The Lucas Paradox and the Human Capital Resource Curse in Philippines, Indonesia, Malaysia, Thailand and Singapore

Iana Justine Vea C. Cale
Business Economics Department, University of Santo Tomas, Philippines

Peter Jeff C. Camaro
Business Economics Department, University of Santo Tomas, Philippines

Kristel P. Melendres*
Business Economics Department, University of Santo Tomas, Philippines

Marie Antoinette L. Rosete, MDE
Business Economics Department, University of Santo Tomas, Philippines

ABSTRACT

Lucas (1990) stated in his study that capital doesn't flow from rich to poor countries because of differences in capital per worker. The resource curse tackles the irony of why resource abundant economies tend to grow slower than those with low resources (Sachs and Warner, 1997). This study examines the connection between Lucas Paradox and Resource Curse among the developed and developing countries in the ASEAN based from Solow's neoclassical model and the Cobb Douglas production function. The study proves the connection between the two phenomena and its existence in the ASEAN countries. This research also proves that an increase in education directly affects human capital stock and that age is positively related to human capital as different age groups increase human capital. It was also confirmed that human capital stock depends upon the distribution of the population between urban and rural sectors. On the other hand, the effect of the Capital per Effective worker hypothetically increases the overall Income per Effective worker but seems to be lacking in the developing countries thus proving the Lucas Paradox and Human Capital Resource Curse are present and are interconnected with each in countries such as the Philippines, Indonesia, Malaysia, Thailand and Singapore.

Keywords: ASEAN, Human Capital, Lucas Paradox, Resource Curse

1. INTRODUCTION

It has been believed that there is a positive relationship between natural resources and economic development (Rostow, 1961; Balassa 1980) until Sachs and Warner (1997) argued that countries with high natural resource wealth tend to grow more slowly than countries with low natural resources. This paradoxical result is also known as the "resource curse" is observed in most developing countries when most resource rich

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

countries tend to be left behind by resource-scarce countries. Sachs and Warner's work supported the resource curse thesis of Auty (1990, 2001).

Van der Ploeg (2011) mentioned that natural resources will open a lot of opportunities for economic growth and development and yet many countries are still cursed by natural resource wealth. As countries like Africa who have high resources but have a low GDP, researchers would tend to question the slow growth of their economy as there should be a positive relationship between natural resources and development. In East Asia, the countries with few raw materials such as Hong Kong, Singapore, South Korea, and Taiwan have done even better than the resource-rich ones like Indonesia, Malaysia, and Thailand. The same instance with oil-rich countries like in Nigeria, Iran, Venezuela, Kuwait, Iraq and other Organization of the Petroleum Exporting Countries (OPEC) in exploiting their resources to compete against developed countries but it just leads to the progress of oil-importing ones (Gylfason, 2001).

The modified Solow-Swan neoclassical growth model states that capital should flow from developed to developing countries. Lucas (1990) observed that the neoclassical theory does not occur presently. He also stated that developing countries tend to suffer because of low capital flows. This ideology brings us the Lucas Paradox.

The resource curse is a big issue of resource abundant economies, and they depreciate the GDP of a country. However, if a country is abundant in resources, shouldn't the economy of that country flourish? The researchers theorize that maybe the manufacturing sector or the service sector of the economy is the weak point that maybe capital in one of those sectors has the issue. Since the Lucas Paradox speaks of capital not flowing from rich countries to poorer ones, the researchers ask, does the Lucas Paradox result to the resource curse? The researchers developed a hypothesis, if abundant countries are affected by the capital flows in the economy.

The original resource curse discusses more on natural resources but instead of doing the same study, this research contributes in examining whether the "curse," as theorized by Sachs and Warner (1997), holds true for measures of human capital. A lot of countries tend to monitor their natural capital especially when they have high resources that they neglect other potential assets such as education that may help the growth of the economy (Gylfason, 2001). Additionally, countries with low resources focus on their manufacturing industry. They value education or job trainings because they wish to be employed in the manufacturing sector (Sachs & Warner, 1997). Meanwhile, resource-rich nations tend to focus on their agriculture industry and neglect opportunities of education because their job does not require professional skill.

Researchers like Sachs and Warner (1997) and Gylfason (2001) stated the crowding out abilities of natural resources to human capital investment and as stated by Shao and Yang (2014), researchers like Birdsall et al. (2001) carried out comparative analysis on the negative correlation between resource abundance and human capital investments, which results to the well-known resource curse.

This research aims to examine why resource-rich economies tend to grow slower than those resource-scarce economies in the case of developed and developing countries in the

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

ASEAN nation. This research also investigates if investment to human capital is inversely related to resource abundance and to find out if the lack of investments to human capital discourages capital flow to the resource rich economies resulting to a slow economic growth. For this purpose, the researchers examine 5 countries (Philippines, Singapore, Indonesia, Malaysia and Thailand) from the Association of South East Asian Nations (ASEAN). The researchers opt to study the economy of the Philippines, classified as a low middle-income country by the World Bank (2013) in their World Development Report. This paper also used other developing ASEAN countries namely Indonesia, Malaysia, Thailand. The researchers also chose to study the top ASEAN country in terms of per capita income (Table 1) and is also a developed country namely Singapore to further see why they are more prosperous than other ASEAN nations given that they have low resources. Also, from the 2011 data of International Monetary Fund (IMF) in Table 1 Singapore has the least land area which implies that it would have less resources than other ASEAN countries since the others have a larger land area for natural resources but has the most per capita income among the ASEAN nations followed by Brunei which also follows Singapore in the least land area which somewhat gives more confirmation on the so called resource curse.

