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Challenges and opportunities for protecting geographical indications in Thailand

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Explanatory notes

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References to "tons" are to metric tons, unless otherwise specified.

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.

A point (.) is used to indicate decimals.

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IS CLIMATE CHANGE HINDERING ECONOMIC GROWTH OF ASIAN ECONOMIES?

Naeem Akram*

Asia is recognized as one of the most vulnerable regions to climate change on the planet. With approximately 60 per cent of world's population residing in Asia, this phenomenon presents serious concerns for policymakers in the region. The present study analyses the impacts of climate change on economic growth for selected Asian countries during the period 1972-2009. A growth model has been developed by incorporating temperature and precipitation as proxies for climate change in the production function and a fixed effect model (FEM) and seemingly unrelated regression (SUR) have been used to estimate the model. The results reveal that economic growth is negatively affected by changes in temperature, precipitation and population growth whereas urbanization and human development stimulates economic growth. The results also indicate that agriculture is the most vulnerable sector to climate change and manufacturing is the least affected sector.

JEL Classification: Q54, O44, C23, C33.

Key words: Climate change, economic growth, fixed effect model, seemingly unrelated regression.

* Federal Urdu University of Arts Science & Technology, Islamabad (e-mail: naeem378@yahoo.com). Acknowledgment: the paper is a partial outcome of the research project funded by the South Asian Network for Development and Environmental Economics (SANDEE). I am extremely grateful to SANDEE for the research grant that enabled me to undertake the present study. My sincere thanks go to Priya Shyamsundar, Jeffrey Vincent, Jean Marie and Mani Nepal for their valuable suggestions when I was working with SANDEE. I am also grateful to the anonymous referees as their comments have improved the paper to a great extent.

I. INTRODUCTION

A strong correlation exists between energy consumption and economic growth. Energy use results in accelerating greenhouse gas (GHG) emissions. Estimates indicate that approximately 75 per cent of all CO₂ emissions have come from developed countries. These results imply that economic growth depends on energy usage that leads to environmental degradation. However, economic growth may bring an initial phase of deterioration but later on, due to the adoption of better abatement technologies, it might bring some improvement to the quality of the environment (Grossman and Krueger, 1995; Hitz and Smith, 2004). Recently, accelerating emissions of GHGs in developing countries, especially in emerging economies, such as Brazil, China and India, have raised serious concerns about the relationship between climate change and economic growth. Although climate change may initially have some positive effects for some developed countries, it will be destructive in the long run (Hope, 2006).

Moreover, the impacts of climate change are not evenly distributed. The poorest countries and people feel the adverse impacts of climate change first and will suffer the most from them as these countries are more vulnerable to the negative effects of rising sea level and the impact on water resources, ecosystems, crop production, fisheries and human health (Stern and others, 2006; Nordhaus, 1991; Tol, 2008; Yohe and Schlesinger, 2002). In less developed countries, a large percentage of the population is dependent on climate-sensitive sectors and there is low capacity to develop and implement adaptation strategies. Nevertheless, these countries have to bear the cost for promotion and adoption of different mitigation strategies (Adger, 2006). Notably, the impact of mitigation will only be felt in the long run by future generations (Sathaye, Shukla and Ravindranath, 2006). Similarly, due to limited adaptive capacities, these countries' poor communities are more vulnerable to natural hazards (Smith and Wandel, 2006).

In order to accelerate economic growth and curtail poverty, developing countries need to expand their industrial development and improve living standards. As this takes place, emissions of GHG rise, which, in turn, leads to considerable changes in the climate. Therefore, it is very crucial that a comprehensive study on Asian countries be conducted to analyse the effects of changing weather patterns (an indicator of climate change) on economic growth. Despite data limitations, the present study has attempted to empirically test the relationship between weather patterns and economic growth.

The organization of the paper is as follows: after the introduction, section II presents a brief review of the literature and contains a description of the situation of climate change in Asia. In section III, a theoretical background of the study is presented followed by a discussion on a model for climate change and economic growth that has been developed. The empirical model along with the description of data are presented in section IV. Section V is devoted to a discussion of the estimation results and the last section concludes the paper in which some policy implications and suggestions for further research are presented.

II. LITERATURE REVIEW

Although economic analysis of climate change is a comparatively new issue, numerous studies have estimated the impacts of climate change on economic growth in different regions of the world. Most of these studies are numerical in nature and a bit speculative but they do provide a solid foundation for future research.

Due to climate change, some sectors of the economy may grow faster in comparison to the others and at the same time, the size and composition of some countries' gross domestic product (GDP) may change. Climate change also affects the long-term growth potential of the country. Furthermore, the effects of climate change are not homogeneous within countries; it was found that agriculture, coastal zones and elderly people are more heavily affected than their counterparts. (O'Brien, Sygna and Haugen, 2004; Parry and others, 2007; Lucas and Simone, 2011). According to Stern and others (2006), in the next fifty years, world temperatures are expected to rise 2-3°C. This increase will have severe consequences on economic development as it will affect water quality, agricultural productivity and human health. It was further calculated that about 5 per cent of global GDP per annum would be lost by these impacts. Weitzman (2007) has criticized these findings by indicating that there are uncertainties associated with the measurement of the impacts of climate change and the conclusions drawn were based on a very low discount rate.

Dell, Jones and Olken (2008) found that because of climate change, the growth rate of poor countries would be reduced by 0.6 to 2.9 percentage points. According to Fankhauser and Tol (2005), climate change affects capital accumulation and people's propensity to save, which, in turn, reduces economic growth. By using different growth model specifications, it was found that dynamic effects are relatively larger as compared to direct or static impacts of climate change. However, Calzadilla, Pauli and Roson (2007) concluded that extreme weather would result in savings. This is based on the assumption that in line with expectations that global damage would increase, people would increase savings to avoid the anticipatory negative effects of

climate change. Notably, extreme weather is expected to boost investment as well. According to Lecocq and Shalizi (2007), GDP will be affected indirectly by variations in demand structure even though there is no direct effect of climate change on it. Climate change can result in resource scarcity, which could lead to violent conflict and consequently reduce economic growth in the long-run (Zhang and others, 2007; Tol and Wagner, 2010; Butkiewicz and Yanikkaya, 2005).

Parry and others (2007) projects that a decline in water supplies stored in glaciers and snow cover will result in water scarcity. If global average temperature increases by 1.5-2.5°C then approximately 20-30 per cent of plant and animal species will face the danger of extinction. An increase of temperature in the range of 1-3°C has the potential to increase food production but an increase in temperature beyond that would result in a decline in food production. A rise in sea surface temperature of 1-3°C would cause more frequent coral bleaching events and widespread mortality, unless there is thermal adaptation or acclimatization by corals. Sea level rise will negatively affect the coastal wetlands, including salt marshes and mangroves (Nicholls and Tol, 2006). Projections made by Agrawala and others (2003) reveal that the economy of Bangladesh is affected by climate change through sea level rise, higher temperatures, enhanced monsoon precipitation and run-off, potentially reduced dry season precipitation and an increase in cyclone intensity. This situation has created serious hurdles for the sustainable economic development of the country.

As temperature and precipitation are direct inputs in agricultural production, many believe that the largest effects of climate change will be on agriculture. However, under the conditions of climate change, agriculture production rises in the higher latitudes, partly because of an increase in arable land, and production tends to fall in the tropics, mainly due to an assumed decline in the availability of water (Cooper, 2000; Parry and others, 2007). Gregory, Ingram and Brklacich (2005) suggested that climate change was playing an important role for agriculture but its relative importance varied among regions as well as among different societal groups within a region. For example, in southern Africa, climate is among the most frequently cited drivers of food insecurity. In other regions, such as the Indo-Gangetic Plain of India, other factors, including inefficient labour, availability and quality of ground water for irrigation, ranked higher than the direct effects of climate change as a factor influencing food security. Climate change can affect food systems in several ways, such as having direct effects on crop production through changes in rainfall and temperature. Changes in rainfall lead to drought or flooding, whereas warmer or cooler temperatures will change the length of the growing season. Both of these will affect food prices and the supply chain infrastructure.

Mendelsohn and Dinar (1999) concluded that higher temperatures would reduce grain yields. They also found that India and Brazil had attempted to minimize the effects of global warming on agriculture and that individual farmers had played a very crucial role in that regard. Later on Mendelsohn, Dinar and Sanghi (2001) and Mendelsohn and Williams (2004) found that most of the market sector impacts of climate change have a hill-shaped relationship with temperature. Global warming will likely benefit cool countries/areas, have modest effects on temperate locations and negatively affect hot areas.

Despite the importance of livestock to poor people and the expected effects of climate change on livestock systems, the impacts of climate change on livestock in developing countries are a relatively neglected research area. Livestock feeds, its quantity and quality, heat stress, water, livestock diseases and disease vectors and biodiversity are the major channels through which climate change affects livestock (Thornton and others, 2009).

Gilbreath (2004), in a discussion of a report of the World Health Organization (WHO), states that climate change may increase the risk of death and suggests that most of the diseases common in developing countries are sensitive to climate change. The discussion also notes that even a proportionally small change in the global incidence of some diseases could result in significant public health impacts. It has been estimated that in some regions, the effects of climate change will increase the risk of diarrhoea to 10 per cent in 2030 from the 1990 level. Similarly, the degree of global warming can raise the risk of contracting malaria, leading to expectations that the disease will likely affect 1 million persons and cause the death of about 27,000 persons by 2030 (McMichael and others, 2004). It has also been found that there is a correlation between the spread of malaria and climate change in India (Bhattacharya and others, 2006).

Environmental regulations are generally perceived to impose constraints on production, which lead to harmful impacts on economic growth. However, it has been argued that the effects of environmental policy on economic growth vary through the stages of development (Bretschger and Smulders, 2001; Smulders, Bretschger and Egli, 2011). Environmental regulations will enhance the prospects for growth if improved environmental quality increases the productivity of inputs. Because environmental regulation promotes pollution abatement activities, increasing the returns to scale and these regulations can also stimulate innovations (Ricci, 2007). Greiner (2004; 2005) has found that an increase in GHG emissions will negatively affect the aggregate output and the marginal productivity of capital and that higher abatement activities might reduce GHG emissions and lead to higher economic growth. Tol (2009) has also argued that GHG emissions had severely affected economic

development and called for a higher carbon tax to reduce the emissions.

Asian countries collectively encompass the world's greatest economic, cultural and ecological diversity. About 60 per cent of the world's population live in these countries, making Asia the most populated continent. The total economic activities of Asia make up about 25 per cent of the world's GDP (World Bank, 2010). Consequently, the region is facing many environmental and socioeconomic challenges.

In 2010, Maplecroft released a climate change vulnerability index.¹ Out of 170 countries, 16 countries were identified to be in a condition of extreme risk. Among them, 10 are in Asia. Below is the list of the most vulnerable countries.

Table 1. List of the most vulnerable countries

Bangladesh (1)	Mozambique (5)	Zimbabwe (9)	Viet Nam (13)
India (2)	Philippines (6)	Myanmar (10)	Thailand (14)
Madagascar (3)	Haiti (7)	Ethiopia (11)	Malawi (15)
Nepal (4)	Afghanistan (8)	Cambodia (12)	Pakistan (16)

Note: Value in parenthesis is the respective rank of the country.

It is worth mentioning here that the variation in climate and geographic features among Asian countries is very large. For example, in China and some parts of India and Pakistan (particularly areas around the Himalayas), winter temperatures are at or below freezing. On the other hand, South-East Asia and the Pacific islands generally experience temperatures above 25°C throughout the year. Consistent with global temperature trends, Asian countries have also been experiencing a warming trend in recent decades. Climate modelling indicates an increase in temperature in Asia by 0.5-2°C by 2030 and 1-7°C by 2070 and predict that arid areas of northern Pakistan and India and western China are likely to warm more quickly. In addition, models indicate increasing rainfall during the summer monsoon season and a reduction in winter rainfall and predict that Asia will also be affected by a rise in the global sea level of approximately 3-16 cm by 2030 and 7-50 cm by 2070 (Parry and others, 2007).

¹ To calculate the vulnerability of 170 countries for the impacts of climate change over the next 30 years, 42 social, economic, and environmental indicators have been used. The index can be downloaded at www.maplecroft.com.

Climate change is resulting in the degradation of land, ecosystems, water and air quality in Asian countries. It is threatening to undermine food security as well as causing health problems. Crop yields are estimated to fall by up to 30 per cent and one billion people may be affected by a water shortage, leading to drought and land degradation by the 2050s (Christensen and others, 2007; Cruz and others, 2007). Climate change has also resulted in the melting of the Himalayan glaciers, which in the short run has raised the risk of mudslides, erosion and flooding. The health impacts primarily consist of epidemics of malaria, dengue, and other vector-borne diseases (Martens and others, 1999). In summer, the increase in humid conditions and severe heat waves can increase the risk of mortality and morbidity in poor communities (Epstein, Sohar and Shapiro, 1995).

Notably, Asia is dealing with increasing cases of natural hazards, such as landslides in the Philippines (2006), extreme weather events in China (2006) including storms, flooding in the east and south, heat and drought in the central and north-eastern regions, and catastrophic floods in Pakistan (2010 and 2011). The impacts of these disasters include hunger, disease, loss of income and livelihoods, collateral damage to infrastructures, all of which affect the survival and well-being of the population.

III. THEORETICAL BACKGROUND

The two most widely used types of approaches for analysing the impacts of climate change on economic growth are the enumerative approach and the dynamic approach. In the enumerative approach, the economic impacts of climate change are analysed separately sector by sector, such as the effects of climate change on agriculture, the ecosystem or tourism. These effects are evaluated together to obtain an estimate of the total change in social welfare stemming from climate change (Nordhaus, 1991; Cline, 1994; Tol, 1995). In this approach, the effects of climate change are analysed by focusing on only one period. Intertemporal effects are ignored. These studies, however, have failed to provide information on how climate change may affect welfare in the long run. This approach also ignores the significant “horizontal interlinkages”, such as the interaction of sectoral impacts. It mostly uses computable general equilibrium (CGE) models and simulation techniques.

In the dynamic approach, different specifications of growth models are used by incorporating the damage function. The Solow-Swan and Ramsey-Cass-Koopmans models are the most widely used growth models for analysing the impacts of climate change on economic growth. The Mankiw, Romer and Weil (1992) model is also applied (Fankhauser and Tol; 2005), but to a lesser degree. In all three of these models, under the assumption of a constant savings rate, it has been found that if climate

change has a negative impact on output, then the amount of investment will also be reduced. In the long run, capital stock and consumption per capita will decline, which will result in shrinking aggregate demand and will adversely affect GDP. In an endogenous growth model, the situation becomes even worse if lower investment (caused by capital accumulation effect) slows the technical progress and improvements in labour productivity or human capital accumulation (Lecocq and Shalizi, 2007).

Both of these approaches were used to some extent to conduct the present study and analyse the impacts of climate change on economic growth and its components, such as agriculture, manufacturing and services.

Theoretical model

Dell, Jones and Olken (2008) incorporated the climatic variables in the production function of their model, which was used as the baseline for the present study. The model provided the theoretical basis for incorporating climate change into growth equations and the guidelines for decomposition of the impacts of changes in weather on economic growth.

Consider the production function.

$$Y_{it} = e^{\alpha T_{it}} A_{it} L_{it} K_{it} \quad (1)$$

$$\frac{\Delta A_{it}}{A_{it}} = g_i + \beta T_{it} \quad (2)$$

Where Y is GDP, L is labour force, A is technology and can be referred to as labour productivity and T are the impacts of climate, g is the growth rate of GDP and K is human capital. Equation (1) captures direct effects of climate change on economic growth, such as impacts on labour productivity. Equation (2) captures the indirect (dynamic) effect of climate, such as the impact of climate on other variables that indirectly influence GDP. Notably, equation (1) directly relates climate change to GDP whereas in equation (2), climate changes affect labour productivity, which will, in turn, affect GDP growth.

After taking logs of equation (1) and differencing with respect to time, the following equation can be derived.

$$g_{it} = g_i + (\alpha + \beta)T_{it} - \alpha T_{it-1} \quad (3)$$

Where g_{it} is the growth rate of output, direct effects of climate change on economic growth appear through α and indirect effects appear through β while g_i denotes the fixed effects.

This equation separately identifies the direct and indirect effects of climate change. Both of these affect GDP growth rate in the initial period. However, when climate returns to its prior state, direct effect reverses itself. For example, a rise in temperature may harm agricultural production, but whenever temperature returns to its normal level the agricultural production once again accelerates. On the other hand, an indirect effect emerges during climate shocks and their effects persist even in the normal conditions, such as failure in human capital development resulting in a permanent deterioration in human capital and economic growth.

IV. EMPIRICAL MODEL AND DESCRIPTION OF DATA

In the light of the theoretical model, the following super reduced form equation of economic growth will be estimated. The equation is an empirical specification of the equation (3) of the preceding section.

$$y_{it} = \alpha_0 + \alpha_1 hc_{it} + \alpha_2 pop_{it} + \alpha_3 ur_{it} + \alpha_4 tmp_{it} + \alpha_5 pr_{it} + \varepsilon_{it} \quad (A)$$

Where y represents GDP growth rate and hc , pop , ur , tmp and pr denotes human capital, population growth, urbanization, temperature and precipitation, respectively. In order to see which sector of the economy is affected more by climatic conditions, the model is also regressed on the main sectors of GDP, such as agriculture (Ag), manufacturing (Mn) and services (Sr). The model that is estimated in this regard is the following:

$$\left. \begin{aligned}
 Ag_{it} &= \alpha_0 + \alpha_1 hc_{it} + \alpha_2 pop_{it} + \alpha_3 tmp_{it} + \alpha_4 pr_{it} + \xi_{it} \\
 Mn_{it} &= \alpha_0 + \alpha_1 hc_{it} + \alpha_2 pop_{it} + \alpha_3 tmp_{it} + \alpha_4 pr_{it} + \psi_{it} \\
 Sr_{it} &= \alpha_0 + \alpha_1 hc_{it} + \alpha_2 pop_{it} + \alpha_3 tmp_{it} + \alpha_4 pr_{it} + \delta_{it}
 \end{aligned} \right\} \quad (B)$$

Three different specifications are tested: temperature in the first specification, precipitation in the second specification, and both temperature and precipitation are used as indicators of climate change in the third specification. The random effect model and fixed effect model technique were considered to estimate model (A). The Hausman test of endogeneity was used to select the suitable technique. For the estimation of model (B), which is a seemingly unrelated model, the seemingly unrelated regression (SUR) technique was used.² Panel data spanning the period 1972-2009 for the selected Asian countries, namely Bangladesh, India, Indonesia, Malaysia, Pakistan, the Philippines, Sri Lanka and Thailand, were used.

The selection of an indicator of climate change is an extremely critical issue. In this regard, GHG emission levels, atmospheric GHG concentration levels, global mean temperature, sea-level rise and intensity or frequency of extreme events are the most commonly used indicators.

In the study, annual temperature and precipitation have been selected as an indicator of the climate change for two reasons. The first is that the impact literature can be directly related to a change in mean temperature, such as Parry and others (2007), Dell, Jones and Olken (2008). The second reason is that changes in mean temperature have a direct relationship with GHG concentrations. However, it is relatively difficult to relate the other indicators directly to GHG concentrations.

² For details of estimation methodologies see Wooldridge (2002; 2005); Baltagi (2005).

A brief description and details of the data used in this study are presented in table 2.

Table 2. Data sources

S.#	Name of variable	Data source	Comment
1.	GDP growth rate (y)	WDI ³	GDP growth rate
2.	Population growth rate (pop)	WDI	Population growth rate
3.	Urbanization (ur)	WDI	Urban population as percentage of total population
4.	Human capital (hc)	Data maintained by Easterly (2001) and WDI	Secondary school enrolment
5.	Agriculture (Ag)	WDI	Agriculture value addition in US\$
6.	Manufacturing (Mn)	WDI	Manufacturing value addition in US\$
7.	Services (Sr)	WDI	Services value addition in US\$
8.	Temperature (tmp)	Terrestrial Air Temperature and Precipitation database, Gridded monthly time series	Annual temperature is calculated by using the monthly data.
9.	Precipitation (pr)	Terrestrial Air Temperature and Precipitation database, Gridded monthly time series	Annual precipitation is calculated by using the monthly data.

V. ESTIMATION RESULTS

Before estimating the empirical model (A), the Hausman test was used to select the appropriate estimation methodology, which would be either a fixed effect model or a random effect model. The significant Chi-square test statistics suggest that the use of a fixed effect model would be appropriate instead of using the random effect model in all three specifications.

³ World Development Indicators.

Table 3. Hausman test results

	Chi-sq. statistic	Chi-sq. d.f.	Prob.
Specification 1	17.792	4	0.001
Specification 2	26.362	4	0.000
Specification 3	34.194	5	0.000

The results of estimation of equation (A) by using the fixed effect model (fixed period) are summarized in table 4.

Table 4. Single equation estimation results (fixed effect model)

Variable	Specification 1	Specification 2	Specification 3
Constant	9.08 (2.12)	0.12 (1.68)	0.59 (3.30)
hc	0.19* (4.67)	0.04* (6.77)	0.13* (7.75)
pop	-0.009** (-1.89)	-0.05* (-2.40)	-0.04* (-2.52)
ur	0.35* (2.26)	0.01** (1.87)	0.06* (3.45)
tmp	-0.69* (-49.21)	—	-0.82* (-1.97)
pr	—	0.97* (12.55)	0.10* (2.67)
R-squared	0.986	0.860	0.964
Adjusted R-squared	0.986	0.849	0.961
Durbin-Watson stat	1.975	1.951	2.024
F-statistic	96.402	50.618	24.447
Prob (F-statistic)	0.000	0.000	0.000

Notes: Values in parenthesis are the t-statistics; * and ** denote significance at 5% and 10% respectively.

The results reveal that human capital has a positive and significant impact on economic growth. This is in accordance with the theory that human development enhances economic growth. It is also supported by numerous studies on the subject, including, among others, Romer (1986), Barro and Sala-i-Martin (2003) and Naqvi (2010). The results also support the Malthusian theorem, which states that population growth leads to slowing economic growth of a country. These findings are supported by Coale and Edger (1958). It has also been found that urbanization plays a positive and significant role in economic development. Lucas (1988), Shumway and Otterstron (2001) and Naqvi (2010) also suggest that urbanization has a positive impact on economic growth. An increase in precipitation has a positive impact while an increase in temperature will negatively affect economic growth. Hence, changes in temperature and precipitation negatively affect the economic growth of the selected countries. In relative terms, changes in temperature are more harmful for growth in comparison with precipitation. It may also be noted that the coefficients of climate-related variables are highest in all the specifications, revealing that climate change is the major factor affecting GDP growth. The diagnostic test suggests the non-existence of autocorrelation and significance of the overall model.

The results of estimating the empirical model (B) - the reduced model of various sectors of economic growth - by using the seemingly unrelated regression (SUR) are summarized in table 5.

The results show that human capital has a positive relationship with all sectors of GDP while the other variables, namely population growth, temperature and precipitation, have a negative and significant impact on all the sectors. They reveal that impacts of various variables on different sectors are not evenly distributed. Human capital stimulates manufacturing the most and agriculture the least. Similarly, in Asia, population growth rate has the highest negative impact on the services sector and the negative impacts of the population growth rate are limited to the agriculture sector. It sheds light on the issue that agriculture has a comparatively higher labour absorption capacity. As far as climate-related effects are concerned, the agriculture sector is the most adversely affected by a reduction in precipitation in comparison to a rise in temperature. The severe impacts of climate change on agriculture are highlighted in earlier studies on the subject including by Reilly (1999) and Mendelsohn and Dinar (1999).

In the manufacturing and services sectors, precipitation has an insignificant impact on economic growth. It was also found that both the manufacturing and services sectors are negatively and significantly affected by rising temperatures.

Table 5. Seemingly unrelated regression (SUR) estimation results

Variables	Specification 1	Specification 2	Specification 3
Agriculture:	$Ag_{it} = \alpha_0 + \alpha_1 hc_{it} + \alpha_2 pop_{it} + \alpha_3 tmp_{it} + \alpha_4 pr_{it} + \xi_{it}$		
Constant	39.44* (10.90)	21.26 (0.27)	29.08* (2.67)
hc	0.70* (3.04)	0.41* (2.51)	0.39* (2.32)
pop	-0.38** (-1.74)	-0.30** (-1.80)	-0.37* (-2.43)
tmp	-5.69* (-5.05)	—	-0.78* (-2.11)
pr	—	0.54* (2.78)	1.39* (3.77)
R-squared	0.097	0.103	0.157
Adjusted R-squared	0.0876	0.092	0.143
Manufacturing:	$Mn_{it} = \alpha_0 + \alpha_1 hc_{it} + \alpha_2 pop_{it} + \alpha_3 tmp_{it} + \alpha_4 pr_{it} + \psi_{it}$		
Constant	33.69* (8.55)	35.41* (2.13)	22.45* (3.14)
hc	1.84* (7.31)	1.18** (1.77)	1.11* (2.59)
pop	-0.72* (-3.04)	-0.96* (-4.63)	-0.48* (-6.12)
tmp	-4.99* (-4.07)	—	-0.33* (-2.61)
pr	—	0.30** (1.74)	0.35 (0.88)
R-squared	0.212	0.260	0.399
Adjusted R-squared	0.203	0.237	0.363
Services:	$Sr_{it} = \alpha_0 + \alpha_1 hc_{it} + \alpha_2 pop_{it} + \alpha_3 tmp_{it} + \alpha_4 pr_{it} + \delta_{it}$		
Constant	38.24* (10.35)	32.11 (1.03)	29.22 (1.62)
hc	1.39* (5.90)	1.06* (4.29)	0.99* (3.57)
pop	-0.87* (-3.92)	-0.70* (-2.67)	-0.63* (-2.20)
tmp	-4.67* (-4.93)	—	-0.20* (-2.14)
pr	—	0.26 (1.01)	0.12 (1.65)
R-squared	0.186	0.178	0.264
Adjusted R-squared	0.176	0.160	0.248
Determinant residual covariance of the model	0.023	0.029	0.036

Notes: Values in parenthesis are the t-statistics. * and ** denote significance at 5% and 10%, respectively.

VI. CONCLUSIONS AND POLICY IMPLICATIONS

The present study has carried out panel data research on the relationship between changes in weather patterns (an indicator of climate change) and economic growth for the Asian economies. The results show that temperature and precipitation have negative and significant relationships with GDP growth as well as with the productivity in agriculture, manufacturing and services sectors. However, the severity of these negative effects is higher in the agriculture sector as compared to the manufacturing and services sectors. These results support the findings of Parry and others (2007) that an increase in temperature will negatively affect agriculture.

The study results assert that if climate change is not controlled, the economic growth of these countries will be reduced considerably. Of note, however, Asian countries alone can do very little with regard to controlling climate change as their share of GHG emissions in comparison to developed countries is small. Hence, there is a need for an international policy regarding the adoption of mitigation strategies to control climate change. The United Nations Framework Convention on Climate Change⁴ is an excellent attempt in this regard. The reduction in economic growth will also result in increasing poverty. Although the poor contribute the least to causing climate change, they are the most adversely affected by this phenomenon due to their dependency on agriculture and their limited ability to pay for the resources necessary to adopt the preventive measures and adaptation strategies. Therefore, control of climate change is not only important for economic growth of Asian countries but it is also crucial for poverty alleviation.

It is noteworthy to reiterate that there is a very large variation in climate and geographic features among the Asian countries. Therefore, further analysis in the contexts of the spatial variation in the Asia is needed. Single country analysis as well as studies at the subnational levels should be conducted. In that direction, in the future, the study will be extended to explore the impacts of climate change on economic activities in various provinces of Pakistan and on the various states of India.

⁴ United Nations, *Treaty Series*, vol. 1771, No. 30822.

REFERENCES

- Adger, W. Neil (2006). Vulnerability. *Global Environmental Change*, vol. 16, No. 3, pp. 268-281.
- Agrawala, S., and others (2003). Development and climate change in Bagladesh: focus on coastal flooding and the sundarbans. Environment Directorate and Development Co-operation Directorate. Paris: OECD. Available from www.oecd.org/env/climatechange/21055658.pdf.
- Baltagi, B.H. (2005). *Econometric Analysis of Panel Data*, 3rd ed. West Sussex: John Wiley & Sons.
- Barro, R., and X. Sala-i-Martin (2003). *Economic Growth*, 2nd edition. Cambridge: MIT Press.
- Bhattacharya, S., and others (2006). Climate change and malaria in India. *Current Science*, vol. 90, No. 3, pp. 370-375.
- Bretschger, L., and S. Smulders (2001). Explaining Environmental Kuznets Curves: how pollution induces policy and new technologies. Revised version of Center Discussion Paper, No. 2000.95. Tilburg, Netherlands: Tilburg University.
- Butkiewicz, J.L., and H. Yanikkaya (2005). The impact of sociopolitical instability on economic growth: analysis and implications. *Journal of Policy Modeling*, vol. 27, No. 5, pp. 629-645.
- Calzadilla, A., F. Pauli, and R. Roson (2007). Climate change and extreme events: an assessment of economic implications. *International Journal of Ecological Economics and Statistics*, vol. 7, No. 7, pp. 5-58.
- Christensen, J.H., and others (2007). Regional climate projections. In *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, S. Solomon, and others, eds. Cambridge: Cambridge University Press.
- Cline, W.R. (1994). The costs and benefits of greenhouse gas abatement. A guide to policy analysis. In *The Economics of Climate Change*. Paris: OECD.
- Coale, A.J., and M.H. Edgar (1958). *Population Growth and Economic Development in Low Income Countries*. Princeton: Princeton University Press.
- Cooper, R.N. (2000). International approaches to global climate change. *The World Bank Research Observer*, vol. 15, No. 2, pp. 145-172.
- Cruz, R.V., and others (2007). Asia climate change 2007: impacts, adaptation and vulnerability. In *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.
- Dell, M., B.F. Jones, and B.A. Olken (2008). Climate change and economic growth: evidence from the last half century. Working Paper, No. 14132. Cambridge, MA: National Bureau of Economic Research.
- Easterly, W. (2001). The lost decades: developing countries' stagnation in spite of policy reform 1980-1998. *Journal of Economic Growth*, vol. 6, No. 2, pp. 135-157.
- Epstein Y., E. Sohar, and Y. Shapiro (1995). Exceptional heatstroke: a preventable condition. *Israel Journal of Medical Science*, vol. 31, No. 7, pp. 454-462.
- Fankhauser, S., and R.S. Tol (2005). On climate change and economic growth. *Resource and Energy Economics*, vol. 27, No. 1, pp. 1-17.
- Gilbreath, J. (2004). Climate change: global warming kills. *Environmental Health Perspectives*, vol. 112, No. 3, p. 160.

- Gregory, P.J., J.S.I. Ingram, and M. Brklacich (2005). Climate change and food security, philosophical transactions. *Biological Sciences*, vol. 360, No. 1463, pp. 2139-2148.
- Greiner, A. (2004). Anthropogenic climate change in a descriptive growth model. *Environment and Development Economics*, vol. 9, No. 5, pp. 645-662.
- _____ (2005). Anthropogenic climate change and abatement in a multi-region world with endogenous growth. *Ecological Economics*, vol. 55, No. 2, pp. 224-234.
- Grossman, G.M., and A.B. Krueger (1995). Economic growth and environment. *The Quarterly Journal of Economics*, vol. 110, No. 2, pp. 353-377.
- Hitz, S., and J.B. Smith (2004). Estimating global impacts from climate change. *Global Environmental Change*, vol. 14, No. 3, pp. 201-218.
- Hope, C.W. (2006). The marginal impact of CO₂ from PAGE2002: an integrated assessment model incorporating the IPCC's five reasons for concern. *Integrated Assessment Journal*, vol. 6, No. 1, pp. 19-56.
- Lecocq, F., and Z. Shalizi (2007). How might climate change affect economic growth in developing countries? Policy Research Working Paper, No. 4315. Washington, D.C.: World Bank.
- Lucas, B., and S. Valente (2011). Climate change and uneven development. *The Scandinavian Journal of Economics*, vol. 113, No. 4, pp. 825-845.
- Lucas, R.E., Jr. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, vol. 22, No. 1, pp. 3-42.
- Mankiw, N.G., D. Romer, and D.N. Weil (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics*, vol. 107, No. 2, pp. 407-437.
- Martens P., and others (1999). Climate change and future populations at risk of malaria. *Global Environmental Change*, vol. 9, No. 1, pp. 89-107.
- McMichael, A., and others (2004). Global climate change. In *Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors*. Geneva: World Health Organization.
- Mendelsohn, R., and A. Dinar (1999). Climate change, agriculture, and developing countries: does adaptation matter? *World Bank Research Observer*, vol. 14, No. 2, pp. 277-293.
- Mendelsohn, R., A. Dinar, and A. Sanghi (2001). The effect of development on the climate sensitivity of agriculture. *Environment and Development Economics*, vol. 6, No. 1, pp. 85-101.
- Mendelsohn, R., and L. Williams (2004). Comparing forecasts of the global impacts of climate change. *Mitigation and Adaptation Strategies for Global Change*, vol. 9, No.4, pp. 315-333.
- Naqvi, Syed Nawab Haider (2010). *The Evolution of Development Policy: A Reinterpretation*. Oxford: Oxford University Press.
- Nicholls, R.J., and R.S.J. Tol (2006). Impacts and responses to sea level rise: a global analysis of the SRES scenarios over the twenty-first century. *Philosophical Transactions of the Royal Society*, vol. 364, No. 1849, pp. 1073-1095.
- Nordhaus, W.D. (1991). To slow or not to slow: the economics of the greenhouse effect. *Economic Journal*, vol. 101, No. 407, pp. 920-937.
- O'Brien, K.L., L. Sygna, and J.E. Haugen (2004). Vulnerable or resilient? A multiscale assessment of climate impacts and vulnerability in Norway. *Climatic Change*, vol. 64, No. 1-2, pp. 193-225.

