DOES INCREASED PER CAPITA TRADE LEAD TO HUMAN DEVELOPMENT? – A STUDY OF THE ASEAN COUNTRIES, CHINA, JAPAN AND KOREA (ASEAN PLUS THREE)

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By

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DOES INCREASED PER CAPITA TRADE LEAD TO HUMAN DEVELOPMENT? – A STUDY OF THE ASEAN COUNTRIES, CHINA, JAPAN AND KOREA (ASEAN PLUS THREE)

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ABSTRACT

The linkage between trade and development is complex. Different measure of development yields different relationship between trade and development. Moreover, the impact of trade on development is usually tested through the intermediaries of economic performance and changes in income.

This paper examines the direct relationship between human development and per capita trade. The hypothesis is that the increase in per capita trade is positively correlated with the enhancement of human development, measured by the UNDP Human Development Index. This paper uses panel data covering the ASEAN Plus Three countries from 1990 to 2011, and adopts Ordinary Least Squares (OLS) model with country and year controls for quantitative analysis. The results confirmed the positive relationship between trade and human development. In this case of Southeast and East Asian countries, export has a greater impact than import on human development, possibly due to the success of the export oriented economic growth strategy across the region. More importantly, multilateral trade agreement and trade openness also have a positive impact on the livelihood of people, for both higher income countries and lower income countries. Major economic downturns like the 2008 financial crisis have a very significant negative impact on trade and development in countries across the region. These findings suggest
that countries should continue their export oriented economic growth strategy and promote per capita trade volume with multilateral engagement and further trade openness.
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Introduction

According to the United Nations (UN) statistics, the growth rate of international trade has been around 6.5 percent since the early 1990s. (UN, 2010) The robust growth of trade has boosted the economy of many developing countries, benefited society as a whole and lifted many out of poverty. Positively speaking, trade increases income, brings in opportunities, expands choices and builds up capacities. However, trade does not necessarily bring about positive changes to everyone; that is, the benefits are not always enjoyed by all.

As for development per se, many governments have flipped over the page of the pre-1990’s GNP-oriented development sentiment. That is, there may be a downside. Not only because they have to face the new challenges like environment pollution induced by the unsustainable development process, but also they start to realize that the ultimate goal of development is to enhance livelihoods for the people. The concept of development has embroidered more and more human-centered components.

The United Nations Development Programme (UNDP) was the pioneer in leading this conceptual transition of understanding development. Seeing “excessive preoccupation with GNP growth and national income accounts” has “supplanted a focus on ends by an obsession with merely the means” (UNDP, 1990) UNDP explained human development as a process to expand people’s choices. They believed that what can be incorporated under this definition, no matter what development stages, are a long and healthy life, the ability to acquire knowledge, and
access to resources needed for decent standards of living. (UNDP, 1990) To evaluate human development, UNDP abandoned the single standard of income and instead devised a series of socio-economic indicators. This approach was innovative, if not revolutionary, not only because it quantified the indicators, but also it systematically introduced the idea of human development.

The human development indicators that UNDP (1990) adopts to capture the “complexity of human life” and to proxy capabilities as a whole are: life expectancy at birth, which is an index of population health and longevity; adult literacy, which is a measure of knowledge and education; and GDP per capita at purchasing power parity, which is an indicator of standard of living.

Since trade influences the three dimensions of human development, though indirectly through income, we are able to analyze the linkages between trade and human development. People used to take it for granted that increased trade leads to human development. However empirical evidences suggest that there are links missing between trade and development, such as income distribution, national economy structure and government’s behaviors. For example, agricultural workers are sometimes marginalized by agricultural imports. Thus, it is recognized that the linkages are not as straightforward as imagined, but rather are vague and complex. However in today’s world, with interdependence deepening among countries, trade can have a strong influence on country’s economic growth and human development. It is important for us to understand how trade influences human development.
As the major geographical regions in the world display different characteristics and levels of development, trade may or may not have similar impact on human development across the globe. There are already studies on Latin America in terms of trade and human development, and UN reports on Africa and South Asia, but analysis focused on East Asia and Southeast Asia is still absent. This paper will fill in this gap to mitigate cross-country differences unrelated to trade, a common group of countries will be studied. Since the world’s economic engine has moved to Asia in the 21st century, this area will be studied.