ASEAN Countries	Land Area	2011 Population	2011 Per Capita Income (USD)
Myanmar	676,578 km^2	60,280,000	$832
Thailand	513,120 km^2	67,091,089	$5394
Cambodia	181,035 km^2	14,652,665	$931
Malaysia	329,000 km^2	28,728,607	$9700
Singapore	710 km^2	5,183,700	$49270
Indonesia	1,904,569 km^2	248,216,193	$3508
Brunei	5,765 km^2	408,786	$36583
Philippines	299,764 km^2	103,775,002	$2223
Vietnam	331,210 km^2	91,519,289	$1374
Laos PDR	236,800 km^2	6,586,266	$1203
Total	4,478,551 km^2	626,741,597	-

Table 1. Source: Asian Development Bank (2010), Central Intelligence Agency (2012), International Monetary Fund (2011)

The remainder of this study proceeds as follows: Section 2 discusses a review of related studies about the variables that were used. In Section 3, the researchers present the econometric model as well as the data and method used. Results and interpretations are discussed in Section 4. Section 5 concludes with a short summary of the study and recommendations for future research.

2. LITERATURE REVIEW

2.1 Capital per effective worker to Income per Effective Worker

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Lucas (1990) wanted to show the effects of human capital investment to the Cobb-Douglas Production Function. From the capital per worker he added the term "effective" to stress the impact of labor effectivity to the variable from Solow (1956) model to be elaborated in the theoretical framework.

Hypothesis 1: Investment in Capital per effective worker increases Income per Effective Worker

2.2 Human Capital Invested in Working Population to Income per Effective Worker

Economies with a stable labor would presumably have an edge in economic development if their policies focus on the accumulation of human capital (Lucas, 1990). Human capital of individuals have two concepts namely education and experience of the labor market (Wasmer, 2001).

Persson and Malmber (1996) stated that human capital measured by average years of schooling affects subsequent per capita income growth positively.

Hypothesis 2: Investments in Human Capital Invested in Working Population increases Income per Effective Worker

2.3 Education to Human Capital Invested in Working Population

The quality of education a worker has attained is the most marketable in the eyes of the investors. The more skilled you are, the more likely an employer would hire you (Hanson II, 1996). As stated by Canlas (2003), it is widely accepted that education is an essential cause of long-run economic growth.

Spending on education has a positive and significant direct effect on the accumulation of education and indirect effect on growth spending has a positive and significant impact on the accumulation of education (Baldacci et. al., 2008). Krueger (1968) stated that even though India and the United States had the same education-sector distribution in each age, the attainable per capita income would be lower than in US because of the distribution of age in India. Consequently, even if the age-sector distribution of Indian and American was the same, the educational attainment in India would result in a lower attainable income. Gille (2014) argued that the quality of education and income per capita has a negative relationship and that the relation is stronger in developed nations.

According to the study of Ding and Knight (2009), the average annual growth rate in China (1.5%) was faster comparing to high-income economies (1.2%) due to the growth rate of human capital. On the other hand, the average annual growth rate of China was

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

slower than other developing countries because of the level of education which was explained by the growth rate of human capital.

As stated by Shao and Yang (2014), better-quality education can contribute to increasing the demand for educational and promoting human capital accumulation and growth.

Hypothesis 3: An increase in Education directly affects Human Capital Invested in Working Population

2.4 Age to Human Capital Invested in Working Population

Frosch and Tivig (2007) examine that there is an additional effect of age on innovative performance at any given level of human capital. In addition, an independent effect of age based on the (age-specific) level of exploitation abilities and motivation can control the effect of human capital on innovative performance.

Fougère et al. (2009) have observed a significant increase in the participation rate of older workers but human capital accumulation is lower for older workers. At middle age (41-44), the labour supply experience an increase and additional allocated time on work. Moreover, these individuals are more qualified and effective since they have invested more time in human capital.
Feinstein et al. (2004) states that male workers from UK who undertook work related training in ages 33–42 experienced a higher wage growth of 4–5 percent over the period 1991–2000. Skirbekk (2003) also added that older workers are getting more productive over time.

Cr´epon et al. (2003) suggest to include age indicators such as mean age or different age groups for age-productivity pattern on aggregate level and use Cobb-Douglas function to explain age-heterogeneous human capital. Also, Ilmakunnas et al. (2004) include age effects to explain the stock of different types of human capital differentiated by age.

According to Crespo et al. (2008; 2009); Goujon et al. (2008); Lutz and KC (2011) as most educated tends to work longer and retire at later ages, an increase in human capital will balance the declining working-age population. Hence, an increase in the human capital working-age population will lead to economic growth but also decrease it by rise in pensions upon retirement Philipov (2014).

Hypothesis 4: From the cases above, age is positively related to human capital as different age groups increase human capital.

2.5 Sectoral Distribution to Human Capital Invested in Working Population

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

The sectoral distribution was considered as an important explanatory component in the difference between the developed and developing countries. It is also commonly held to be a factor in determining income per head. The sectoral distribution has a significant effect on attainable income. Individuals who live in an urbanized zone tend to invest in human capital than those who are living in the rural area (Krueger, 1968; Sachs & Warner, 1997)

Hypothesis 5: Human Capital Invested in Working Population depends upon the distribution of the population between Urban and Rural sectors.

2.6 Sythesis

The two variables discussed in the Lucas (1990) model should affect the output per capita positively if the variables have a positive value and therefore has a direct relationship to income per capita while the 3 variables of Krueger (1968) has positive effects on human capital.