- Parry, M., and others, eds. (2007). *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
- Reilly, J. (1999). What does climate change mean for agriculture in developing countries? A comment on Mendelsohn and Dinar. *World Bank Research Observer*, vol. 14, No. 2, pp. 295-305.
- Ricci, F. (2007). Channels of transmission of environmental policy to economic growth: a survey of the theory. *Ecological Economics*, vol. 60, No. 4, pp. 688-699.
- Romer, P. (1986). Increasing returns and long-term growth. *Journal of Political Economy*, vol. 94, No. 5, pp. 1002-1037.
- Sathaye, J., P.R. Shukla, and N.H. Ravindranath (2006). Climate change, sustainable development and India: global and national concerns. *Current Science*, vol. 90, No. 3, pp. 314-325.
- Shumway, J., and S. Otterstron (2001). Spatial patterns of migration and income change in the mountain west: the dominance of service-based, amenity-rich counties. *Professional Geographer*, vol. 53, No. 4, pp. 492-502.
- Smit, B., and J. Wandel (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, vol. 16, No. 3, pp. 282-292.
- Smulders, S., L. Bretschger, and H. Egli (2011). Economic growth and the diffusion of clean technologies: explaining Environmental Kuznets Curves. *Environmental and Resource Economics*, vol. 49, No. 1, pp. 79-99.
- Stern, N., and others (2006). *Stern Review: the Economics of Climate Change*. London: HM Treasury.
- Thornton, P.K., and others (2009). The impacts of climate change on livestock and livestock systems in developing countries: a review of what we know and what we need to know. *Agricultural Systems*, vol. 101, No. 3, pp. 113-127.
- Tol, R.S.J. (1995). The damage costs of climate change toward more comprehensive calculations. *Environmental and Resource Economics*, vol. 5, No. 4, pp. 353-374.
- _____ (2008). Why worry about climate change? A research agenda. *Environmental Values*, vol. 17, No. 4, pp. 437-470.
- _____ (2009). The economic effects of climate change. *Journal of Economic Perspectives*, vol. 23, No. 2, pp. 29-51.
- Tol, R.S.J., and S. Wagner (2010). Climate change and violent conflict in Europe over the last millennium. *Climatic Change*, vol. 99, No. 1-2, pp. 65-79.
- Weitzman, M. (2007). A review of the Stern Review on the Economics of Climate Change. *Journal of Economic Literature*, vol. XLV, pp. 703-724.
- Wooldridge, J.M. (2002). *Econometric Analysis of Cross Section and Panel Data*. London: MIT Press.
- _____ (2005). *Introductory Econometrics: A Modern Approach*, 3rd edition. Boston: South-Western College Publishing.
- World Bank (2010). *World Development Report 2010*. Washington, D.C.
- Yohe, G.W., and M.E. Schlesinger (2002). The economic geography of the impacts of climate change. *Journal of Economic Geography*, vol. 2, No. 3, pp. 311-341.
- Zhang, D., and others (2007). Climate change and war frequency in Eastern China over the last millennium. *Human Ecology*, vol. 35, No. 4, pp. 403-414.

PUBLIC SPENDING ON EDUCATION, HEALTH CARE AND ECONOMIC GROWTH IN SELECTED COUNTRIES OF ASIA AND THE PACIFIC

*Biswajit Maitra and C.K. Mukhopadhyay**

In this paper the role of public spending on the education and health sectors is examined with regard to promoting the gross domestic product (GDP) of 12 countries in Asia and the Pacific over the last three decades. In six of those countries, namely Bangladesh, Kiribati, Malaysia, Maldives, the Philippines and the Republic of Korea, Johansen cointegration tests confirmed the existence of cointegrating relations. In the remaining countries, namely Fiji, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu, cointegrating relations were absent. The causal impact of education and health-care spending on GDP was further examined in the study. Education spending was found to have raised GDP in Bangladesh, Fiji, Kiribati, Maldives, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu. On the other hand, health-care spending contributed to GDP growth in Bangladesh, Nepal, the Philippines, Singapore and Sri Lanka. In the Philippines spending on education had a negative impact on GDP, while in Kiribati, Maldives and Vanuatu, the impact of health-care spending on GDP was found to be negative. In the case of Malaysia and the Republic of Korea, neither education spending nor health-care spending exhibited an appreciable impact on GDP. It was also found that the gestation lag of education spending was longer than that of health-care spending.

JEL Classification: I25, I15.

Key words: Education spending, endogenous growth theory, health-care spending, gross domestic product.

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I. INTRODUCTION

Human capital, along with physical capital, plays an indispensable role in economic development. Human capital formation entails spending on education, health and training. Lucas (1988) held the view that public spending on education promoted human capital, which in turn might contribute to economic growth. Romer (1990) highlighted the role of spending on research and development in economic growth. More specifically, in respect of the endogenous growth theory, spending on education and health is viewed as promoting human capital, which would lead to endogenous technical progress and thus accelerated economic growth. In accordance with this theoretical proposition, policymakers very often advocate increased spending on the education and health sectors, particularly at the early stage of development. Some empirical studies support the view that efficient and sufficient spending on the education and health sectors fosters human capital formation and promotes economic growth (Schultz, 1961; Swaroop, 1996; Lee and Barro, 1997; Psacharopoulos and Patrinos, 2004; Gupta, Clements and Inchauste, 2004). However, the efficacy of such spending in Asian and Pacific countries remains scantily researched and documented. In the present paper, an attempt is made to fill this gap through an examination of the role of public spending on education and health-care services in promoting economic growth in the context of 12 countries in the Asia-Pacific region by using comparatively recent datasets covering the period 1981-2011. The choice of the countries in this study was constrained by the availability of a continuous time series dataset of the variables concerned.¹ Details of the location and overall economic status of these countries along with the corresponding study period are presented below.

¹ Long economic time series datasets for some high-income developed countries in the region, such as Australia and New Zealand, were not collected; as result, these countries were not included in the study.

Table 1. Sample countries and study period

Country	Subregion	Income level ^a	Period of study
Republic of Korea	East Asia	High income	1981-2011
Singapore	East Asia	High income	1981-2010
Malaysia	East Asia	Upper middle income	1981-2011
Philippines	East Asia	Lower middle income	1981-2011
Maldives	South Asia	Upper middle income	1982-2011
Sri Lanka	South Asia	Lower middle income	1981-2010
Bangladesh	South Asia	Low income	1981-2011
Nepal	South Asia	Low income	1981-2011
Tonga	Pacific	Lower middle income	1983-2005 ^b
Fiji	Pacific	Lower middle income	1981-2010
Kiribati	Pacific	Lower middle income	1988-2010
Vanuatu	Pacific	Lower middle income	1983-2007

Source: Asian Development Bank (ADB), *Key Indicators for Asia and the Pacific* (August 1999 to August 2012). Available from www.adb.org/key-indicators/2011/main (accessed 17 August 2012).

Notes: ^a Documented in World Bank country table. Available from <http://data.worldbank.org/> (accessed August 2012).

^b Figures for education and health-care spending for 2001 and 2002 are missing in the ADB dataset. These figures were generated by applying interpolation techniques.

Most of the countries in the Asia-Pacific region are lagging behind the developed world with regard to human development. Acute diversity in this region is found in terms of topography, culture, politics and the state of human development. In order to exploit the opportunities offered by globalization and to attain balanced regional development, the countries concerned are expected to progress in unison. In this context, the development of human resources is of the utmost importance. Nevertheless, some countries in the region have failed to give these aspects due importance in their economic development strategies.

During the last three decades, most countries in Asia and the Pacific have elevated themselves from being overpopulated, low-income countries to become growing economies facing many challenges. Over the years, ESCAP, the Asian Development Bank (ADB) and the World Bank have shown keen interest in the economic and social development of the region. Several development projects have been implemented in which inclusive and good-quality education and adequate health services have emerged as strategic elements. Data reflecting achievements in the education and health sectors of the selected countries over last three decades are contained in table A.1 in the annex.

Budgetary allocations for the education and health sectors in the selected countries are documented in table A.2 in the annex, which shows that such spending in almost all the selected countries has been rising over time. Among these countries, allocations to the education sector as a percentage of GDP are highest in Maldives followed by Malaysia and the Republic of Korea. Health-care spending as a percentage of GDP is highest in the Philippines followed by Maldives and the Republic of Korea. Factors affecting the variations in the allocations to the education and health sectors may depend on the fiscal scenario and on whether the Government employs welfare or compulsion which are, by and large, some practical constraints of a political economy.²

II. THEORETICAL ISSUES AND REVIEW OF SELECTED EMPIRICAL STUDIES

Theoretical issues

There is a difference of opinion among economists on the causal relationship between public sector spending and the steady growth of an economy. The Keynesian school of thought postulates that public expenditure contributes positively to income growth in the short run through the multiplier process. Public expenditure can be used as an exogenous fiscal policy instrument to influence economic growth. On the other hand, Wagner (1883) postulated that, when the per capita income of a country increased, the Government would raise public spending. This is popularly known as Wagner's law, under which GDP growth causes a rise in public spending and in such a case an unidirectional causality runs from GDP growth to public expenditure. Empirical findings in this regard, however, are inconclusive in the countries concerned. According to Barro (1991), investment expenditure, especially in State-owned production, contributes positively to economic growth. On the other hand, government consumption spending has growth-retarding effects, but the problems relate to the categorization of expenditures under two broad forms of consumption and investment headings in empirical investigations.

Public expenditures are often categorized into productive and unproductive expenditures. This *categorization* implies that productive expenditures have a direct positive effect on economic growth while unproductive expenditures have an indirect effect or no effect. Again, with productive (and development) expenditure, there may be some components, such as spending on economic overheads, which involve a very long gestation period. Quantitative analysis may even fail to capture returns on such expenditure in the short run.

² See Persson and Tabellini (2000) for details.

Spending on education and health is generally regarded as productive spending with a comprehensive role in the economy. Returns from such spending are often accounted for in terms of appreciable progress in education and health constraints. Progress in education constraints generates private and social returns, where private returns include empowerment and higher individual earnings (Mincer, 1974). Over the last three decades, a plethora of empirical studies have established that individual earnings are associated with more schooling (Psacharopoulos and Patrinos, 2004; Hanushek and Wössmann, 2007). Social returns, on the other hand, may result in the renovation of society harnessing human resources. Educational attainment promotes awareness, and truly educated citizens help build a peaceful nation. Besides, education helps improve the health awareness of people and enhance social and political participation (Hill and King, 1991; Currie and Moretti, 2003).

Access to available health services increases life expectancy, reduces infant mortality and improves upon many other health parameters. Healthiness reduces casualty due to illness and increases the competence of the workforce, which indirectly contributes to economic growth. These beneficial effects of health are well documented by Howitt (2005) and developed into a theoretical model based on the Schumpeterian growth theory where six different channels are identified through which improvement in the health status of a country may affect its long-run growth.

Indirect returns from human capital, or spillover effect, may remain uncaptured by quantitative parameters cited in economic growth. However, such indirect spillover effects are very important for developing countries since investment in human capital also has self-sustaining intragenerational returns. Human capital, such as academic attainment and knowledge of the current generation, is transmitted automatically to the future generation of a society, and in this way human capital investments have self-sustaining returns in the longer term as well.

The implications of education in economic development have been investigated since the early 1960s by the so-called Human Capital School, which originated at the University of Chicago (Schultz, 1961; Becker, 1964), where expenditure on education was regarded as an investment. Spending on education and health has also been justified in endogenous growth theory (Lucas, 1988; Romer, 1990). In the endogenous growth model, technological progress, which increases productivity and accelerates the pace of growth, can be determined within the model through the formation of human capital. Spending on education and health helps promote efficiency, knowledge and inventions, all of which contribute to the economic growth of a country. Lucas (1988) states

$$y = AK^\alpha (uh)^{1-\alpha} (h_a)^\gamma \quad (1)$$

where y is output, K is physical capital, u is the fraction of time devoted to productive activities (and the rest to accumulation of knowledge), h is the human capital input and h_a is the average human capital in the economy. Spending on education and health care proceed as human capital inputs. These inputs contribute to human capital and therefore to output growth through either direct accumulation (uh) or the existing stock of knowledge (h_a), which leads to innovation and spills over into the rest of the economy. Moreover, if $\gamma > 0$, then the production function involves increasing returns to scale, where productivity growth is endogenized in human capital inputs.

It is therefore recognized that spending on education and health care may promote output growth of the economy through the channel of human capital formation. If this is the case, we can state the relationship between output and spending on education and health care in the following way:

$$Y_t = AE_t^\alpha H_t^\beta \varepsilon_t \quad ; \quad \alpha, \beta > 0 \quad (2)$$

Equation (2) represents a Cobb-Douglas production function, where Y_t is output (GDP) per unit of labour, A is total factor productivity, E_t is the spending on education and H_t is the spending on health care, while α, β are the shares of education and health-care spending respectively.

Taking log,

$$\ln Y_t = \ln A + \alpha \ln E_t + \beta \ln H_t + \ln \varepsilon_t$$

Differentiating with respect to "t", we have:

$$\frac{1}{Y_t} \frac{dY_t}{dt} = \frac{1}{A} \frac{dA}{dt} + \alpha \frac{1}{E_t} \frac{dE_t}{dt} + \beta \frac{1}{H_t} \frac{dH_t}{dt} + \frac{1}{\varepsilon_t} \frac{d\varepsilon_t}{dt} \quad (3)$$

or

$$\dot{Y}_t = \dot{A} + \alpha \dot{E}_t + \beta \dot{H}_t + \vartheta_t \quad (4)$$

where \dot{Y} , \dot{E} , \dot{H} are output growth, growth of education expenditure, growth of health-care expenditure respectively and $\vartheta_t = \frac{1}{\varepsilon_t} \frac{d\varepsilon_t}{dt}$.

Equation (4) asserts that output growth depends on the growth of education expenditure and growth of health-care expenditure. However, the relationship between output growth and education and health-care expenditure is usually not instantaneous. Accordingly, the estimable form of equation (4) may be:

$$\dot{Y}_t = \dot{A} + \alpha_i \dot{E}_{t-i} + \beta_i \dot{H}_{t-i} + \vartheta_t \quad (5)$$

where, \dot{E}_{t-i} , \dot{H}_{t-i} ($i = 1, 2, \dots, k$) are lagged series of \dot{E}_t and \dot{H}_t respectively.

Review of selected empirical studies

A plethora of empirical studies have enquired into the relationship between education expenditure and economic growth across countries. Musila and Belassi (2004) explored the relationship between government education expenditure (per worker) and economic growth for the period 1965-1999. They found that education expenditure per worker had a positive and significant impact on economic growth in both the long run and short run. Al-Yousif (2008) examined the causal relationship between education expenditure (as a proxy for human capital) and economic growth in the six economies of the Gulf Cooperation Council over the period 1977-2004. Results based on the Granger causality test, within a vector error-correction mechanism, are mixed and varied across the countries. Permani (2009) reviewed the literature on the link between education and economic growth in East Asia and found that education assumes an important role in economic growth, although it is not a singularly important one. Permani (2009) was of the view that the observed two-way causal link between education and economic growth appeared to be ambiguous. Li and Liang (2010) examined the sources of economic growth through the estimation of an augmented Mankiw-Romer-Weil model, which considers human capital in the forms of both health and education for a group of East Asian countries. Empirical results, based on panel data analysis for the period 1961-2007 and subsample estimation for the period following the 1997 Asian financial crisis, exhibit the impact of the stock of health and education on economic growth, that is, that such growth is statistically significant while the impact of health on economic growth is stronger than that of education. Some other empirical studies examine the role of education and health-care spending in terms of progress in education and health constraints (Kim and Moody, 1992; Gupta, Verhoeven and Tiongson, 2002; Farahani, Subramanian and Canning, 2010).

An extensive body of empirical research has been compiled over the last three decades on the role of education and health-care spending in the promotion of economic growth. Wilson (1995) enquired into the relationship between medical care

expenditure and GDP growth in countries belonging to the Organization for Economic Cooperation and Development (OECD) and reported a bidirectional relationship between these variables. Devlin and Hansen (2001) examined Granger causality between aggregate health-care spending and GDP in 20 OECD countries. In some countries health-care expenditure was found to Granger cause GDP, while for the others Granger causality from GDP to health-care expenditure was noted. Bhatt and Jain (2004) studied the long-run relationship between private health-care expenditure and GDP in India through cointegration tests, but found no cointegrating relationship. Kiymaz, Akbulut and Demir (2006) examined the long-run relationship among the per capita private, public and total health-care expenditures vis-à-vis per capita GDP and the population growth of Turkey. They observed cointegrating relationships among health-care expenditure and GDP and population growth. The evidence of causality running from per capita GDP to health-care expenditures was also cited. Wang (2011) explored the causality between health-care expenditure and economic growth for 31 countries through the estimation of panel regression and quantile regression equations over the period 1986-2007. Panel regression analysis testified that expenditure growth positively contributed to economic growth, while economic growth retarded the growth of health expenditure. On the other hand, quantile regression analysis showed that the influence of expenditure growth on economic growth varied with the level of economic growth.

III. VARIABLES, DATASET, STATIONARITY AND COINTEGRATION

The present empirical study involves GDP (measure of economic growth), public spending on education and health care based on a dataset of the 12 countries in Asia and the Pacific mentioned previously. Log-level series (expressed in real terms) of GDP and public spending on education and health care are denoted by Y_t , E_t and H_t respectively. Corresponding first difference series (growth series) have been denoted by ΔY_t , ΔE_t and ΔH_t respectively.

Stationarity and order of integrability of the dataset have been tested through the Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1981) unit-root tests. Table 2 presents the results of such tests on selected series at level and upon first differencing. ADF tests accepted the null hypothesis of unit-root (even at the 1 per cent level) in all three series at the log levels in the countries. However, these ADF tests rejected the unit-root of the series upon first differencing. ADF tests therefore testify that the selected series of the countries under study are I(1) by nature.

The existence of long-run relationships among the I(1) series requires study of cointegration. This is done in view of the fact that an equilibrium relationship among

Table 2. Results of unit-root tests

Country (study period)	ADF test on level data			ADF test on first difference data			Conclusion
	Series	ADF statistic without trend	ADF statistic with trend	Series	ADF statistic without trend	ADF statistic with trend	
Bangladesh	Y_t	-0.21	-2.94	ΔY_t	-4.19	4.12	I(1)
	E_t	-0.68	-2.42	ΔE_t	-5.68	-5.58	I(1)
	H_t	-1.04	-2.51	ΔH_t	-5.67	-5.60	I(1)
Fiji	Y_t	3.98	-2.25	ΔY_t	-5.23	-5.65	I(1)
	E_t	-0.99	-1.92	ΔE_t	-4.95	-4.91	I(1)
	H_t	0.72	-2.82	ΔH_t	-4.27	-4.20	I(1)
Kiribati	Y_t	-0.73	-2.08	ΔY_t	-5.40	-5.24	I(1)
	E_t	-1.80	-1.51	ΔE_t	-4.41	-4.20	I(1)
	H_t	-1.51	-1.50	ΔH_t	-5.45	-6.21	I(1)
Malaysia	Y_t	-0.07	-2.75	ΔY_t	-5.30	-5.20	I(1)
	E_t	0.01	-3.15	ΔE_t	-5.51	-4.42	I(1)
	H_t	0.67	-3.28	ΔH_t	-5.45	-5.62	I(1)
Maldives	Y_t	0.88	-2.10	ΔY_t	-6.12	-6.30	I(1)
	E_t	-2.01	-1.85	ΔE_t	-3.04	-3.65	I(1)
	H_t	-2.07	-1.68	ΔH_t	-3.12	-4.64	I(1)
Nepal	Y_t	-0.88	-2.39	ΔY_t	-6.33	-6.23	I(1)
	E_t	-0.15	-2.59	ΔE_t	-5.06	-5.70	I(1)
	H_t	0.14	-1.69	ΔH_t	-6.09	-6.25	I(1)
Philippines	Y_t	1.87	-2.65	ΔY_t	-3.04	-3.55	I(1)
	E_t	-0.35	-2.97	ΔE_t	-3.47	-3.42	I(1)
	H_t	-1.85	-1.79	ΔH_t	-5.17	-5.33	I(1)
Republic of Korea	Y_t	-1.91	-2.71	ΔY_t	-6.64	-6.73	I(1)
	E_t	-1.76	-1.77	ΔE_t	-5.73	-5.82	I(1)
	H_t	-1.72	-2.45	ΔH_t	-4.98	-4.89	I(1)
Singapore	Y_t	-0.89	-1.41	ΔY_t	-4.84	-4.84	I(1)
	E_t	-2.44	-2.84	ΔE_t	-4.97	-4.78	I(1)
	H_t	-0.55	-2.92	ΔH_t	-6.86	-6.74	I(1)
Sri Lanka	Y_t	-0.67	-1.56	ΔY_t	-3.95	-3.96	I(1)
	E_t	-1.55	-3.38	ΔE_t	-6.04	-6.00	I(1)
	H_t	-1.41	-3.35	ΔH_t	-7.49	-7.54	I(1)
Tonga	Y_t	-1.21	-1.40	ΔY_t	-4.64	-4.69	I(1)
	E_t	-1.75	-1.24	ΔE_t	-6.18	-6.61	I(1)
	H_t	-2.20	-0.94	ΔH_t	-4.40	-4.05	I(1)
Vanuatu (1983-2007)	Y_t	-0.05	-2.46	ΔY_t	-4.29	-4.36	I(1)
	E_t	-1.17	-2.50	ΔE_t	-4.00	-3.95	I(1)
	H_t	-1.58	-2.15	ΔH_t	-5.13	-5.10	I(1)

Source: Authors' calculation.

GDP, education and health-care spending requires that their stochastic trends be linked. Linkage among the stochastic trends would indicate that the variables are cointegrated. The cointegration study involves multivariate cointegration tests of Johansen (1991; 1995).

Table 3 summarizes the results of Johansen cointegration tests involving log level I(1) series of GDP, education and health-care spending in the selected countries. Johansen tests established cointegrating relationships in the case of Bangladesh, Kiribati, Malaysia, Maldives, the Philippines and the Republic of Korea. On the other hand, the Johansen cointegration tests established the absence of cointegrating relationships in the case of Fiji, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu.

Table 3. Summary results of Johansen cointegration tests

Country studied	Trace test	Max-Eigen test
Bangladesh	One cointegrating relationship**	One cointegrating relationship**
Fiji	No cointegrating relationship	No cointegrating relationship
Kiribati	One cointegrating relationship*	One cointegrating relationship*
Malaysia	One cointegrating relationship**	One cointegrating relationship**
Maldives	One cointegrating relationship	One cointegrating relationship
Nepal	No cointegrating relationship	No cointegrating relationship
Philippines	One cointegrating relationship**	One cointegrating relationship*
Republic of Korea	One cointegrating relationship*	One cointegrating relationship*
Singapore	No cointegrating relationship	No cointegrating relationship
Sri Lanka	No cointegrating relationship	No cointegrating relationship
Tonga	No cointegrating relationship	No cointegrating relationship
Vanuatu	No cointegrating relationship	No cointegrating relationship

Source: Authors' calculation.

Notes: * Significant at the 1 % level; ** significant at the 5 % level.

IV. IMPACT OF EDUCATION AND HEALTH-CARE SPENDING ON GDP

Methodological issues

The cointegrating relationship among GDP, education and health-care spending was confirmed in the economies of Bangladesh, Kiribati, Malaysia, Maldives, the Philippines and the Republic of Korea. Thus the impact of education and health-care spending on GDP (based on the normalized cointegrating equation) was studied through the estimation of an appropriate vector error correction (VEC) model. For this purpose, the following VEC model was used:³

$$\Delta Y_t = \eta_1 + \rho_1 (EC)_{t-1} + \psi_{1i} \sum_{i=1}^n \Delta Y_{t-i} + \gamma_{1i} \sum_{i=1}^n \Delta E_{t-i} + \theta_{1i} \sum_{i=1}^n \Delta H_{t-i} + \omega_t \quad (6)$$

$$\Delta E_t = \eta_2 + \rho_2 (EC)_{t-1} + \psi_{2i} \sum_{i=1}^n \Delta E_{t-i} + \gamma_{2i} \sum_{i=1}^n \Delta Y_{t-i} + \theta_{2i} \sum_{i=1}^n \Delta H_{t-i} + \vartheta_t \quad (7)$$

$$\Delta H_t = \eta_3 + \rho_3 (EC)_{t-1} + \psi_{3i} \sum_{i=1}^n \Delta H_{t-i} + \gamma_{3i} \sum_{i=1}^n \Delta Y_{t-i} + \theta_{3i} \sum_{i=1}^n \Delta E_{t-i} + z_t \quad (8)$$

where ‘ Δ ’ is the first difference operator; $(EC)_{t-1}$ is the error correction term lagged one period; and ρ_1, ρ_2, ρ_3 are the short-run coefficients of the error correction term (speed of adjustment parameters). The speed of adjustment parameter is very important in the analysis of error correction mechanism. A higher value of the parameter indicates higher speed of adjustment of the model from short-run disequilibrium to long-run equilibrium.

Rejection of cointegrating relationships among GDP, education and health-care spending in Fiji, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu does not discard the possibility of having any causal relationship among the series. Such possibilities were investigated through the estimation of the unrestricted vector autoregression (VAR) model presented through equations (9), (10) and (11).⁴ According to the requirement of the VAR model, first differenced stationary series (growth series) of the variables concerned are used.

³ However, the results of estimated equation (1) are needed in line with the objective of this study.

⁴ Results of estimated equation (4) in countries are reported according to the objective of this study.

$$\Delta Y_t = \alpha_1 + \beta_{1i} \sum_{i=1}^k \Delta Y_{t-i} + \phi_{1i} \sum_{i=1}^k \Delta E_{t-i} + \delta_{1i} \sum_{i=1}^k \Delta H_{t-i} + \varepsilon_{1t} \quad (9)$$

$$\Delta E_t = \alpha_2 + \beta_{2i} \sum_{i=1}^k \Delta E_{t-i} + \phi_{2i} \sum_{i=1}^k \Delta Y_{t-i} + \delta_{2i} \sum_{i=1}^k \Delta H_{t-i} + \varepsilon_{2t} \quad (10)$$

$$\Delta H_t = \alpha_3 + \beta_{3i} \sum_{i=1}^k \Delta H_{t-i} + \phi_{3i} \sum_{i=1}^k \Delta Y_{t-i} + \delta_{3i} \sum_{i=1}^k \Delta E_{t-i} + \varepsilon_{3t} \quad (11)$$

where ΔY_{t-i} , ΔE_{t-i} , ΔH_{t-i} ($i = 1, 2, \dots, k$) are lagged series of GDP growth, growth in education and health-care spending respectively. ε_{1t} , ε_{2t} and ε_{3t} represent innovations that may be contemporaneously correlated but are uncorrelated with their own lagged terms and with all of the right-hand side variables. For the selection of optimum lag length (k), lag selection criteria have been adapted. Besides, the block exogeneity in the VAR model has been examined through Wald tests. Variance decomposition analysis⁵ is used to identify the relative importance of education and health-care spending in the variation of GDP (growth) in the out-of-sample periods ahead. Such an approach appears to be an improvement upon the methodological structures of the existing studies on Asian and Pacific countries.

Findings from the estimated vector error correction model for Bangladesh, Kiribati, Malaysia, Maldives, the Philippines and the Republic of Korea

Results of the estimated VEC models for the economies of Bangladesh, Kiribati, Malaysia, Maldives, the Philippines and the Republic of Korea are presented in table 4. Variance decomposition of GDP in the countries concerned is summarized in table 5.

⁵ The forecast error variance decomposition reflects the proportion of forecast error variance of a variable which is explained by a change in itself as opposed to that proportion attributable to change in other interrelated variables.

Bangladesh

Bangladesh is one of the least developed South Asian countries. Over the last three decades the country has been performing slowly. The GDP per capita (based on purchasing power parity at constant 2005 international dollars) of Bangladesh registered an increase from \$676.80 in 1980 to \$1,568.40 in 2011. Between 1980 and 2011, the expectation of life at birth rose by an additional 13.7 years. The infant mortality rate sharply declined to 38 per 1,000 live births in 2011 from 130 in 1980. Progress has also been noticed in family planning. The country's Human Development Index (HDI) score increased from 0.259 in 1980 to 0.500 in 2011.

Our study shows that in Bangladesh the short-run dynamics among GDP, education and health-care spending over the period 1981-2011 is significant. These short-run dynamics move towards the long-run equilibrium state, correcting 64 per cent of the disequilibrium errors of the past periods. It was also found that both education and health-care spending have been contributing to GDP where the gestation lag of education spending is four years and that of health-care spending is one year.

A significant role of education and health-care spending in GDP of Bangladesh was also revealed by the Wald test, where the calculated chi-square statistic accepts the null hypothesis of Granger causality against the alternative hypothesis of block exogeneity of GDP in our estimated VEC model. In the event of continuation of such a relationship in the future, the variance decomposition analysis indicates that both education and health-care spending may make a significant contribution to the composition of the country's GDP profile in years to come.

Kiribati

The estimated VEC model for the economy of the Pacific island country Kiribati testifies that one-year lagged education spending in the past three periods has led to a rise in GDP, while health-care spending in the past two periods seems to have retarded the country's GDP growth.⁶ The Wald test results confirmed the endogeneity of the variables. Decomposition of forecast error variances for GDP demonstrates that, in the event of the current economic structure remaining unchanged, education spending would account for at most 38 per cent of GDP, and health spending would account for at most 11 per cent in the years to come.

⁶ The lag-structure in the VEC model could not be extended for in-depth study because of the paucity of the degrees of freedom.

Malaysia

The estimated VEC model in the case of Malaysia reveals that the speed of adjustment coefficient is negative but statistically insignificant even at the 10 per cent level. Therefore, disequilibrium errors fail to affect GDP in Malaysia. In this estimation, the lagged coefficients of education and health-care spending are also found to be insignificant even at the 10 per cent level. GDP in Malaysia appears to be exogenous in this system.

Wald tests, on the other hand, revealed that health-care spending Granger causes GDP at the 10 per cent level. Therefore, the Wald test rejects the possibility of block exogeneity of GDP (at the 10 per cent level). The variance decomposition analysis suggests that if no endogenous and/or exogenous structural change occurs then health-care spending may be able to account for 28 per cent of the variance of GDP in the periods ahead.

Maldives

Maldives is the smallest country in Asia in terms of land area and population. Over the last two decades the economy of Maldives improved, from being one of the poorest countries in the world to becoming an upper middle income country, although its economic base remains limited to only two sectors, fisheries and tourism. Over this period the economy also recorded significant progress in human development. In terms of literacy rate, infant mortality rate and life expectancy, the country is considerably ahead of many other neighbouring countries. Maldives also achieved phenomenal success in terms of the Millennium Development Goals. Currently only 1 per cent of its population is living under the poverty line; starvation is virtually non-existent; HIV rates have fallen; and malaria has been eradicated. The HDI score of Maldives in 2011 was 0.661.

The cointegrating findings of the study suggest that in Maldives education spending has a positive impact on GDP. Specifically, estimated four-year lagged education spending is found to be positive and significant at the 5 per cent level, indicating that budgetary allocations for the education sector lead to a rise in GDP for Maldives, with the gestation lag being four years. On the other hand, the impact of health-care spending on GDP is found to be negative. Other lags are found to be statistically insignificant even at the 10 per cent level.

These findings have been supplemented by the Wald test, where the Wald test statistic (χ^2 statistic) accepts Granger causality (in the model with GDP acting as the dependent variable) and rejects the possibility of block exogeneity of GDP even at the

1 per cent level. Estimated decomposed forecast error variance of GDP indicates that, in the presence of such relationships in the future, both education and health-care spending may contribute equally to the composition of the GDP profile and account for a significant part of the variance in GDP.

