most influential development policy of the twenty-first century. He further looks at the impact the Declaration has had on countries in the subregion.

The articles in the publication show that, over the last few decades, the effectiveness of foreign aid as a developmental tool has been mixed due to the different approaches and policies of donors. In the publication, it is pointed out that all countries in South Asia, even Bhutan, which is not a signatory to the Paris Declaration, follow the five core principles (ownership, harmonization, alignment, managing for results and mutual accountability) of the Declaration in order to improve the socioeconomic conditions in their countries. According to Kelegama, the outcome of the Paris Declaration in the South Asian context is not yet clear, and it will likely be several more years before any positive results can be seen. Moreover, the Paris Declaration has also been criticized for being a donor-centred policy framework that does not do enough to alleviate the problems associated with poverty in developing countries (Reality of Aid, 2008).

Furthermore, in the book it is argued that, as a whole, foreign aid has not worked well to solve the deep developmental problems in South Asian countries, and despite the large amounts of aid flowing into the subregion, South Asia is home to more than half of the world's poor. The overall outcome of this book is the recommendation for donors and recipients to pay particular attention to how best to use aid. Hubbard (2005) also confirmed that, without effective aid management, aid funds will fail and the aid recipients will remain poor.

Although the book has many strengths, it can be criticized for being focused solely on the recipient side of aid – the specific structure and management systems of donors' official development assistance are not discussed in any detail. As a result, it is difficult for readers to understand the aid effectiveness challenges from donors' perspectives in the subregion. Aid effectiveness is discussed in all of the articles; however, except in the case of Afghanistan, there are no details on the progress of aid effectiveness based on the Paris Declaration indicators. Moreover, the publication does not include a discussion on technical cooperation, which is one of the main forms of foreign aid that South Asian countries receive from developed countries due to a lack of capacity within Governments. As Scott (2009) affirmed, technical cooperation plays a vital role in solving the absorptive capacity problems of the recipients through training, research and the transfer of knowledge and skills.

Overall, the aforementioned shortcomings in the publication do not undermine Kelegama's arguments. The book is highly informative; the foreign aid experiences in each country in South Asia are comprehensively analysed and discussed as case studies, and policy recommendations are provided. Consequently, it would be an advantage for Governments in South Asia to apply the policy conclusions offered in the book to managing aid in the future. Moreover, the publication provides each country in South Asia with policy lessons for developing an international framework for foreign aid and future policy priorities. It may also provide aid recipients beyond the subregion with crucial policy lessons in aid utilization.

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