2.7 Theoretical Framework

The researchers used the model proposed by Lucas (1990) derived from the Cobb-Douglas Production Function.

$$y = TFPx^{\beta}h^{\gamma}$$

•*y* is the Income per effective worker
•*TFP* is intercept parameter (often called the level of technology) or Total Factor Productivity
•*x* is capital per effective worker
•*h* is human capital invested in the working population taken from the Anne Krueger and Resource Curse Model
•ϒ is the external factors that affect the human capital invested in the working population, which for the consistency with the Cobb Douglas Production Function would have the value of 0.50
•β is the external factors affecting capital per effective worker, which as of the ϒ would also have a value of 0.50

Note that by adding "effective" to the variables, Lucas (1990) stresses the effect of labor efficiency to the capital stock. The variable Capital per Effective Worker is taken from Solow's (1956) model.

$$x = \frac{K}{L * E}$$

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

where
•*K* is Capital or Foreign Direct Investment
•*L* is the Working Population
•*E* is Labor Productivity

Human Capital Invested in the Working Population is the knowledge and skills invested and accumulated by the Working Population, which is taken from Anne Krueger's Human Capital Stock Equation which would also be used for the resource curse.

$$h = f(A, E, S)$$

The researchers employ the per capita form of Krueger (1968) production function

$$h = BA^{\alpha_1}E^{\alpha_1}S^{\alpha_1}$$

where
B is the fraction of population in the labor force or the Working Population
A is Age
E is Education
S is Sectoral Distribution
α would have a value of 0.50, 0.25 and 0.25 to remain consistent with the Cobb Douglas Production Function.

Note that the value of the α value of the Education Variable is 0.50 since the researchers would want to add emphasis on Education since it is the best indicator of human capital investment, but the researchers would also show the results of changing the exponent of the other independent variables to 0.50.

From this, the researchers replaced the *x* and *h* from the Cobb-Douglas Production function resulting to the formula the researchers used for the Lucas Paradox.

$$y = TFP(\frac{K}{L * E})^{0.50}(BA^{0.25}E^{0.50}S^{0.25})^{0.50}$$

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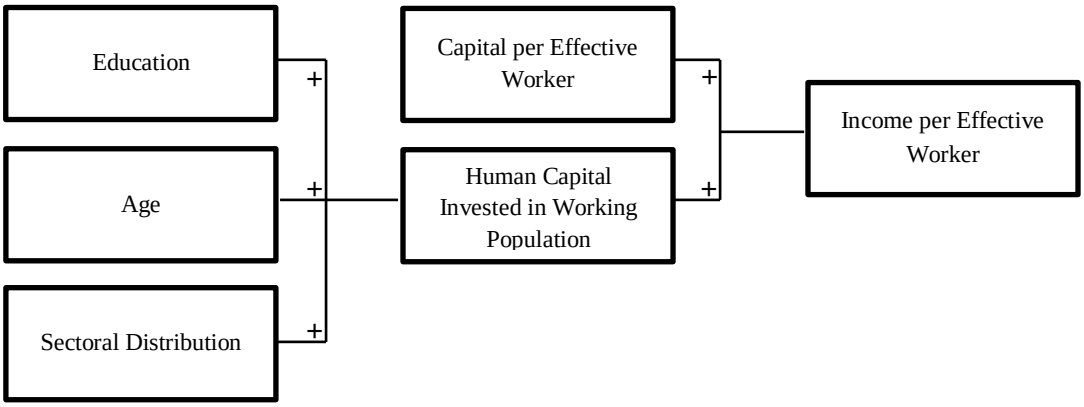
2.8 Simulacrum



3. RESEARCH METHOD

The objective of this research is to determine if the Lucas Paradox and the Resource Curse exists in 5 ASEAN countries. The researchers also want to investigate if what Gylfason (2001) stated in his paper is true, that natural resource abundance crowds out the investment on other capital resources such as human capital result in less capital flows to developing countries. As previously stated in the theoretical framework, the researchers used a modified Cobb-Douglas production function for the Lucas (1990) model.

$$y = TFP(\frac{K}{L * E})^{0.50}(BA^{0.25}E^{0.50}S^{0.25})^{0.50}$$

The dependent variable y is the income per effective worker. The variable TFP donates an intercept added by Lucas (1990) to denote the level of technology or Total Factor Productivity. The term $\frac{K}{L*E}$ is the expanded form of the variable x taken from Solow (1956) which is capital per effective worker. The variable x explains the term capital per effective worker which gives us the measure of physical capital used by "effective" workers. The variable h would represent the effect of the Human Capital Resource Curse in the Lucas Paradox.

To measure the Resource Curse the researchers interpreted the results of Krueger's (1968) human capital stock equation. The researchers also checked whether the investments in human capital would be a determining factor in the Resource Curse. This paper used the per-capita version of the production function.

$$h = BA^{0.25}E^{0.50}S^{0.25}$$

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With the dependent variable h representing Human Capital Invested in the Working Population, the variable B represents the fraction of the population in the labor force. The variable A representing age differential since age is a determinant of productivity since different age groups affect income per capita differently. The independent variable E represents education which is one of the best proxy variables to use as human capital investment and lastly the variable S represents the Sectoral Distribution in the Population. The Sectoral Distribution of the Population is also known as the Distribution of the population in the Rural and Urban Sectors of the economy. Sectoral Distribution is an important factor in determining the quality of human capital since the rural and urban sectors of the economy has different effects on human capital stock.

The researchers will be using the data from the Barro-Lee and World Bank Database. Figures will be obtained using 5-year intervals from 1970-2010. The researchers opt to study 1 developed ASEAN country namely Singapore and 4 developing ASEAN countries specifically Indonesia, Malaysia, Thailand and Philippines because of the completeness of their data.