However, the matter of concern is the negative impact of health-care spending on GDP. Such a negative impact may be due to some practical constraints of the health-care sector, such as inherent geographical location (and scattered population), lack of professionally and technically skilled health personnel (human resource constraint), vulnerability to climatic changes and environmental health problems, and emerging and re-emerging diseases. Several steps have been taken by the country to address these problems. Compared with other South Asian countries, allocations in the health-care sector are the highest in Maldives. Owing to human resource constraints, the country is compelled to hire experts from abroad, which is a huge financial burden on the health sector. Scattered locations pose increasing costs on health-care delivery. These problems hinder the efficiency of health-care services in Maldives and may be the possible disguised factors accounting for the negative contribution of health-care spending in GDP. However, an in-depth study is required to identify the specific reasons.

Philippines

The emerging economy of the Philippines is rapidly transiting to industrialization. The literacy rate of the country was recorded as 95 per cent in 2008. Life expectancy at birth increased from 48 years in 1980 to more than 68 years in 2010. The *Human Development Report 2011* revealed that the country's HDI score was 0.644.

The estimated VEC model for the economy of the Philippines shows that the speed of the adjustment parameter is negative and statistically significant at the 1 per cent level. It indicates that the short-run dynamics that GDP maintains with education and health-care spending are significant. In each period, 32 per cent of the disequilibrium error has been corrected and the system converges to the long-run equilibrium state. The estimate of two-period lagged education spending is found to be negative and significant at the 10 per cent level. It implies that two-period lagged education spending has some growth-retarding effect. Estimates of one- and two-period lagged health-care spending are found to be positive and statistically significant even at the 5 per cent and 1 per cent levels respectively. These imply that spending on the health-care sector in the Philippines contributes to GDP growth with a time lag of one to two years. Findings of the Wald test in this regard is that health-care spending Granger causes GDP but education spending fails to Granger cause GDP. Findings of variance decomposition analysis further testify to the significant role of health-care

spending in GDP compared with education spending in the composition of the GDP profile in forthcoming periods where health-care spending may account for more than 48 per cent variance of GDP in the 12-year forecast periods ahead.

Republic of Korea

Estimated VEC models for the Republic of Korea reveal that the error correction term, or the speed of adjustment parameter (EC_{t-1}), is negative and statistically significant at the 1 per cent level. That term implies that the short-run dynamics that GDP maintained with education and health-care spending in the Republic of Korea are significant. The (absolute) value of the speed of adjustment parameter ($|\widehat{EC}_{t-1}|$) is 0.069, indicating that only 6.9 per cent of disequilibrium errors of previous periods have been corrected for the present period. Estimated coefficients of lagged education and health-care spending are statistically insignificant even at the 10 per cent level. This implies that lagged spending in education and health care fails to affect GDP; therefore, GDP seems to be exogenous in this model. The Wald test further confirms the exogeneity of GDP in this model.

However, forecast error variance decomposition of GDP (presented in table 4) based on the estimated VEC model indicates that in the Republic of Korea education spending accounts a significant percentage of forecast error variance of GDP in the out-of-sample forecast horizon. Specifically, education spending accounts for about 21 per cent of forecast error variance of GDP at the three-period-ahead horizon, which further increased by 49.6 per cent at most in the six-period-ahead forecast horizon. Health-care spending in this regard accounts for at most 9.9 per cent of the forecast error variance of GDP at the 12-year forecast horizon.

Apart from these documented facts and figures, the findings of statistically insignificant impacts from education and health-care spending on GDP are quite surprising. It seems a possibility that GDP growth might be predominantly due to some other factors, such as technological improvement, efficient production process, allocation of resources and administrative innovations. In such cases, the impacts of education and health-care spending on GDP appeared to be less spectacular, which is reflected in the insignificant coefficient of the variables at different lags in the estimated VEC models.

Table 4. Results of vector error correction estimation

Parameters	Bangladesh		Kiribati		Malaysia		Maldives		Philippines		Republic of Korea	
	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio
α	0.048	1.638	0.009	-1.389	0.157	2.941	0.173	2.230	0.051	4.954	0.135	3.455
EC _{t-1}	-0.644	-2.914	0.342	2.898	-0.197	-1.084	-0.009	-0.569	-0.320	-3.739	-0.069	-3.294
ΔY_{t-1}	-0.405	-2.419	-0.638	-2.249	-0.203	-0.860	-0.196	-0.939	0.055	0.306	-0.305	-1.111
ΔY_{t-2}	-0.449	-2.354	-0.656	-2.421	-0.022	-0.101	-0.163	-0.849	0.131	0.701	-0.308	-1.073
ΔY_{t-3}	0.015	0.087	-0.403	-1.764	-0.223	-0.889	-0.102	-0.540	-0.324	-2.142	0.018	0.464
ΔY_{t-4}	-0.095	-0.607	-	-	0.025	0.112	-0.143	-0.811	-	-	0.012	0.467
ΔY_{t-5}	-	-	-	-	0.442	-1.705	-	-	-	-	-	-
ΔE_{t-1}	0.100	1.211	1.288	3.447	-0.165	-0.811	0.208	1.126	0.001	0.015	0.022	0.186
ΔE_{t-2}	0.025	0.311	0.978	3.270	-0.240	-1.176	-0.086	-0.573	-0.156	-2.359	-0.121	-1.206
ΔE_{t-3}	-0.018	-0.235	0.525	3.066	0.171	0.809	-0.044	-0.380	-0.657	-1.012	-0.136	-1.279
ΔE_{t-4}	0.190	3.128	-	-	-0.014	-0.061	0.310	2.739	-	-	-0.110	-0.981
ΔE_{t-5}	-	-	-	-	-0.141	-0.629	-	-	-	-	-	-
ΔH_{t-1}	0.464	2.957	-1.043	-2.987	-0.262	-1.119	-0.001	-0.007	0.154	3.397	-0.021	-0.568
ΔH_{t-2}	0.171	1.307	-0.904	-3.492	-0.041	-0.180	-0.089	-0.775	0.111	2.343	-0.063	-2.069
ΔH_{t-3}	-0.058	-0.474	-0.233	-1.389	-0.168	-0.773	-0.249	-2.505	0.059	1.419	-0.053	-1.612
ΔH_{t-4}	0.054	0.513	-	-	0.329	1.657	-0.031	-0.399	-	-	0.004	0.089
ΔH_{t-5}	-	-	-	-	0.246	1.367	-	-	-	-	-	-
Diagnostic statistics	R ² = 0.80, $\overline{R^2}$ = 0.60, AIC = -3.59, SBC = -2.91, log likelihood = 60.7		R ² = 0.78, $\overline{R^2}$ = 0.51, AIC = -3.98, SBC = -2.85, log likelihood = 43.3		R ² = 0.75, $\overline{R^2}$ = 0.24, AIC = -2.95, SBC = -2.12, log likelihood = 53.8		R ² = 0.75, $\overline{R^2}$ = 0.44, AIC = -2.05, SBC = -1.36, log likelihood = 39.6		R ² = 0.79, $\overline{R^2}$ = 0.66, AIC = -4.88, SBC = -4.35, log likelihood = 76.96		R ² = 0.70, $\overline{R^2}$ = 0.38, AIC = -3.29, SBC = -2.617, log likelihood = 56.8	
VEC Granger causality/block exogeneity Wald tests	Dep. variable: ΔY_t Exclude X² prob. ΔE_t : 12.36 0.01 ΔH_t : 16.96 0.00 All: 42.58 0.00		Dep. variable: ΔY_t Exclude X² prob. ΔE_t : 12.6 0.00 ΔH_t : 21.4 0.00 All: 27.1 0.00		Dep. variable: ΔY_t Exclude X² prob. ΔE_t : 4.05 0.54 ΔH_t : 10.24 0.06 All: 17.26 0.06		Dep. variable: ΔY_t Exclude X² prob. ΔE_t : 12.89 0.00 ΔH_t : 15.12 0.00 All: 23.7 0.00		Dep. variable: ΔY_t Exclude X² prob. ΔE_t : 5.97 0.11 ΔH_t : 11.87 0.00 All: 24.40 0.00		Dep. variable: ΔY_t Exclude X² prob. ΔE_t : 3.29 0.51 ΔH_t : 7.23 0.12 All: 11.2 0.19	

Source: Authors' estimation.

Note: AIC: Akaike information criterion; and SBC: Schwarz Bayesian criterion.

Table 5. Variance decomposition of GDP growth (based on vector error correction estimation)

Country	Bangladesh			Kiribati			Malaysia			Maldives			Philippines			Republic of Korea		
	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t
1	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
2	73.3	19.9	6.8	70.3	29.2	0.5	92.3	5.6	2.1	81.1	14.9	4.0	81.7	14.3	4.0	99.8	0.2	0.0
3	70.5	20.2	9.3	60.6	37.9	1.5	87.9	10.0	2.1	71.7	11.9	16.4	81.4	11.8	6.8	76.2	20.9	2.9
4	68.0	15.8	16.1	58.9	35.8	5.3	87.0	10.5	2.5	69.0	11.3	19.7	75.3	18.7	5.9	54.0	40.2	5.8
5	65.8	17.5	16.6	64.3	29.8	5.9	70.3	19.9	9.8	69.8	11.8	18.4	70.9	19.4	9.7	47.0	47.3	5.7
6	66.9	18.0	15.1	57.6	35.8	6.6	61.4	20.7	17.9	68.5	13.4	18.1	63.6	18.2	18.2	44.8	49.6	5.6
7	66.5	19.5	13.9	59.0	33.0	7.9	59.2	18.3	22.5	70.8	13.1	16.1	58.4	15.7	25.9	43.7	50.4	5.9
8	67.2	19.6	13.2	59.9	30.9	9.2	58.2	18.1	23.7	68.8	17.1	14.1	55.5	12.6	31.9	43.1	49.5	7.4
9	67.3	20.4	12.3	61.4	28.7	9.8	55.3	16.2	28.5	69.6	16.7	13.6	52.2	9.9	37.9	43.4	48.0	8.5
10	67.5	21.3	11.2	61.4	28.0	10.5	53.9	18.4	27.7	67.8	16.1	16.0	48.3	8.3	43.4	43.0	48.4	8.7
11	67.9	21.5	10.6	59.7	29.5	10.8	55.5	17.7	26.8	67.5	16.6	15.8	45.9	7.0	47.1	42.4	48.4	9.1
12	67.8	22.0	10.3	56.4	32.6	11.0	54.2	17.2	28.6	68.6	15.9	15.4	45.3	5.9	48.8	43.0	47.1	9.9

Source: Authors' estimation.

Findings from the estimated VAR model for Fiji, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu

Results of the estimated VAR models for the economies of Fiji, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu are presented in table 6. Based on the estimated VAR models, the corresponding forecast error variance decomposition of GDP growth is presented in table 7.

Fiji

Findings from the analysis in the case of Fiji are similar to those for Tonga. In the estimated VAR model for Fiji the coefficient of five years of lagged GDP is positive (0.58) and significant at the 10 per cent level, indicating that education spending has some growth effect on GDP. However, the role of health-care spending on GDP growth was found to be statistically insignificant. The Wald test rejects the possibility of causal effect of both education and health-care spending on GDP growth. However, from the variance decomposition table the indication is that education spending may contribute to the country's GDP growth in the future.

Nepal

In Nepal both education and health-care spending exhibit a contributing role for GDP growth. At the initial period spending on education has a growth-retarding effect. However, such spending contributes positively to GDP with time lags of four years. Health-care spending, on the other hand, contributed to GDP growth at a time lag of one year.

Therefore, findings concerning the role of education and health-care spending on GDP in Nepal are similar to those in the case of Sri Lanka. However, Nepal is far behind Sri Lanka in respect of progress in human development as well as progress in other aspects of the economy.

Nepal is among the least developed countries and has been performing slowly in terms of economic and social development. In Nepal, the adult literacy rate has increased from 20.57 per cent in 1981 to 59.14 per cent in 2008. The expectation of life at birth has risen from 48.15 years in 1990 to 68.39 years in 2010. The infant mortality rate has declined from 132.6 per 1,000 in 1980 to 41.4 in 2010. The HDI score has risen from 0.242 in 1980 to 0.458 in 2011.

Singapore

In Singapore estimates of four-year lagged education spending and one-year lagged health-care spending were found to be positive and significant at the 5 per cent level. Values of these estimates are 0.256 and 0.226 respectively. Estimates of all other lags are insignificant (even at the 10 per cent level). Statistically significant estimates of (lagged) education spending and health-care spending in the presence of lagged GDP in the VAR equation indicate that both education and health-care spending Granger cause GDP growth in Singapore over the period of the study. These findings have been confirmed further through the Wald test. Variance decomposition analysis found that in the future health-care spending may play a more significant role than education spending in the composition of the GDP growth profile of Singapore.

The significant role in education and health-care spending in the GDP growth of Singapore may be viewed as a success for domestic policy. In this regard, Osman-Gani (2004) presented an account of macro-level strategies of human capital formation and their success. Particularly since the country's independence, the economy of Singapore rapidly has been transformed from being a low-income economy to a high-income developed economy. In terms of almost all economic and social parameters, the progress of the country is very impressive. Based on 2011 data, the literacy rate in Singapore is 96.1 per cent, expectation of life at birth is 82 years, labour force participation rate (percentage of economically active persons to the population aged 15 years and older) is 66.1,⁷ and number of doctors per 10,000 population is 18. The country's HDI score was 0.889 in 2011 and it rose to the 26th position in the HDI rankings. One of the most important reasons behind the phenomenal success of Singapore is the strong base of human capital which the country has generated through consistent and strategic national policy of spending in the education and health sectors for the development of the country.

Sri Lanka

Although 20 years of internal strife has affected Sri Lanka immensely, the country recorded a much better performance in human development relative to other countries in the South Asian subregion. Sri Lankan policymakers recognize education and health as priority sectors and followed a consistent policy in that regard. This has resulted in the country's phenomenal achievements in education and health. According to the *Human Development Report 2011*, the country's HDI score of 0.691 (rank 97th) places Sri Lanka on the list of medium HDI countries.

⁷ Available from www.singstat.gov.sg/stats/keyind.html#keyind.

Human development performance in Sri Lanka is reflected in our empirical findings. Specifically, the estimated VAR model for the economy of Sri Lanka showed that at the initial period (lag 2) education spending has a growth-retarding negative impact. However, with the passage of time, such spending contributes to GDP growth, particularly at the five- and six-year lag periods. On the other hand, estimates of health-care spending at lag 1 and lag 5 have significant positive impacts on GDP growth. In short, in the economy of Sri Lanka spending on health care contributes to GDP growth with both shorter and longer horizons of time. Findings of the estimated VAR model are quite consistent with the findings of Wald tests reported in the lower panel of table 6. The variance decomposition table indicates that in the future education spending may play a more significant role than health-care spending in promoting the GDP growth of the country.

Tonga

The economy of Tonga relies on remittances from Tongans living abroad as well as on foreign aid. The country has no strategic and mineral resources and therefore is based on primary activities, such as agriculture and fishing. Assistance from the World Bank, aid from Australia and New Zealand as well as from China and Japan help develop the education sector of the country. The Pacific Regional Initiative for the Implementation and Delivery of Basic Education, or “PRIDE”, also helps promote the quality of education in the country. The HDI score of the country increased to 0.704 in 2011.

In Tonga, education spending helps raise GDP growth. More specifically, the coefficient of three years of lagged education spending in Tonga is 0.56 (i.e. positive) and is significant at the 5 per cent level. Spending on education in Tonga therefore helps raise GDP growth with a gestation lag of three years. However, the impact of health-care spending on GDP growth was found to be statistically insignificant. This result has further been confirmed through the Wald test. Variance decomposition analysis indicates that in Tonga education spending may be helpful in constituting a GDP growth profile in the future.

Vanuatu

The economy of the mountainous country of Vanuatu largely depends on agriculture and tourism. Economic reforms and a stable Government have helped the country progress in terms of human development. For instance, life expectancy is currently more than 70 years. The adult literacy rate is above 82 per cent. The net enrolment rate at the primary level is 100 per cent. Infant mortality sharply declined from 49.9 per 1,000 in 1980 to 11.4 in 2010.

In the economy of Vanuatu two-period lagged education spending helped raise GDP growth, while one-period lagged health-care spending retarded GDP growth. In the future, education spending may play a major role in determining the GDP growth profile of the country.

One noticeable feature of the findings of the estimated VEC and VAR models in the countries concerned is that the gestation lags of education spending in promoting GDP are longer than those of health-care spending in this regard. This may be due to the fact that, at the very early stage of growth, spending on education works as consumption spending, which may not contribute directly to GDP and may depress GDP (as is found in the case of Sri Lanka). However, with the passage of time such spending was channeled through the process of teaching, learning, research and training to the formation of a skilled labour force, which we call human capital. This human capital participates in productive activities and leads to (endogenous) technical progress, contributing positively to economic growth. In such cases, the time lag of four years or more is quite sensible. Health-care spending, on the other hand, contributes to GDP with a gestation lag of one year. Health-care spending exploits the generation of improved health-care services, which reduce illness and casualties, and provide a healthy labour force. The healthy labour force participates in and contributes positively to GDP in such cases where the gestation lag may be short or long.

Table 6. Results of vector autoregression estimation

Parameters	Fiji		Nepal		Singapore		Sri Lanka		Tonga		Vanuatu	
	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio	Estimates	't'-ratio
α	0.058	1.637	0.026	1.291	0.049	1.475	0.014	0.7964	0.009	-0.325	-0.003	-0.185
ΔY_{t-1}	0.441	1.337	-0.013	-0.053	0.416	1.117	-0.117	-0.561	0.563	1.700	1.058	3.087
ΔY_{t-2}	-0.373	-1.011	0.179	0.906	-0.182	-0.462	0.577	2.103	-0.205	-0.711	-0.160	-0.888
ΔY_{t-3}	-0.405	-1.126	-0.057	-0.345	0.144	0.462	0.363	2.296	0.203	0.716	0.201	1.169
ΔY_{t-4}	-0.327	-0.778	0.305	1.796	-0.290	-0.738	0.088	0.742	-	-	-0.035	-0.177
ΔY_{t-5}	-0.331	-0.944	-	-	-0.642	-1.619	-0.268	-1.352	-	-	-	-
ΔY_{t-6}	1.116	2.455	-	-	-	-	-0.842	-3.551	-	-	-	-
ΔE_{t-1}	0.217	0.596	-0.158	-3.341	-0.078	-0.651	0.081	1.015	-0.008	-0.054	0.105	0.917
ΔE_{t-2}	0.091	0.220	0.002	0.041	-0.016	-0.150	-0.447	-3.336	-0.059	-0.377	0.290	3.016
ΔE_{t-3}	0.151	0.389	0.078	1.603	0.073	0.717	-0.154	-2.222	0.563	2.581	-0.209	-1.523
ΔE_{t-4}	0.231	0.744	0.103	2.661	0.256	2.521	0.059	1.247	-	-	0.127	1.185
ΔE_{t-5}	0.291	0.984	-	-	-0.044	-0.399	0.167	2.426	-	-	-	-
ΔE_{t-6}	0.583	2.192	-	-	-	-	0.325	3.604	-	-	-	-
ΔH_{t-1}	-0.503	-1.461	-0.043	-1.950	0.226	2.738	0.189	1.525	0.273	1.443	-0.296	-2.416
ΔH_{t-2}	0.089	0.261	0.063	2.813	0.197	1.955	0.459	3.667	-0.241	-1.296	-0.171	-1.797
ΔH_{t-3}	0.079	0.195	-0.011	-0.512	0.157	1.937	0.036	0.619	-0.155	-0.729	-0.124	-0.973
ΔH_{t-4}	-0.273	-0.803	-0.033	-1.611	0.173	1.963	0.071	1.825	-	-	0.174	1.329
ΔH_{t-5}	0.0003	0.0007	-	-	0.063	1.017	0.173	4.337	-	-	-	-
ΔH_{t-6}	-0.675	-1.6305	-	-	-	-	-0.120	-2.387	-	-	-	-
Diagnostic statistics	$R^2 = 0.85$, $\overline{R^2} = 0.17$, AIC = -2.34, SBC = -1.402, log likelihood = 45.9		$R^2 = 0.65$, $\overline{R^2} = 0.33$, AIC = -5.59, SBC = -4.96, log likelihood = 85.68		$R^2 = 0.73$, $\overline{R^2} = 0.22$, AIC = -3.437, SBC = -2.65, log likelihood = 57.2		$R^2 = 0.92$, $\overline{R^2} = 0.64$, AIC = -6.02, SBC = -5.08, log likelihood = 91.2		$R^2 = 0.59$, $\overline{R^2} = 0.28$, AIC = -3.252, SBC = -2.762, log likelihood = 37.6		$R^2 = 0.91$, $\overline{R^2} = 0.76$, AIC = -4.36, SBC = -3.72, log likelihood = 56.6	
VAR Granger causality/ block exogeneity Wald tests	Dep. variable: ΔY_t Exclude X^2 prob. ΔE_t : 5.787 0.44 ΔH_t : 6.798 0.33 All: 11.6 0.47		Dep. variable: ΔY_t Exclude X^2 prob. ΔE_t : 17.94 0.00 ΔH_t : 12.36 0.00 All: 21.97 0.00		Dep. variable: ΔY_t Exclude X^2 prob. ΔE_t : 13.15 0.02 ΔH_t : 12.11 0.03 All: 0.00 0.00		Dep. variable: ΔY_t Exclude X^2 prob. ΔE_t : 51.7 0.00 ΔH_t : 23.5 0.00 All: 58.03 0.00		Dep. variable: ΔY_t Exclude X^2 prob. ΔE_t : 7.125 0.06 ΔH_t : 3.07 0.38 All: 9.98 0.12		Dep. variable: ΔY_t Exclude X^2 prob. ΔE_t : 15.1 0.00 ΔH_t : 17.8 0.00 All: 50.2 0.00	

Source: Authors' estimation.

Note: AIC: Akaike information criterion; and SBC: Schwarz Bayesian criterion.

Table 7. Variance decomposition of GDP growth (based on vector autoregression estimation)

Country	Fiji			Nepal			Singapore			Sri Lanka			Tonga			Vanuatu		
	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t	ΔY_t	ΔE_t	ΔH_t
1	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
2	71.7	19.7	8.6	79.9	0.3	19.8	50.2	1.7	48.1	73.1	21.3	5.6	77.5	18.0	4.5	62.4	28.7	8.9
3	71.8	19.3	8.8	59.9	8.9	31.2	48.2	4.7	47.1	58.0	35.5	6.5	74.0	20.6	5.5	57.3	30.1	12.6
4	63.8	20.7	15.5	55.2	16.9	27.9	47.9	5.4	46.6	55.9	36.6	8.5	54.5	39.9	5.6	46.2	36.0	17.8
5	63.2	20.9	15.9	50.4	15.8	33.8	40.6	18.6	40.7	57.6	33.7	8.7	51.5	40.7	7.8	34.8	52.3	12.9
6	70.0	22.2	16.8	50.0	16.7	33.3	40.7	18.3	41.0	53.7	35.7	10.6	59.6	33.2	7.2	35.7	45.3	19.0
7	75.7	15.1	9.2	46.5	20.5	33.0	39.0	17.5	43.5	55.2	33.5	11.2	60.5	32.3	7.2	32.1	45.9	22.0
8	73.4	16.3	10.3	46.2	20.4	33.4	39.4	17.5	43.1	50.3	39.7	10.0	60.2	32.6	7.2	32.7	45.7	21.6
9	73.4	15.5	11.1	46.4	20.8	32.8	39.8	15.2	44.9	50.8	39.3	9.9	57.8	35.1	7.1	32.3	46.8	20.9
10	73.5	14.9	11.6	46.2	20.9	32.8	41.8	14.8	43.3	53.9	34.5	11.6	57.7	35.1	7.1	32.3	47.1	20.6
11	73.5	14.0	11.5	46.0	21.3	32.7	39.6	14.3	46.1	54.5	34.1	11.4	59.3	33.5	7.2	31.8	47.9	20.3
12	73.2	14.1	12.7	46.0	21.3	32.7	40.1	14.5	45.4	54.2	34.5	11.3	59.3	33.3	7.4	32	47.7	20.3

Source: Authors' estimation.

V. CONCLUDING REMARKS AND POLICY IMPLICATIONS

This study examines the efficacy of public spending in education and health care in promoting GDP in the Asia-Pacific region over the period 1981-2011. For this purpose, the study involved the use of a battery of time series data-analysing techniques, such as unit-root tests (ADF tests), cointegration, estimation of error correction models, unrestricted vector autoregressive models and variance decomposition analysis.

ADF tests confirmed that each of the three time series (GDP, public spending on education and health care) is non-stationary at their log level and stationary upon first differencing in the countries concerned. Johansen (1991; 1995) multivariate cointegration tests involving I(1) series of GDP, public spending on education and health care testify to the existence of a cointegrating relationship in the case of Bangladesh, Kiribati, Malaysia, Maldives, the Philippines and the Republic of Korea. However, in the case of Fiji, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu a cointegrating relationship among GDP, education and health-care spending is absent.

Study with the error correction models enquires into the underlying causal effect of education and health-care spending in promoting GDP in Bangladesh, Kiribati, Malaysia, Maldives, the Philippines and the Republic of Korea. On the other hand, the causal impact of the rate of change of education and health-care spending on the GDP growth of Fiji, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu has been studied through the estimation of appropriate unrestricted VAR models.

The impact of education and health-care spending on GDP is not uniform. In the case of 9 of the 12 countries, education spending has been found to exert a positive impact on GDP. These countries are Bangladesh, Fiji, Kiribati, Maldives, Nepal, Singapore, Sri Lanka, Tonga and Vanuatu. In Bangladesh, Nepal, the Philippines, Singapore and Sri Lanka the impact of health-care spending on GDP was found to be positive and significant. In the Philippines education spending has a negative impact on GDP, while in Kiribati, Maldives and Vanuatu the impact of health-care spending on GDP was found to be negative.

The study shows that the impact of education and health-sector spending on GDP growth is not an instantaneous process. A gestation lag exists before these forms of spending exert appreciable impacts on economic growth. As a matter of fact, spending on education and health care initially leads to the development of human capital, which ultimately manifests itself in the form of economic growth. Accordingly, the economic authority of any country cannot expect an immediate upsurge in

economic growth following spending on education and health. Development of human capital is a time-consuming process which accounts for the gestation lags. These gestation lags vary across countries depending upon the state of the socioeconomic and administrative structure in the countries concerned.

It is therefore imperative for the economic authority to be persistent in allocation of resources for the development of the education and health sectors.

Utilization of allocated resources in the education and health sectors may depend largely on good governance and efficient institutions, and skilled manpower of the country. In order to reap all the benefits of such spending, the authority should ensure a supportive and efficient socioeconomic structure for efficient utilization of resources. Particularly, in the case of low-income countries it may be a difficult task to utilize such resources in the face of some practical constraints, such as inappropriate planning, faltering monitoring and skilled manpower, widespread corruption and administrative bottlenecks. In such a situation, inclusion of some potential variables, such as good governance and democracy, may provide insights about the efficacy of such spending on economic growth. However, as this study has not included such variables, another study may be undertaken in this direction.

REFERENCES

- Al-Yousif, Yousif Khalifa (2008). Education expenditure and economic growth: some empirical evidence from the GCC countries. *Journal of Developing Areas*, vol. 42, No. 1, pp. 69-80.
- Barro, R.J. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics*, vol. 106, No. 2, pp. 407-444.
- Becker, G. (1964). *Human Capital*. Chicago: University of Chicago Press.
- Bhatt, R., and N. Jain (2004). Time series analysis of private healthcare expenditures and GDP: cointegration results with structural break. Working Paper, No. 2004-05-08. Ahmedabad, India: Indian Institute of Management.
- Currie, Janet, and E. Moretti (2003). Mother's education and the intergenerational transmission of human capital: evidence from college openings. *Quarterly Journal of Economics*, vol. 118, No. 4, pp. 1495-1532.
- Devlin, N., and P. Hansen (2001). Health care spending and economic output: Granger causality. *Applied Economics Letters*, vol. 8, No. 8, pp. 561-564.
- Dickey, D.A., and W.A. Fuller (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, vol. 49, No. 4, pp. 1057-1072.
- Farahani M., S.V. Subramanian, and D. Canning (2010). Effects of state-level public spending on health on the mortality probability in India. *Health Economics*, vol. 19, No. 11, pp. 1361-1376.
- Gupta, S., B. Clements, and G. Inchauste, eds. (2004). *Helping Countries Develop: The Role of Fiscal Policy*. Washington, D.C.: International Monetary Fund.
- Gupta, S., M. Verhoeven, and E. Tiongson (2002). The effectiveness of government spending on education and health care in developing and transition economies. *European Journal of Political Economy*, vol. 18, No. 4, pp. 717-737.
- Hanushek, Eric A., and Ludger Wössmann (2007). The role of education quality in economic growth. Policy Research Working Paper, No. 4122. Washington, D.C.: World Bank.
- Hill, M.A., and E.M. King (1991). Women's education in developing countries: an overview. In *Women's Education in Developing Countries: Barriers, Benefits and Policy*, E.M. King, and M.A. Hills, eds. Washington, D.C.: World Bank.
- Howitt, P. (2005). Health, human capital and economic growth: a Schumpeterian perspective. In *Health and Economic Growth: Findings and Policy Implications*, G. Lopez-Casasnovas, B. Rivera, and L. Currais, eds. Cambridge, MA: MIT Press.
- Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica*, vol. 59, No. 6, pp. 1551-1580.
- _____ (1995). *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models*. Oxford: Oxford University Press.
- Kim, Kwangkee, and Phillip M. Moody (1992). More resources better health? A cross-national perspective. *Social Science and Medicine*, vol. 34, No. 8, pp. 837-842.
- Kiyamaz, H., Y. Akbulut, and A. Demir (2006). Tests of stationarity and cointegration of health care expenditure and gross domestic product: an application to Turkey. *European Journal of Health Economics*, vol. 7, No. 4, pp. 285-289.
- Lee, J.W., and R. Barro (1997). Schooling quality in a cross section of countries. Working Paper, No. 6198. Cambridge, MA: National Bureau of Economic Research.

- Li, Hongyi, and H. Liang (2010). Health, education, and economic growth in East Asia. *Journal of Chinese Economic and Foreign Trade Studies*, vol. 3, No. 2, pp. 110-131.
- Lucas, R.E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, vol. 22, No. 1, pp. 3-42.
- Mincer, Jacob (1974). *Schooling, Experience, and Earnings*. New York: Columbia University Press. Available from www.nber.org/books/minc74-1.
- Musila, J.W., and W. Belassi (2004). The impact of education expenditures on economic growth in Uganda: evidence from time series data. *Journal of Developing Areas*, vol. 38, No. 1, pp. 123-133.
- Osman-Gani, A.M. (2004). Human capital development in Singapore: an analysis of national policy perspectives. *Advances in Developing Human Resources*, vol. 6, No. 3, pp. 276-287.
- Permani, R. (2009). The role of education in economic growth in East Asia: a survey. *Asian-Pacific Economic Literature*, vol. 23, No. 1, pp. 1-20.
- Persson, Torsten, and Guido Tabellini (2000). *Political Economics: Explaining Economic Policy*. Cambridge and London: MIT Press.
- Psacharopoulos, G., and H.A. Patrinos (2002). Returns to investment in education – a further update. Policy Research Working Paper, No. 2881. Washington, D.C.: World Bank.
- _____ (2004). Returns to investment in education: a further update. *Education Economics*, vol. 12, No. 2, pp. 111-134.
- Romer, P.M. (1990). Endogenous technical change. *Journal of Political Economy*, vol. 98, No. 5, pp. S71-S102.
- Schultz, T.W. (1961). Investment in human capital. *American Economic Review*, vol. 51, No. 1, pp. 1-17.
- Swaroop, V. (1996). The public sector in the Caribbean: issues and reform options. Policy Research Working Paper, No. 1609. Washington, D.C.: World Bank. Available from <http://elibrary.worldbank.org/content/workingpaper/10.1596/1813-9450-1609>.
- Wagner, A. (1883). Three extracts on public finance. In *Classics in the Theory of Public Finance*, R.A. Musgrave, and A.T. Peacock, eds. (1958). London: Palgrave Macmillan and International Economic Association.
- Wang, Kuan-Min (2011). Health care and economic growth: quantile panel-type analysis. *Economic Modelling*, vol. 28, No. 4, pp. 1536-1549.
- Wilson, Mark R. (1995). Medical care expenditure and GDP growth in OECD nations. *Social Science and Medicine*, vol. 14, pp. 25-32.

