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The Rise of the Middle Class and Economic Growth in ASEAN

by

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Abstract: We present instrumental variables estimates of the relationship between the share of income accruing to the middle class and GDP per capita. The increase in GDP per capita that ASEAN economies experienced during 1970-2010 significantly contributed to a higher share of income accruing to the middle class in these countries. Econometric model estimates show that the impact of a rise of the middle class on economic growth depends on initial levels of GDP per capita. In the majority of ASEAN countries, a rise of the middle class that is unrelated to GDP per capita growth would have had a significant negative effect on economic growth for levels of ASEAN economies' GDP per capita in 1970. In contrast, for recent values of GDP per capita a rise of the middle class would positively contribute to growth of GDP per capita in ASEAN. We show that investment is an important channel through which the income share of the middle class affects economic growth.

Key words: Middle Class, Inequality, Economic Growth, ASEAN

JEL codes: O1

1. Introduction

Over the past half century ASEAN countries have experienced remarkable growth in GDP per capita. According to the Penn World Table (Heston et al., 2012), Singapore is at the forefront with a GDP per capita growth between 1970-2010 of about 8 percent per annum on average; for the ASEAN-4 average PPP GDP per capita growth was around 5 percent per annum. The emergence of a middle class and its contribution to economic growth is a classic topic in the economics literature.¹ Interests in the middle class – and, in particular, for ASEAN economies – extend well beyond academics. For example, Dickson Ho of HKTC (2017) writes in an article entitled *The Middle Class Consumer Markets in ASEAN*: “With a combined GDP of about US\$2.6 trillion and robust growth, ASEAN is seen as a rising star among the world's growth markets in terms of both trade and investment.”

This paper presents estimates of the relationship between the share of income held by the middle class and economic growth of ASEAN economies. As such the paper is part of a literature in macroeconomics that examines the relationship between income inequality and aggregate output of countries; see Galor (2011) for a review. At least since Kuznet (1955) it has been noted that the relationship between income inequality and GDP per capita may be non-linear. Galor and Zeira (1993) provide a model that generates such a non-linear relationship between inequality and GDP per capita. In their model a bi-directional causality between income distribution and GDP per capita emerges: (i) an increase in GDP per capita reduces income inequality; (ii) the effect of an increase in income inequality on GDP per capita is positive for relatively poor countries and negative for relatively rich countries. In the Galor and Zeira (1993) model the mechanism that generates the non-linear effect of income inequality on GDP per capita is investment: With imperfect credit market and fixed costs of investment an increase in income inequality increases investment in relatively

1 It should be noted that in political science, see e.g. Lipset (1959), a middle class that emerges as an outcome of growth of countries' national incomes is viewed as crucial for the development of democratic institutions. For a recent empirical paper that shows democracy has a positive causal effect on economic growth see Acemoglu et al. (2017).

poor countries; but the opposite is the case in relatively rich countries.²

The first part of this paper presents estimates of the effects that economic growth during 1970-2010 had on ASEAN countries' income shares of the third and fourth quintile. Brueckner et al. (2015) used international oil price shocks and trade-weighted world income of countries as instruments to estimate the effect that exogenous variation in GDP per capita has on various measures of countries' income inequality. Using these estimates and data on changes of ASEAN countries' GDP per capita between 1970 and 2010, this paper computes predicted effects that GDP per capita growth during 1970-2010 had on changes of the income share accruing to the middle class of ASEAN countries. The main finding is that the middle class gained substantially from economic growth over the past four decades: the share of income accruing to the 3rd (4th) quintile increased for the median ASEAN country by around 6 (7) percentage points due to growth in average incomes during that period.

In the second part of the paper we present predictions of the effects that a change in the income share of the middle class has on ASEAN countries' GDP per capita growth. These predicted effects are computed by combining estimates of the non-linear effect that a change in the income share of the middle class has on GDP per capita growth and data on ASEAN countries' initial GDP per capita. One of the main findings in this paper is that for the majority of ASEAN countries a rise of the middle class would have had a negative effect on economic growth if it would have occurred at an early stage of economic development, as measured by levels of GDP per capita in 1970. ASEAN economies' average income was too low in 1970 for a rise of the middle class to have generated a positive effect on economic growth. In contrast, for current values of average income a rise of the middle class has a positive effect on economic growth in ASEAN.