4. RESULTS AND DISCUSSION

	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
1970	31,872,751.66	3,843,896.10	14,845,433.09	1,453,673.66	14,830,203.11
1975	42,985,758.86	5,238,117.87	20,473,372.40	1,938,612.80	16,594,007.15
1980	56,081,819.32	7,321,527.55	26,536,472.68	2,622,881.56	26,841,952.10
1985	74,276,332.40	9,570,917.69	32,447,284.09	2,988,574.53	31,780,677.32
1990	96,309,475.32	11,986,441.38	42,731,754.66	3,964,340.94	44,967,457.23
1995	117,585,442.42	15,754,389.87	51,156,862.24	4,780,030.31	48,565,118.93
2000	146,224,465.39	20,970,993.27	55,991,667.05	6,121,578.46	50,828,113.49
2005	175,318,074.31	24,266,064.90	67,063,173.49	6,461,505.20	66,952,423.35
2010	227,292,455.91	30,879,086.58	75,876,276.09	9,280,542.47	80,673,534.56

Table 4.11 Human Capital Invested in the Working Population ((persons employed) (Education^0.5)*(Sectoral Distribution^0.25)*(Population, 15-64/100))*

Table 4.11 shows Human Capital Investment on the Working Population of the selected ASEAN countries. Referring and incorporating the Anne Krueger formula for the Human Capital Resource, and be consistent with the Cobb Douglas Production Function, the researchers used the exponents with the values of 0.25, 0.25 and 0.5 for the tables 4.11, 4.21 and 4.31.

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	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
1970	15781733.74	2042073.26	7636546.81	962644.8385	7965409.093
1975	21323664.84	2769239.492	10328487.82	1291930.307	8795532.028
1980	27858848.22	3805590.749	13152947.45	1731937.609	13980927.34
1985	37871977.65	4892692.049	16409867.67	1911923.486	16210946.8
1990	50089709.97	6196926.276	21856109.71	2467757.27	22317128.94
1995	62158089.57	7996528.715	25718033.17	2844002.199	23523850.34
2000	78142216.92	10716073.13	27818787.02	3519720.249	24677045.87
2005	90709514.35	12418047.71	32764175.43	3748379.224	32180528.97
2010	115031345.8	15764102.68	36522942.29	5118196.305	39098021.95

TABLE 4.21 Emphasis on Sectoral Distribution [Sectoral Dist. ^0.5] ((persons employed)(Education^0.25)*(sectoral distribution(urban/(rural+urban))^0.5)*(Population (15-64 % of total/100)^0.25))*

	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
1970	20,994,303.16	2,279,489.98	8,516,618.28	839,635.61	10,029,649.52
1975	27,573,099.48	3,031,772.34	11,379,973.25	1,151,258.26	10,798,775.08
1980	35,042,310.13	4,114,069.23	14,388,574.63	1,574,049.53	16,871,721.98
1985	46,109,289.25	5,188,277.98	17,444,662.60	1,751,497.16	19,693,972.63
1990	59,226,588.32	6,473,391.82	22,637,752.28	2,280,608.46	27,236,057.04
1995	71,222,296.70	8,166,898.36	26,816,856.45	2,614,341.62	28,730,296.01
2000	87,022,999.63	10,753,240.01	29,205,689.39	3,233,168.32	30,096,996.42
2005	99,044,318.74	12,367,109.98	34,827,514.01	3,460,363.47	37,627,472.21
2010	123,430,261.16	15,590,978.42	39,353,492.82	4,741,382.58	44,186,075.82

*TABLE 4.31 Emphasis on Age [Age ^0.5] (persons employed) *(Education^0.25)* (sectoral distribution(urban/(rural+urban))^0.5)*(Population (15-64/100)^0.25))*

To be precise with the results the researchers tried all the possible combinations from the exponents. Let the independent variables of Education, Age and Sectoral Distribution all go through the 0.25, 0.25 and 0.5 exponents and checked the results of each one. Table 4.11 shows the Human Capital Resource if Education is raised to 0.5 while Age and Sectoral Distribution are both raised to 0.25. Table 4.21 shows the effect of raising the Sectoral Distribution to 0.5 while both Education and Age are 0.25. For Table 4.31, Age was the one raised to 0.5 while the Education and Sectoral Distribution was raised to 0.25.

The results in tables 4.11, 4.21 and 4.31 shows the relationship of the independent variables of Education, Age and Sectoral Distribution to the Dependent Variable of Human Capital Invested in the Working Population. The results of the Tables were all positive with only Singapore lagging behind in the Human Capital Resource. The results

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

of Indonesia, Malaysia, Philippines and Thailand all surpass that of Singapore across all the time periods from 1970-2010 but the results remain consistent increasing across time.

While the results of the Lucas Paradox in tables 4.12, 4.22 and 4.32 tells us otherwise. The Lucas Paradox Model shows us the Income per Effective Worker of the country and the researchers used the results from Tables 4.11, 4.21 and 4.31 to determine the outcome of the dependent variable of income per effective worker. The researchers also remained consistent with the Cobb-Douglas Production Function and used 0.5 on both the Capital per Effective Worker and the Human Capital Investment on the Working Population but the results from the tables previously stated shows that the results from tables 4.12, 4.22 and 4.23 are inversely related with the results in tables 4.11, 4.21 and 4.31. It indicates that Singapore now exceeds the Income per Effective Worker of other selected ASEAN Countries.