ANNEX

Table A.1. Selected development parameters in selected Asia-Pacific countries, 1980-2011

Country (income level)	GDP per capita (based on PPP in constant 2005 United States dollars)	Adult literacy rate	Primary school enrolment (% net)	Infant mortality rate	Immunization DPT children ages 12-23 months (%)	Immunization measles children ages 12-23 months (%)	Hospital beds per 1 000 population	Life expectancy at birth	HDI score
Bangladesh	676.81 (1980)	29.22 (1981)	97 (2001)	130 (1980)	1 (1981)	1 (1982)	0.126 (1980)	55.2 (1980)	0.26 (1980)
(low income)	1 568.4 (2011)	55.90 (2010)	88 (2009)	38 (2011)	95 (2010)	94 (2010)	0.300 (2004)	68.9 (2010)	0.500 (2011)
Fiji	3 434.4 (1980)	..	97 (2001)	31.2 (1980)	68 (1980)	32 (1980)	2.813 (1980)	63.01 (1980)	0.624 (1990)
(lower middle income)	4 198.6 (2011)	..	97 (2009)	14.9 (2010)	99 (2010)	94 (2010)	2.100 (2009)	69.22 (2010)	0.688 (2011)
Kiribati	2 077.75 (1980)	..	95.41 (1979)	82.4 (1980)	43 (1983)	24 (1983)	5.09 (1980)	51.9 (1982)	..
(lower middle income)	2 063.38 (2011)	..	97.06 (2002)	37.7 (2011)	99 (2011)	90 (2011)	1.4 (2010)	64.92 (2012)	0.624 (2011)
Malaysia	4 866.9 (1980)	69.51 (1980)	95 (2001)	25.9 (1980)	67 (1980)	11 (1983)	2.278 (1981)	67.4 (1980)	0.631 (1990)
(upper middle income)	13 672.1 (2011)	92.45 (2009)	95 (2009)	5.4 (2010)	94 (2010)	96 (2010)	1.8 (2010)	74.02 (2010)	0.761 (2011)
Maldives	3 230.3 (1995)	92.23 (1985)	97 (2001)	113.5 (1980)	1 (1981)	39 (1981)	0.763 (1990)	52.6 (1980)	0.57 (2000)
(upper middle income)	7 833.9 (2011)	98.38 (2006)	97 (2009)	13.6 (2010)	96 (2010)	97 (2010)	1.381 (2007)	76.5 (2010)	0.661 (2011)
Nepal	566.5 (1980)	20.57 (1981)	..	132.6 (1980)	8 (1980)	2 (1981)	0.175 (1980)	48.15 (1980)	0.340 (1990)
(low income)	1 101.9 (2011)	59.14 (2008)	..	41.4 (2010)	82 (2010)	86 (2010)	5.00 (2006)	68.39 (2010)	0.458 (2011)
Philippines	2 826.9 (1980)	83.89 (1980)	89 (2001)	51.4 (1980)	47 (1980)	9 (1982)	1.708 (1980)	63.16 (1980)	0.571 (1990)
(lower middle income)	3 630.9 (2011)	95.01 (2008)	88 (2009)	23.2 (2010)	87 (2010)	88 (2010)	0.500 (2009)	68.48 (2010)	0.644 (2011)
Republic of Korea	5 543.57 (1980)	100 (2011)	99 (2001)	15.3 (1980)	61 (1981)	4 (1980)	1.700 (1980)	65.8 (1980)	0.742 (1990)
(high income)	27 541.3 (2011)	..	100 (2009)	4.1 (2011)	94 (2010)	98 (2010)	10.3 (2009)	80.76 (2010)	0.897 (2011)
Singapore	15 115.9 (1980)	82.91 (1980)	..	11.5 (1980)	84 (1980)	47 (1980)	3.956 (1980)	71.9 (1980)	0.801 (2000)
(high income)	53 591.1 (2011)	94.71 (2009)	..	2.1 (2010)	97 (2010)	95 (2010)	3.1 (2008)	81.64 (2010)	0.866 (2011)
Sri Lanka	1 553.05 (1980)	86.7 (1981)	94.15 (1980)	36.8 (1980)	46 (1980)	20 (1985)	2.94 (1980)	68.2 (1980)	0.53 (1980)
(lower middle income)	4 928.99 (2011)	90.5 (2008)	94.38 (2010)	14.2 (2010)	99 (2010)	99 (2010)	3.1 (2004)	74.7 (2010)	0.691 (2011)
Tonga	2 597.9 (1981)	98.9 (1996)	95 (2001)	26.2 (1980)	40 (1980)	91 (1981)	3.449 (1980)	67.55 (1980)	0.649 (1990)
(lower middle income)	4 091.9 (2011)	99.01 (2001)	97 (2009)	13.2 (2011)	99 (2010)	99 (2010)	2.6 (2010)	72.15 (2010)	0.704 (2011)
Vanuatu	2 765.8 (1980)	52.87 (1974)	86.2 (1982)	49.9 (1980)	22 (1980)	20 (1982)	6.17 (1981)	58.5 (1980)	..
(lower middle income)	4 061.9 (2011)	82.03 (2009)	100 (2009)	11.4 (2010)	68 (2010)	52 (2010)	1.7 (2009)	70.8 (2010)	0.617 (2011)

Source: World Bank data table. Available from <http://data.worldbank.org/> (accessed 26 August 2012).

Table A.2. Spending on education and health in selected Asia-Pacific countries

Country	Public spending on education as percentage of total public expenditure	Public spending on education as percentage of GDP	Public spending on health care as percentage of GDP	Public spending on health care as percentage of total public expenditure	Private spending on health care as percentage of GDP
Bangladesh	6.151 (1980) 14.109 (2009)	0.943 (1980) 2.233 (2009)	1.275 (1995) 1.063 (2009)	8.835 (1995) 7.364 (2010)	2.248 (1995) 2.289 (2009)
Fiji	11.34 (1981) 14.723 (2009)	5.046 (1980) 4.480 (2009)	2.252 (1995) 2.513 (2009)	8.011 (1995) 9.399 (2010)	0.852 (1995) 0.901 (2010)
Kiribati	3.13 (1974) 11.60 (2002)	8.97 (1995) 9.26 (2010)	14.86 (1995) 12.08 (2010)	0.46 (1995) 1.99 (2010)
Malaysia	14.67 (1980) 18.93 (2009)	5.72 (1980) 5.78 (2009)	1.43 (1995) 2.151 (2009)	5.323 (1995) 9.207 (2010)	1.595 (1995) 2.65 (2009)
Maldives	7.199 (1986) 16.026 (2010)	2.345 (1986) 8.711 (2010)	3.347 (1995) 5.192 (2009)	9.199 (1995) 8.577 (2010)	5.135 (1995) 2.813 (2009)
Nepal	8.335 (1980) 20.216 (2010)	1.569 (1980) 4.718 (2010)	1.310 (1995) 2.055 (2009)	7.895 (1995) 7.919 (2010)	3.639 (1995) 3.759 (2009)
Philippines	9.127 (1980) 15.048 (2009)	1.719 (1980) 2.652 (2009)	6.268 (1995) 7.552 (2010)	1.363 (1995) 1.332 (2009)	2.085 (1995) 2.489 (2009)
Republic of Korea	12.635 (1998) 15.77 (2008)	3.543 (1980) 5.04 (2009)	1.424 (1995) 4.087 (2010)	7.102 (1995) 12.356 (2010)	2.506 (1995) 2.844 (2010)
Singapore	8.178 (1980) 10.33 (2010)	2.637 (1980) 3.262 (2010)	1.527 (1995) 1.607 (2009)	9.431 (1995) 8.01 (2010)	1.484 (1995) 2.300 (2009)
Sri Lanka	7.667 (1980) 8.075 (2009)	2.704 (1980) 2.056 (2009)	1.631 (1995) 1.789 (2010)	5.490 (1995) 5.767 (2010)	1.865 (1995) 2.169 (2009)
Tonga	.. 13.49 (2003)	10.34 (1984) 3.91 (2004)	3.38 (1995) 4.13 (2010)	9.69 (1995) 12.93 (2010)	1.66 (1995) 0.93 (2010)
Vanuatu	17.39 (1998) 23.7 (2009)	7.64 (1998) 5.17 (2009)	2.19 (1995) 4.75 (2010)	7.97 (1995) 18.19 (2010)	0.76 (1995) 0.49 (2010)

Source: World Bank data table. Available from <http://data.worldbank.org/> (accessed 26 August 2012).

OBSTACLES TO BANK FINANCING OF MICRO AND SMALL ENTERPRISES: EMPIRICAL EVIDENCE FROM THE PACIFIC WITH SOME POLICY IMPLICATIONS

Parmendra Sharma and Neelesh Gounder*

In recognizing on one hand the importance of the micro and small enterprise (MSE) sector for the growth and development of economies in the Pacific subregion and on the other, the financing constraints of the sector, the authors surveyed a group of MSEs in a Pacific island country and found that the sector may be particularly constrained by bank interest rates, fees and charges, and collateral requirements. This situation holds implications for policy, and the authors propose an initiative led by the banking sector to improve the situation. Keeping in mind an economy's specific financial, regulatory, economic and other structures and circumstances, voluntary or mandatory, it seems as if direct or indirect bank involvement appears vital. The implications for economic growth and development are considerable.

JEL Classification: G21, G28, O10, O16, O50.

Key words: Fiji, Pacific, financing obstacles, micro and small enterprises (MSEs), bank loans.

I. INTRODUCTION

Across countries, the small and medium-sized enterprise (SME) sector has been shown to be an essential component for economic growth. Indeed, SMEs usually account for the majority of a country's firms and a significant share of employment (Hallberg, 2001). In the United States, for example, about 40 to 60 per cent of the country's gross national product and 50 per cent of the workforce may well be

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sustained by the SME sector (Neubauer and Lank, 1998). Similarly, across 76 other developed and developing economies, SMEs may account for close to 60 per cent of manufacturing employment; in some cases, the ratios are equivalent to the entire workforce (Ayyagari, Beck and Demirgüç-Kunt, 2007). The case for an important SME-economic activity link is documented and argued in numerous other studies (e.g. Havas, 2002; Klapper, Luc and Raghuram, 2006). In essence, the SME sector has come to be regarded as the “engine of economic development” (Beck and Demirgüç-Kunt, 2006).

On the other hand, across countries, the SME sector appears to be considerably capital constrained as well; not only do SMEs face higher financing obstacles compared with larger firms, the effect of such constraints appears stronger compared with larger firms (e.g. Beck, Demirgüç-Kunt and Maksimovic, 2005; Beck and others, 2006). In view of their economic significance on one hand and perceived/documentated financing constraints on the other, a spate of research has naturally attempted to examine and better understand the nature and extent of such constraints from both the demand and supply perspectives.

While studies on the financing constraints of SMEs have spanned many countries and regions, little systematically documented literature appears available on the subject in the case of the Pacific island economies, a socioeconomically disadvantaged subregion, vulnerable, small island developing States (SIDS) and least developed countries in dire need of economic activity and growth;¹ the Pacific island economies tend to be excluded even from otherwise extensive cross-country studies, such as one by Beck and others (2006), which covers as many as 80 developed and developing countries around the world. Furthermore, economies that fit the foregoing description are likely to have relatively small SME sectors (Snodgrass and Biggs, 1996; Cull and others, 2006). For such economies then, while understanding and addressing the financing constraints of SMEs would indeed be useful, apparently, it would be equally useful to better understand the reasons for the smaller SME sector itself.

Intuitively, it would be financing constraints that in the first place prevent micro and smaller enterprises (MSEs) from expanding and growing into SMEs; as detailed below (section II), in this study, MSEs include registered, licensed, formal enterprises only. Indeed, as Evans and Boyan (1989) point out, lack of access to credit services is

¹ Pacific countries have historically received sizeable amounts of aid from the international community, including the Asian Development Bank and the World Bank and countries such as Australia and France, leading to the argument for that there is little urgency in domestically driven economic activity; however, on the other hand, there is also visible evidence of efforts to improve local living standards via many government-driven reforms and policies.

likely to be an important impediment for starting up a microenterprise and for sustained growth. Accordingly, in the case of economies such as those in the Pacific, in addressing the problems of the SME sector, it appears imperative to also obtain an in-depth understanding of the problems of the MSE sector, which is precisely the purpose of the present study.

This study uses Fiji as a Pacific case study. A number of authors have used Fiji as a representative of the region (e.g. Sharma and Nguyen, 2010; Sharma and Gounder, 2011); among other reasons, Fiji affords expediency in data collection and availability, and the presence of official definitions of enterprise size tends to make Fiji a practical choice in Pacific regional studies. Moreover, Fiji is the second largest country in the subregion in terms of population, and it has a relatively more advanced economic and financial structure. Conceivably, the experience of MSEs elsewhere in the subregion is not likely to be better than Fiji's. In the light of the findings that formal external financing options for firms in Fiji may be extremely limited to bank finance, which in turn appears to be relatively inaccessible (Sharma and Brimble, 2012), this study attempts to understand the following regarding the operation and growth of MSEs in Fiji: (a) the importance of bank finance; and (b) the drivers and obstacles to bank finance. Thus, this study provides a *demand-side* view of financing constraints to the MSE-SME transition; a *supply-side* view has recently been examined by Sharma and Gounder (2011), showing that the main suppliers – banks – may not in fact have a major problem providing the business sector in Fiji with credit.

In addition to filling the above-mentioned void in the literature, our study makes other important contributions. By using survey data on an enterprise's perceived as well as actual financing constraints, we avoid having to imperfectly infer financing constraints from secondary data as some studies have attempted, including those by Fazzari, Hubbard and Petersen (1988) and Kaplan and Zingales (1997). Thus, we are able to assess more accurately the financing constraints of MSEs in Fiji. Moreover, since our survey includes both non-borrowing as well as borrowing enterprises, we are able to evaluate perceptions against actual experiences.

Contrary to the claims of the "pecking order" theory (e.g. Myers, 1984; Holmes and Kent, 1991), our analysis shows that MSEs in Fiji do have a preference for bank finance. At least 50 per cent of the surveyed enterprises had a bank loan and for every single enterprise surveyed, both borrowing and non-borrowing, young and old, bank finance was considered to be a very important source for operation and growth, second only to founders' own capital. For MSEs of any age, preference is not necessarily confined to insider finance. However, costs and certain terms and conditions of borrowing keep these enterprises away from banks; those with current credit contracts may have no other option.

The rest of the paper is organized as follows: section II reviews the extant literature on definitions, significance and financing constraints relating to the MSE-SME transition; section III provides a discussion of the MSE sector in Fiji and the Pacific; section IV discusses the survey; section V presents the results; and section VI contains policy implications and concludes the study.

II. FINANCING THE MSE-SME TRANSITION

Definitions and significance of the study

A micro/small enterprise is commonly defined as one with up to five (or six) employees (Snodgrass and Biggs, 1996; Cull and others, 2006). Often also, these may include unregistered and informal enterprises,² but in this study a micro/small enterprise is defined as a registered, licensed, formal business, capable of running a self-funded operation and qualified to obtain a commercial bank loan. Our definition does not include those whose founders or prospective entrepreneurs have little or no resources to invest in the establishment and operation of the business or those not eligible for a bank loan. An SME, on the other hand, could be an enterprise with up to 250 employees – a definition used in 54 of the 76 developed and developing countries studied by Ayyagari, Beck and Demirgüç-Kunt (2007),³ or one with annual sales between \$200,000 and \$4 million (small; average midpoint, \$2 million) and \$2 to \$16 million (medium; average midpoint, \$9 million) – a definition used commonly by banks across 45 developed and developing countries (Beck, Demirgüç-Kunt and Peria, 2008). Aside from this definition, SMEs are generally regarded as formal enterprises.

While the debate on causality remains unresolved, a large body of literature shows that SMEs matter for a country's economic growth and development; proponents and policymakers are so convinced of this that the sector is widely regarded as the "engine of economic growth and development".⁴ The proponents of the SME-economic growth argue that (a) SMEs enhance competition and entrepreneurship; (b) SMEs are more productive than large firms; and (c) SME expansion boosts employment more than the growth of large firms. On the other hand, numerous studies also have found the sector to be considerably capital constrained, to the extent that inadequate financial resources may well be a primary cause of failure (Van Auken and Neeley, 1996; Coleman, 2000).

² For more detail, see www.microenterpriseworks.org.

³ According to this study, the cut-off could actually range from 200 to 300 in some cases; for most, 250 is the cut-off. For example, in African countries, the cut-off is 200 and in Japan it is 300.

⁴ See Beck and Demirgüç-Kunt (2005) and references therein for a review of different views.

While accepting its economic significance on one hand and appreciating its generic financing constraints on the other, Governments around the world have assumed the responsibility of providing and facilitating financial assistance to the SME sector. A common strategy has been the partial credit guarantee (PCG) scheme. Designed to expand lending to SMEs, a PCG is essentially a risk transfer and diversification mechanism for lowering the risk to the lender by substituting part of the counterparty risk by the issuer, which guarantees repayment of part of the loan in case of a default (Beck and others, 2010). Multilateral organizations such as the World Bank strongly support government efforts to assist local SME sectors. The Bank itself allocates billions of dollars to support SME programmes worldwide; more than \$10 billion over the period 1998-2002 and \$1.3 billion in 2003 alone have been allocated (World Bank, 2002; 2004). The Bank is also actively involved in assisting Governments design strategies for alleviating financing constraints of SMEs.

In the light of the foregoing it would appear that, for economic growth and development, a reasonably large and vibrant SME sector would be highly desirable, especially for underprivileged economies such as those in the Pacific, which characteristically appear to have smaller and less vibrant SME sectors. Size and vibrancy in turn require, *inter alia*, that start-up, micro and smaller firms are able to “transit” to the next stage – into SMEs; however, financing constraints may yet again prove to be a major obstacle.

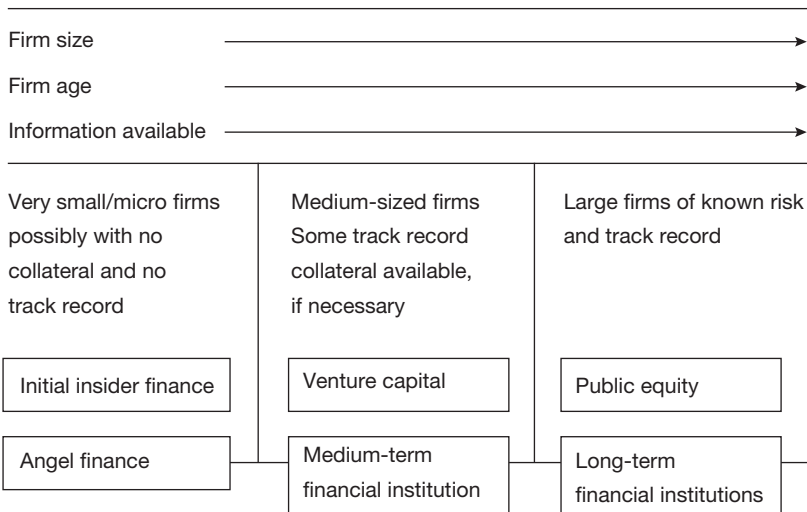
Growth stages, constraints and transitions

Despite some criticisms, life cycle or stage models offer a valuable framework for systematically understanding the lifespan of a business enterprise (e.g. Galbraith, 1982; Kazanjian, 1988). (For comprehensive reviews of stage models, including criticisms, see McMahon (2010) and Davidsson, Achtenhagen and Naldi (2005)). An oft-cited growth model in the literature is one proposed by Greiner (1972), who claims that firms pass through five distinct and distinguishable phases of development. The Hanks and others (1993) model has also received a lot of attention in the literature. Based on a comprehensive review of previous major models, including the Greiner model, Hanks and others (1993) propose four stages: (a) start-up – young, small enterprises with simple organizational structures; (b) expansion – slightly older and larger enterprises with more complex organizational structures; (c) maturity – larger enterprises than in the previous stage with more complex structures; and (d) diversification – the highest level of entrepreneurship.

Essentially, stage models commonly propose that enterprises “transit” gradually from one stage to another such that most, if not all, firms do start small. However, the models also claim that the transitional process can often be highly challenging – firms experience typical problems of a particular stage of growth; those able to resolve the problems are usually able to transit to the next stage, but others may be forced to exit the business environment altogether or remain ever small. This phenomenon appears well articulated by Berger and Udell (1998), a financial growth model to which the literature frequently refers. The authors propose a three-stage firm growth model: very small; medium-sized and large firms (figure 1).

As figure 1 illustrates, according to this model, the transition from the very small to the large firm stage is determined largely by access to “confined” sources of finance. For example, in the case of a very small firm, survival and transit to the medium-sized stage would be determined importantly by the availability and the firm’s accessibility to insider finance (founder capital, trade credit, etc.) and so-called angel finance. Thus, in the absence of “angels”, a very small firm can rely only on insider finance; the model predicts that at this stage, external debt, such as a bank loan, is highly unlikely due mainly to the firm’s size, age and operational opacity.

Figure 1. Financial growth cycle



Source: Model adapted from Berger and Udell (1988).

Firm characteristics vis-à-vis financing constraints

The claim of Berger and Udell (1998) that size and age limit a firm's access to finance has been contested by other researchers. Gregory and others (2005), for example, find that size may be merely an indicator in decisions relating to selecting between insider financing and longer-term debt/public equity (LTD/PE), and may not even predict the use of venture capital/medium-term debt (VC/MTD) versus LTD/PE. The authors also show that younger, not older firms, contrary to the proposal of Berger and Udell (1998), are more likely to use PE/LTD than VC/MTD; the paradox can be explained perhaps by the lack of adequate growth in older firms. Birch and others (1999) agree that it is the younger growth firms that may be able to secure the more attractive financing forms. Unlike the case of their larger counterparts, financing for smaller enterprises is anything but standardized; funding sources for small enterprises may range from internal injections to debt financing. Gregory and others (2005) contend that, since small enterprises may be characteristically different, predicting financing sources based on firm characteristics may not be very useful. Essentially, the study by Gregory and others (2005) demonstrates that enterprise growth cycles cannot be collapsed into a universal model; indeed Berger and Udell (1998) admit that their model may not fit all types of small businesses.

Financing constraints and the MSE-SME transition

Notwithstanding the debate on firm characteristics vis-à-vis financing constraints, the MSE-SME transition is likely to be importantly constrained by the lack of access to external finance (Beck, Demirgüç-Kunt and others 2005; Beck and others, 2006). In a worldwide survey of 80 countries and 10,000 executives, Schiffer and Weder (2001) showed that smaller firms reported higher levels of growth obstacles compared with medium or larger firms. A 2002-2003 World Bank survey confirms that large firms generally have greater access to bank credit compared with smaller firms, which are compelled to depend largely on internal funds and retained earnings for survival and growth.⁵ Arguably, a number of factors, including "relationship lending", based primarily on "soft" information gathered via extensive laborious and costly processes to mitigate opacity problems, perceived diseconomies of scale and lower profitability opportunities might discourage banks from lending to smaller firms (e.g. Beck, Demirgüç-Kunt and Peria, 2008).

The survey also shows that the level of access to external finance may differ across countries – the share of small firms with no external finance ranged from 19 to

⁵ See <http://research.worldbank.org/ics/jsp/index.jsp>. The survey included 38 developing countries across Europe, Asia, Africa and Latin America.

73 per cent. Similarly, Beck and others (2006) found, in a study spanning 80 countries and 10,000 firms, that there was a 39 per cent probability that a small firm would rate financing as a major obstacle (as opposed to minor, moderate, or no obstacle) compared with 38 per cent for medium and 29 per cent for large firms. Further, compared with large firms, small firms finance, on average, 13 percentage points less of their investments with external finance.

More recently, Beck, Klapper and Mendozae (2010) noted that, while domestic credit to the private sector has generally been increasing in most developing countries, anecdotal and statistical evidence suggest that smaller enterprises continue to be largely left out. The higher financing obstacles reported by smaller firms across developing and developed economies is consistent with both anecdotal evidence as well as the theory's predictions. Smaller firms typically need smaller loans, but greater opacity and collateral problems usually translate into higher risk premiums. Consequently, smaller firms grow much more slowly, if at all (Beck, Demirgüç-Kunt and Maksimovic, 2005).

While these studies confirm that smaller firms may have more difficulties in accessing external finance, they do not per se show nor suggest that smaller firms are completely deprived of external finance. In this respect, a large number of studies have also attempted to examine and understand the reasons for the lower degree of access to external finance by smaller firms. Our study explores the financing situation of MSEs in the Pacific, a sector and subregion largely ignored in the literature to date; even wide cross-country studies appear to have missed out on these economies. The study examines, from a demand perspective, the drivers and obstacles to *bank* finance - the overwhelmingly dominant form of external financing option for enterprises in Fiji.

III. THE CONTEXT OF THE STUDY: MICRO AND SMALL ENTERPRISES IN THE PACIFIC

According to the classification of the Secretariat for the Pacific Community, the Pacific subregion comprises, among others, Cook Islands, Fiji, Guam, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.⁶ According to ESCAP, these economies also fall into a group of "countries with special needs"; more specifically, they are categorized as small island developing States (SIDS); some,

⁶ For a full list of countries and territories in the region, see www.spc.int/en/about-spc/members.html and table A.1 in the annex.

including Kiribati, Samoa, Solomon Islands, Timor-Leste, Tuvalu and Vanuatu, are also classified as least developed countries.⁷

A small island developing State is typically an economy with a narrow resource base; small markets; heavy reliance on a few external and remote markets; high costs of energy, infrastructure, transportation, communication and servicing; little resilience to natural disasters; fragile natural environments; and limited opportunities for the private sector.⁸ Similarly, a least developed country is an economy characterized typically by extreme poverty, structural economic weaknesses, lack of capacity to grow, acute susceptibility to external economic shocks and natural and man-made disasters. Generally, these economies together are also classified by the World Bank as “lower middle income” economies; table A.1 in the annex provides more information on their characteristics.

Against this backdrop, across the Pacific, it would not be hard to imagine a private sector comprising numerous MSEs, few large companies and a small SME sector; essentially, a fairly different size distribution of firms compared with developed and larger developing economies – a point made also by Snodgrass and Biggs (1996). In Samoa, for example, apart from some State-owned enterprises and a few large private companies, enterprises are usually micro, small or medium-sized. MSEs remain small for relatively extended periods of time. Most enterprises that start small also tend to stay small, with only a few graduating to medium or large size (UNCTAD, 2001).⁹ Moreover, MSEs are not only important for growth and development in the Pacific but across Asia as well. Despite a lack of official statistics, available data show that in some countries up to 93 per cent of establishments in the manufacturing sector operate with fewer than five workers.¹⁰ In fact, in some cases, such as Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu, a generally held perception that most, if not all, enterprises are small or medium-sized has resulted in no official classification of enterprises.

However, lack of access to finance for MSEs is likely to be a deeper problem in these economies, resulting, among other things, in a relatively small SME sector. Indeed, AusAID’s *Pacific 2020* report highlights that “credit (in the Pacific) is difficult or

⁷ See www.unescap.org/pdd/about_csns.asp.

⁸ See www.unohrrls.org/en/ldc/25/.

⁹ It may be noted here that in the Pacific, considerations other than mainly profit maximization, such as social considerations, could be a reason for this, among others.

¹⁰ For further details, see <http://beta.adb.org/publications/key-indicators-asia-and-pacific-2009?ref=countries/cook-islands/publications>.

impossible to obtain for all but the largest businesses” (AusAID, 2006). Credit appears to be available only at affordable cost conditional upon acceptable collateral; for start-up firms as well as existing businesses with a good track record, collateral requirements may severely limit access to credit, and can raise the cost of borrowing to unaffordable levels – possibly, the problems could be compounded by foreign-based criteria for credit assessments applied by the mostly foreign, mainly Australian, banks in the subregion. To understand the financing problems of MSEs in the Pacific, we use Fiji as a case study.

The official definition of a micro enterprise in Fiji is one adopted by the Reserve Bank of Fiji (RBF), and includes the following: a “microenterprise” is one with a turnover or total assets not exceeding 30,000 Fijian dollars (\$16,000 equivalent) and employs not more than five employees. Similarly, SMEs are defined as follows: (a) a “small enterprise” is one with a turnover or total assets between FJD 30,000 and FJD 100,000 (\$55,000) that employs between 6 and 20 employees; and (b) a “medium enterprise” as one with a turnover or total assets between FJD 100,000 and FJD 500,000 (\$272,000) that employs between 21 and 50 employees (RBF, 2009).

Apparently, the scaling is much smaller in the case of Fiji and across the rest of the Pacific – a direct reflection of the size of the economies – small island States – attributes that make this study interesting and useful. While the microenterprise definition based on number of employees appears more or less consistent with the definition used elsewhere, that of an SME is very different; the 250 employee cut-off (Ayyagari, Beck and Demirgüç-Kunt, 2007) or the annual sales (Beck, Demirgüç-Kunt and Peria, 2008) definitions of an SME used in a number of other countries may well define a large enterprise in the case of Fiji.

Formal external finance for MSEs in Fiji is likely to be synonymous with bank finance (Knapman and others, 2001; Sharma and Nguyen, 2010; Sharma and Brimble, 2012). Further, it appears that financing the private sector may not generally be a major problem for banks (Sharma and Gounder, 2011). However, it also appears that banks may not be interested in financing all types of firms; MSEs in particular may be a disadvantaged sector, which, according to the extant literature, is not surprising. Official schemes to alleviate financing constraints of MSEs in Fiji include a requirement by RBF, effective January 2010, that regulated commercial banks have in place separate “microfinance units” to focus on providing “a broad range of financial services such as deposits, loans, payments services, money transfers and insurance to micro and small enterprises” (RBF, 2009). In doing so, banks are expected to “work closely with the community, its leaders and potential clients and identify opportunities for extending financial services to MSEs and assisting their businesses”.

In managing the microfinance-related operations, banks are expected to even adapt their systems and lending procedures, including creating separate systems, products, loans procedures, staffing policies and governance necessary to achieve the goals of the scheme. Specifically, banks' microfinance units are expected to, among others:

- (a) Introduce appropriate products and services to better fit micro and small enterprise clients;
- (b) Locate other points of service in areas best suited for offering microfinance products and services, and utilize part-time and mobile branches where demand does not warrant a full-time, fixed branch;
- (c) Change prices (e.g. interest rates charged on different loan products);
- (d) Pursue other initiatives for the achievement of the microfinance unit's core objectives.

In monitoring the requirements of the scheme, RBF requires banks to submit regular reports demonstrating how they have endeavoured to fulfil the requirements of the scheme, including the number and value of new and total loans to MSEs per reporting period (quarterly). These reports are expected to be aligned with other report items submitted to RBF, which also monitors the deposit activities of MSEs. However, while data on a broad range of bank loans and deposit activities are publicly available, those on deposit and loan activities relating to MSEs do not appear to be publicly available yet.

IV. THE SURVEY

The data for this study were gathered via an opinion survey of MSEs in Fiji. Given that banks are the main, and usually sole, source of external finance for these enterprises, the questionnaire was designed to capture views of respondents on obstacles to *bank* finance. It may be that an MSE may or may not have a bank loan; accordingly, questions were designed to capture views relating to both possible situations. To determine if a respondent had a bank loan or not, we asked the question: "does your business have a loan with a bank?" A "yes" response directed the respondents to a particular set of subsequent questions where opinion was sought on issues relating to having a loan or applying for more loans. Specifically, participants were asked to respond to the following overall question: "do you consider any of the following to be a problem with your current loan or in applying for more loans?",

followed by a list of possible problems, including costs, collateral and disclosure requirements; these are commonly included in studies examining financing obstacles (e.g. Beck and others, 2006)

Where the answer to the question: “does your business have a loan with a bank?” was “no”, the respective respondent was directed to a different set of subsequent questions; in addition to a “yes” or “no” option, respondents could also decide not to participate in the survey any further by taking a third option, “not relevant”. In this case, the intention was to understand the reason(s) for not having a bank loan; specifically, the question asked was: “if you do not have a bank loan, is it because or due to...” followed by a list of possible reasons, including, self-exclusion, lack of information, unfamiliarity with banks, and loan processes and procedures, and costs. To guard against the bias of respondents, more than one question was created for a particular response. The question was phrased in different styles and consistency of answers was checked to ensure the responses were unbiased.

In responding to the specific questions in relation to either situation, as described above, respondents were asked simply to select the choice that best expressed their response from a pre-determined set of options, confined to “yes”, “no”, or “maybe” with an option also of not answering a question if it was not relevant or the respondent was not sure of the response. As required by Griffith University’s Ethics Committee, respondents were conspicuously advised that the interviews and data processing would be strictly confidential, that their anonymity would be safeguarded at all times and that only aggregate results would be published; these assurances considerably facilitated the data gathering exercise – respondents felt practically unconstrained in sharing their views.

In addition to the above, the survey endeavoured to ascertain the importance of bank loans, relative to other sources, for the operation and growth of an MSE. Respondents were asked to rate, on a scale of 1 (not important) to 7 (very important), the importance of a number of sources of funds expected to be used by MSEs in developing economies, including founder’s capital, loan/equity from family/friends, trade/other creditors, money lenders, bank/non-bank finance and retained earnings.

Recognizing that enterprise characteristics may influence external funding opportunities, an attempt was made in the survey to obtain information also on such issues as business type/sector, date of incorporation, place of business, number of employees, ownership type, ethnicity of founding owners and education level of main owners/managers. Opacity and information asymmetries are likely to be particularly large for young and newly established enterprises compared with older and more established ones as they may not have had sufficient time to develop the desirable

long-term relationship with banks for financing purposes (Gertler, 1998).