Consistent with the credit market imperfection channel the paper documents that investment is an important mechanism through which the rise of the middle class affects economic growth. At

² Banerjee and Newman (1993) propose a model of occupational choice where in the presence of credit market imperfections income distribution affects the share of population that become entrepreneurs.

the early stage of development, as measured by 1970 levels of GDP per capita, an increase in the share of income held by the middle class would have had a negative effect on investment in ASEAN countries. But for recent levels of ASEAN countries' GDP per capita the opposite is the case: An increase in the share of income held by the middle class increases investment.

The paper makes two important contributions to the literature: one is conceptual, the other empirical. The important conceptual contribution is that the effect of a change in the income share held by the middle class on economic growth depends on initial income. There are theoretical models that suggest a non-linear effect of income distribution on economic growth (e.g. Galor and Zeira, 1993; Banerjee and Newman, 1993; Aghion and Bolton, 1997).³ Our econometric model takes the non-linear relationship suggested by the theory serious. The paper's important empirical contribution is to use an instrumental variables approach for estimating the effects of the income share of the middle class on economic growth and vice versa. This is consistent with theoretical literature, cited above, where credit market imperfections give rise to a bi-directional causal relationship between inequality and growth.

2. Estimation Framework and Data

Equation (1) shows the econometric model for estimating the effect that the income share of the middle class has on economic growth:

$$(1) \quad \ln(y)_{it} - \ln(y)_{it-1} = a_i + b_t + \theta_1 \text{MiddleClass}_{it} + \theta_2 \text{MiddleClass}_{it} * \ln(y_{it-1}) + \varphi \ln(y)_{it-1} + u_{it}$$

In the above equation $\ln(y)_{it}$ stands for the natural logarithm of real GDP per capita in country i and period t ; MiddleClass_{it} is the share of income of the 3rd quintile in country i and period t minus the sample average income share of the 3rd quintile; a_i are country fixed effects; b_t are time fixed effects; u_{it} is an error term. We note that equation (1) can be re-written as:

$$(1') \quad \ln(y)_{it} = a_i + b_t + \theta_1 \text{MiddleClass}_{it} + \theta_2 \text{MiddleClass}_{it} * \ln(y_{it-1}) + (\varphi+1)\ln(y)_{it-1} + u_{it}$$

3 Borrowing constraints are crucial for generating a non-linear relationship between income inequality, investment, and economic growth. For a discussion of borrowing constraints in investment in human capital, see Chapman (2006); or Asian Development Bank (2011) for a discussion that has a specific focus on Asian countries.

We estimate the econometric model using 5-year non-overlapping panel data. The panel comprises 104 countries during the period 1970-2010. The parameter ϕ measures the convergence rate over a 5-year period. The contemporaneous effect of a within-country change in the income share of the middle class on the natural logarithm of GDP per capita is $\theta_1 + \theta_2 * \ln(y_{it-1})$. If ϕ is significantly negative, so that $1 + \phi$ is below unity in absolute value (i.e. there is convergence), then the cumulative effect after T periods on the level of GDP per capita is $(\theta_1 + \theta_2 * \ln(y_{it-1}))((1 - (1 + \phi)^T) / -\phi)$.

One issue in the estimation of equation (1') is the endogeneity of the income share of the middle class to GDP per capita. Brueckner et al. (2015) use instrumental variables estimation to estimate the effect of GDP per capita on various measures of income inequality. These authors find that growth in GDP per capita has a significant positive effect on the income share of the 3rd quintile. That is, in the equation below α is positive:

$$(2) \quad \text{MiddleClass}_{it} = e_i + f_t + \alpha \ln(y)_{it} + \varepsilon_{it}$$

If α is positive in equation (2) then the least squares estimate of θ in equation (1') is upward biased. That is, least squares estimation is biased towards finding a positive effect of the middle class on GDP per capita growth. In order to correct for endogeneity bias of θ in the estimation of equation (1') we construct an inequality variable that is adjusted for the impact that GDP per capita has on the income share of the middle class, i.e. $Z_{it} = \text{MiddleClass}_{it} - \alpha \ln(y)_{it}$.⁴