	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
1970	0.047450186	0.041160933	-	0.070239536	0.033971036
1975	0.191699071	0.10542432	0.07837081	0.11914941	0.046705223
1980	0.07799611	0.187770567	0.073928664	0.261666087	0.086030629
1985	0.108520317	0.138964686	0.058104584	0.204469729	0.086368573
1990	0.199991118	0.245989871	0.150936018	0.434985853	0.302597942
1995	0.41806439	0.351325132	0.251238096	0.516226233	0.20933146
2000	-	0.2570886	0.249924726	0.766383295	0.203070455
2005	0.378010954	0.291927588	0.214872667	0.697578829	0.396441046
2010	0.492633893	0.441038398	0.17669534	1.291047161	0.428664405

Table 4.12 Lucas Paradox Model or Income per Effective Worker (Income per Effective Worker = TFP(Capital per effective worker(FDI/Labor Productivity*Person Employed)^0.5)*(Human Capital Stock Model^0.5))*

	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
1970	0.03338916	0.030000953	-	0.057158552	0.024896556
1975	0.135017056	0.076653754	0.055664462	0.097267085	0.034003284
1980	0.054972245	0.135374763	0.052047851	0.212629845	0.062088911
1985	0.07748985	0.099357716	0.04132128	0.163543102	0.061684829
1990	0.144228291	0.176872477	0.107945354	0.343194922	0.21317485
1995	0.303959154	0.250299034	0.178136297	0.398189413	0.145688905
2000	-	0.183776998	0.17616378	0.58112344	0.141495077
2005	0.271905167	0.20883444	0.150189215	0.531310261	0.274847665
2010	0.350461147	0.31512206	0.122589979	0.958768805	0.298420926

Table 4.22 (TFP(Capital per effective worker(FDI/Labor Productivity*Person Employed)^0.5)*(Human Capital Stock Model^0.5))*

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

	Indonesia	Malaysia	Philippines	Singapore	Thailand
1970	0.038510475	0.031697005	-	0.053381847	0.027936894
1975	0.153532564	0.080205004	0.058429243	0.091819038	0.037677065
1980	0.061653575	0.140754557	0.054437748	0.202706324	0.068206499
1985	0.085502742	0.102314993	0.042604209	0.156531481	0.067989342
1990	0.156831955	0.180774862	0.109858629	0.329924828	0.235498921
1995	0.325367661	0.252951348	0.181902001	0.381773618	0.161006098
2000	-	0.184095422	0.180501684	0.556965734	0.15626306
2005	0.284122629	0.20840569	0.154846132	0.510490074	0.297199439
2010	0.363030072	0.313386919	0.127251741	0.922800723	0.317244862

Table 4.32 (TFP(Capital per effective worker(FDI/Labor Productivity*Person Employed)^0.5)*(Human Capital Stock Model^0.5))*

Resource Curse was presented from the tables 4.11, 4.21 and 4.31. The countries of Indonesia, Malaysia, Philippines and Thailand are all resource-rich countries based on the stated tables. They are rich in human capital resource and all far exceeds that of Singapore but as the researchers refer to Tables 4.12, 4.22 and 4.32 it shows that those countries that are resource rich have a far lower income than that of a low resource country such as that of Singapore. The researchers then divulge into the Lucas Paradox, in tables 4.11, 4.21 and 4.31 the researchers show to us that Indonesia, Malaysia, Philippines and Thailand are all resource rich countries. In the present, these countries are all classified as developing countries. From the previously stated tables, the expected results were that these resource rich countries would all have a high income per effective worker since these countries already have the advantage in the Human Capital Invested in the Working Population or Human Capital Stock Variable. But the results in Tables 4.12, 4.22 and 4.32 show that the countries of Indonesia, Malaysia, Philippines and Thailand are overtaken by Singapore who had a very low Human Capital Stock Value. The researchers then look at the other independent variable of Capital per Effective Worker and the Intercept Variable of TFP. The researchers assume for either of these two to be the basis behind the significant change in the results and in the Lucas Paradox Model.

	Philippines	Singapore	Indonesia	Malaysia	Thailand
1970	0.4767	0.922	0.3561	0.4791	0.4155
1975	0.6572	0.961	0.4946	0.6515	0.4383
1980	0.6309	1.0809	0.5594	0.7484	0.5146
1985	0.4525	0.9978	0.5599	0.6364	0.5892
1990	0.5024	0.9687	0.5682	0.6122	0.5528
1995	0.4951	0.8798	0.6452	0.6408	0.5033
2000	0.4147	1.1614	0.3902	0.5661	0.379

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2005	0.4006	1.0736	0.3976	0.6476	0.4785
2010	0.4175	1.1182	0.4071	0.6482	0.4844

TABLE 4.4 TFP level at current PPPs (USA=1) (Penn World Table 8.1)

	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
1970	5.57073E-10	1.9202E-09	-8.388E-12	3.9924E-09	4.51E-10
1975	3.49468E-09	4.99894E-09	6.94583E-10	7.9295E-09	6.84E-10
1980	3.4664E-10	8.59777E-09	5.17442E-10	2.23432E-08	1.04E-09
1985	5.05767E-10	4.9819E-09	5.08166E-10	1.4051E-08	6.76E-10
1990	1.28632E-09	1.34697E-08	2.1122E-09	5.08628E-08	6.66E-09
1995	3.57062E-09	1.90797E-08	5.03363E-09	7.20247E-08	3.56E-09
2000	-3.54538E-09	9.83468E-09	6.48675E-09	7.1132E-08	5.65E-09
2005	5.15572E-09	8.37408E-09	4.28999E-09	6.53383E-08	1.03E-08
2010	6.4426E-09	1.49924E-08	2.36065E-09	1.43639E-07	9.71E-09

*TABLE 4.5 Capital per Effective Worker (Calculated to from FDI/(Working Population*Labor Productivity))*

The values from Table 4.4 indicates the Total Factor Productivity which is an intercept variable in the Lucas Paradox Model. Based on Table 4.4, Singapore, a developed and resource-scarce country has a higher Total Factor Productivity than those of the developing and resource-rich countries such as Philippines, Indonesia, Malaysia and Thailand. The values in the column of Singapore are already far above those of the other countries in the final year of 2010, having a significant lead in the values against the rest of the selected ASEAN countries. The researchers could also see in the said table that there is a great difference between the data of the former and latter countries.