The countries examined will include the Association of Southeast Asian Nations (ASEAN), China, Japan and South Korea, namely, ASEAN plus Three. Many of the countries have shown the strong ambition to develop their domestic economy and the commitment to improve people’s livelihood. Moreover, the countries are at very different development stages, and this offers an opportunity to see how trade is related to human development in countries with diverse human development needs and dissimilar government capacities. Because the countries are integrated into global economy in various degrees and implement different trade policies, it is possible to examine how these factors influence our analysis.

**Literature Review**

The discussion of trade and development dates back to Ricardo’s comparative advantage theory (1817), at which time the complex relationship between trade and development was oversimplified in the economic model. However as Robert Heilbroner (1997) put it, social
contentment cannot be expected from economic growth. Early in the 1970s, the Easterlin Paradox raised the point that happiness does not increase with demonstrable economic growth, nor does it correlate with per capita GNP based on an empirical study using data from 19 countries (Easterlin, 1974). Many scholars at the same time worked to demonstrate the positive effects of economic growth on human welfare (Hirsch, 1976; Beckerman, 1974; Kahn, 1976; Mesarovic, 1974) However, others debated the opposite though without empirical evidence (Nordhaus, 1972; Olson, 1974). The discussion continued for decades and there have been many new perspectives. Ranis and Stewart (2001) successfully broke the common view that increases in economic growth automatically leads to advances in human development through quantitative analysis of Latin American countries from 1960 to 1992. They produced the famous “virtuous/vicious cycles” that levels of economic growth and human development are mutually reinforcing. Ranis (2004) emphasized this point in another study that countries may either enter a high growth and large gains in human development, or a low growth and low rate of human development.

Amongst the many elements of economic growth, income has the most direct influence on human development. Doh C. Shin (1978) argued that higher national income leads to greater welfare. At the household level, not only does average income matter, the distribution of the income and the extent of societal poverty reduction is crucial in impacting human development as well (Ranis & Stewart, 2001). Gender also contributes to the discussion because research has shown that female-headed households usually spend more on human development related goods
like food, health and education (UNDP, 2008). Overall, the general tone on income and human development would be that basic income advances human development globally.

In return, human development can also have an impact on economic growth, as the “virtuous/vicious cycles” theory suggests. This is close to the discussion of how human capital influences economic growth because education and health contributes to the impact of human development on economic growth. Education strongly affects labor productivity and it advances business innovation and technological change. Health is inherently desirable as an end in itself, and improvements in health improve productivity and incomes (Ranis, 2004). Examples of countries that adopted successful human development policies at the early stage of economic development are Korea and Singapore. Singapore invested in universal health care and education out of the belief that a healthy and contented workforce would be more productive; Korea has a very high rate of university enrolment linked university research with industry (UNDP, 2008).

UNDP sees four pillars of human development related to trade (2008). The first is productivity, which enhances human capabilities and allows people to benefit from trade. The second is equality, which ensures all groups benefit sufficiently from trade, especially through a more equitable income distribution. The third is sustainability, which preserves developmental achievements. The last is empowerment, which means people have the ability to influence the process and events that affect their lives.
Trade however, can have mixed effects on human development. Positively, with trade, new items are available in the domestic market and the price of goods competing with imports may go down. The export sector more likely will flourish with increased wages and employment. Notably, trade liberalization has a positive gender impact, as the share of paid employment for women increases with global outsourcing (Haq, 2009). On the contrary, import sector may face more competition from foreign firms. Furthermore, reduced government revenue from tariffs may affect government spending on public goods (Haq, 2009). Trade may sweep low-skilled workers out of the job market (UNDP, 2006c). Thus, the complex processes resulting from more trade in goods and services produce both winners and losers. The net outcome depends on existing conditions like the equality situation, infrastructure, education and health policies (UNDP, 2006c). But what definitely produces losers and undermines human development is unfair trade, which not only results in high tariffs and subsidies, but also denies the poorest people’s chances to escape from poverty and inequalities (Iyer, 2005). The debate on the trade side is mostly centered on trade liberalization. There is less literature discussing the direct and indirect impact of multilateral trade agreement on human development. This paper seeks to address this concern.