In total, we obtained complete and valid data on 77 enterprises operating in the wider capital city area of Suva and neighbouring business areas. Of the 77, most turned out to be owned by people of Indian ethnicity (69 per cent); this is hardly surprising as it is common knowledge that the Indian community dominates commerce in Fiji. What is surprising though is that almost half (45 per cent) of those interviewed had tertiary education, with the rest (55 per cent) having at least secondary education. Of the enterprises surveyed about 44 per cent turned out to be relatively new (up to 5 years old); 39 per cent were 6 to 10 years old; 17 per cent 11 to 15 years old and one was more than 15 years old. All of the surveyed enterprises had up to five employees.

V. RESULTS AND DISCUSSION

Importance of bank finance

To understand the importance of bank finance relative to various other sources, we asked the question: “on a scale of 1 (not important) to 7 (very important), how would you rate the importance of (the listed) sources of funds for the operation and growth of your business?”, where the term banks included Australia and New Zealand Banking Corporation Limited; Bank of Baroda; Bank of South Pacific Limited; and Westpac Banking Corporation Limited, that is, all banks in Fiji. Overall, founders’ own capital appears to be a very important source of finance; the average score here was 7.00, or very important for each and every enterprise surveyed. The next more important source appears to be retained earnings; the average score here was 6.94, almost on par with founders’ capital, followed by trade creditors at 6.73. Although ranked as the fourth (out of nine) most important source overall, the average of 6.61 indicates that bank finance is also regarded as a relatively important source of finance for MSEs. For fully three quarters of the enterprises, bank finance was very important (score of 7); if we include the score of 6 in the very important category, the proportion of enterprises indicating bank finance as very important jumps to an astounding 97 per cent. Thus, by and large, bank finance is a relatively important financing source for MSEs in Fiji.

In the light of this observation, the above-mentioned results indicate that having a bank loan or not does not materially influence an enterprise’s opinion regarding the importance of bank finance for the operation and growth of business; bank finance appears to be important regardless. Further, 77 per cent of those currently without a bank loan indicated that they would borrow from a bank if they could. These findings lead to the questions of (a) why may many MSEs be without a bank loan; (b) can the

experience of those currently with a bank loan be used to encourage those without, to obtain a bank loan; and (c) what would be the implications of answers to the foregoing for economic activity?

Why are many microenterprises without a bank loan?

To understand why an enterprise may not have a bank loan even when a bank loan is considered relatively important regardless, we asked respondents a set of questions compiled via a review of the literature; about 22 possible reasons were listed.

Table 1. Responses of respondents to the question: “if you *do not* have a bank loan, is it because or due to (list provided)”

Panel A

Response	Interest (percentage)	Fees (percentage)	Collateral (percentage)	Paper (percentage)	Disclose (percentage)	Contribute (percentage)
Yes	91.89	90.19	94.59	94.59	91.89	91.89
No	0.00	2.70	0.00	2.70	0.00	2.70
Maybe	8.11	8.11	5.41	2.70	8.11	5.41
Not sure	0.00	0.00	0.00	0.00	0.00	0.00

Panel B

Response	Get loan (percentage)	Loan type (percentage)	Apply (percentage)	Info (percentage)	Repay (percentage)	Refused (percentage)
Yes	27.03	10.81	5.41	16.22	8.11	21.62
No	72.97	89.19	94.59	81.08	89.19	78.38
Maybe	0.00	0.00	0.00	2.70	0.00	0.00
Not sure	0.00	0.00	0.00	0.00	2.70	0.00

Panel A of the table shows that most respondents (over 90 per cent) were concerned with interest rates, fees and charges, collateral, paperwork, disclosure and own contribution requirements in obtaining a bank loan. For example, 91.89 per cent were concerned with the level of interest rates.

Panel B of the table shows that, on the other hand, most respondents were not too concerned that they would not be able to get a loan (get loan), knew what loan type they required (loan type), knew how to apply (apply), could collect the required information (info) and did not appear to have major concerns regarding the repayment process (repay). For example, only 5 per cent were not sure how to apply and 8 per cent were not sure about the repayment process.

It is clear from the responses obtained that the surveyed enterprises currently without a bank loan are concerned mainly about the banks' collateral, paperwork, disclosure and own contribution requirements, interest, and fees and change; with respect to each of these, more than 90 per cent of the responses was an emphatic "yes" to the question: "if you do not have a bank loan, is it because or due to (list provided)". In the case of interest rates, collateral and disclosure, every single respondent believed that these were unreasonable. Approximately 3-8 per cent of the respondents appeared undecided on paperwork, own contribution and fees and charges; where a "no" response was recorded, these constituted very small proportions – only about 3 per cent did not believe that fees and charges, paperwork and own contribution were unreasonable (table 1, panel A). Other issues of concern related to terms and conditions of bank credit (83 per cent) and repayment schedule/method (81 per cent).

On a positive note, the surveyed enterprises without a bank loan appeared relatively knowledgeable and optimistic about getting into a credit contract with a bank. For instance, only 5 per cent appeared to have difficulties in applying for a loan. Similarly, only about 11 per cent appeared to be ill-informed about the type of loan for which they would like to apply (table 1, panel B). Further, 16 per cent indicated they would have trouble gathering the required information. About 27 per cent had doubts about being successful in obtaining a loan if they applied. Past refusal did not appear a major deterrent; only 21 per cent may have been refused a loan in the past.

The experience of microenterprises *with* a bank loan

Our analysis shows that many of the surveyed enterprises would like to borrow from a bank for the operation and growth of their businesses but adverse perceptions regarding loan requirements and cost structures appear to keep them away from banks. It is possible that these perceptions are not valid, and that the actual

experience of those with a bank loan may be different and positive, which could be used to encourage enterprises without a loan to borrow. Accordingly, this section analyses the experience of the surveyed enterprises currently *with* a bank loan.

With respect to the major perceived concerns of the enterprises without a bank loan, it appears unlikely that the experience of those with a bank loan would be of much help; the perceptions of the former may, in fact, be valid. Of the surveyed enterprises with a bank loan, every single respondent considered interest rates to be problematic; the answer to the question: “if you have a bank loan, do you consider (interest rates) to be a problem with your current loan or in applying for more loans” was an emphatic “yes” for fully 100 per cent of the respondents (table 2). Equally concerning were banks’ disclosure requirements; again 100 per cent of the respondents considered this to be a problem. Collateral and paperwork requirements also seem to be major problems; in both cases, while less than 100 per cent, i.e. 97.5 per cent considered these to be problematic, none of the respondents believed that they were not problematic – the others (2.5 per cent) were undecided.

Among other major concerns were own contribution requirements (95 per cent) and fees and charges (90 per cent); the remaining respondents (5 per cent and 10 per cent, respectively) were undecided, i.e. again none considered these to be trouble-free. Moreover, the practical experiences of the borrowing enterprises regarding some other issues appear also not to be very encouraging. For instance, 75 per cent indicated that complying with the terms and conditions of the loan was constantly challenging and 65 per cent were unhappy with what they described as very rigid repayment policies; only 5 per cent and 22.5 per cent, respectively, did not agree. Also, at least half of the borrowers believed that the attitude of banks was not desirable.

Table 2. Responses of respondents to the question: “if you *have* a bank loan, do you consider the following to be a problem with your current loan or in applying for more loans (list provided)”

Response	Interest (percentage)	Fees (percentage)	Collateral (percentage)	Paper (percentage)	Disclose (percentage)	Contribute (percentage)
Yes	100.00	90.00	97.50	97.50	100.00	95.00
No	0.00	0.00	0.00	0.00	0.00	0.00
Maybe	0.00	10.00	2.50	2.50	0.00	5.00
Not sure	0.00	0.00	0.00	0.00	0.00	0.00

As the table shows, those with a bank loan have or may have greater concerns regarding interest rates, fees and charges, collateral, paperwork, disclosure and own contribution requirements in obtaining a bank loan. For example, every single respondent (100 per cent) indicated that interest rates were a concern, compared with 92 per cent of those without a bank loan (see table 1, panel A).

Additional analysis: regression results

In addition to the above analysis, we conducted a regression analysis of the determinants of bank loans. Since the respondents included both enterprises with and without a bank loan, we were able to utilize a discrete choice model to determine the factors that may be significant in explaining the chance of getting a loan. Thus, to examine if business characteristics, such as age, ownership (family or non-family) and founder’s ethnicity, might have any significant influence on perceptions, we ran a regression using the following probit model:

$$y^*_i = x_i \beta + \epsilon_i$$

where, y^*_i is the unobserved latent variable, x_i is a set of observed characteristics, and ϵ_i the unobserved characteristics. The dependent variable y^*_i is a discreet variable that represents a choice from a set of mutually exclusive choices. The probit model is a popular tool for explaining binary choice decisions, such found as in our survey.

In tables 3 and 4, DATE represents the year of incorporation of the firm; EDUC equals 0 if the firm’s owner/manager obtained a primary education, 1 for a secondary education and 2 for a tertiary education; NON-FIJIAN is a dummy variable which equals

1 if the founding owner is non-Fijian and 0 otherwise; and FAMILY-OWNED is a dummy variable which equals 1 if the firm's ownership type is family-owned and 0 otherwise.

The results from the binary probit regressions are shown in table 3. The only variable which is significant (at the 5 per cent level) is the type of ownership (FAMILY-OWNED). We checked the robustness of the results through binary extreme value regressions. The results from binary extreme value are shown in table 4. The sign and significance of the variables remain the same, except that the FAMILY-OWNED variable is now significant at the 10 per cent level. These results suggest that non-family-owned businesses are likely to be relatively more disadvantaged when applying for a loan, i.e. the probability of not getting a loan for this group may be higher. One possible reason for this result could be that family-owned businesses may be able to provide family assets as collateral to enhance the chances of getting a loan.

Table 3. Binary probit

Variable	Coefficient	z-Statistic	Prob.
Constant	-1.970791	-1.853820	0.0638
DATE	-0.190641	-0.966116	0.3340
EDUC	-0.229862	-0.943473	0.3454
NON-FIJIAN	0.276028	1.156788	0.2474
FAMILY-OWNED	1.426407	2.035871	0.0418
McFadden R ²	0.078469		
No. of firms	77		

Table 4. Binary extreme value

Variable	Coefficient	z-Statistic	Prob.
Constant	-2.241803	-1.489235	0.1364
DATE	-0.176159	-0.799731	0.4239
EDUC	-0.302731	-1.028828	0.3036
NON-FIJIAN	0.329087	1.088199	0.2765
FAMILY-OWNED	1.910078	1.684370	0.0921
McFadden R ²	0.076984		
No. of firms	77		

VI. POLICY IMPLICATIONS AND CONCLUSION

The wide acceptance that the SME sector matters for economic growth and development and the findings at the same time that the sector may be considerably capital-constrained has resulted in many single and cross-country studies examining the nature and extent of such constraints from both the demand and supply perspectives. However, little systematically documented literature appears available on the subject in the case of the Pacific, a socioeconomically disadvantaged subregion, with vulnerable, small island developing States and least developed countries in dire need of economic activity and growth. Furthermore, economies that fit the foregoing description are likely to have relatively small SME sectors. For such economies then, while understanding and addressing the financing constraints of SMEs would indeed be useful, apparently equally useful would be to better understand the reasons for the smaller SME sector itself.

The smaller SME sector in turn is a result of financing constraints that in the first place prevent micro and smaller enterprises from expanding and growing into an SME; an in-depth understanding of the financing problems of the MSE sector then is equally important, and is the purpose of this study. In this study an MSE is defined as a registered, licensed, formal business, with up to five (or six) employees, capable of running a self-funded operation and qualified to obtain a commercial bank loan; excluded are unregistered and informal enterprises and those founders or prospective entrepreneurs with little or no resources to invest in the establishment and operation of the business or those not eligible for a bank loan.

Fiji is selected as a representative of the Pacific island economies; the choice was influenced also by the expediency of data collection and presence of official definitions of enterprise size – many economies in the region do not have official definitions. Data were collected via a survey of 77 MSEs. In recognizing also that commercial banks would constitute the major source of external finance for MSEs in Fiji, the survey focused on financing constraints of these enterprises with respect to bank credit.

Of the surveyed enterprises, 97 per cent indicated that banks were a very important source of funds for the operation and growth of their businesses. Analysis of the data clearly shows that, for both enterprises with and without bank loans, the main concerns relate to banks' collateral, paperwork, disclosure and own contribution requirements, and interest and fees and charge. For example, in the case of those without a bank loan, with respect to each of the foregoing variables, more than 90 per cent of the responses was an emphatic "yes" to the question: "if you do not have a

bank loan, is it because or due to (list provided)”. More interestingly, 90 per cent of those currently with a bank loan indicated that they would borrow from anywhere but a bank if they had a choice. The proportion of enterprises with or without a bank loan turned out to be about the same.

Does this indicate that these MSEs (and perhaps other firms) are stuck with banks? Perhaps they would like to terminate the contract but are not able to do so. We also note that founders’ capital, retained earnings, creditors and loan from family/friends are, on average, relatively important sources of funds for both current bank borrowers as well as non-borrowers. Perhaps the non-borrowers do as much as they can with these internal sources of funds, i.e. any expansion to the business would have to be limited to available internal funds. Perhaps the more venturesome would endeavour to seek funds from non-internal sources such as banks but expansion becomes constrained by adverse experiences.

While our survey is limited to only 77 MSEs and confined to a particular geographical setting, we believe that MSEs across not only Fiji but elsewhere in the Pacific subregion might have similar experiences, or possibly worse ones. An important implication of our findings then is that MSEs across the Pacific, with little track record, little or no “acceptable” collateral and little or no contribution to make towards the loan, would have considerable difficulty in obtaining finance from the formal financial sector. If banks are the main source of formal external finance, such as in Fiji, then many SMEs are likely to remain ever small and/or gradually die. More importantly, this would not help the MSE-SME transition. Accordingly, the SME-sector-stimulated economic activity for these economies is likely to be considerably limited, having adverse implications for economic growth, an issue already of major concern for these economies.

A number of policy implications emerge. Given the Pacific subregion’s adverse geographic, demographic and other socioeconomic structures, financing the widely dispersed and sometimes isolated MSEs might create formidable challenges to any service provider. However, there would also be many MSEs which are more “reachable”, such as those surveyed in this study. The latter group constitutes those located within a reasonable proximity to the local business centre. We provide policy suggestions for this group.

With respect to the “reachable” MSEs, banks, via their branch operations, may be required to provide affordable and suitable financial products, including credit to these enterprises. Requiring banks to allocate credit to a particular sector is not a new concept across the Pacific, including in Fiji; mandatory sectoral lending has been

used in the past to create jobs and enhance economic growth. In fact, a recent survey by the Consultative Group to Assist the Poor identified many banks and other financial institutions engaged in microfinance; many are entering the market attracted by sustainable profits and growth opportunities.

While existing and established branch networks, among others, give commercial banks a comparative advantage in reaching out to the more “reachable” MSEs, prudence requires that banks properly understand the underlying characteristics of the MSE market. Generally, banks may increase (voluntarily or otherwise) their involvement in the SME market directly or indirectly. Selecting the approach most suitable for the bank and the local circumstances is important, since each has a particular set of rational, risk profile, success factors and costs (CGAP, 2005).

Under the direct approach, a bank may form a specialized unit (an internal microfinance unit) to manage SME-related activities – the Fiji model; a bank may also form a separate legal entity (specialized financial institution) to undertake SME activities or it may form a non-financial legal entity (service company) to provide loan origination and portfolio management services. The indirect approach involves working with existing providers. Here, a bank may contract a credible monetary financial institution (MFI) to originate and service loans in return for an income (outsource retail operations, similar to outsourcing automated teller machine (ATM) transactions) or provide a term loan or line of credit to an MFI for working and/or lending capital (providing commercial loans to MFIs) or provide infrastructure and services to an MFI.

All of the above approaches are feasible and there are many examples of success. The success of the Fiji model is yet to be determined; the Reserve Bank of Fiji has not disclosed the rationale for selecting the direct, internal unit approach for the country. It may also be noted that the new regulations are likely to increase costs of banks, which in turn are likely to be passed on to customers. Perhaps there has been a need to better understand the MSE market, as this study highlights. Perhaps the banks need to work in partnership with existing MFIs, which have an extensive knowledge base and good rapport with the target clients. Perhaps, wider consultation in selecting the approach would have been useful.

The selection of the approach may indeed take into account an economy’s specific financial, regulatory, economic and other structures and circumstances but, in alleviating the financing constraints of the MSE sector in the Pacific, including in Fiji, a banking-sector-led initiative appears workable and vital. While banks may voluntarily wish to take advantage of the opportunities in providing financial services to the sector,

the seriousness of the situation justifies mandatory involvement. Bank involvement implies developing products appropriate for the target clientele. Effective delivery in turn would require adapting systems and procedures and providing specialized staff training and incentives. Moreover, the vision and commitment of the bank management and board, and the regulator appear vital.

REFERENCES

- Australian Agency for International Development (AusAID) (2006). *Pacific 2020: Challenges and Opportunities for Growth*. Available from www.ausaid.gov.au/publications/pdf/pacific2020.pdf. Accessed November 2011.
- Ayyagari, M., T. Beck, and A. Demirgüç-Kunt (2007). Small and medium enterprises across the globe. *Small Business Economics*, vol. 29, p. 415.
- Beck, T., and A. Demirgüç-Kunt (2005). Small and medium-size enterprises: overcoming growth constraints. Policy Research Working Paper, No. WPS3127. Washington, D.C.: World Bank.
- _____ (2006). Small and medium-size enterprises: access to finance as a growth constraint. *Journal of Banking and Finance*, vol. 30, No. 11, pp. 2931-2943.
- Beck, T., A. Demirgüç-Kunt, and V. Maksimovic (2005). Financial and legal constraints to firm growth: does size matter? *Journal of Finance*, vol. 60, pp. 137-177.
- Beck, T., A. Demirgüç-Kunt, and M.S.M. Peria (2008). Bank financing or SMEs around the world: drivers, obstacles, business models, and lending practices. Policy Research Working Paper, No. WPS4785. Washington, D.C.: World Bank.
- Beck, T., L.F. Klapper, and J.C. Mendozae (2010). The typology of partial credit guarantee funds around the world. *Journal of Financial Stability*, vol. 6, pp. 10-25.
- Beck, T., and others (2006). The determinants of financing obstacles. *Journal of International Money and Finance*, vol. 25, pp. 932-952.
- Berger, A, and G. Udell (1998). The economics of small business finance: the roles of private equity and debt markets in the financial growth cycle. *Journal of Banking and Finance*, vol. 22, pp. 613-673.
- Birch, D., and others (1999). *Corporate Demographics*. Cambridge, MA: Cognetics.
- Coleman, S. (2000). Access to capital and terms of credit: a comparison of men- and women-owned small businesses. *Journal of Small Business Management*, vol. 38, No. 3, pp. 37-53.
- Consultative Group to Assist the Poor (CGAP) (2005). Commercial banks and microfinance: evolving models of success. Available from www.cgap.org/gm/document-1.9.2572/FN28.pdf. Accessed June 2011.
- Cull, R., and others (2006). Historical financing of small- and medium-size enterprises. *Journal of Banking and Finance*, vol. 30, pp. 3017-3042.
- Davidsson, P., L. Achtenhagen, and L. Naldi (2005). Research on small firm growth: a review. Proceedings of the European Institute of Small Business, pp. 1-28.
- Evans, D.S., and J. Boyan (1989). An estimated model of entrepreneurial choice under liquidity constraints. *Journal of Political Economy*, vol. 97, No. 4, pp. 808-827.
- Fazzari, S.M., R.G. Hubbard, and B.C. Petersen (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, vol. 1988, No. 1, pp. 141-206.
- Galbraith, J. (1982). The stages of growth. *Journal of Business Strategy*, vol. 3, No. 1, pp. 70-79.
- Gertler, M. (1988). Financial structure and aggregate economic activity: an overview. *Journal of Money Credit and Banking*, vol. 20, No. 3 (part 2), pp. 559-588.
- Gregory, B.T., and others (2005). An empirical investigation of the growth cycle theory of small firm financing. *Journal of Small Business Management*, vol. 43, No. 4, pp. 382-392.

- Greiner, L.E. (1972). Evolutions and revolutions as organisations grow. *Harvard Business Review*, vol. 50, No. 4, pp. 37-46.
- Hallberg, K. (2001). A market-oriented strategy for small and medium-scale enterprises. Discussion Paper, No. 48. Washington, D.C.: International Finance Corporation.
- Hanks, S.H., and others (1993). Tightening the life-cycle construct: a taxonomic study of growth stage configurations in high-technology organisations. *Entrepreneurship Theory and Practice*, vol. 8, No. 2, pp. 5-29.
- Havas, A. (2002). Does innovation policy matter in a transition country? The case of Hungary. *Journal of International Relationships and Development Policy*, vol. 4, pp. 380-402.
- Holmes, S., and P. Kent (1991). An empirical analysis of the financial structure of small and large Australian manufacturing enterprises. *Journal of Small Business Finance*, vol. 1, No. 2, pp. 141-154.
- Kaplan, S., and L. Zingales (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics*, vol. 112, No. 1, pp. 169-215.
- Kazanjian, R.K. (1988). Relation of dominant problems to stages of growth in technology-based new ventures. *Academy of Management Journal*, vol. 31, No. 2, pp. 257-279.
- Klapper, L.F., L. Luc, and R. Raghuram (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics*, vol. 82, pp. 591-662.
- Knapman, B., and others (2001). *Financial Sector Development in Pacific Island Member Countries: Country Reports*. Manila: Asian Development Bank.
- McMahon, G.P. (2010). The stage of SME growth reconsidered. Research Paper Series 98-5. Adelaide: School of Commerce, Flinders University of South Australia.
- Myers, S.C. (1984). The capital structure puzzle. *Journal of Finance*, vol. 34, No. 3, pp. 575-592.
- Neubauer, F., and A.G. Lank (1998). *The Family Business: Its Governance and Sustainability*. London: Macmillan Press.
- Reserve Bank of Fiji (RBF) (2009). Banking supervision policy statement No.14: minimum requirements for commercial banks on internal microfinance divisions and units. Available from www.reservebank.gov.fj/docs/Banking%20Supervision%20Policy%202014.pdf. Accessed January 2011.
- Schiffer, M., and B. Weder (2001). Firm size and the business environment: worldwide survey results. Discussion Paper, No. 43. Washington, D.C.: International Finance Corporation.
- Sharma, P., and M. Brimble (2012). Sustainable development in the small states of the South Pacific: toward a corporate social responsibility for international banks in small economies. Discussion Papers Finance, No. 2012-11. Brisbane, Australia: Griffith Business School, Griffith University.
- Sharma, P., and N. Gounder (2011). Supply side obstacles to financing the private sector: empirical evidence from a small island developing state. Discussion Paper Finance, No. 2011-01. Brisbane, Australia: Griffith University.
- Sharma, P., and T. Nguyen (2010). Law and banking development in a South Pacific island economy: the case of Fiji, 1970-2006. *Journal of Asia Pacific Economy*, vol. 15, No. 2, pp. 192-216.
- Snodgrass, D.R., and T. Biggs (1996). *Industrialization and the small firm: patterns and policies*. San Francisco: ICS Press.

- United Nations Conference on Trade and Development (UNCTAD) (2001). Growing micro and small enterprises in LDCs: the missing “middle” in LDCs – why small enterprises are not growing. Report of project on National Policies and Measures for Growing Micro and Small Enterprises in LDCs. UNCTAD/ITE/TEB/5. Available from www.unctad.org/templates/Page.asp?intItemID=1695&lang=1. Accessed September 2011.
- Van Auken, H.E., and L. Neeley (1996). Evidence of bootstrap financing among small start-up firms. *Journal of Entrepreneurial and Small Business Finance*, vol. 5, No. 3, pp. 235-249.
- World Bank (2002). *Review of Small Business Activities*. Washington, D.C.
- _____ (2004). *Review of Small Business Activities*. Washington, D.C.

ANNEX

Table A.1. Pacific island countries

Country	Capital	Land (sq. km.)	Population [year]	GDP (\$) [year]	Political status
American Samoa	Pago Pago	199	67 242 [2011]	462.2 million [2005]	Dependent territory
Cook Islands	Rarotonga	236	13 200 [2009]	206.5 million [2009]	Freely associated state
Federated States of Micronesia	Pohnpei	702	110 000 [2010]	269.7 million [2009]	Freely associated state
Fiji	Suva	18 300	900 000 [2010]	3.3 billion [2011]	Independent republic
French Polynesia	Papeete	4 000	267 000 [2009]	5.6 billion	An overseas country within the French Republic
Guam	Agaña	544	183 286 [2011]	..	Dependent territory
Kiribati	Tarawa	811	100 000 [2010]	163.0 million [2011]	Independent republic
Nauru	Yaren	21	9 771 [2009]	55.0 million [2009]	Independent republic
New Caledonia	Noumea	18 600	245 580	8.9 billion [2010]	“Special collectivity”
Niue	Alofi	260	1 536 [2009]	15.8 million [2009]	Freely associated state
Northern Mariana Islands	Saipan	464	40 050	633.4 million [2000]	Dependent territory
Palau	Koror	458	20 397 [2009]	179.6 million [2009]	Freely associated state

Table A.1. (continued)

Country	Capital	Land (sq. km.)	Population [year]	GDP (\$) [year]	Political status
Papua New Guinea	Port Moresby	463 000	6.5 million [2010]	11.0 billion [2011]	Constitutional monarchy
Pitcairn Islands	Adamstown	47	48 [2011]	..	Dependent territory
Republic of Marshall Islands	Majuro	181	54 000 [2009]	161.7 million [2008]	Freely associated state
Samoa	Apia	2 944	187 000 [2010]	606.0 million	Independent republic
Solomon Islands	Honiara	28 900	500 000 [2010]	770.0 million [2011]	Constitutional monarchy
Tokelau	Administrative centres are located on each atoll	12	1 384 [2011]	..	Dependent territory
Tonga	Nuku'alofa	748	103 000 [2010]	378.0 million [2011]	Independent kingdom
Tuvalu	Funafuti	26	11 093 [2009]	32.0 million [2010]	Constitutional monarchy
Vanuatu	Port Vila	12 200	200 000 [2010]	767.0 million [2011]	Independent republic
Wallis and Futuna	Mata-Utu	142	15 398 [2011]	..	Dependent territory

Source: Adapted from Australian Strategic Policy Institute, *Our Near Abroad: Australia and the Pacific Islands Regionalism* (Australia, 2011). Available from www.aspi.org.au/publications/publication_details.aspx?ContentID=319 (accessed December 2011).

THE ENVIRONMENTAL KUZNETS CURVE IN ASIA: THE CASE OF SULPHUR AND CARBON EMISSIONS

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The present study examines whether the Race to the Bottom and Revised EKC scenarios presented by Dasgupta and others (2002) are, with regard to the analytical framework of the Environmental Kuznets Curve (EKC), applicable in Asia to representative environmental indices, such as sulphur emissions and carbon emissions. To carry out this study, a generalized method of moments (GMM) estimation was made, using panel data of 19 economies for the period 1950-2009. The main findings of the analysis on the validity of EKC indicate that sulphur emissions follow the expected inverted U-shape pattern, while carbon emissions tend to increase in line with per capita income in the observed range. As for the Race to the Bottom and Revised EKC scenarios, the latter was verified in sulphur emissions, as their EKC trajectories represent a linkage of the later development of the economy with the lower level of emissions while the former one was not present in neither sulphur nor carbon emissions.

JEL Classification: Q53, Q56.

Key words: Environmental Kuznets Curve, race to the bottom, revised EKC, sulphur and carbon emissions, Asia.

I. INTRODUCTION

The Environmental Kuznets Curve (EKC) provides an analytical framework to examine how economies deal with environmental issues. It postulates an inverted-U relationship between pollution and economic development; at early stages of development,

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environmental quality deteriorates as per capita income increases, while at higher levels of development, environmental degradation is seen to decrease as per capita income increases further.

Dasgupta and others (2002), however, point out that the conventional EKC has been challenged by numerous critics: the critics that have taken a negative view claim that the curve will rise to a horizontal line denoting maximum existing pollution levels, as globalization promotes a “race to the bottom” in environmental standards (the scenario of Race to the Bottom), whereas the optimistic critique suggests that the level of the curve drops and shifts to the left as growth generates less pollution in the early stages of industrialization and pollution begins falling at lower income levels (the scenario of Revised EKC). Both of these schools of thought, however, have not been supported with much empirical research.

The purpose of the present paper is to examine whether the scenarios of Race to the Bottom and Revised EKC are applicable in Asia to representative environmental indices, namely sulphur emissions and carbon emissions. In recent decades, intra-economic integration in terms of trade and investment flows¹ has taken place in Asia. This consolidation will be further strengthened as a result of the upcoming formation of the ASEAN² Economic Community in 2015. Asian economies are at different stages of development consisting of high-income countries, such as Japan and the Republic of Korea, middle-income countries, such as Malaysia and Thailand, and low-income countries, such as Cambodia and Myanmar.³ Because of the ongoing integration combined with the great diversity among Asian countries, Asia is a prime region for analysing the Race to the Bottom and Revised EKC scenarios. An understanding of the validity of these scenarios can contribute to determining the type of policy actions needed in the region.

Following the introduction, the present study, contains a discussion of the empirical literature on EKC and the contribution of this paper in section II. An empirical study of the scenario-adaptability is provided in section III and section IV contains some concluding remarks.

¹ Kawai (2009) indicates, for example, that the ratio of intraregional trade relative to world trade in East Asia has gone up from 35 per cent in 1980 to 54 per cent in 2007. This ratio is higher for East Asia than for the area covered in the North American Free Trade Agreement (NAFTA), 43 per cent in 2007 and slightly less for the European Union, 57 per cent in 2007.

² Association of Southeast Asian Nations.

³ The classification of income groups is based on the World Development Indicators of World Bank.

II. LITERATURE REVIEW AND AUTHOR'S CONTRIBUTION

In a “conventional” discussion of the inverted-U relationship between environmental quality and economic development, Dasgupta and others (2002) indicated the following: in the first stage of industrialization, pollution worsens at a rapid pace because people are more interested in jobs and income than in clean air and water, communities are too poor to pay for abatement, and environmental regulation is correspondingly weak; along the curve, pollution per capita levels off in the middle-income range, and then falls towards pre-industrial levels in wealthy societies; as leading industrial sectors become cleaner, people value the environment more highly, and regulatory institutions become more effective. “Kuznets” was apparently attached to the curve by Grossman and Krueger (1993), who noted its resemblance to the Kuznets inverted-U relationship between income inequality and development.

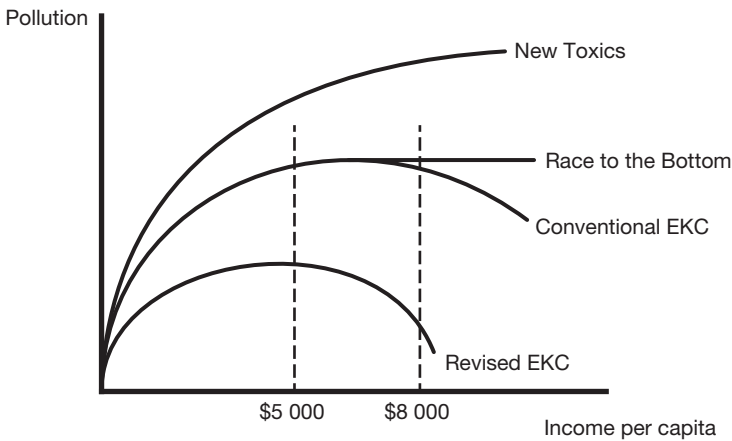
Empirical tests and theoretical debates on EKC have been ongoing since it was first discussed in 1992 in the *World Development Report 1992: Development and the Environment* by the World Bank.⁴ Until the mid 1990s, most of the empirical studies concentrated on validating the EKC hypothesis and its requirements by using cross-sectional data. Some of evidence on specific pollutants supported the validity of EKC, such as the work of Grossman and Krueger (1995) and Selden and Song (1994), while other studies indicated that EKC did not hold at all times and for all pollutants, such as the work of Shafik (1994). Since the late 1990s, the EKC studies have shifted from cross-sectional analyses to time-series analyses, especially analyses for comparing EKC of individual economies in terms of such factors as the height and the timing of their peaks or their shapes as found in the works of, among others, Panayotou (1997) and De Bruyn, Van den bergh and Opschoor (1998).