As stated in the previous chapters the Lucas Paradox is the phenomenon that happens when capital doesn't flow from developed countries to developing countries. From Table 4.5, the researchers could observe that the values of Singapore, which is a developed country far surpasses that of Indonesia, Malaysia, Philippines and Thailand which already shows us the disparity between the capitals of the developed to the developing countries. Also, the results of the data from Tables 4.11, 4.21, 4.31, 4.4 and 4.5 show the results in Tables 4.12, 4.22 and 4.32. The Income per Effective Worker of Singapore overtakes that of the others through the Intercept Variable of Total Factor Productivity and the Independent Variable Capital per Effective Worker thus proving that the Lucas Paradox exists in the ASEAN Countries.

5. CONCLUSION AND RECOMMENDATION

The aim of this research is to determine whether Lucas Paradox and the Resource Curse exist in the 5 ASEAN countries namely, Philippines, Singapore, Indonesia, Malaysia and

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Thailand. The researchers found out that Lucas Paradox and Resource Curse is present in the 5 ASEAN countries. The lack of investments in human capital discourages capital to flow from developed to developing countries which results to slow economic growth.

Solow (1956) and Lucas (1990) stated that investment in capital per effective worker increases income per effective worker but based on the results, the researchers found out the statement to be true but is lacking in the selected developing ASEAN countries capital per effective worker income per effective worker. On the other hand, the researchers confirmed that investments in Human Capital increases income per effective worker as previously said by Lucas (1990) and Solow (1956). This paper also supports the existing studies of Baladicci et al. (2008), Krueger (1968), Shao and Yang (2014) which says that an increase in education directly affects human capital stock. The researchers also proved that age is positively related to human capital as different age groups increase human capital similar to the statements of Frougere et al. (2009), Crespo et al. (2009) Groujon et al. (2008) Lutz & KC (2011) Philpove (2014). Krueger (1968) and Sachs and Warner (1997) stated that human capital stock depends upon the distribution of the population between urban and rural sectors and this holds true in this research.

Based on the results of this research, the researchers recommend that developing countries such as Philippines, Indonesia, Malaysia and Thailand should make ways to entice and encourage capital investments to flow from the developed countries such as Singapore. Developing countries with high resources have the potential to surpass developed countries that have fewer resources. These developing countries need intuitive policies so that capital investments from both local and foreign would flow into the country in order for them to take advantage of the high resource that it has so that they would be able to bolster themselves from a developing country to become a developed one.

Moreover, the government should make policies that would enable the economies of these resource-rich developing countries to fully utilize their resources while also being able to replenish used resources so that these countries would be able to sustain themselves and would not need to import goods but export surplus goods. In addition, maybe with the effective use of the investments the developing countries not only of the ASEAN but also of the world would be able to sustain itself and reduce the need for imports.

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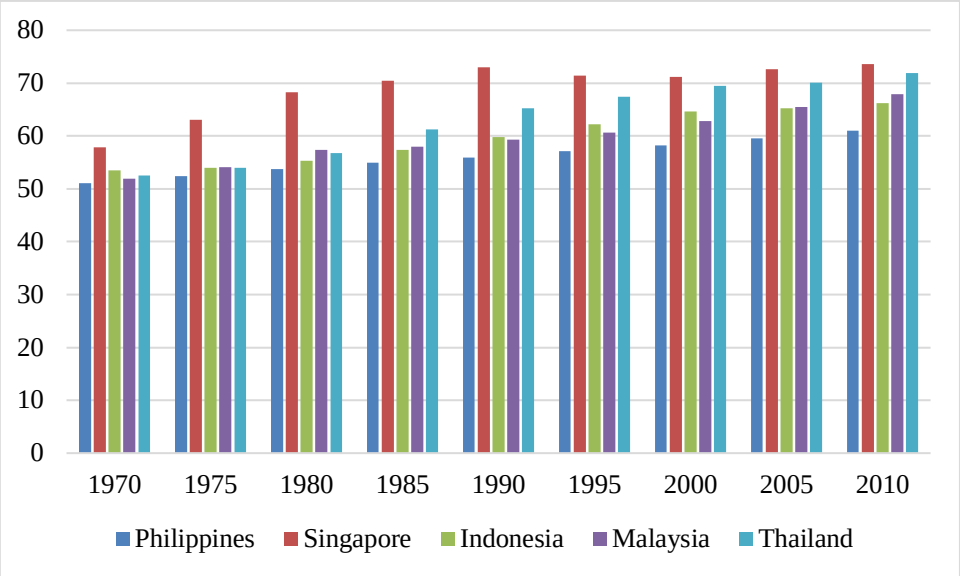
APPENDIX

Appendix A

	Philippines	Singapore	Indonesia	Malaysia	Thailand
1970	51.01738	57.87607	53.46209	51.94138	52.50835
1975	52.40585	63.0572	54.00508	54.09191	53.98329
1980	53.67721	68.22517	55.33363	57.42514	56.81757
1985	54.97469	70.42968	57.32436	58.02938	61.19682
1990	55.92277	72.9446	59.78154	59.29244	65.27177
1995	57.08706	71.40517	62.18586	60.58766	67.3636
2000	58.25739	71.20011	64.60457	62.84131	69.45845
2005	59.49861	72.62946	65.29344	65.50805	70.13104
2010	61.00096	73.64652	66.18067	67.84787	71.90584