Trade does not usually influence human development directly; instead, there are a couple of channels through what it can fuel human development. It indirectly impacts human development through income, depending on the structure of economy and growth, and employment and wages (UNDP, 2006a). More specifically on trade and human development indicators, trade promotes education through communication and cross-cultural understanding, advances health and...
longevity through the introduction of new types of medicines, health related equipment and medical trainings, and broadens people’s outlooks even if trade does not necessarily increase income (Davies & Quinlivan, 2006). Important factors to be considered for trade’s influence on human development would be an open market (Davies & Quinlivan, 2006; UNDP, 2006a; UNDP, 2006c), political regimes (Davies & Quinlivan, 2006), leadership commitment (Malhotra, 2004), income distribution and whether human development is included in the beginning of liberalizing trade (Ranis & Stewart, 2001). In the analysis of this paper, as many of these factors as feasible will be included into the analysis, so that we will have a better intuitive understanding of them.

There is not much literature devoting to trade and human development discussions in the ASEAN plus Three countries. However, the Ranis study on Latin America and the UNDP Africa report, Laos report, and India report provide good analytical framework for reference. Building on all of this work, this paper will study the trade and human development relationship in the region of Southeast Asia and East Asia region.

**Hypothesis**

This paper analyzes the relationship between trade and human development, using per capita trade data and the human development index of the 10 ASEAN countries plus China, Japan and South Korea over the 1990-2011 time period. The hypothesis is that per capita trade and the human development index are positively correlated.
Data and Methodology

Data
The key sets of panel data used in this paper cover the ASEAN plus Three countries from 1990 to 2011. The Human Development Index (HDI) designed by UNDP is used to reflect human development instead of using income as the proxy. As was clarified in the first Human Development Report (1990), income is only a means rather than an end, and the current income level of any country offers us little guidance on the future growth prospects. Plus, the HDI has already included the effect of gross national income in its calculation. It also considers the effect of life expectancy which acts as a proxy for population health and longevity, and the effect of education attainment which acts as a proxy for adult literacy and education enrollment by educational levels. All the data are retrieved from annual Human Development Reports.

Key independent variable
The key independent variable is per capita trade volume (TRADE_PC). It seems likely that human capital development may react differently to exports and imports, so two sub-analysis will be conducted substituting per capita trade volume by its two components of per capita import (IMPORT_PC) and per capita export (EXPORT_PC), instead of including all of them in the same equation. Each trade variable may have a stronger or weaker relationship to human development level. Davies and Quilivan (2006) have used per capita data as a way of controlling for different population sizes across countries. Total population data was obtained from the
World Bank Databank, in order to calculate per capita import and export statistics with the total trade volume. From previous studies, trade volume is broken down into import volume and export volume to examine how imports and exports relate to human development respectively. It is important here because many countries in the region have adopted export oriented trade policies. In the model, the variables will be analyzed in logarithm form.

**Other independent variables**

There are four continuous independent variables and one binary variable in this analysis.

Gross Domestic Production (GDP) is used as a measure of economic strength and standard of living of a country in this analysis. Ranis, G., and Stewart, F. (2001) found that GDP is statistically and empirically significant in positively influencing human development.

The Consumer Price Index (CPI) is used in this analysis to measure inflation, as a UNDP (2008) study showed it could influence human development. The predicted relationship based on the UNDP study is negative. In the model, the variables will all be analyzed in their logarithm forms.

The Balance of Payment variable (BOP) is included to control for the effects of a deficit or surplus in spending on human development. UNDP (2008) indicated that balance of payment can be a mechanism through which trade can influence growth and development by not rushing to constraint the balance of payments when trade is out of balance.
The binary variable, WTO membership (WTO), is included in the model to account for the likelihood that multiple trade agreement will influence the trade volume and openness, although Rose (2003) believed there is little such effect.