One area of direction for EKC literature is to put into empirical tests the scenarios presented by Dasgupta and others (2002). The three scenarios are different from the conventional scenarios associated with EKC. They are described in figure 1. The first scenario, Race to the Bottom, is a pessimistic one in that the curve flattens and rises towards the highest existing level of pollution. Under this scenario, relatively high environmental standards in high-income economies impose high costs on polluters, prompting shareholders to drive firms to relocate to low-income countries with weak or non-existent environmental regulations. The rising capital outflows then forces governments in high-income countries to begin relaxing environmental standards. The second scenario, entitled New Toxics, is also pessimistic: industrial society

⁴ See http://wdronline.worldbank.org/worldbank/a/c.html/world_development_report_1992/abstract/WB.0-1952-0876-5.abstract1.

continuously creates new, unregulated and potentially toxic pollutants, thereby the overall environmental risks from these new pollutants continue to grow even if some sources of pollution are reduced. The other scenario Revised EKC is rather optimistic. It assumes that due to growing public concern and research knowledge about environmental quality and regulation, developing societies can experience an EKC that is lower and flatter than the conventional one would suggest; these societies may develop from low levels of per capita income with little or no degradation in environmental quality. Under this scenario, the lower and flatter EKC curve can be attributed to such factors as environmental regulation, economic liberalization and pressure from market agents and better information. Notably, these factors are described with several cautionary notes.

Figure 1. Environmental Kuznets Curve: different scenarios



Source: Dasgupta and others (2002).

These scenarios are also mentioned in other literature surveys and overviews. Dinda (2004), for instance, analysed the Race to the Bottom scenario, as well as the Diffusion of Technology, International Assistance, and Technological and Organizational Change scenarios, all of which resulted in a lower and flatter EKC as compared to the conventional scenario. As an interesting analogy, Mukhopadhyay and Chakraborty (2005) presented two conflicting hypotheses as the trade-environment debate, namely the pollution haven hypothesis and the factor endowment hypothesis. They conducted empirical tests using both hypotheses on trade of India with the rest of the world and the European Union during the 1990s.

The contribution of this study is to test statistically the Race to the Bottom and Revised EKC scenarios presented by Dasgupta and others (2002) using as the targets sulphur and carbon emissions in Asia.⁵ Thus far, there is limited evidence on the validity of these scenarios. Notably, Asia is a suitable location for carrying out empirical tests of these scenarios due to forthcoming economic integration in parts of the region and the great economic diversity among its countries. The analysis uses the latest data, spanning the periods 1950-2000 on sulphur emissions and 1950-2009 on carbon emissions. The usage of this data made it possible to make the EKC estimation reflect the recent trends of technological progress and policy responses to address environmental issues as well as the growing economic interaction of Asia. The additional contribution is that the estimation for the EKC adopts a dynamic panel model. It appears to take some periods for the current level of emissions to adjust towards their equilibrium level – a kind of inertia in the emission level. Most of previous studies on EKC have adopted a static panel model in terms of ordinary fixed or random estimations. When there is evidence of dynamics in the data, however, the validity of applying a static model might be questioned as being dynamically miss-specified. Thus far, it appears that only Halkos (2003) has constructed a dynamic panel model for the EKC estimation. Therefore, the method of Halkos (2003), which allows dynamic adjustments in the level of emissions, was used for the present paper.

III. EMPIRICS

The analysis consisted of two steps. First, it gave a simple overview of the relationship between per capita real income and environmental indices, focusing on selected economies in East Asia. The next step was to carry out a dynamic panel analysis using cross-country panel data to examine the EKC pattern and to see if the scenarios Race to the Bottom and Revised EKC would be validated in the environmental management in Asian economies.

Data

For sulphur emissions, data estimated by Stern (2005) were used. This database, measured in thousands of metric tons of sulphur, was compiled by using a combination of published and reported estimates and its own estimate for the purpose of estimating the sulphur emissions in global and county-by-country base with a historical trend from 1850 to 2000. As a sample period for a dynamic panel analysis, the data after 1950 was extracted, considering the availability of the

⁵ The scenario of New Toxics is excluded in the statistical test as the analysis here focuses on sulphur and carbon emissions.

partner's data, namely per-capita-GDP data (stated later). As the sample economies in the dataset, the following 19 economies in Asia were the focus for the analysis: Afghanistan; Bangladesh; Bhutan; Cambodia; China; India; Indonesia; Japan; Lao People's Democratic Republic; Malaysia; Mongolia; Nepal; Pakistan; Philippines; Republic of Korea; Sri Lanka; Thailand; Viet Nam; and Taiwan Province of China.⁶

For carbon emissions, data estimated by Boden, Marland and Andres (2011) were used. This database, expressed in thousand metric tons of carbon, was estimated by a common methodology using statistics on gas fuels, liquid fuels, solid fuels, gas flaring, cement manufacturing and their estimated carbon coefficients for the purpose of estimating the carbon emissions in a global and county-by-country base with a historical trend from 1751 to 2010.⁷ The sample period for the panel estimation below is 1950-2009, which is consistent with the data availability of per-capita-GDP data (stated later). The sample economies are the same as those in aforementioned sulphur emissions.

The aforementioned emissions for sulphur and carbon show the total amount in each economy. For the analysis, the total amount was divided by the economy's population (both emissions will be expressed in metric kilograms per capita). For the population and the GDP per capita, version 7.0 of the Penn World Tables (PWT) estimated by Heston, Summers and Aten (2011) were used. Regarding the GDP per capita, "PPP (purchasing power parity) Converted GDP Per Capita (Laspeyres) at 2005 constant dollar prices" was adopted. The database covers data from the period 1950-2009. Time series data covering Asian sample economies, which were consistent with the samples in sulphur and carbon emissions, were used at all times.

To sum up, for conducting the panel estimation in the later section, a table of the annual data of the 19 economies for sulphur emissions per capita with GDP per capita during the period 1950-2000, and for carbon emissions per capita with GDP per capita during the period 1950-2009 was constructed.

Overview of the EKC's in sample economies in East and South-East Asia

The analysis focuses on seven East and South-East Asian economies, namely Indonesia; Japan; Malaysia; Republic of Korea; Thailand; Viet Nam; and Taiwan Province of China. These economies characteristically have been progressing in terms

⁶ Data from the following Asian economies were excluded: Brunei as it is an oil-production economy; Hong Kong, China; Macau, China; and Singapore because they are city economies; and Myanmar and Democratic People's Republic of Korea due to the lack of the partner's per-capita-GDP data.

⁷ The original estimation period is 1751-2008, and the estimation for 2009-2010 is a preliminary one.

of integration and diversification. Figure 2 reports the time series relationships (every five years from 1950 to the end of data) between per capita GDP and per capita emissions of sulphur and carbon in the seven East and South-East Asian economies. The rough findings are as follows. First, there seems to be a contrast in the shape of the trajectories of the EKC. The curve for sulphur emissions appears to create an inverted-U shape pattern, especially in advanced economies, such as Japan, the Republic of Korea and Taiwan Province of China. On the other hand, the curve for carbon emissions seems to represent an increasing trend, although the slope in Japan appears to be flattened with higher GDP per capita. Second, there also seems to be a difference even in the location of the trajectories of the EKCs of sample economies; the lowering and flattering shifts of the EKCs for latecomer economies are clearly observed in the case of sulphur emissions. On the other hand, no clear shifts can be seen in the carbon emissions. These differences in per capita GDP-emissions relationships in terms of the shape and location of the EKC trajectories may produce different implications between sulphur and carbon emissions. This point is statistically tested through a dynamic panel estimation in the following section.

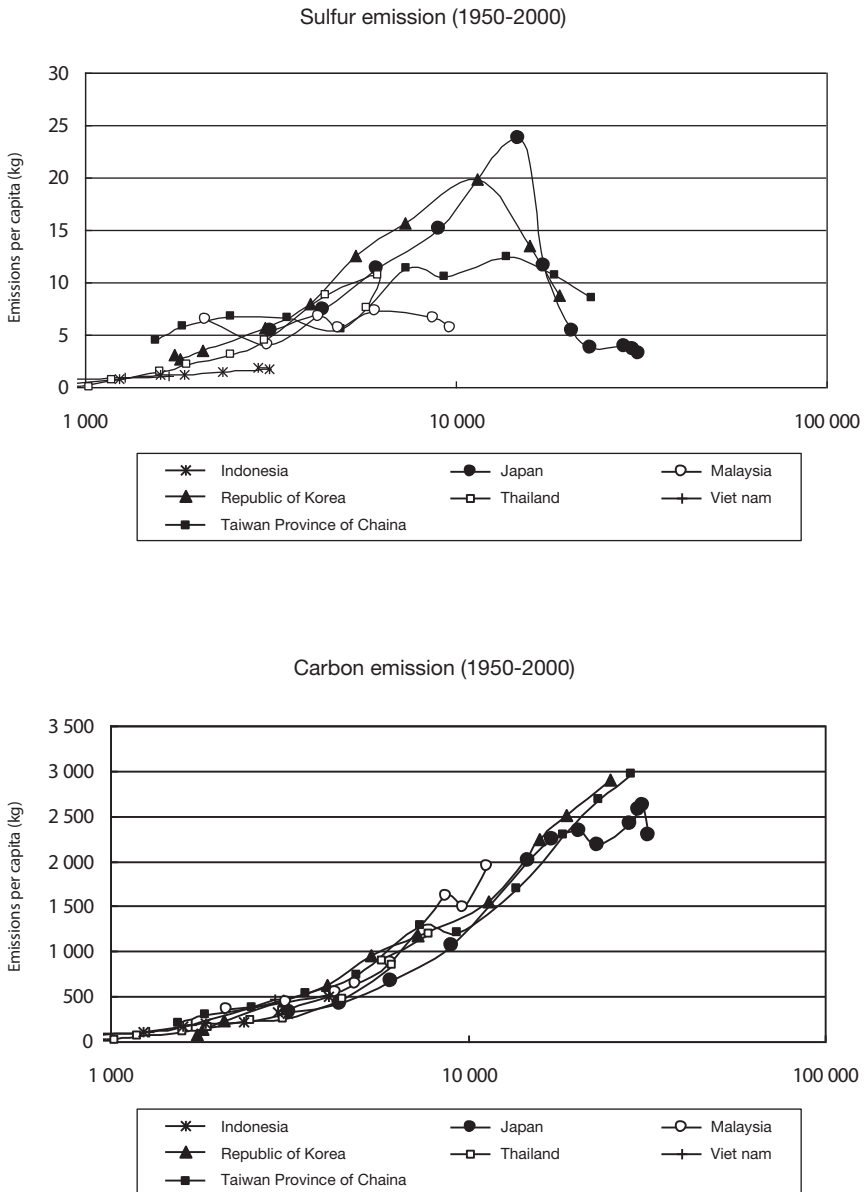
Dynamic panel analysis

The next step in the study was to conduct a dynamic panel analysis using cross-country panel data to examine the EKC pattern and determine whether the Race to the Bottom and Revised EKC scenarios would be applicable in the environmental management in Asian economies.

Methodology

To continue, clarification of some methodological points related to the analysis is required. In studying the relationship between pollution and growth, there are two possible approaches to model construction. One is to estimate a reduced-form equation that relates the level of pollution to the level of income. The other is to model the structural equations relating environmental regulations, technology, and industrial composition to GDP, and then to link the level of pollution to the regulations, technology, and industrial composition. Essentially, the reduced-form is inferior to the structural-form, in the sense that the former denies any insight into the underlying causes of EKCs, thereby making it difficult to design specific policy implications from

Figure 2. Environmental Kuznets Curves in East and South-East Asia



Sources: Stern (2005); Boden, Marland and Andres (2011); Hestonm, Summers and Aten (2011).

EKCs (see Dinda, 2004). In spite of this, the analysis used the reduced-form approach by basically following what has been spelled out in the literature on this subject such as Grossman and Krueger (1995) and Selden and Song (1994). The reasoning behind this is that it is not necessary to collect data on pollution regulations and the state of the existent technology, which are not always available under the reduced-form approach.

The reduced-form equation was then specified by adding appropriate variables in accordance with the analytical interests. The objective, at this point, was to determine whether the Asian EKC trajectories followed the Race to the Bottom and Revised EKC scenarios. The former was verified by checking if the EKC trajectories do not trace an inverted-U shape while for the latter, an examination was done to see if the EKC trajectories of latecomer economies trace the lower course more closely than those of the forerunner economies. Under the Revised EKC scenario, sample economies with a later degree of development enjoy a lower level of environmental pollution than forerunners' economies. Thus, a variable representing the later degree of development among the economies was inserted into the equation for EKC. The later degree of development of a sample economy in a certain year was specified as the ratio of the GDP per capita of that economy relative to the maximum GDP per capita among sample economies (equivalent to the GDP per capita of Japan) in that year.

Another methodological innovation in this study was to adopt a dynamic panel model. Halkos (2003) pointed out that the use of a static model could be justified only if the processes were very rapid or if the static equation represented an equilibrium relationship. Since neither a rapid adjustment nor equilibrium relationship between pollution and income were expected in the observed data, a dynamic model approach would provide more statistically sound estimates. In line with the argument of Halkos (2003), a dynamic panel model was constructed by inserting a lagged dependent variable as a regressor into the EKC equation for materializing a partial adjustment towards an equilibrium emissions level.

Based on analytical interests mentioned above, the modified EKC model was specified as follows:

$$\text{EMS}_{it} = \alpha_0 + \alpha_1 \text{GDP}_{it} + \alpha_2 \text{GDP}_{it}^2 + \alpha_3 \text{LAC}_{it} + \alpha_4 \text{EMS}_{it-1} + \alpha_5 f_i + e_{it} \quad (1)$$

where i is the economy's index, t is the time index, and e is the error term. The dependent variables EMS is the measure of the per capita emissions of sulphur and carbon. As for the independent variables, GDP is the GDP per capita. LAC represents the later

degree of development, specifically the ratio of the GDP per capita of a certain economy relative to the maximum GDP per capita among economies in a certain year, namely GDP per capita of Japan; the lower LAC means the later development of the economy. The f_i denotes exogenously economy-specific factors that affect emissions, including, among others, climate, geography, and energy resources. The equation does not include period dummy because its inclusion was rejected significantly by statistical tests in the equation estimate.

To verify the inverted-U shape of EKC, the signs and magnitudes of α_1 and α_2 should be examined. Environmental emissions per capita can be said to exhibit a meaningful EKC with the real GDP per capita, if $\alpha_1 > 0$ and $\alpha_2 < 0$, and if the turning point, $-\alpha_1 / (2 * \alpha_2)$ is a reasonable number. Of particular importance is the coefficient of LAC, α_3 , which is useful for identifying the Revised EKC scenario. The positive sign of α_3 , such as a linkage of the later development of the economy with lower pollution can be a proof of the existence of the Revised EKC scenario.

Equation (1) contains the lagged dependent variable among the explanatory variables, and thus the ordinary least square (OLS) is inconsistent. Obtaining consistent estimates require the application of an instrumental variables estimator or Generalized Method of Moments (GMM). At this point, the system GMM estimator was adopted. The system GMM estimator was developed by Arellano and Bond (1991), who argued that additional instruments could be obtained in a dynamic model from panel data if the orthogonality conditions between lagged values of the dependent and the disturbances were utilized. The GMM estimator eliminates country effects by first-differencing as well as controls for possible endogeneity of explanatory variables. The first-differenced endogenous variables of EMS with two lagged periods can be valid instruments provided there is no second-order autocorrelation in the idiosyncratic error terms. The first differenced explanatory variables of GDP with one lagged period was also used as an instrumental variable since GDP could be correlated with the error term in cases in which environmental pollution might aggravate economic growth. The process next entails conducting two step GMM iterations with the weights updated one time, and adopting the White period as the GMM weighting matrix. The tests for autocorrelations and the Sargan test on over-identifying restrictions are presented in the table below.

Estimation results and interpretations

Table 1 lists the results of the GMM estimation on sulphur and carbon emissions per capita. All the cases indicate that the inclusion of the lagged dependent variable of the emissions per capita proved to be positively discernable, thus implying inertia in the level of the emissions and justifying the formation of the dynamic panel

model. The Sargan tests do not suggest rejection of the instrumental validity at conventional levels for any cases estimated. As for the test results for autocorrelations, all the AR(2) test statistics reveal the absence of second-order serial correlation in the first-differenced errors and as a consequence that the instruments are valid.

Table 1. Results of dynamic panel estimation by GMM

	Sulphur emissions		Carbon emissions	
GDP	6.63*10 ⁻⁴ *** ^a (304 984.8)	8.34*10 ⁻⁴ *** (94.73)	1.39*10 ⁻¹ *** (133.02)	1.63*10 ⁻¹ *** (100.13)
GDP ²	-3.25*10 ⁻⁸ *** (-106 694.3)	-4.09*10 ⁻⁸ *** (-70.31)	-1.36*10 ⁻⁶ *** (-44.48)	-1.60*10 ⁻⁶ *** (-37.95)
LAC		2.91 *** (57.27)		-1.17*10 ³ *** (-31.85)
(EMS) _{t-1}	7.82*10 ⁻¹ *** (1 451 300)	7.73*10 ⁻¹ *** (312.36)	1.29*10 ⁻¹ *** (46.95)	1.14*10 ⁻¹ *** (40.54)
Turning point	1.02*10 ⁴	1.01*10 ⁴	5.11*10 ⁴	5.09*10 ⁴
Sargan test ^b	0.65	0.66	0.63	0.59
AR(1) ^c	0.00	0.00	0.00	0.00
AR(2) ^c	0.68	0.65	0.42	0.71
No. of obs.	724	724	869	869

Sources: Stern (2005); Boden, Marland and Andres (2011); Heston, Summers and Aten (2011).

Notes: a *** p<.01.

b Sargan test denotes the p-value of a Sargan-Hansen test of overidentifying restrictions.

c AR(k) is the p-value of a test that the average autocovariance in residuals of order k is zero.

The shape of the EKC of each emission index was verified first. In the cases of both sulphur and carbon emissions, the estimates for the coefficients α_1 and α_2 showed signs of the inverted U-shapes, and were different from zero, as high levels of significance. The turning points, however, indicated a reasonable number, about \$10,000, in sulphur emissions, but an unfeasible number, about \$50,000, which was far beyond the observed range, in carbon emissions. Sulphur emissions can, therefore, be said to reflect a meaningful, inverted U-shaped EKC with GDP per capita, but carbon emissions appear to reveal the early stage of the EKC, namely upward sloping with GDP per capita.

The difference in the turning points between sulphur and carbon emissions may be the result of the differences in the nature of pollutants – sulphur emissions are local pollutants, whereas carbon emissions are global pollutants. This difference and its interpretation are supported by the literature survey; for instance, Dinda (2004) and Nahman and Antrobus (2005) summarized by stating that EKC's were more likely to hold for local pollutants and not hold for global pollutants. According to Dinda (2004), significant EKC's exist only for local air pollutants, such as sulphur, standard particle matter, mono-nitrogen oxide and carbon monoxide (Cole, Rayner and Bates, 1997), and urban air concentrations with a peak at lower income levels than total per capita emissions (Selden and Song, 1994). In contrast, the global environmental indicators, such as carbon dioxide, municipal waste, and energy consumption (Horvath, 1997) and traffic volumes, either increase monotonically with income or have high turning points with large standard errors (Holtz-Eakin and Selden, 1995).

The local pollutants, such as sulphur emissions, are subject to regulation. In fact, the pollution controls on sulphur emissions have been promoted intensively over a broad area of Asia since the 1970s. According to Iwami (2001), the remarkable reduction of sulphur emissions in Japan from the beginning of 1970s to the mid 1980s comes from environmental regulations reinforced by central and local governments, and technological development for desulphurization and energy efficiency promoted by private companies. It also stated that the other East and South-East Asian economies were trying to initiate similar efforts to the ones set by Japan.⁸ On the other hand, global pollutants, such as carbon emissions, are easily externalized and thus not subject to regulation.

The next step entailed determining if the Race to the Bottom and/or the Revised EKC scenarios were verified in the Asian EKC trajectories. The Revised EKC scenario was identified in sulphur emissions, since the estimate for sulphur emissions has a significantly positive α_3 , coefficient of LAC, thereby representing a linkage of the later development of the economy with a lower level of emissions. In Asia, this scenario is also consistent with the result of studies on emissions-control policies and technologies in Asia. According to Iwami (2001), for instance, in the early 1970s, air pollution, particularly sulphur concentration, in the large metropolitan areas of South-East Asia was less prevalent, despite rapid economic growth in their respective countries when compared with metropolitan areas of Japan. This is because their governments and firms implemented initiatives in the early stage of development

⁸ From the late 1970s to the early 1980s, Indonesia, Malaysia, the Philippines, and Thailand moved forward with establishing fundamental frameworks for environmental protection including regulations pertaining to sulphur emissions, such as laws, standards, and institutions (Taguchi, 2001).

based on experiences in developed countries.⁹ As for the Race to the Bottom scenario, the question is whether the scenario is applicable to carbon emissions as its estimation does not show an inverted-U shape in the feasible range of GDP per capita. Since this scenario assumes the existence of high environmental standards in high-income economies, carbon emissions do not appear to be relevant to it due to the lack of a framework to regulate them effectively. As mentioned early, global pollutants, such as carbon emissions, are difficult to regulate. In fact, regulatory frameworks on greenhouse gas were set domestically and internationally only after the Kyoto Protocol was approved in 1997. Asian countries, with the exception of Japan, are, however, non-Annex I countries. Consequently, they have no legal obligation to reduce carbon emission and therefore, lack motivation to reduce emissions and set a precedence (see, for example, Yaguchi, Sonobe and Otsuka, 2007). Moreover, as long as even Japan, an Annex I country, has not succeeded in reducing carbon emissions in any practical terms and marking the turning point,¹⁰ no spillover effects may be expected. Thus, it is likely that the Race to the Bottom scenario is not applicable with regard to carbon and sulphur emissions. To sum up the discussion on the scenarios' adaptability to sulphur and carbon emissions, it may be stated that the difference between sulphur and carbon emissions comes largely from the difference in the maturity of emissions-control policies and technologies in Asia for historical reasons.

IV. CONCLUDING REMARKS

For this paper, the author set out to examine whether the Race to the Bottom and Revised EKC scenarios presented by Dasgupta and others (2002) are, with regard to the analytical framework of the Environmental Kuznets Curve (EKC), applicable in Asia to representative environmental indices, such as sulphur emissions and carbon emissions in the light of the region's ongoing economic integration and great diversity. For this purpose, a dynamic panel estimation by a system of GMM using the panel data with 19 economies was carried out for the period 1950-2009.

The main findings of this analysis are as follows. Regarding the validity of EKC, sulphur emissions follow the expected inverted U-shape pattern, while carbon emissions

⁹ As examples of technological transfers to ASEAN countries, Matusoka and others (2000) showed that they introduced automatic air-monitoring facilities, such as telemeter systems (remote data reporting), during the 1980s and 1990s by learning from the experiences of industrialized countries. Taguchi (2001) described the contribution of Japan's Official Development Assistance (ODA) for this kind of technological transfers to East Asian countries.

¹⁰ The Japan's greenhouse gas emissions increased after 2010, after a dropping briefly during 2008-2009. See www.env.go.jp/earth/ondanka/ghg/2010gaiyo.pdf.

tend to increase in line with per capita income in the observed range. The outcome is supportive of literature that contains arguments that EKC's are more likely to be applicable for local pollutants than for global pollutants (Dinda, 2004; Cole, Rayner and Bates, 1997; Selden and Song, 1994; Horvath, 1997; Holtz-Eakin and Selden, 1995). Regarding the Race to the Bottom and Revised EKC scenarios, the latter was verified under conditions of sulphur emissions as their EKC trajectories represent a linkage of the later development of the economy with the lower level of emissions while the former is not applicable under conditions of sulphur nor carbon emissions. Even though studies show that carbon emissions tend to increase in line with per capita income in the observed range, the Race to the Bottom scenario does not appear to apply in this case. This is because the scenario assumes the existence of high environmental standards. Asian countries, including Japan, however, have not succeeded in creating effective regulatory frameworks for reducing carbon emissions, thereby no spillover effects can be expected. The difference in the scenarios' adaptability between sulphur and carbon emissions may come from the difference in the maturity of emissions-control policies and technologies in Asia for historical reasons.

These findings imply the necessity to facilitate technological advancements, such as the development of technology pertaining to capturing and/or storing carbon dioxide, and the internalization of externalities through such methods as emissions charge and greenhouse taxes. As long as the Asia and the Pacific stands as a crucial region for greenhouse gas abatement in many senses, technological advancement and consolidated regulatory frameworks should be encouraged in the region at large.

REFERENCES

- Arellano, M., and S.R. Bond (1991). Some tests of specification of panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, vol. 58, pp. 277-297.
- Boden, T.A., G. Marland, and R.J. Andres (2011). Global, regional, and national fossil-fuel CO₂ emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee.
- Cole, M.A., A.J. Rayner, and J.M. Bates (1997). The Environmental Kuznets Curve: an empirical analysis. *Environment and Development Economics*, vol. 2, No. 4, pp. 401-416.
- Dasgupta, S., and others (2002). Confronting the Environmental Kuznets Curve. *Journal of Economic Perspectives*, vol. 16, No. 1, pp. 147-168.
- De Bruyn, S.M., J.C.J.M. Van den Bergh, and J.B. Opschoor (1998). Economic growth and emissions: reconsidering the empirical basis of 166 *Journal of Economic Perspectives* Environmental Kuznets Curves. *Ecological Economics*, vol. 25, No. 2, pp. 161-175.
- Dinda, S. (2004). Environmental Kuznets Curve hypothesis: a survey. *Ecological Economics*, vol. 49, pp. 431-455.
- Grossman, G., and A. Krueger (1993). Environmental impacts of the North American Free Trade Agreement. In *The U.S.-Mexico Free Trade Agreement*, P. Garber, ed. Cambridge: MIT Press.
- _____ (1995). Economic growth and the environment. *Quarterly Journal of Economics*, vol. 112, No. 2, pp. 353-377.
- Halkos, G.E. (2003). Environmental Kuznets Curve for sulphur: evidence using GMM estimation and random coefficient panel data models. *Environment and Development Economics*, vol. 8, No. 4, pp. 581-601.
- Heston, A., R. Summers, and B. Aten (2011). Penn World Table Version 7.0. Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.
- Holtz-Eakin, D., T.M. Selden (1995). Stoking the fires?: CO₂ emissions and economic growth. *Journal of Public Economics*, vol. 57, pp. 85-101.
- Horvath, R.J. (1997). Energy consumption and the Environmental Kuznets Curve debate. Department of Geography, University of Sydney, Australia (Mimeo).
- Iwami, T. (2001). Advantage of latecomer in abating air-pollution: experience in East Asia. CIRJE-J-64, Discussion Paper Series, Faculty of Economics, University of Tokyo.
- Kawai, M. (2009). International exchange and monetary system in East Asia. *Financial Review*, vol. 93, No. 1, pp. 176-194. (In Japanese).
- Matusoka, S., and others (2000). The capacity building of environmental management in East Asia. *View Point to the East Asia*, vol. 11, No. 4, pp. 92-105. (In Japanese).
- Mukhopadhyay, K., and D. Chakraborty (2005). Is liberalization of trade good for the environment? Evidence from India. *Asia-Pacific Development Journal*, vol. 12, No. 1, pp. 109-136.
- Nahman, A., and G. Antrobus (2005). The Environmental Kuznets Curve: a literature survey. *South African Journal of Economics*, vol. 73, No. 1, pp. 105-120.
- Panayotou, T. (1997). Demystifying the Environmental Kuznets Curve: turning a black box into a policy tool. *Environment and Development Economics*, vol. 2, No. 4, pp. 465-484.

- Selden, T.M., and D. Song (1994). Environmental quality and development: is there a Kuznets Curve for air pollution emissions? *Journal of Environmental Economics and Management*, vol. 27, No. 2, pp. 147-162.
- Shafik, N. (1994). Economic development and environmental quality: an econometric analysis. *Oxford Economic Papers*, vol. 46, pp. 757-773.
- Stern, D.I. (2005). Global sulphur emissions from 1850 to 2000. *Chemosphere*, vol. 58, pp. 163-175.
- Taguchi, H. (2001). Do developing countries enjoy latecomers' advantages in environmental management and technology? – Analysis of the Environmental Kuznets Curve. *International Review for Environmental Strategies* (Institute for Global Environmental Strategies), vol. 2, No. 2, pp. 263-276.
- Yaguchi, Y., T. Sonobe, and K. Otsuka (2007). Beyond the Environmental Kuznets Curve: a comparative study of SO₂ and CO₂ emissions between Japan and China. *Environment and Development Economics*, vol. 12, No. 3, pp. 445-470.

CHALLENGES AND OPPORTUNITIES FOR PROTECTING GEOGRAPHICAL INDICATIONS IN THAILAND

Chuthaporn Ngokkuen and Ulrike Grote*

In this paper, the legal framework for the protection of geographical indications (GIs) in Thailand is analysed and challenges the country has been facing in that regard are discussed. Although the legal protection of GIs is ensured by the World Trade Organization, unresolved issues remain concerning GI protection in Thailand. Biopiracy, existing conflicts of interests concerning different types of intellectual property rights (trademarks and patents versus GIs) and the rise in regional and bilateral trade agreements have created major challenges at the multilateral level. In drawing on GI cases in Thailand, in particular that concerning jasmine rice, an attempt is made to further analyse these challenges to protect genetic resources from the perspective of Thailand. This paper concludes with suggestions on how such challenges can be mitigated and in which direction trade negotiations should be shaped.

JEL Classification: O13, O34, Q17, Q18.

Key words: Intellectual property, geographical indications, biopiracy, jasmine rice, Thailand.

I. INTRODUCTION

In the past three decades, the role of intellectual property rights (IPRs) in agribusiness has increased enormously. The so-called Green Revolution in the 1960s was the most significant reason for the introduction of proprietary aspects in industrial agriculture. Seeds became the private property of multinational seed companies and

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international research centres, such as the International Maize and Wheat Improvement Center and the International Rice Research Institute (IRRI). Although the protection of IPRs is ensured by various international conventions, conflicts still arise between developed and developing countries concerning those rights. On one hand, developed countries which produce most of the world's intellectual property (IP) and possess biotechnological knowledge accuse developing countries of IP piracy. On the other hand, developing countries which own large reserves of the Earth's pool of genetic resources, accuse developed countries of biopiracy (Adi, 2006; GRAIN, 1998). There have been in fact reported attempts by multinational corporations, mainly owned by developed countries, to exploit advantages and weaknesses in various conventions by trying to monopolize the seed and germ-plasm industry (Adi, 2006).

Some developing countries, such as India, Kenya and Thailand, thus hope to utilize the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) of the World Trade Organization (WTO) to protect their national intellectual and cultural heritage, as well as their rich biodiversity resources (Zou, 2005). Geographical indications (GIs), which indicate that a certain good originates from a particular region, where a given quality of the good is attributable to its place of origin, have become a hotly discussed issue in the international trade context. GIs stand at the intersection of three issues in international law: international trade, intellectual property and agricultural policy (Raustiala and Munzer, 2007). The demand for extending protection on products other than wine and spirits under the multilateral framework is becoming stronger, not only because GIs provide protection against counterfeiting and freeriding on the reputation of the GI products but also because of their potential role in protecting public goods, such as traditional and indigenous knowledge (Grote, 2009). There is also evidence that GIs can provide higher economic returns to holders of traditional knowledge through price premiums (see Teuber, 2007), fostering tourism (Suh and MacPherson, 2007) and enhancing rural development (Tregear and others, 2007).

At the national level, Thailand ensures GI protection through the enforcement of a special law on GIs that was enacted in 2003. Effective protection is expected to have important implications for Thailand's rural households, since many of them are involved in the production of GI products. Benefits may arise from improved market access and potential price premiums. This could reduce vulnerability to poverty among the rural poor and thus reduce their migration to urban areas by retaining labour and other production factors in the geographical area concerned (Correa, 2002).

This paper analyses whether and to what extent GIs can provide protection to genetic resources. In order to achieve this objective, the paper is structured as follows: in section II the threat of biopiracy is outlined by taking a close look at the case of

jasmine rice. In section III the role of GI certification and its legal framework are discussed. Some more practical issues involving GIs, such as the registration and certification process for GI products in Thailand, are described in section IV, along with information about registered GI products in Thailand. In section V, some of the challenges associated with the use of GIs as a protection tool for genetic resources are highlighted, again drawing on the case of jasmine rice; some solutions to these challenges are also offered. The paper concludes with some policy recommendations offered in section VI.

II. BIOPIRACY AND THE CASE OF JASMINE RICE

This section first highlights the need to protect genetic resources against biopiracy. The case study of jasmine rice illustrates the importance of IPR protection for Thailand. This section then describes the origins of jasmine rice, followed by a brief description of the economic value of jasmine rice for Thailand. Subsequent subsections are concerned with the protection of jasmine rice through patents and GIs.