Table A. Population ages 15-64 (% of total) (World Bank)



Graph A. Population ages 15-64 (% of total) (World Bank)

Appendix B

	Philippines	Singapore	Indonesia	Malaysia	Thailand
1970	4.71	5.20	2.84	4.20	2.51
1975	5.49	5.07	3.19	4.82	3.01
1980	6.21	5.26	3.63	5.76	3.64
1985	6.58	5.97	3.86	6.72	4.15
1990	7.10	6.66	4.18	6.97	4.85
1995	7.56	7.98	4.62	8.39	5.50
2000	7.87	9.15	5.15	9.09	5.65

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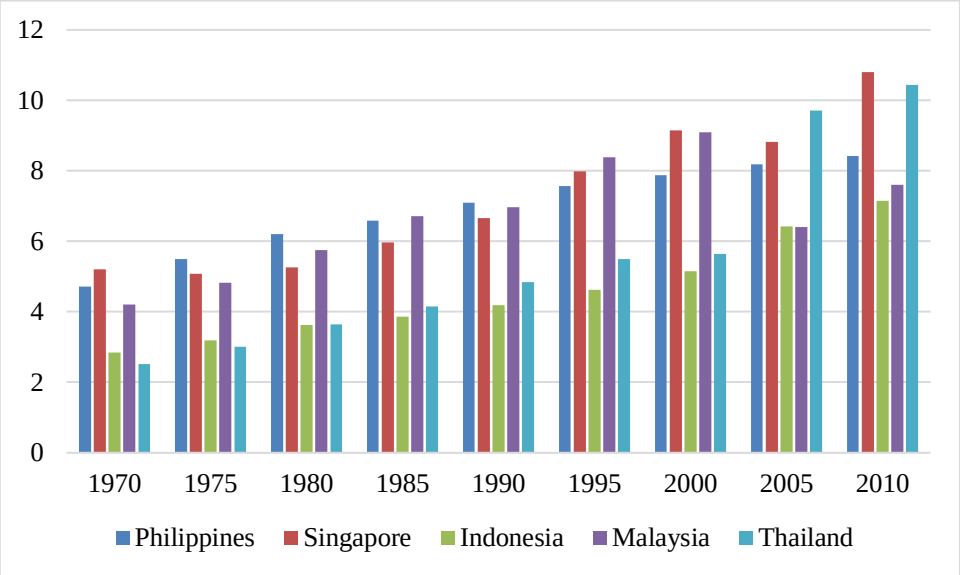
2005	8.18	8.83	6.42	6.41	9.71
2010	8.43	10.81	7.15	7.61	10.44

Table B. Education (Barro- Lee Database)



GRAPH B. Education (Barro- Lee Database)

Appendix C

	Philippines	**Singapore**	**Indonesia**	**Malaysia**	**Thailand**
1970	11808151	2074500	19603445	3649374	7704890
1975	14684963	2262600	25251978	4635632	10057938
1980	17765406	2413900	32601271	5816257	12695002
1985	23384719	2736000	43050032	7234729	14621050
1990	30100867	3047100	55490637	9068034	16648930
1995	33612998	3524500	71054512	11541546	17943401
2000	37237944	4027900	88851211	14515479	19680061
2005	39995260	4265800	103934623	17178671	24712163
2010	42288228	5076700	120622937	19940100	29397844

Table C. Urban Population (World Bank)

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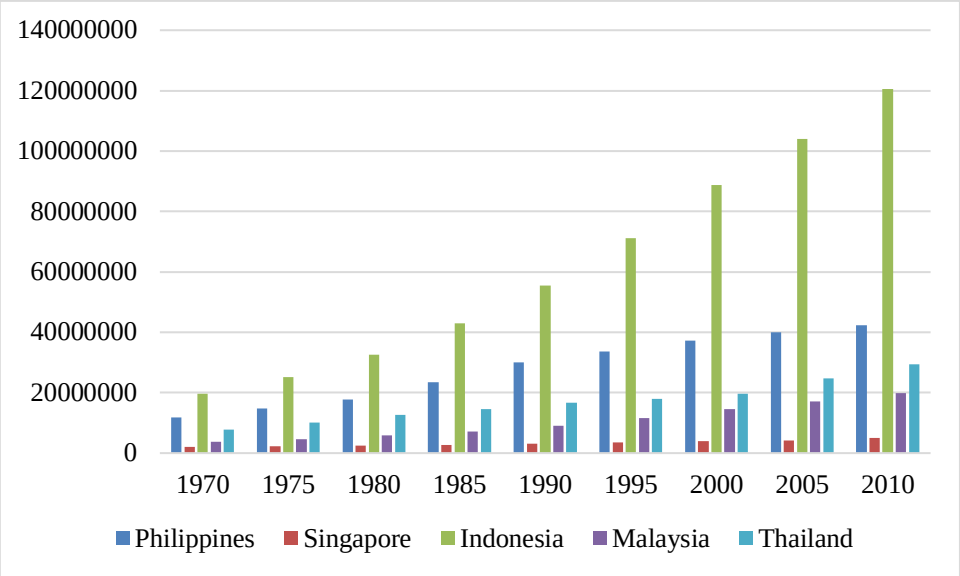

Graph C. Urban Population (World Bank)