In order to get an economic picture of the countries examined, table 1 summarizes the mean country statistics of Gross Domestic Production (GDP) and Consumer Price Index (CPI), and Balance of Payment (BOP) through the years of 1990-2011 by countries. The countries are ranked by Gross National Income (GNI) per capita. The figures are generally wide ranging but with only one low-income country, Myanmar.
Table 1: Country Statistics, 1990-2011 Mean, Ranked by Gross National Income (GNI) per capita

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>15</td>
<td>97</td>
<td>44.7</td>
</tr>
<tr>
<td>Singapore</td>
<td>154</td>
<td>89</td>
<td>16.5</td>
</tr>
<tr>
<td>Japan</td>
<td>3407</td>
<td>100</td>
<td>2.8</td>
</tr>
<tr>
<td>Korea</td>
<td>862</td>
<td>87</td>
<td>1.6</td>
</tr>
<tr>
<td>Malaysia</td>
<td>240</td>
<td>91</td>
<td>6.2</td>
</tr>
<tr>
<td>Thailand</td>
<td>362</td>
<td>98</td>
<td>0.6</td>
</tr>
<tr>
<td>China</td>
<td>4277</td>
<td>90</td>
<td>3.4</td>
</tr>
<tr>
<td>The Philippines</td>
<td>217</td>
<td>83</td>
<td>-0.4</td>
</tr>
<tr>
<td>Indonesia</td>
<td>604</td>
<td>73</td>
<td>0.6</td>
</tr>
<tr>
<td>Vietnam</td>
<td>139</td>
<td>106</td>
<td>-3.7</td>
</tr>
<tr>
<td>Laos</td>
<td>8</td>
<td>60</td>
<td>-11.2</td>
</tr>
<tr>
<td>Cambodia</td>
<td>15</td>
<td>100</td>
<td>-3.3</td>
</tr>
<tr>
<td>Myanmar</td>
<td>47</td>
<td>78</td>
<td>-1.4</td>
</tr>
</tbody>
</table>

Source: Gross Domestic Production (GDP) and Consumer Price Index (CPI), and population data from World Bank, Balance of Payment (BOP) from EcoStat
The estimation model is as followed:

\[ \text{HDI}_{it} = \beta_0 + \beta_1 \log X_{1, it} + \beta_2 \log X_{2, it} + \beta_3 \log X_{3, it} + \beta_4 \log X_{4, it} + \beta_5 X_{5, it} + \beta_6 X_{6, it} + X_7 + X_8 + \epsilon_{i,t} \]

\( X_1 \) = TRADE_PC, total trade per capita

\( X_2 \) = GDP, Gross National Product

\( X_3 \) = CPI, Consumer Price Index

\( X_4 \) = BOP, balance of payment

\( X_5 \) = WTO, WTO membership

\( X_6 \) = LTRADEWTO, Interaction variable of WTO and TRADE_PC in log form

\( X_7 \) = control variable for country, C

\( X_8 \) = control variable for year, T

\( \epsilon_{i,t} \) : individual random error component

\( \beta_0 \) = Y-intercept

\( \beta_1, \beta_2, \beta_3, \ldots \beta_9 \): Coefficients of respective independent variables