Biopiracy and the call for better protection of intellectual property rights

As a member of WTO and as a party to the TRIPS Agreement, Thailand is required to take appropriate measures to implement the provisions of the agreement within its domestic legal framework. However, beyond the legal requirements under TRIPS, there is also a need to protect against biopiracy, which is an exploding issue in Asia (Jaovisidha, 2003); it refers to the uncompensated exploitation of developing countries' natural resources (Afreen and Abraham, 2008). Biopiracy arises when IP systems are used to legitimize the exclusive ownership and control of genetic resources and knowledge without recognizing the rights of, and without compensating, the indigenous and rural communities concerned (Delgado, 2002). Biopiracy can be related to the spread of genetic resources and to the traditional knowledge which has been gained, adapted and embedded in the local culture of an indigenous community over time. For the past several years, there has been an increasing number of reported cases of biopiracy and commercial exploitation of plants, genetic resources and traditional knowledge from developing countries. Natural products, such as neem, turmeric, ayahuasa, hoodia cactus and basmati rice, are well-known examples of such reported cases of misappropriation (O'Connor, 2003). The first cases of biopiracy in Thailand included the "Jasmati" case as well as the cases of the medical plant *plao-noi* (*Croton sublyratus*) and a variety of bitter melon (*Momordica* spp.) which is known to slow the progress of HIV infection (Kerr and Yampoin, 2007).

Biopiracy related to jasmine rice

Thailand experienced the first case of biopiracy when a newly developed hybrid variety under the name “Jasmati” was registered in 1997 by the Rice Tec Corporation at the Patent and Trademark Office of the United States of America. The name contains two variants of two rice varieties: jasmine rice from Thailand and basmati rice from the Indian subcontinent. However, “Jasmati” rice, which is a hybridized variety called Della that was developed from the Italian Bertone rice in the United States, has characteristics other than those of basmati and jasmine rice. The use of the name Jasmati could therefore mislead rice consumers by making them wrongly believe that Jasmati rice would have the same characteristics as jasmine rice from Thailand and/or basmati rice from the Indian subcontinent, even though the rice was not genetically related to the jasmine rice grown in Thailand. This concern was reinforced by the finding of a market survey showing that over half of the consumers in the United States buying “Jasmati” thought it was related to jasmine and basmati rice (Roggemann, 2005).¹

The origins of jasmine rice

Jasmine rice, or *hom* (fragrant) *mali* (jasmine flower) rice (in Thai: *khao hom mali*), is a rice variety which is grown in upland areas of Thailand only once a year using two kinds of Thai jasmine rice seeds: Khao Dawk Mali 105 and RD15 (in Thai: *GorKhor* 15). Khao Dawk Mali 105 resulted from the further development of local Thai jasmine rice seeds. It was first discovered in Laempradoo Subdistrict, Panasnikom District of Chonburi Province in southeastern Thailand, and then taken to be cultivated in Tatonglang Subdistrict in Bangkla District of Chachoengsao Province, a neighbouring province of Chonburi. Owing to its high yields, many farmers adopted it. Even though this traditional jasmine rice was relatively expensive, it became popular among Thai consumers, in particular among the rich in Bangkok. Since 1950, this traditional form of Thai jasmine rice was further bred and developed in field trials of the Rice Research Centre in Chachoengsao Province. After six years of cultivation tests in different areas of Thailand, it was found that the northeastern region of the country (usually referred to as *Isaan* in Thailand), with its unique sandy loam and rain-fed upland soil, is most suitable for jasmine rice cultivation using Khao Dawk Mali 105 seeds. The next generation of rice breeders used Khao Dawk Mali 105 seeds as a parent for the crossing and then irradiated them with gamma rays to foster mutation of the rice.

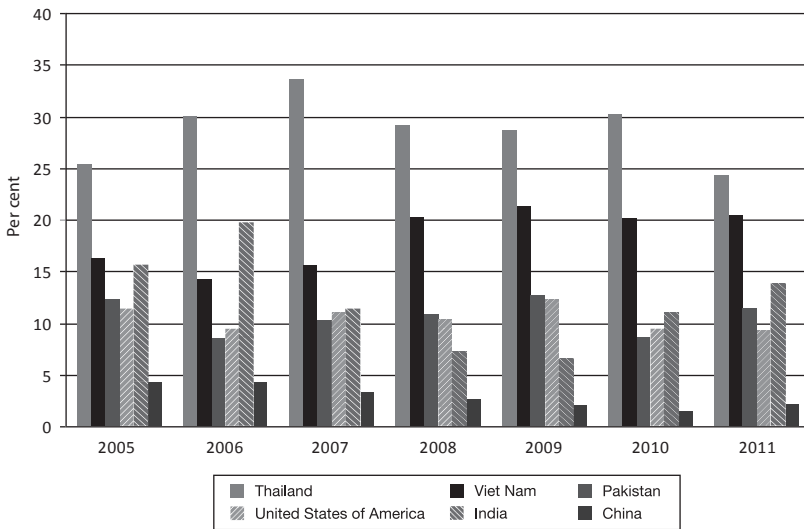
¹ More threatening than the “Jasmati” patent is “Jasmine 85” which was developed by IRRI to create an “improved” jasmine rice variety that can be grown in the United States using jasmine rice seed, namely Khao Dawk Mali 105 which is a major rice variety grown in the northeastern Thailand. However, it still has a limited effect in the United States market, especially for Asian Americans (Goodwin and others, 1992).

The outcome of this breeding development was RD15, which has been cultivated in northern and northeastern Thailand since 1965 (Thailand, Bureau of Rice Research and Development, n.d.; iCoopThai, n.d.).

Thereafter, the Thai Government has made efforts to promote the cultivation of jasmine rice in the northeastern part of the country using Khao Dawk Mali 105 and RD15. However, since northeastern consumers prefer sticky rice as a staple food, a breakthrough was achieved only in three of the provinces in the southern part of *Issan*, namely Buri Ram, Surin and Si Sa Ket, where local people are ethnically Khmer and prefer to consume jasmine rice. Within these provinces, a huge flat and dry area called *Thung Kula Rong-Hai* was then used for the cultivation of the premium form of jasmine rice, imparting a unique texture and the natural and distinct aromatic fragrance of the jasmine flower, with the source of the fragrance being 2-acetyl-1-pyrroline. Owing to these specific characteristics, jasmine rice became popular among many consumers not only in Thailand but also outside the country.

Economic value of jasmine rice

The importance of rice for Thailand derives not only from its being a major staple food for domestic consumption but also from its export volume and value. Thailand has been one of the world's largest rice exporters for nearly three decades (Toriyama, Heong and Hardy, 2005). Its market share amounted to more than 25 per cent of the global total traded between 2005 and 2010, leaving the second and third largest exporters, Viet Nam and Pakistan, far behind (see figure 1). Exporting rice to the global market has resulted in considerable export revenues not only for Thailand as a whole but also for individual rice farmers.

Figure 1. World market shares of rice exports by country, 2005-2011

Source: Authors, based on data from the United States Department of Agriculture (USDA). *Grain: World Market and Trade*. Available from <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1487> (accessed 17 May 2012).

Jasmine rice makes up more than a quarter of Thai rice exports each year. As table 1 shows, in 2011 approximately a third of the rice export value stemmed from exporting jasmine rice, which earned about \$2 billion in foreign currency for Thailand (Thailand, Ministry of Agriculture and Cooperatives, 2009; 2010).

Table 1. Rice trade

Item	2006	2007	2008	2009	2010	2011
World rice exports (million tons of milled rice)	29.48	31.93	29.22	29.53	31.61	34.76
Thailand's world market share (percentage)	25.40	28.80	35.00	29.10	29.5	30.2
Domestic consumption (million tons of milled rice)	10.50	10.73	11.28	12.12	12.08	12.08
Export						
- Total export volume (million tons of milled rice)	7.49	9.19	10.22	7.26	8.94	10.71
- Total export value (US\$1 000 million) ^a	2.59	3.45	6.06	5.01	5.30	6.40
- Total Thai jasmine rice export volume (million tons of milled rice)	2.60	3.07	2.52	2.63	2.36	2.36
- Total Thai jasmine rice export value (US\$1 000 million) ^a	1.06	1.39	1.81	2.0	2.0	2.09
Export price for Thai jasmine rice (US dollars/ton) ^a	475	565	910	937	1 023	1 043

Source: Authors, based on data from Thailand, Ministry of Agriculture and Cooperatives (2009; 2010; 2011).

Note: ^a Exchange rates for 2006, 2007, 2008, 2009, 2010 and 2011 are 37.93, 34.56, 33.36, 34.34, 31.73 and 30.49 baht/US dollar, respectively (Bank of Thailand, 2002-2011).

The call for protection

The discussion on special protection for GI products was brought to the public's attention with the case involving the "Jasmati" trademark (O'Connor, 2004). A trademark is a private right that can be transferred or sold, while a GI is a community right that cannot be sold or transferred to other parties. Hence, concerns are related to the economic importance of Thai jasmine rice, which is one of Thailand's most important agricultural export crops and which is regarded as a source of culture and belief. Against this backdrop, the Act on GI Protection B.E. 2546 was introduced in 2003 as a tool for protecting origin-based products from biopiracy (Jaovisidha, 2003), and in the case of jasmine rice, the registration of a rice patent on its aroma genes in the United States in 2008. In addition, to promote the cultivation and marketing of jasmine rice, the Thai Hom Mali Rice Trade Association Thung Kula Rong-Hai Geographical Indication was established in 2008. By 2008/09, there were 1,131 Thai jasmine rice farmers, 13 exporters and 4 processors certified as GI operators for Thung Kula Rong-Hai rice by the Department of Intellectual Property (Ngokkuen and Grote, 2011; 2012).

III. THE ROLE OF GEOGRAPHICAL INDICATION PROTECTION AND ITS LEGAL FRAMEWORK

In this section the role of GI certification in protecting genetic resources is highlighted first, showing that GIs are potentially useful in protecting against biopiracy. The legal framework then elaborates on how GIs are protected at the international and national levels.

The role of geographical indication certification

While an overview of the economic literature on GI protection has been provided by Bramley, Biénabe and Kirsten (2009), Jena and Grote (2010) and Teuber, Anders and Langinier (2011), this section focuses on some selected economic aspects of GIs. Of special relevance in this context is the role of information on quality and reputation, which is conveyed via certification or labelling. Thus, the importance of GI certification can be explained on the basis of different theories, namely the information theory, the reputation theory of Shapiro (1982; 1983) and theories from new institutional economics.

The use of distinctive or quality signs, such as geographical names, is directly related to the information theory and Shapiro's model on reputation (OECD, 2000). Despite the experience or search activities of consumers, it is more difficult and

expensive for them to obtain information about the quality of a product than about its price (Nelson, 1970). Consumers are not always able to use the experience from repeated purchases to discern product quality (Marette, Crespi and Schiavina, 1999). Akerlof (1970) stressed the importance of information for the proper functioning of the market since market failures occur when asymmetric information exists. If the qualities are given exogenously, the problem is one of adverse selection, meaning that the sellers know the actual quality of their products while the consumers do not. Without any means of differentiating goods, there will be no incentives for producers of high-quality goods to remain in such a market because all goods tend to be sold at the same price. This situation is well known under the term “market for lemons”.

One solution to reducing information asymmetry and improving consumer information about product quality could be a private or public intervention, for example by introducing labelling schemes which supply consumers with information about ingredients, production methods, packaging, storage and product origin (Beales, Craswell and Salop, 1981; OECD, 2000; Marette, Crespi and Schiavina, 1999; Vivas-Eugui, 2001).

To protect themselves from the risks of asymmetric information, producers use various signs as markers of quality and assurance of reputation. Thus, distinctive signs and reputation, which denote the persistence of quality, play an important role in signalling a certain level of quality (e.g. Stigler, 1961; Schmalensee, 1978; Shapiro, 1982; 1983; Rangnekar, 2004). Reputation conveyed via a distinctive sign economizes search costs for consumers (Stigler, 1961; Rangnekar, 2004). Savings in search costs then enable reputable goods to receive price premiums which consumers are somewhat willing to pay (Stigler, 1961) and which compensate sellers for their investments in reputation (Shapiro, 1983). This is true especially in the case of origin-linked products for which reputation is a factor that can lead to a higher price based on the recognized tradition and excellence of the product. Such a reputation often requires the use of legal instruments to protect the product name (Vandecandelaere and others, 2009). GIs provide such a mechanism. They identify products and confer the exclusive right to use a distinctive sign for all producers from a given geographical area. GIs thus enable the producers to convey a considerable quantity of information to consumers and become a worthwhile marketing tool if they are used properly and are well protected (Tregear, Kuznesof and Moxey, 1998; Addor and Grazioli, 2002; Rangnekar, 2004; Jena and Grote, 2010).

International legal framework for geographical indication protection

The protection of IPRs is pursued at the international level through various agreements and conventions, including the International Convention for the Protection of New Varieties of Plants, which led to the establishment of the International Union for the Protection of New Varieties of Plants; the Convention on Biological Diversity; and the TRIPS Agreement, which establishes a comprehensive framework on intellectual property protection covering the following main areas of IPRs: copyright, trademarks, geographical indications, industrial designs, patents, the lay-out designs of integrated circuits and undisclosed information. It is considered as the first international treaty to protect GIs through substantive provisions (Jain, 2009).

Until now, there has still been no conclusion regarding the scope of GI protection at WTO but the demand for extending protection on products other than wine and spirits under the multilateral framework is becoming stronger and louder. The stalemate at WTO is caused by two strands of viewpoints with respect to the exceptions clause: the grandfather clause under article 24.5 of the TRIPS Agreement has driven the rise in regional and bilateral trade talks between the Member States led by the United States and the European Union. While the United States emphasizes in its regional and bilateral trade deals the exceptions clause in favour of trademarks that are identical with or similar to GIs, the European Union seeks to eliminate the exceptions available under this clause in order to establish a *sui generis* form of GI protection that clearly prevails over trademarks (Das, 2007; Jain, 2009). In view of the endless negotiations regarding GI protection extension under WTO, some developing countries, being convinced of the economic benefits and trade potential inherent in GIs, have voluntarily started to register their GI products in other countries. Thailand, for instance, registered its GI products in the European Union (Grote, 2009).

For the consolidation of benefits via GI protection for developing countries possessing GI assets, actions are needed not only at the national level but also at the international level in order to reach a consensus on the extension of GI protection for products other than wine and spirits. National regulations which only apply to one country are not sufficient in a global economy where products often are moved beyond national borders (Addor and Grazioli, 2002). Since negotiations in WTO might take years before any consensus is reached, it is necessary that there be international recognition of GIs which are nationally registered (Vivas-Eugui, 2001).

National legal framework for geographical indication protection

Implementing TRIPS standards for GI protection at the national level can be done either through the *sui generis* system following the collective or public approach inherent in a GI, or under the private system of trademark law pursuing an individual ownership or private approach (Vivas-Eugui, 2001; Addor and Grazioli, 2002; Vandecandelaere and others, 2009). Many countries have chosen to protect GIs as certification marks under the private trademark system. This means that if one specific country wants to register a GI in any country with a system of trademark law, it would then have to protect the GI through the registration of a certification mark in the national office of that country (Vivas-Eugui, 2001). Thailand has chosen the *sui generis* system based on a collective approach by enforcing the Act on GI Protection B.E. 2546 (2003), the objectives of which are: (a) to protect consumers from misleading information about the product and producers from unfair competition; (b) to add value to products and serve as a marketing tool for the producers; (c) to maintain product standards; (d) to distribute GI income to rural areas and support industries in the rural communities; and (e) to protect traditional knowledge and strengthen indigenous communities (Thailand, Department of Intellectual Property, 2004).

The Act entered into force in Thailand on 28 April 2003. Prior to its enactment, no specific provisions existed to protect geographical indications in the country (Jaovisidha, 2003). However, Thailand has been providing general protection against the deceptive use of IPRs for many years via such means as the Consumer Protection Act of 1979, the Food Act of 1979 and the Penal Code of 1956 (amended by an Act in 1994). Furthermore, certain general legislation, such as protection under the criminal law, tort law and protection under the Trademark Act, was applied, although the pieces of legislation were not designed to protect against biopiracy and therefore only provided indirect and inadequate protection (Jaovisidha, 2003; O'Connor, 2004).

According to the Thai Act on GI Protection, GIs are defined as “a name, symbol or any other thing used for calling or representing a geographical origin and capable of identifying that the goods originating in that geographical origin are the goods, the particular quality, reputation or characteristic of which is attributable to such geographical origin” (Thailand, Ministry of Commerce, 2003, section 3). The geographical origin refers to a certain area, district, region or locality, including sea, lake, river, watercourse, island, mountain or the like. GI labels are classified into two types: (a) *direct GI* – a geographical name that relates directly to GI products, such as Chaiya Salted Eggs or Thung Kula Rong-Hai Thai Hom Mali Rice (TKR); and

(b) *indirect GI* – sign or anything that does not contain a geographical name to identify the geographical origin or production origin, such as a “Yamo”² picture.

The Act refers to goods that can be purchased, exchanged or transferred. They can originate from nature or they can be agricultural products, including handicrafts and industrial products. There are two protection levels: (a) *general protection* against any use of GIs that are misleading or constitute unfair competition (section 27); and (b) *higher level of protection for special products named by the Minister of Commerce*. Salted egg producers in Chiang Mai, for example, cannot use the name “Chaiya Salted Eggs” since doing so would mislead consumers and constitute unfair competition. Thus, a higher level of protection is provided, even when the use of such GI does not mislead the public about the true origin of a product. The prohibition is also valid for any use of GI in translation or accompanied by the expressions “kind” or “type” or the like. Thailand has named special products for this category of GI protection, such as rice, silk, wine and spirits.

The owners of a registered GI are communities or organizations located in the geographical origin. These owners have the exclusive right to prevent all third parties from using their GI. Since GIs are the rights of the community, they cannot be transferred to others for use. Furthermore, it must be acknowledged that the national legislation has limited power to curb infringements happening abroad.

IV. GEOGRAPHICAL INDICATION REGISTRATION AND CERTIFICATION PROCESS IN THAILAND

This section describes some practical issues around GIs, namely their registration and certification process. Furthermore, it highlights the GI products being registered and certified in Thailand. The implementation of the GI Act involves setting strict product standards as well as origin requirements; these are needed to justify the strong rights granted and it makes sure that there is no danger of goods becoming generic. Without such regulations, the value of a GI for all legitimate users may be negatively affected when one registered GI user decides to sell his or her low-quality products in the high-quality market (Anania and Nisticò, 2004; Jena and Grote, 2010). The system of GI registration therefore serves as a tool by which producers can reach the consumers with a consistent quality signal.

² “Yamo” is the colloquial name of Thao Suranaree, a nineteenth century heroine from Nakhon Ratchasima Province in northeastern Thailand.

Geographical indication registration process

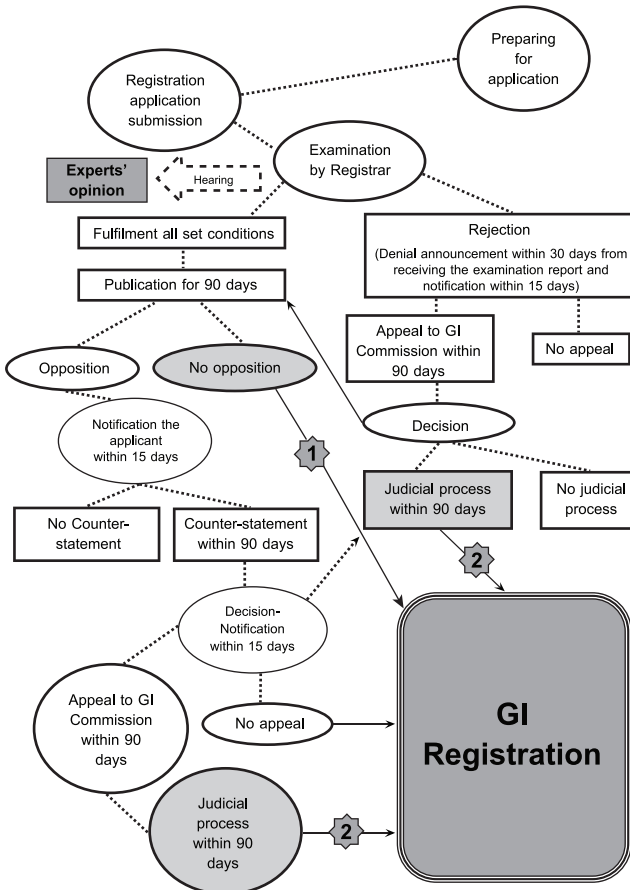
In order to protect GIs, the Thai GI Protection Act has established a registration system. In section 7 of the GI Act three groups of stakeholders eligible to apply for registration are identified: (a) *governmental bodies, governmental offices, State-owned enterprises or local administration organizations* which are registered as a juristic person; (b) *single persons, groups of persons or juristic persons* who do business involving GI products and who are located or live in the GI area; and (c) *groups or organizations of consumers* who make use of GI products. These stakeholders represent the interests of the producers of the products concerned (Thailand, Ministry of Commerce, 2003). In addition, applicants can be Thai nationals or foreigners. Foreigners who want to register their GIs in Thailand must either hold a nationality in the member countries of the treaties concerned or the multilateral GI protection agreements in which Thailand is a member, or they must have settled down or have their own enterprises in Thailand or in any of the member countries. Regarding foreign GIs, there must be clear evidence that these products have been already granted protection in their country of origin by the date of GI application in Thailand. Section 5 of the Act contains a list of GI names which cannot be registered, i.e. generic names or names that are commonly used in the trade of those goods as well as names being contrary to public order, morality and public policy (Thailand, Ministry of Commerce, 2003).

According to Thailand's Department of Intellectual Property (n.d.), there are several stages in developing a GI. First, a network must be built by assembling all business operators in the production line from upstream raw material producers to the downstream process operators of a specific potential GI product. The origin and quality as well as the reputation or other characteristics of the good along with the history of the production of the goods concerned in that location of geographical origin must be documented. Furthermore, there should be evidence of consumer perceptions concerning those goods. Finally, a cost-benefit analysis which considers the monitoring and marketing costs should be undertaken to provide insights on whether GI application would pay off for the stakeholders involved. It is clearly noted that not all area names or all kinds of products need protection in the form of a GI. The product specification requires the zoning or boundary setting for GI production and the establishment of the inspection structure and control system. A draft production standard can then be submitted to request certification of the selected good by a foreign certification body. Finally, marketing and public relations plans for the GI product should be established. Once all these stages have been finalized, the GI registration application must be submitted either to the GI Registry or the Provincial Office of Commercial Affairs under the Ministry of Commerce. The Department of Intellectual Property is then responsible for the examination of all applications, the

registration of GIs and ultimately the licensing of a Thai GI label.

Within 120 days from the date of receiving the application, the examination officer must submit the examination report to the Registrar who will consider the report and make a decision whether to register the product in question as a GI or not. If the Registrar sees that all inherent conditions of the GI application for registration have been fulfilled, the Department would then announce the GI registration application. If there is no opposition by other interested parties, the product in question will be registered as a GI, as shown in figure 2 (line No. 1).

Figure 2. Procedures for registration of geographical indications in Thailand



Source: Authors, based on Thailand, Ministry of Commerce (2003); and Department of Intellectual Property website. Available from www.ipthailand.go.th/ipthailand/index.php?option=com_content&task=view&id=1079&Itemid=251 (accessed 23 December 2009).

Any interested party or even the government official is entitled to request the GI Commission not to register a product of concern as a GI, or to cancel already registered ones if any of the following two situations applies (Thailand, Ministry of Commerce, 2003):

- (a) The registration application for a GI or for GI registration has not proceeded publicly, or any statement in the application does not reflect the true reality during the registration procedure;
- (b) A changed situation after registration leads the registered GI to become generic or contrary to public order, morality and public policy, or the changed situation leads to a change in the characteristics, quality and reputation of the GI goods concerned.

Once the name of the GI product has been registered by the Registrar, the producers from the geographical origin and entrepreneurs of such GI products are granted rights over the use of the GI label, as shown in figure 3. However, it is important to note that, while the producers have to come from the geographical origin, the entrepreneurs do not necessarily need to originate from that particular GI area. The use of a GI label by any GI value chain actors on their product can nevertheless be cancelled (a) when it is misleading and deceptive, thus resulting in potential damage to the reputation of persons who are users of the same GI, and (b) when the GI label is used for other products which are not registered and do not come from the same place of origin (section 27 of the Act). Any person who uses a GI label without the legitimate right to do so, or who uses it to mislead consumers shall be liable to a fine of up to Baht 200,000.

Figure 3. GI label for Thai geographical indications

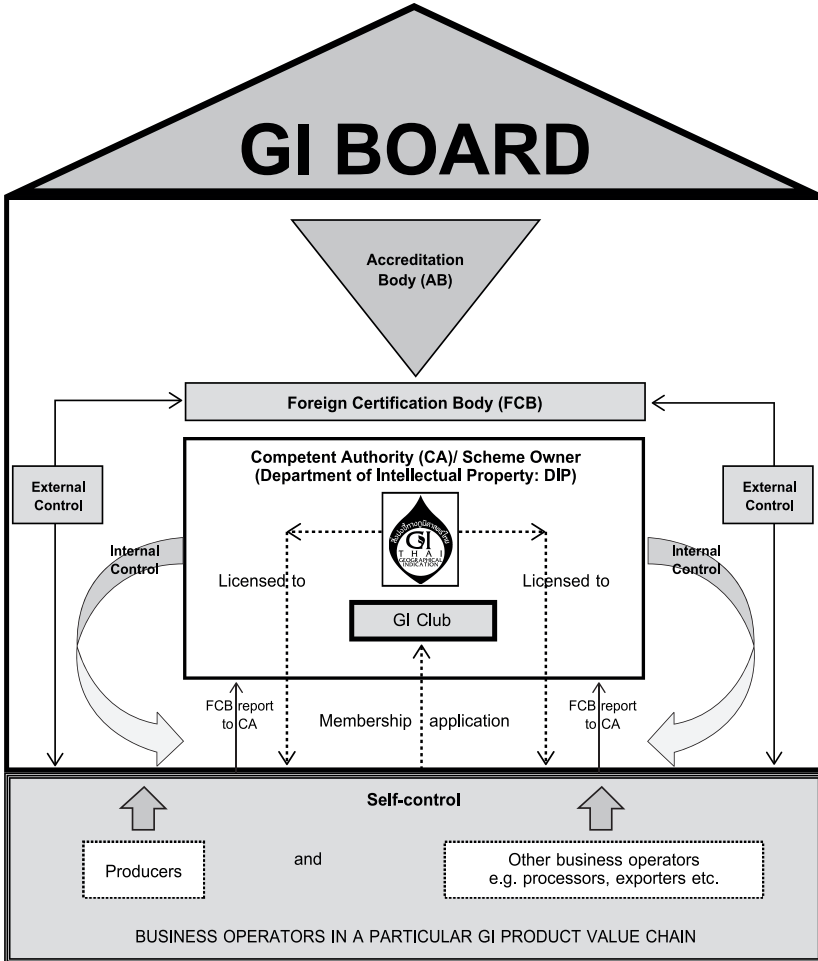


Source: Department of Intellectual Property, Ministry of Commerce of Thailand.

Geographical indication certification process in Thailand

After registration of the GI good, the producers and business operators of that particular GI product still need to become certified. Figure 4 illustrates the GI certification process in Thailand. According to Ngokkuen and Grote (2011), three important steps are required for certifying commercial operators of the GI product production line: (a) self-control; (b) internal control; and (c) external control by the foreign certification body on behalf of a competent authority, i.e. the Thai Department of Intellectual Property. Self-control is the initial step in the quality control management of the GI product concerned. This implies that producers follow the producer manual and the control plan given by the Department of Intellectual Property in order to maintain the quality of the GI product concerned. Internal control relates to the control within the border of the country concerned. It involves the control of all GI producers, processors and other GI stakeholders by local and national governmental bodies, which are usually represented by a GI committee at the provincial level. These actors have to be certified by the Department of Intellectual Property. The external control involves the quality control and formality checks by the foreign certification body. This is particularly the case when such GI products are exported to countries where GI certification is required (Ngokkuen and Grote, 2011). External control is also carried out by the accreditation body which has the responsibility to provide accreditation for the certification body. The responsible accreditation body in Thailand is the Thai Industrial Standards Institute (TISI) and the National Bureau of Agricultural Commodity and Food Standard (ACFS).

Figure 4. Geographical indication certification process and GI control system in Thailand



Source: Authors, based on website of the Department of Intellectual Property. Available from [www.ipthailand.go.th/ipthailand/index.php?option=com_docman&task=cat_view &gid=232&Itemid=192](http://www.ipthailand.go.th/ipthailand/index.php?option=com_docman&task=cat_view&gid=232&Itemid=192) (accessed 23 December 2009); and Ngokkuen and Grote (2011: p.174).

After being certified by the Department, the GI producers or GI business operators can use the GI label on the packages for their product and for their marketing campaigns. However, the membership status of the GI business operators must be annually renewed by the competent authority.

Registered geographical indication products in Thailand

Within the last 10 years, 46 different products have been registered and certified as GIs in Thailand. Panasnikom Handicrafts, Trang Roast Pork and Doi Tung Coffee became the country's first three registered GIs (see table A.1 in the annex). As of December 2012, 8 product types have been registered as GIs, namely handicrafts, food, coffee, wine and spirits, horticultural products, rice, pottery, general textiles and textile goods, and silk. Most of the registered GIs in Thailand are Thai GIs. Eight registered GIs are foreign ones. The most often registered GI products are horticultural products (14 products), followed by 8 kinds of GI rice. Thung Kula Rong-Hai Thai Hom Mali Rice from the Northeast is the most popular form of jasmine rice and has been registered as Thai GI rice, followed by Surin Hom Mali Rice from the same region.

V. CHALLENGES OF GEOGRAPHICAL INDICATION PROTECTION

There are a number of challenges associated with GIs as a tool to protect genetic resources in Thailand. Two major challenges are highlighted in this section, namely the use of GI certificates versus patents, and regional trade agreements along with the TRIPS Agreement. Both challenges are explained by drawing on the case study of jasmine rice. Some possible solutions are suggested.

The call for better protection of geographical indications

At the international level, the GI registration application for the product labelled "Khao Hom Mali Thung Kula Rong-Hai" was submitted by the Thai Department of Intellectual Property to the European Union's GI Registry on 20 November 2008 (European Commission, 2010). This GI application was the first one from Asia and the first attempt to seek GI protection abroad. As of April 2012, the term *Khao Hom Mali Thung Kula Rong-Hai* has still not been registered by the European Union's GI Registry due to the opposition of five countries: Belgium, France, Italy, the Netherlands and the United Kingdom of Great Britain and Northern Ireland. These countries contended that Thailand should not be the only country allowed to register the term *Khao Hom Mali*, as other countries can also grow jasmine rice. European rice traders were concerned about not being able to use the word *Khao Hom Mali* in branding other Jasmine rice products from Thailand once the term *Khao Hom Mali Thung Kula Rong-Hai* would have been registered as GI in the European Union. They suggest that Thailand should apply for registering only the term *Thung Kula Rong-Hai*.³ Thailand then agreed to

³ "Five European nations oppose Thai registration of Thai Hom Mali rice", *MCOT online news*, 26 January 2011.

apply for GI protection only for the term *Thung Kula Rong-Hai*. However, the DIP insisted on having its *Thung Kula Rong-Hai* jasmine rice to be sold at a premium price with the GI designation displayed on the packaging. In addition, the rice must be packed at the site where it was cultivated and be traceable back to the field in order to keep the quality of the jasmine rice concerned, which originated from the GI area. Thailand does not forbid rice traders in the European Union from importing and packing in the European Union varieties of Thai jasmine rice grown in other areas of Thailand next to other varieties of premium rice, brown rice, or other kinds of rice. However, it must be ensured that the European traders have an appropriate supervised packing system, making all rice imported from Thailand capable of being traced to its origin. This is in order to protect the reputation of Thai rice.⁴

Besides the attempt to protect the reputation of Thai jasmine rice abroad through registration of a GI, there have been also intensive attempts since 2001 by the Thai Government to protect it under the trademark law in other countries (Thailand, Department of Foreign Trade, 2002). Thai jasmine rice under the name “Thai Hom Mali Rice” with an official Thai-language term “Khao Hom Mali Thai” or “Kaow Hom Mali Thai” has already been successfully registered as a certification mark (figure 5) by the Trademark Office in more than 50 countries, including Australia, Canada, Malaysia, Singapore and the United States (Thailand, Department of Foreign Trade, 2002). The Thai-language terms “khao” and “hom mali” refer to rice and jasmine flower fragrance in English, respectively. The reason behind the registration application of Thai jasmine rice labelled “Khao Hom Mali” instead of “Jasmine rice” is due to the existing private system of trademark law in some countries, including the United States where the court considers the term “jasmine” as generic. The Department of Foreign Trade of Thailand’s Ministry of Commerce controls the use of the certification mark which is aimed at providing consumers with information and assurance that rice imported with the mark meets its quality standards. The mark is also used to certify the origin, composition and method of production, quality or other quality characteristics of a product.