Appendix D

	Philippines	Singapore	Indonesia	Malaysia	Thailand
1970	23996909	0	95231336	7259260	29180024
1975	26611332	0	105472140	7676150	32277016
1980	29633026	0	114889095	8017482	34690323
1985	30940233	0	121962163	8529611	37420418
1990	31847821	0	125946184	9143063	39933894
1995	35993541	0	125903333	9183828	41322688
2000	40413904	0	122689217	8905272	43013261
2005	45825954	0	122320080	8617453	41151810
2010	51156094	0	120990189	8179400	37294180

Table D. Rural Population (World Bank)

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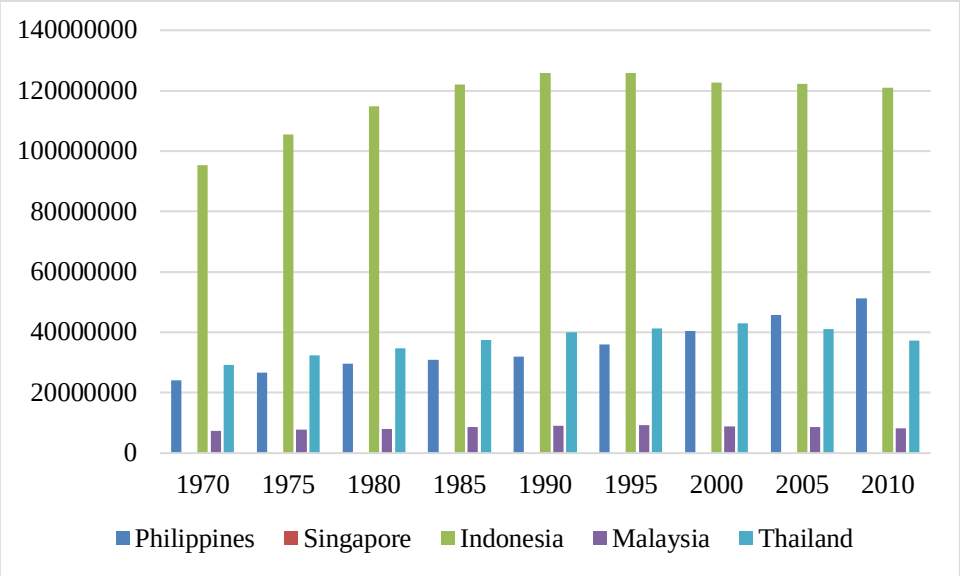

Graph D. Rural Population (World Bank)

Appendix E

	Indonesia	Malaysia	Philippines	Singapore	Thailand
1970	0.170709996	0.334539962	0.329790007	1	0.20889
1975	0.193170001	0.376519987	0.355600012	1	0.23758
1980	0.221040003	0.420439984	0.374809994	1	0.26791
1985	0.260890003	0.458930028	0.430460003	1	0.28095
1990	0.305839998	0.49794002	0.485899992	1	0.29424
1995	0.360759999	0.556879987	0.482900005	1	0.30276
2000	0.420020002	0.619770007	0.479550004	1	0.31391
2005	0.45937	0.665940007	0.466029996	1	0.3752
2010	0.49924	0.709120006	0.452550001	1	0.4408

Table E. Sectoral Distribution [Urban/(Urban+Rural)] (World Bank)

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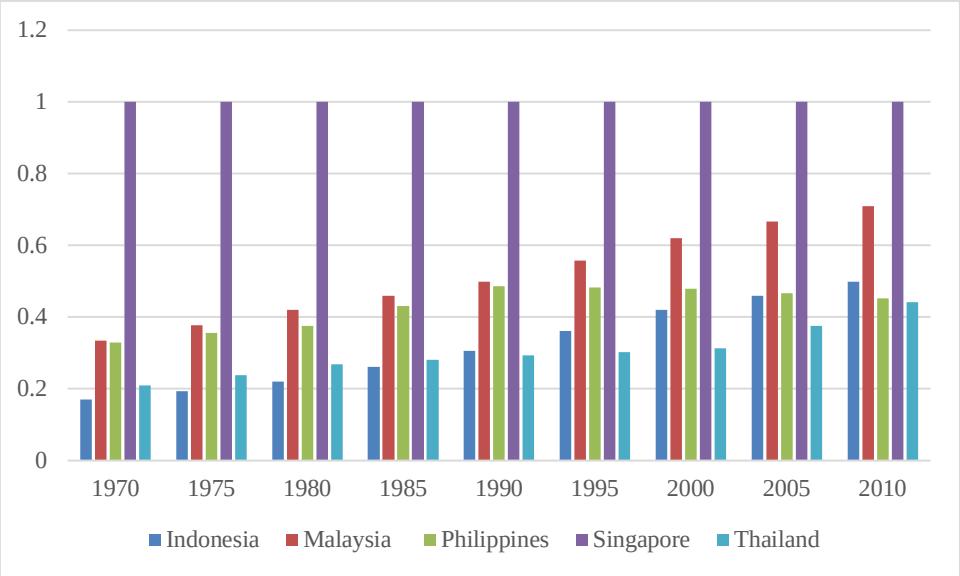

Graph E. Sectoral Distribution [Urban/(Urban+Rural)] (World Bank)

ACKNOWLEDGEMENT

This research was made through the generous and endless support of our family, friends and professors. First and foremost, we thank the Almighty Father for providing us the strength in the writing of this thesis. We also like to express our outmost gratitude to Asst. Prof. Marie Antoinette L. Rosete, MDE, our research adviser, for her consistent guidance and for motivating us all throughout our research. We would also like to thank the Business Economics Department of University of Santo Tomas for this opportunity.

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