The following table summarizes the variables and gives a prediction of the relationships between each independent variable and the dependent variable. The selection of the variables and the predicted relationships are based on previous studies.
\begin{table}
\centering
\begin{tabular}{|l|l|l|l|l|}
\hline
\textbf{Definition} & \textbf{Variable Name} & \textbf{Predicted Sign} & \textbf{Justification} & \textbf{Source} \\
\hline
\textbf{Independent Variable} & & & & \\
\hline
$Y$ & Continuous variable indicating Human Development Index (from 0 to 1) & HDI & N/A & UNDP, 1990 \text{ Human Development Reports, UNDP} \\
\hline
\textbf{Dependent Variables} & & & & \\
\hline
$X_{1a}$ & The key Continuous variable indicating annual total trade per capita & TRADE\text{\_}PC & + & Davis & Quinlivan, 2006 \text{ World Bank} \\
\hline
$X_{1b}$ & The key Continuous variable indicating annual import per capita & IMPORT\text{\_}PC & + & Davis & Quinlivan, 2006 \text{ World Bank} \\
\hline
$X_{1c}$ & The key Continuous variable indicating annual export per capita & EXPORT\text{\_}PC & + & Davis & Quinlivan, 2006 \text{ World Bank} \\
\hline
$X_2$ & Continuous variable indicating Gross Domestic Product (GDP) & GDP & + & Ranis, G., \& Stewart, F., 2001 \text{ World Bank} \\
\hline
$X_3$ & Continuous variable indicating Consumer Price Index (CPI) & CPI & + & UNDP, 2008 \text{ World Bank} \\
\hline
$X_4$ & Continuous variable indicating Balance of Payment (BOP) & BOP & + & UNDP, 2008 \text{ EconStat} \\
\hline
$X_5$ & Binary variable indicating World Trade Organization (WTO) membership in a given year & WTO & + & Rose, 2003 \text{ World Bank} \\
\hline
$X_6$ & Interaction variable of WTO and LTRADE\text{\_}PC in log form & LTRADE\_WTO & + & Model Diagnostics & N/A \\
\hline
$X_7$ & Series of dummy variable for country & C & N/A & N/A & N/A \\
\hline
$X_8$ & Series of dummy variable for year & T & N/A & N/A & N/A \\
\hline
\end{tabular}
\caption{Variables: Definition, Names, Predicted Signs and Justification}
\end{table}
The total sample size of this analysis is 286 observations. Table 3 outlines the descriptive statistics for both the dependent variable and the independent variables used in the model. Means show the average values for each variable across the 13 countries through the 22 years between 1990 and 2011. There are extreme variations across all variables, for example the highest human development index is 0.98 whereas the lowest is only 0.19, representing the great disparities of economy and societal development of the targeted countries. The standard deviations of total trade volume per capita and GDP are about twice of their own mean, which is not surprising consider the apparent variance of trade and GDP across the countries.
**Table 3: Descriptive Statistics**

<table>
<thead>
<tr>
<th>VARIABLE NAME</th>
<th>SAMPLE SIZE</th>
<th>Mean</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Development Index</td>
<td>272</td>
<td>0.72</td>
<td>0.19</td>
<td>0.98</td>
<td>0.16</td>
</tr>
<tr>
<td>Total Trade Volume Per Capita</td>
<td>271</td>
<td>$12,167.37</td>
<td>$16.72</td>
<td>$174,981.80</td>
<td>27,844.12</td>
</tr>
<tr>
<td>Gross Domestic Production</td>
<td>278</td>
<td>$817.49 (in billions)</td>
<td>$2.9 (in billions)</td>
<td>$11,300 (in billions)</td>
<td>1,616.34</td>
</tr>
<tr>
<td>Consumer Price Index</td>
<td>277</td>
<td>88.07366</td>
<td>3.77</td>
<td>235.84</td>
<td>35.93</td>
</tr>
<tr>
<td>Balance of Payment</td>
<td>278</td>
<td>$4.515 (in billions)</td>
<td>-$20.97 (in billions)</td>
<td>$78.77 (in billions)</td>
<td>14.62</td>
</tr>
<tr>
<td>WTO Membership</td>
<td>286</td>
<td>0.6188811</td>
<td>0</td>
<td>1</td>
<td>0.49</td>
</tr>
</tbody>
</table>

**Methodology**

Considering the extreme variance of every variable and to improve model specification, all the continuous independent variables will be analyzed in logarithm forms in the model. A chow test indicated that the country and time data were not poolable (see Appendix I for data test results).

The range of sensitivities of influences on human development across all the 13 countries makes it preferable to generate a control variable for country, named \( c \), to control for the variance across
all entities. Variable c is created in the way that countries are dichotomized to lower income
groups (coded as “1”) and higher income groups (coded as “0”) according to the World Bank
income classification. For example, in 2011 countries with gross national income per capita less
than $4,036 will be coded as “1”, while those with gross national income per capita more than
$4,036 will be coded as 0a. Countries with missing values will not be used.