⁴ For more information on this point, see “Hom Mali rice GI registration likely this year”, *Bangkok Post*, 25 June 2011; and “Thailand/European Union: EU nations oppose Thailand’s registration with European Commission for geographical indication of Thai Jasmine rice”, *Thai Press Reports*, 2011.

Figure 5. Certification mark of Thai Hom Mali Rice originated in Thailand

Source: Department of Foreign Trade, Ministry of Commerce of Thailand.

In January 2008, the National Science and Technology Development Agency in Thailand obtained a patent on genes that generate aroma in the world famous jasmine rice in the United States. This was considered by the Agency as a necessity to be able to protect Thailand's national treasure by keeping other countries from obtaining a patent on rice, an act that would damage Thai farmers and the Thai rice industry. However, due to the existing conflicts of interests regarding IPR types at the multilateral level, i.e. trademarks and patents versus GIs, this move to patent Thai Jasmine rice genes could send a wrong signal to other trading partners. Since Thailand prefers the *sui generis* GI law over trademarks and patent law in protecting GI products and since the country had strongly opposed the patent registration of living organisms and genetic resources in the past, alliance-seeking activities with respect to better protection of agricultural GIs at the multilateral level are therefore in the situation of self-challenge.

Moreover, there is concern that the rice patent on genes from jasmine rice could develop into a double-edged sword in the future, owing to the limited duration of the patent protection period of up to 20 years. Law experts, non-governmental organizations and farmers thus see this rice patent as more harmful than beneficial for the long-term protection of Thai jasmine rice. Anybody could benefit from this variety by adopting the genetic engineering technology needed to put the aromatic genes into any rice variety in order to make it as aromatic as Thai jasmine rice after the expiration of the patent protection period. Combining this concern with the issue of biopiracy, the damage would be much more severe, since foreigners could also apply for patents on other living organisms and genes,⁵ even though such living organisms and genetic

⁵ For additional details, see "Thai rice gene patent sends wrong signal", *Bangkok Post*, 3 July 2009.

resources do not have a point of origin in their countries. Bad experiences with cases such as those of *plao-noi* and bitter gourd could affect Thailand again.

Even though there is still room for relief – since under the Convention on Biological Diversity there is some willing to assign ownership rights to the first phase of the biotechnology process and at the multilateral level – the TRIPS Agreement still does not grant patent protection to any products resulting from the first phase of the biotechnology process (Kerr and Yampoin, 2007). Furthermore, it allows signatory countries to exempt and exclude plant and animal patents from their national patent laws (El-Said, 2005). However, the convention to protect such living organisms and genetic resources has still not been ratified at the international level. Furthermore, even if the products from the first phase of the biotechnology process are not granted patent protection under the TRIPS Agreement, the extension of GI protection under article 23 of TRIPS for agricultural products is still under negotiation. The challenge for GI protection would therefore increase to a greater extent not only for GI protection in Thailand, but also for the whole GI protection system under TRIPS. What Thailand could do alternatively with respect to the issue concerned is to take the initiative to open the floor for negotiations that go much further than the existing request for extending GI protection under article 23. Upgrading its national *sui generis* system for GI protection could be alternatively carried out by adding protection on genetic resources of GI plants. Such a tightened *sui generis* system should not only be integrated into the national legal framework but it should also conform well to specific needs of indigenous and local communities and best protect the genetic resources of the country. Hence, a comprehensive approach with a bundle of complementary legal, non-legal and voluntary mechanisms, such as GI registration, currently serves as the best solution for enhanced GI protection.

Regional trade agreements, TRIPS-plus and TRIPS-minus

Owing to the slow progress in completing the current Doha Development Round, more and more regional and bilateral free trade agreements (RTAs and FTAs) have been negotiated in the recent past (El-Said, 2005). This changing trend in trade negotiations has also been induced by (a) article 24.1 of the TRIPS Agreement, which encourages WTO members to have recourse to bilateral agreements; and by (b) the minimum IP standards of the TRIPS Agreement allowing the creation of higher standards in any IP agreement negotiated subsequent to TRIPS among WTO members. This introduction of minimum IP standards is allowed as long as the principles of non-discrimination, i.e. most-favoured-nation and national treatment, are respected (Mercurio, 2006). However, it is important to note that these newly generated RTAs and FTAs operate outside the jurisdiction of WTO, since they are only notified to WTO but are not governed by its rules and dispute settlement arrangements. In addition, since

a new trade round could be launched easier than under the multilateral framework, they are thus multiplying very fast (GRAIN, 2001). As of 15 January 2012, a total of 511 RTAs were notified to the General Agreement on Tariffs and Trade and WTO, of which 319 agreements were in force with most of them (90 per cent) being FTAs, while customs unions account only for 10 per cent (WTO, 2012).

Having failed to achieve stronger IPR protection in the TRIPS negotiations, developed countries have included more protectable subject matter, broader and more extensive coverage, increased harmonization, stronger enforcement mechanisms and a weakening of flexibilities and special and differential treatment in the bilateral FTA negotiations with the developing and least developed countries (Mercurio, 2006). The TRIPS provisions contained in RTAs and FTAs are considered as "TRIPS-plus" provisions if the country is being forcefully required to implement more extensive levels and standards of IPR protection than required under the TRIPS Agreement, or if they have to reduce the scope of their rights and exceptions as well as to eliminate an option which was awarded to them under the TRIPS Agreement (Musungu and Dutfield, 2003). The TRIPS-plus agenda was made particularly by the United States and the European Union through a series of RTAs and FTAs, with the United States pursuing its strategy of "competitive liberalization" and thus becoming the most active country in bilateral trade talks (Mercurio, 2006).

While the European Union in FTAs with other countries stressed the recognition of selected European GIs, particularly GIs for wines and/or spirits, the United States focused to a large extent on the elimination of domestic *sui generis* GI protection systems and their replacement by regular trademark systems (Vivas-Engui and Spennemann, 2006a; 2006b). Vivas-Engui and Spennemann (2006a) termed such provisions by the United States as "TRIPS-minus" provisions. This preference by the United States for trademarks can be explained by the country's own legal tradition of having trademarks, and also because they do not consider GIs as community rights but rather as private rights which can be licensed or sold (Charlier and Ngo, 2007). Binding such standards into FTAs or RTAs will therefore prevent a Government from using proactive legal measures created under the national GI Act to punish freeriders in cases of deception or misuse of the national GIs by a trading partner. Agreeing to such standards therefore not only means agreeing to amend the national IP law, but it also means that countries may be agreeing to standards that are far from their own economic and social needs (Mercurio, 2006). The TRIPS-plus or TRIPS-minus provisions have therefore very important implications for developing countries because of their higher level of flexibility which again puts developing countries into a difficult situation as negotiating partners (George, 2004). Rules and practices under these concepts limit their ability to protect the public interest (Musungu and Dutfield, 2003).

Even though Thailand supports multilateral trade liberalization, as a member of the Asia-Pacific Economic Cooperation forum and as a party to the Association of Southeast Asian Nations (ASEAN), the country is also committed to “open regionalism”. Since 2002, Thailand has actively negotiated preferential trading arrangements with such countries as Australia, China, India, New Zealand and the United States. As of 5 April 2012, free trade talks of Thailand comprised a total of 22 FTAs and RTAs, of which 6 agreements became effective (Thailand, Department of Trade Negotiations, 2012). Many FTAs and RTAs are seen as beneficial for Thailand’s economy. However, the Thailand-United States FTA has been considered as the most critical one since it is comprehensive and very detailed. In its chapter on IPRs, it is specified that trademark holders are granted exclusive rights over third parties who use trade-identical or similar signs, including GIs (TDRI, 2003). Farmers, especially jasmine rice farmers, activists and academics in Thailand have voiced strong opposition to the FTA negotiations with the United States owing to fear of their strong power and particularly because of their role as a funder of jasmine rice bioengineering projects (Roggemann, 2005). The imbalance in bargaining power for developing countries vis-à-vis developed countries is very pronounced and can be more easily exploited in the context of bilateral negotiations than in a multilateral setting. The developing countries, particularly the smaller and weaker among them, have little ability to counter the negotiating demands of powerful trading partners, in particular the United States, in bilateral FTA negotiations (Buckley, Lo and Boulle, 2008). A challenge for a developing country such as Thailand is thus how to counter the negotiating demands of the United States.

Until now, the proposed Thailand-United States FTA has not been concluded. Negotiations have been put on hold by the United States since February 2006, mainly due to the political situation in Thailand. The hold was also due to the expiration of the United States Bipartisan Trade Promotion Authority Act of 2002 in June 2007. The Act has still not been renewed or extended by the United States Congress since that time (Hornbeck and Cooper, 2011). The continuation of the FTA negotiations with the United States has therefore been postponed to an unknown date (Thailand, Department of Trade Negotiations, 2012).⁶ Thus, Thailand still has some time to explore means to strengthen its national legislation for better GI protection before committing itself to such a FTA and concluding further FTAs or RTAs with other leading economies. This could be done for example by amending and upgrading the existing GI Protection Act

⁶ Senator Jim Webb, Chairman of the United States Senate’s Subcommittee on East Asian and Pacific Affairs, during his visit in Thailand expressed the hope that both countries would coordinate their bilateral cooperation and further foster the already strong relations between the two countries, and that the United States was ready to support Thailand with the newly elected government of Ms. Yingluck Shinawatra in various fields (“US senate committee welcomes new Thai PM”, *Thailand Business News*, 16 August 2011).

to a higher level of protection over the trademark law but still being conform with the TRIPS rules. The country should also carefully assess whether the ensuring obligations in the RTAs or FTAs correspond with its economic, cultural and societal priorities (Vivas-Eugui and Spennemann, 2006a; 2006b). This challenge is therefore a domestic matter.

It is important to emphasize that GI protection should be based on the same standards for all countries rather than under a multilateral trade framework and not under the bilateral ones (Mercurio, 2006). At the international level, Thailand and all other developing and least developed countries should make sure that long-term policy goals and coherence with the multilateral obligations are adequately taken into account (Vivas-Eugui and Spennemann, 2006a; 2006b). The multilateral trading system is beneficial for them because of its ability to extend dispute settlements across agreements (Mathur, 2001). Moreover, in the WTO forum, such countries have at least the power of numbers. By grouping together similarly situated members, they have been able to have a significant impact on the direction of the multilateral trade agenda, whereas such an outcome would not be feasible in a bilateral context (Buckley, Lo and Boule, 2008). Thailand should thus stress its position to support the multilateral trade rules of the TRIPS Agreement under the auspices of WTO. The country should actively work more closely together with other “GI alliances” in order to make the GI issue more public. The target should be not only to improve information for consumers of Thai GIs in the global market but also to raise recognition from all parties about the importance of having domestic GIs being better protected. Given the facts that the member countries are already banded into different groups, that developing countries themselves do not share the same viewpoints with respect to the issue of GI protection extension under the TRIPS Agreement and that the promotion of bilateralism by developed countries encompasses “dividing” developing coalitions (Mercurio, 2006), it is currently very difficult to gather alliances and build consent for setting standards for GI protection at the multilateral level.

VI. CONCLUSION

In the recent past, the discussion on better IPR protection has taken centre stage. Developed countries which produce most of the world’s IPs owing to their high knowledge-based technologies, seek to protect their self-interest by trying to influence the IPR conventions. They complain about the inadequacy of IPR protection in developing countries and accuse them of IP piracy. Many developing countries, however, accuse the developed countries of biopiracy. In view of the endless negotiations to extend GI protection to products other than wine and spirits at the

multilateral level, together with no ratification of the Convention on Biological Diversity by the United States, the ability of WTO to cope with the problem of biopiracy around the globe is weak. Some countries, in particular those which possess GI products, have enacted laws to protect their genetic resources. Thailand with its *sui generis* GI protection system hopes to mitigate the problem of exploiting origin-based names. The Thai GI Act was enacted not only due to the requirements of the multilateral trading framework but also due to biopiracy related to its widely known Thai jasmine rice. The biopiracy issue was seen as the main driving force accelerating the process for enacting the GI law.

However, increased trade liberalization through bilateral FTAs and RTAs with economies such as the United States and the attempt to protect its national “assets” by obtaining a patent for the rice genes in the United States Patent and Trademark Office have created a situation that has started to challenge GI protection in Thailand. This is due to the limited protection period for patents registered in the United States (only up to 20 years). Furthermore, patenting life forms was never a position of Thailand at the multilateral trade negotiations on patent protection. Suggestions on how to solve such problems do exist, such as opening negotiations that go much further than the existing request of extending GI protection under article 23, or upgrading its national *sui generis* system for GI protection by adding protection on genetic resources of GI plants. However, there is a cost to such suggestions and the expected outcome is unsure. Raising the issue of automatic protection on genetic resources of GI plants within the scope of GI protection is much more challenging, while there is criticism of the *sui generis* system of GI protection by opponents in a series of bilateral FTAs and RTAs. It is to question whether the country would be better off by using its resources on other facets of development that are more likely to yield sustainable outcomes. While creating consumers’ awareness about GIs, for example, is generally recommendable, it must also be considered that GI promotion is expensive and sustainable benefits are not guaranteed. Nevertheless, given the social, cultural and economic importance of GIs for Thailand, it is necessary and worth trying to seek win-win solutions which are of benefit to both sides, the opponents and proponents of GI protection. Many Thai GIs are agricultural in nature and involve all kinds of actors from poor rural households to GI exporters. Losing “GI assets” due to inadequate protection might have a negative impact on many of the million poor in the rural areas.

REFERENCES

- Addor, F., and A. Grazioli (2002). Geographical indications beyond wines and spirits. A road map for a better protection for geographical indications in the WTO/TRIPS Agreement. *Journal of World Intellectual Property*, vol. 5, No. 6, pp. 865-897.
- Adi, B. (2006). Intellectual property rights in biotechnology and the fate of poor farmers' agriculture. *Journal of World Intellectual Property*, vol. 9, No. 1, pp. 91-112.
- Afreen, S., and B.P. Abraham (2008). Biopiracy and protection of traditional knowledge: intellectual property rights and beyond. Working Paper Series, No. 629, September. Calcutta: Indian Institute of Management.
- Akerlof, G.A. (1970). The market for 'lemons': quality uncertainty and the market mechanism. *Quarterly Journal of Economics*, vol. 84, No. 3, pp. 488-500.
- Anania, G., and R. Nisticò (2004). Public regulation as a substitute for trust in quality food markets: what if the trust substitute cannot be fully trusted? *Journal of Institutional and Theoretical Economics*, vol. 160, pp. 681-701.
- Bank of Thailand (2002-2010). *Average Exchange rates of Commercial Banks in Bangkok*. Bangkok.
- Beales, H., R. Craswell, and S.C. Salop (1981). The efficient regulation of consumer information. *Journal of Law and Economics*, vol. 24, No. 3, pp. 491-539.
- Bramley, C., E. Biénabe, and J. Kirsten (2009). The economics of geographical indications: towards a conceptual framework for geographical indication research in developing countries. In *The Economics of Intellectual Property: Suggestions for Further Research in Developing Countries and Countries with Economies in Transition*. Geneva: World Intellectual Property Organization. Available from www.wipo.int/export/sites/www/ip-development/en/economics/pdf/wo_1012_e_ch_4.pdf. Accessed 30 January 2012.
- Buckley, R., V.L. Lo, and L. Boule (2008). *Challenges to Multilateral Trade. The Impact of Bilateral, Preferential and Regional Agreements*. Alphen aan den Rijn, The Netherlands: Kluwer Law International.
- Charlier, C., and M. Ngo (2007). An analysis of the European communities: protection of trademarks and geographical indications for agricultural products and foodstuffs dispute. *Journal of World Intellectual Property*, vol. 10, No. 3-4, pp. 171-186.
- Correa, C.M. (2002). Protection of geographical indications in Caricom Countries. Available from [www.crn.org/documents/studies/Geographical Indications Correa.pdf](http://www.crn.org/documents/studies/Geographical%20Indications%20Correa.pdf). Accessed 23 December 2011.
- Das, K. (2007). Protection of geographical indications and developing countries. T.R.A.D.E. Working Paper 10. Geneva: South Centre.
- Delgado, G.C. (2002). Biopiracy and intellectual property as the basis for biotechnological development: the case of Mexico. *International Journal of Politics, Culture and Society*, vol. 16, No. 2, pp. 297-318.
- El-Said, M. (2005). The road from TRIPS-minus, to TRIPS, to TRIPS-plus. Implications of IPRs for the Arab world. *Journal of World Intellectual Property*, vol. 8, No. 1, pp. 53-65.
- European Commission (2010). Publication of an application pursuant to article 6 (2) of Council Regulation (EC) No 510/2006 on the protection of geographical indications and designations of origin for agricultural products and foodstuffs (2010/C 169/06). *Official Journal of the European Union*, C 169/7, 29.06.2010. Available from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:169:0007:0011:EN:PDF>. Accessed 20 June 2012.

- George, J. (2004). Next decade of TRIPS Agreement: possibility of tripped geographical indications. *World Trade Review*, vol. 4, No. 14. Available from www.worldtradereview.com/news.asp?pType=N&iType=A&iID=87&siD=14&nID=16122. Accessed 15 December 2009.
- Goodwin, H.L., and others (1992). Market potential for domestic rice varieties among Asian Americans: technical report. Consumer and Product Market Research Report, No. CPM 1-92T. Texas: Texas Agricultural Market Research Center.
- GRAIN (1998). Biopiracy, TRIPS and the patenting of Asia's rice bowl: a collective NGO situationer on IPRs on rice. Available from www.grain.org/article/entries/27-biopiracy-trips-and-the-patenting-of-asia-s-rice-bowl. Accessed 6 September 2011.
- _____ (2001). TRIPS-plus through the back door: how bilateral treaties impose much stronger rules for IPRs on life than the WTO. Available from www.grain.org/article/entries/5-trips-plus-through-the-back-door.pdf.
- Grote, U. (2009). Environmental labeling, protected geographical indications and the interests of developing countries. *Estey Centre Journal of International Law and Trade Policy*, vol. 10, No. 1, pp. 94-110. Available from <http://ageconsearch.umn.edu/bitstream/48795/2/grote10-1.pdf>.
- Hornbeck, J.F., and W.H. Cooper (2011). Trade promotion authority (TPA) and the role of congress in tradem policy. Congressional Research Service Report No. RL33743. Available from www.fas.org/sgp/crs/misc/RL33743.pdf. Accessed 5 April 2012.
- iCoopThai (n.d.). Soontorn Srihanoen: the one who created mythology of Khao Dawk Mali 105 rice. Available from www.icoopthai.com/index.php/cooperative-head-personal/81-rice-jasmin105. Accessed 9 August 2011. (In Thai).
- Jain, S. (2009). Effects of the extension of geographical indications: a South Asian perspective. *Asia-Pacific Development Journal*, vol. 16, No. 2, pp. 65-86.
- Jaovisidha, Suraphol (2003). Protection of geographical indications – “Thailand’s perspective”. Paper prepared for the European Union-Association of Southeast Asian Nations Workshop on Geographical Indication: A Way into the Market, Hanoi, 7-8 October. Available from www.ecap-project.org/archive/fileadmin/ecapll/pdf/en/activities/regional/gi_2003/gi_thailand_surapol.pdf.
- Jena, P.R., and U. Grote (2010). Changing institutions to protect regional heritage: a case for geographical indications in the Indian agrifood sector. *Development Policy Review*, vol.28, No. 2, pp. 217-236.
- Kerr, W.A., and R. Yampoin (2007). Adoption of biotechnology in Thailand and the threat of intellectual property piracy. *Canadian Journal of Agricultural Economics*, vol. 48, No. 4, pp. 597-606.
- Marette, S., J.M. Crespi, and A. Schiavina (1999). The role of common labelling in a context of asymmetric information. *European Review of Agricultural Economics*, vol. 26, No. 2, pp. 167-178.
- Mathur, S.K. (2001). Domestic challenges and the TRIPS agreement: the way forward for India. *Journal of World Intellectual Property*, vol. 4, No. 3, pp. 337-347.
- Mercurio, B. (2006). TRIPS-plus provisions in FTAs: recent trends. In *Regional Trade Agreements and the WTO Legal System*, Lorand Bartel and Federico Ortino, eds. Oxford: Oxford University Press. Available from <http://ssrn.com/abstract=947767>. Accessed 15 December 2009.
- Musungu, S.F., and G. Dutfield (2003). Multilateral agreements and a TRIPS-plus world: the World Intellectual Property Organization (WIPO). TRIPS Issues Papers No. 3 Geneva: Quaker United Nations Office (QUONO); Ottawa: Quaker International Affairs Program.

- Nelson, P. (1970). Information and consumer behavior. *The Journal of Political Economy*, vol. 78, No. 2, pp. 311-329.
- Ngokkuen, C., and U. Grote (2011). The prediction of household's behaviour in adopting geographical indication certification for Jasmine rice from northeastern Thailand. *International Journal on GSTF Business Review*, vol. 1, No. 1, pp. 173-178.
- _____ (2012). Geographical indication for Jasmine: applying a logit model to predict adoption behaviour of Thai farm households. *Quarterly Journal of International Agriculture*, vol. 51, No. 2, pp. 157-185.
- O'Connor, B. (2003). Protecting traditional knowledge: an overview of a developing area of intellectual property law. *Journal of World Intellectual Property*, vol. 6, No. 5, pp. 677-698.
- _____ (2004). *The Law of Geographical Indications*. London: Cameron.
- Organisation for Economic Co-operation and Development (OECD) (2000). Appellations of origin and geographical indications in OECD member countries: economic and legal implications. Study carried out under the Programme of Work for 1999/2000 adopted by the Committee for Agriculture and endorsed by the Trade Committee. Paris: OECD. Available from www.origin-food.org/pdf/meet0901/oecd.pdf. Accessed 18 September 2011.
- Rangnekar, D. (2004). The socio-economics of geographical indications: a review of empirical evidence from Europe. Issues Papers No. 8. Geneva: United Nations Conference on Trade and Development/International Centre for Trade and Sustainable Development.
- Raustiala, K., and S.R. Munzer (2007). The global struggle over geographical indications. *European Journal of International Law*, vol. 18, No. 2, pp. 337-365.
- Roggemann, E. (2005). Fair trade Thai jasmine rice: social change and alternative food strategies across borders. Educational Network for Global and Grassroots Exchange. Los Angeles: Urban and Environmental Policy Institute. Available from <http://globalgrassroots.files.wordpress.com/2011/02/fair-trade-thai-jasmine-rice-ellensroggemannthesis.pdf>.
- Schmalensee, R. (1978). A model of advertising and product quality. *Journal of Political Economy*, vol. 86, No. 3, pp. 485-503.
- Shapiro, C. (1982). Consumer information, product quality, and seller reputation. *Bell Journal of Economics*, vol. 13, No. 1, pp. 20-35.
- _____ (1983). Premiums for high quality products as returns to reputations. *Quarterly Journal of Economics*, vol. 98, No. 4, pp. 659-680.
- Stigler, G.J. (1961). The economics of information. *Journal of Political Economy*, vol. 69, No. 3, pp. 213-225.
- Suh, J., and A. MacPherson (2007). The impact of geographical indication on the revitalization of a regional economy: a case study of Boseong green tea. *Area*, vol. 39, No. 4, pp. 518-527.
- Teuber, R. (2007). Geographical indications of origin as a tool of product differentiation. The case of coffee. Paper presented at the 105th European Association of Agricultural Economists Seminar on International Marketing and International Trade of Food Quality Products. Bologna, Italy, 8-10 March.
- Teuber, R., S. Anders, and C. Langinier (2011). The economics of geographical indications: welfare implications. Working paper, No. 2011-6. Québec, Canada: Structure and Performance of Agriculture and Agri-products Industry Network. Available from www.ualberta.ca/~langinie/Papers/Lit-Overview_GI_Paper_04_2011.pdf. Accessed 11 December 2011.

- Thai Development Research Institute (TDRI) (2003). *Report on Effects of Bilateral FTA between Thailand and the US*. Bangkok. (In Thai).
- Thailand, Bureau of Rice Research and Development (n.d.). Rice knowledge bank. Bangkok: Ministry of Agriculture and Cooperative. Available from www.brrd.in.th/main/index.php?option=com_content&view=article&id=163. Access 9 August 2011. (In Thai).
- Thailand, Department of Foreign Trade (2002). *Project on Publication and Public Relations of Thai Hom Mali Rice (Jasmine) Standards*. Royal Thai Government Report. Nonthaburi: Ministry of Commerce. (In Thai)
- Thailand, Department of Intellectual Property (2004). Basic information on geographical indication. Available from www.ipthailand.go.th/ipthailand/index.php?option=com_content&task=view&id=291&Itemid=248. Accessed 11 December 2009. (In Thai)
- _____ (n.d.). Registration of geographical indication handbook. Nonthaburi: Ministry of Commerce. Available from www.ipthailand.go.th/ipthailand/index.php?option=com_docman&task=cat_view&gid=232&Itemid=192. Accessed 18 December 2009. (In Thai).
- Thailand, Department of Trade Negotiations (2012). *Thai FTA. Latest Status of Negotiations*. Nonthaburi. Available from www.thaifita.com/thaifita/Home/NegoLastestStatus/tabid/117/Default.aspx. Accessed 5 April 2012.
- Thailand, Ministry of Agriculture and Cooperatives (2009). Basic information on agricultural economics 2009. Bangkok. (In Thai).
- _____ (2010). Basic information on agricultural economics 2010. Bangkok. (In Thai)
- _____ (2011). Basic information on agricultural economics 2011. Bangkok. (In Thai)
- Thailand, Ministry of Commerce (2003). Geographical Indications Protection Act, B.E. 2546 (2003), Pinai Nanakorn, trans. *Royal Thai Government Gazette*, vol. 120, part 108a.
- Toriyama, K., H.L. Heong, and B. Hardy, eds. (2005). Rice is life: scientific perspectives for the 21st century. Proceedings of the World Rice Research Conference held in Tokyo and Tsukuba, Japan, 4-7 November 2004. Los Baños, Philippines: International Rice Research Institute, and Tsukuba, Japan: Japan International Research Center for Agricultural Sciences. CD-ROM. Available from http://books.irri.org/9712202046_content.pdf.
- Tregear, A., S. Kuznesof, and A. Moxey (1998). Policy initiatives for regional foods: some insights from consumer research. *Food Policy*, vol. 23, No. 5, pp. 383-394.
- Tregear, A., and others (2007). Regional foods and rural development: the role of product qualification. *Journal of Rural Studies*, vol. 23, pp. 12-22.
- Vandecandelaere, E., and others (2009). Linking people, places and products. A guide for promoting quality linked to geographical origin and sustainable geographical indications. Rome: Food and Agriculture Organization/Strengthening International Research on Geographical Indications.
- Vivas-Eugui, D. (2001). Negotiations on geographical indications in the TRIPS Council and their effect on the WTO agricultural negotiations. Implications for developing countries and the case of Venezuela. *Journal of World Intellectual Property*, vol. 4, No. 5, pp. 703-728.
- Vivas-Eugui, D., and C. Spennemann (2006a). The treatment of geographical indications in recent regional and bilateral free trade agreements. Costa Rica: United Nations Conference on Trade and Development/International Centre for Trade and Sustainable Development Project on Intellectual Property and Sustainable Development.

- _____ (2006b). The treatment of geographical indications in recent WTO discussions and in regional and bilateral agreements. Geneva: International Centre for Trade and Sustainable Development and United Nations Conference on Trade and Development.
- World Trade Organization (WTO) (2012). Regional trade agreements. Available from www.wto.org/english/tratop_e/region_e/region_e.htm. Accessed 5 April 2012.
- Zou, J. (2005). Rice and cheese, anyone? The fight over TRIPS geographical indications continues. Available from www.brooklaw.edu/students/journals/bjil/bjil30iii_zou.pdf. Accessed 17 November 2009.

ANNEX

Table A.1. Registered geographical indications in Thailand classified by product type, 2003-2012

No.	Geographical indications	Product type	Registered date
1	Panasnikom Handicrafts	Handicrafts	26 August 2005
2	Bor Sang Umbrella	Handicrafts	1 June 2006
3	Chiang Mai Celadon	Handicrafts	31 August 2007
4	Yok Blabri Nan	Handicrafts	23 December 2010
5	Trang Roasted Pork	Food	18 April 2006
6	Surat Thani Oyster	Food – seafood	23 June 2006
7	Prosciutto Di Parma	Food – ham	21 July 2006
8	Chaiya Salted Eggs	Food – eggs	27 September 2007
9	Doi Tung Coffee	Coffee	18 April 2006
10	Doi Chaang Coffee	Coffee	27 September 2007
11	Phurua Plateau Wine	Wine	18 April 2006
12	Brunello Di Montalcino	Wine	27 September 2007
13	Napa Valley	Wine	12 June 2008
14	Cognac	Spirits	27 September 2007
15	Pisco	Spirits	30 September 2007
16	Tequila	Spirits	15 August 2008
17	Champagne	Sparkling wine	15 December 2006
18	Scotch Whisky	Whisky	13 July 2007
19	Chainat Khaotangkwa Pomelo	Horticultural product	23 June 2006
20	Sriracha Pineapple	Horticultural product	23 June 2006
21	Chiangrai Phulae Pineapple	Horticultural product	15 December 2006
22	Nanglae Pineapple	Horticultural product	15 December 2006
23	Nakornchaisri Pomelo	Horticultural product	30 September 2007
24	Petchabun Sweet Tamarind	Horticultural product	30 September 2007
25	Phuket Pineapple	Horticultural product	26 October 2007
26	Samutsongkhram Kom Lychee	Horticultural product	10 March 2008
27	Phet Rose Apple	Horticultural product	17 April 2008
28	Glauy Hin Bannang Sata	Horticultural product	8 June 2009

Table A.1 (continued)

No.	Geographical indications	Product type	Registered date
29	Som-O-KhawYai Samutsonkram	Horticultural product	19 March 2010
30	Kathon Hor Bangkrang	Horticultural product	11 May 2010
31	Nont Durian	Horticultural product	11 May 2010
32	Pakpanangn Tabtimsiam Pomelo	Horticultural product	13 September 2010
33	Sangyod Muang Phatthalung Rice	Rice	23 June 2006
34	Hang-Hom-Thong-Sakon-Tawapee Rice	Rice - brown rice	15 December 2006
35	Kaowong Kalasin Sticky Rice	Rice - sticky rice	16 May 2007
36	Thung Kula Rong-Hai Thai Hom Mali Rice	Rice - jasmine rice	27 September 2007
37	Surin Hom Mali Rice	Rice - jasmine rice	26 February 2008
38	Khao Kum Lanna	Rice	17 September 2008
39	Jek Chuey Sao Hai Rice	Rice	30 December 2008
40	Leuang Pratew Chumporn Rice	Rice	30 December 2008
41	Ban Chiang Pottery	Pottery	10 August 2007
42	Kohkret Pottery	Pottery	11 May 2010
43	Mae Jam Tin Jok Woven Cloth	Textiles and textile goods	27 September 2007
44	Lamphun Brocade Thai Silk	Silk	27 September 2007
45	Praewa Kalasin Thai Silk	Silk	27 September 2007
46	Chonnabot Mudmee Thai Silk	Silk	14 January 2009

Sources: Department of Intellectual Property and authors' own compilation.

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- Krueger, Alan B., and Lawrence H. Summers (1987). Reflections on the inter-industry wage structure. In *Unemployment and the Structure of Labour Markets*, Kevin Lang and Jonathan S. Leonard, eds. London: Basis Blackwell.
- Moran, Theodore H., and Gerald T. West, eds. (2005). *International Political Risk Management*, vol. 3, *Looking to the Future*. Washington, D.C.: World Bank.
- Rana Husseini (2007). Women leaders attempt to bridge East-West cultural divide. *Jordan Times*, 9 May.
- Sadorsky, P. (1994). The behaviour of U.S. tariff rates: comment. *American Economic Review*, vol. 84, No. 4, September, pp. 1097-1103.
- Salagaev, Alexander (2002). Juvenile delinquency. Paper presented at the Expert Group Meeting on Global Priorities for Youth. Helsinki, October.
- Stiglitz, Joseph, and others (2006). *Stability with Growth: Macroeconomics, Liberalization and Development*. Initiative for Policy Dialogue Series. Oxford: Oxford University Press.
- Straub, Stephane (2008). Infrastructure and growth in developing countries: recent advances and research challenges. Policy Research Working Paper, No. 4460. Washington, D.C.: World Bank.
- United Kingdom, Department for Education and Skills (2007). *Care Matters: Time for Change*. London: The Stationery Office. Available from www.official-documents.gov.uk.

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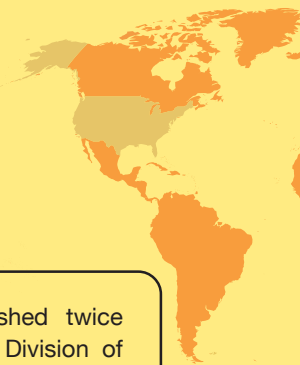
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