Chart 1 shows the relationship between the averages of the human development index and trade
volume per capita by the year. The relationship between the dependent variable (HDI) and the
key independent variable (TRADE_PC) appears positively correlated. Before 2007, the general
trends for both human development index and total trade per capita are upward. The lack of
human development index data in 1996 made it difficult to examine the correlation between HDI
and TRADE_PC during the 1997 Asia financial crisis – whether HDI dropped or increased to the
level in 1997. However, it is clear that during the 2007-2008 global financial crisis, there is an
apparent drop of HDI along with total trade per capita. Considering the obvious turn in 2007, a
control variable for year t will be created that all the years before 2007 will be coded as “1”, and
years after 2007, including 2007, will be coded as “0”. b

---

a The World Bank divides economies according to Gross National Income (GNI) per capita. In 2011, the groups are:
low income, $1,025 or less; lower middle income, $1,026 - $4,035; upper middle income, $4,036 - $12,475; and
high income, $12,476 or more. For the purpose of this thesis, upper middle income countries and high income
countries are combined; lower middle income countries and low income countries are combined.

b Model diagnostics testing shows that the data are not poolable so that two-way fixed effects are not appropriate for
this analysis. Therefore, this paper adopts the OLS model and created country and year control variables to control
for the gross national income differences and the impact of the 2008 financial crisis. There are no multicollinearity
concerns, model specification problems nor omitted variables with the model. Refer to appendices I-V for further
details.
Chart 1: Human Development Index (HDI) and Trade Per Capita (TRADE_PC) from 1990 to 2011 in ASEAN plus Three Countries

Source: Human Development Index (HDI) from annual UNDP Human Development Reports; trade data, population statistics from World Bank database
Regression Results

Table 5 presents the regression results. Model (2) and (3) replace total trade volume per capita with import per capita and export per capita are also included in the analysis, to examine the impact of imports and exports separately.

A total of 248 observations were used in the regressions and each model explains around 88 percent of the variation in human development.

The hypothesis was supported. With one percent increase in total trade volume per capita, there would be a 0.0635 point increase in human development index. Import per capita had a slightly less impact (0.0586) whereas export per capita had a greater impact (0.0650). This is likely to be the result of the export-oriented development strategy across the region that helps to create jobs and increase income. Gross Domestic Production per capita and Consumer Price Index both enjoyed statistically significant and positive relationship with human development index. Balance of Payment did not seem to influence human development index in a statistically significant way in model (1) and (3). In model (2), Balance of Payment impacted human development index in a statistically significant way, although negatively. The interaction term suggests that WTO membership had statistically significant influence on human development index in all models. The year control variable was highly statistically significant which confirmed the speculation that financial crisis does negatively impact human development index,
holding other factors constant. In fact, holding other factors constant, human development index was generally 0.1 point higher before 2007.

The regression results echo the results from many the previous research. It accords many of the existing studies that economic growth is positively correlated with human development (Hirsch, 1976; Beckerman, 1974; Kahn, 1976; Mesarovic, 1974). The regression result for CPI verifies the UNDP (2006) report that the rapid rate of development is accompanied by the increase of CPI. However because of data limitation, we are not able to see the relationship between CPI and human development index when CPI is above 3 percent. It appears that the pattern for trade to impact on development in Asia is similar to those in Latin America (Ranis, 2004) and Africa (UNDP, 2011). The inclusion of WTO membership as a binary independent variable yields the same result in the Rose (2003) analysis that multilateral trade agreement and trade openness has negligible influence on human development.
## Table 4: Regression Result

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>VARIABLE NAME</th>
<th>COEFFICIENT (ROBUST STANDARD ERROR)</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEPENDENT VARIABLE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Development Index</td>
<td><em>hdi</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KEY INDEPENDENT VARIABLE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Trade Volume Per Capita (Model 1), Import Per Capita (Model 2), Export Per Capita (Model 3), in log forms</td>
<td><em>ltrade_pc</em> (Model 1)</td>
<td>0.0635*** (13.75)</td>
<td>0.0586*** (12.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>limport_pc</em> (Model 2)</td>
<td></td>
<td></td>
<td>0.0650*** (14.03)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>lexport_pc</em> (Model 3)</td>
<td></td>
<td></td>
<td></td>
<td>0.0650*** (14.03)</td>
</tr>
<tr>
<td>Gross Domestic Production, in log form</td>
<td><em>lgdp</em></td>
<td>0.0244*** (13.29)</td>
<td>0.0236*** (12.49)</td>
<td>0.0245*** (13.44)</td>
<td></td>
</tr>
<tr>
<td>Consumer Price Index, in log form</td>
<td><em>lcpi</em></td>
<td>0.0290*** (4.09)</td>
<td>0.0350*** (4.80)</td>
<td>0.0236*** (3.31)</td>
<td></td>
</tr>
<tr>
<td>Balance of Payment, in log form</td>
<td><em>lbop</em></td>
<td>0.0035 (0.63)</td>
<td>-0.0114** (2.06)</td>
<td>-0.0028 (-0.51)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>wto</em></td>
<td>0.0590 (1.94)</td>
<td>0.0443 (1.42)</td>
<td>0.0595** (1.98)</td>
<td></td>
</tr>
<tr>
<td>WTO Membership</td>
<td><em>ltadewto</em></td>
<td>-0.0106*** (-2.67)</td>
<td>-0.0085** (-2.10)</td>
<td>-0.0106*** (-2.72)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>c</em></td>
<td>-0.0143 (-1.14)</td>
<td>-0.0240* (-1.90)</td>
<td>-0.0102 (-0.81)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>t</em></td>
<td>0.1042*** (12.16)</td>
<td>0.1025*** (11.59)</td>
<td>0.1047*** (12.34)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td>-0.0663 (-1.48)</td>
<td>-0.0033 (-0.07)</td>
<td>-0.0120 (-0.29)</td>
<td></td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td></td>
<td>0.8856</td>
<td>0.8789</td>
<td>0.8876</td>
<td></td>
</tr>
<tr>
<td><strong>F Statistics</strong></td>
<td></td>
<td>231.22</td>
<td>215.03</td>
<td>235.99</td>
<td></td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td></td>
<td>248</td>
<td>248</td>
<td>248</td>
<td></td>
</tr>
</tbody>
</table>

† Significant at p<0.10, * p<0.05, ** p<0.01, *** p<0.001
Policy Recommendations

The regression results support the mainstream perspective that as the economy grows people’s livelihood will be enhanced. Every one percent growth in GDP will lead to a 0.024 increase in human development index. The increased GDP usually means that the government will have more expenditure and investment in education and health, which supports two important pillars of schooling and life expectancy, composing the human development index. The increase in family income allows the household to spend on what they need most, most often health, thus raise the human development index. In developing countries in Asia, where development level is low to medium, but economy is growing at a fast rate, it is promising that the human development index will continue to increase. These countries should keep their strategy of economic development as the national priority while understand the importance of oversea sources of income to raise the human development level.

The increase of CPI usually accompanies the rapid rate of economic development. However, as a conventional wisdom, when CPI is greater than 3 percent we will have a problem of inflation. The expected positive relationship between CPI and human development index will probably not sustain if our CPI goes beyond 130 (the 2005 CPI is used as the 100 baseline in this dataset). In fact, a CPI that is too high will certainly impair the purchasing capability of households thus depreciating their income. For countries with high inflation rate like Myanmar, which has an inflation rate of 13.5 percent in the year of 2011, its human development index is among the lowest (0.48 in 2011). It is then suggested that a growing CPI under the warning line of 130 is
acceptable with caution, especially with high economic growth; but the risk of CPI should be carefully controlled.

Besides the above macroeconomic indicators, the most important indicator of this analysis, total trade volume per capita, showed a positive relationship with human development index. If we break the total trade volume into import and export, we will see that export per capita has a strong influence on human development index. As a matter of fact, Southeast Asian countries and East Asian countries all have emphasized export in their development strategy. It is suggested that these countries should not only continue bolstering their trade strategy, but also underline the export sector to a greater extent.

Moreover, countries should promote trade openness and take advantage of multilateral trade agreements, as WTO membership has a very significant influence on human development. We should be optimistic about Laos’ human development situation in the coming years since it will get its WTO accession within the year of 2013.

Lastly, financial crisis appears to have a significant and negative impact on trade volume and human development. It suggests that human development levels are very vulnerable to sudden decline in trade resulted from major economic downturns. Governments should be highly aware of this linkage, and take active measures, preferably precautionous measure to mitigate the negative impact.
Appendix I - Poolability Test

The below formula is used to test the poolability of the data to determine if an Ordinary Least Squares (OLS) or a fixed effect model is more appropriate for this analysis.

\[ F = \frac{(e'e - \sum e'_i e_i)/(n - 1)(k + 1)}{\sum e'_i e_i / n(T - k - 1)} \]

where \( e'e \) is the SSE of the pooled OLS and \( e_i'e_i \) is the SSE of the pooled OLS for group \( i \), \( n \) is the number of group observations, \( k \) is the degree of freedom, \( T \) is the time period.

The null hypothesis for this test is \( H_0: \beta_{ik} = \beta_k \)

According to Stata result and calculation, \( F = 11.502 \)

The null hypothesis is rejected and the panel data are not poolable.
Appendix II – Multicollinearity Testing

Table 5: Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Trade Per Capita (Log)</th>
<th>Gross Domestic Production (Log)</th>
<th>Consumer Price Index (Log)</th>
<th>Balance of Payment (Log)</th>
<th>WTO Membership</th>
<th>Interaction term between Trade Per Capita (Log) and WTO Membership</th>
<th>Year Control Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade Per Capita (Log)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Production (Log)</td>
<td>0.201</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Price Index (Log)</td>
<td>0.373</td>
<td>0.345</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance of Payment (Log)</td>
<td>0.668</td>
<td>0.162</td>
<td>0.295</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WTO Membership</td>
<td>0.401</td>
<td>0.325</td>
<td>0.428</td>
<td>0.401</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction term between Trade Per Capita (Log) and WTO Membership</td>
<td>0.633</td>
<td>0.310</td>
<td>0.430</td>
<td>0.527</td>
<td>0.941</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Country Control Variable</td>
<td>-0.847</td>
<td>-0.292</td>
<td>-0.294</td>
<td>-0.591</td>
<td>-0.351</td>
<td>-0.536</td>
<td>1</td>
</tr>
<tr>
<td>Year Control Variable</td>
<td>-0.172</td>
<td>-0.145</td>
<td>-0.393</td>
<td>-0.064</td>
<td>-0.319</td>
<td>-0.324</td>
<td>0.090</td>
</tr>
</tbody>
</table>

A correlation matrix is shown in Table 4.
Appendix III – Model Specification

The link test is used to examine the choice of functional forms of the variables in the model. The test result yields the result below:

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>P&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>_hat</td>
<td>5.39</td>
<td>0</td>
</tr>
<tr>
<td>_hatsq</td>
<td>-0.49</td>
<td>0.625</td>
</tr>
</tbody>
</table>

The p value of _hat is 0.000, which is below the $\alpha = 0.05$ threshold. The p value of _hatsq is 0.625, which is higher than any conventional $\alpha$ level. Therefore, the two p values jointly suggest that the functional forms chosen for this model are appropriate for the analysis.
Appendix IV – Ramsey Rest Test

. ovtest
Ramsey RESET test using powers of the fitted values of hdi
   Ho: model has no omitted variables
       F(3, 235) = 4.94
       Prob > F = 0.0024

The P value is statistically significant. The null hypothesis is rejected. The model has no omitted variable problem.
Appendix V – Heteroscedasticity Testing

Although the Heteroscedasticity Testing result rejects the hypothesis that the standard errors are the same across all entities, the Robustness Testing does not change the t scores of p values of any variable significantly. Thus there is no need for this analysis to use robustness testing.

. estat imtest
Cameron & Trivedi's decomposition of IM-test

<table>
<thead>
<tr>
<th>Source</th>
<th>chi2</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heteroskedasticity</td>
<td>123.67</td>
<td>48</td>
<td>0.0000</td>
</tr>
<tr>
<td>Skewness</td>
<td>16.29</td>
<td>9</td>
<td>0.0611</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.03</td>
<td>1</td>
<td>0.1544</td>
</tr>
<tr>
<td>Total</td>
<td>141.99</td>
<td>58</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
References


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