Data on the income share of the 3rd and 4th quintile are from UN-WIDER World Income Inequality Database, supplemented with data from the World Bank's POVCALNET database for developing countries. The main data source for PPP GDP per capita is the Penn World Table (Heston et al., 2012); as an alternative data source for PPP GDP per capita we will use the World Development Indicators (2017). Data for the oil price shock instrument, constructed as the interaction between the natural logarithm of the international oil price and the average of each country's GDP share of oil net-exports, are from UNCTAD (2011) and the NBER-UN Trade

4 An analogous instrumental variables strategy has been used in the empirical literature on fiscal policy, see e.g. Blanchard and Perotti (2002) or Fatas and Mihov (2003). Brueckner (2013) applies this instrumental variables strategy to estimating the effect of foreign aid on economic growth.

Database (Feenstra et al., 2004), respectively. The data for trade-weighted world income, constructed as the sum of the change in trading partners' GDP multiplied by average bilateral trade shares are from Acemoglu et al. (2008). Data on the sugar-wheat ratio are from Easterly (2007).

3. Results

3.1 Effect of Economic Growth on the Rise of the Middle Class

3.1.1 Econometric Model

Table 1 shows instrumental variables estimates of the within-country effect that GDP per capita has on the income share of the middle class. The estimates in Table 1 represent a within-country effect since the model includes as control variables country and time fixed effects. The country fixed effects absorb the country averages (across time) of GDP per capita and the income shares of the middle class; the time fixed effects absorb the time averages (across countries) of GDP per capita and the income shares of the middle class. In all four specifications of Table 1 the country and time fixed effects are jointly significant at the 1 percent significance level.

Column (1) of Table 1 replicates column (4) of Table 1 in Brueckner et al. (2015).⁵ One can see that the coefficient on log GDP per capita is positive and significantly different from zero at the conventional significance levels. Quantitatively, the coefficient of 0.02 means that a 10 percent (0.1 log) increase in GDP per capita increases the income share of the 3rd quintile by around 0.2 percentage points; for the 4th quintile the effect is slightly larger, around 0.25 percentage points. Column (2) adds the lagged dependent variable to the right-hand side of the estimating equation. This has inconsequential effects for the estimated coefficient on log GDP per capita. In columns (3) and (4) the model is estimated using data from the World Development Indicators (2017). This yields slightly larger coefficients on log GDP per capita than when the model is estimated using Penn World Table data.

⁵ Brueckner et al. (2015) do find not a significant non-linear effect of national income, i.e. $[\ln(\text{GDP p.c.})]^2$, on the income shares.

Consistent estimation of the effects that GDP per capita has on the income share of the middle class requires that the instruments are relevant and valid. Instrument relevance refers to the statistical precision of the first-stage effect that the instruments have on the endogenous variable, GDP per capita. As can be seen from the bottom panel of Table 1, each of the instruments – oil price shocks (OPS) and trade-weighted world income (TWWI) -- has a highly significant effect on GDP per capita. The Cragg-Donald F-Statistic is above the critical value of 10 below which instruments are typically declared as weak (Staiger and Stock, 1997). Economically, the sign of the first-stage coefficients are intuitive: a positive terms of trade shock (i.e. an increase in the international price of oil for an oil exporter; or a decrease in the international oil price for an oil importer) raises the value of net-exports and thus has a positive effect on national income; an increase in the national income of trading partners increases demand for the home country's exports and thus increases the home country's income.

Instrument validity requires that oil price shocks and trade-weighted world income have no systematic effect on the income share of the middle class other than through GDP per capita. That is, the instruments should be uncorrelated with the second-stage error term. Since the model is overidentified we can compute the Hansen test which has the null hypothesis that the instruments are valid. In all four specifications of Table 1 the p-values from the Hansen test are above 0.1. Hence one cannot reject the hypothesis that the instruments are valid.

3.1.2 Implications for ASEAN Countries

Based on the estimates in Table 1 we can compute the effect that changes in the natural logarithm of GDP per capita between 1970-2010 had on the income shares of the 3rd and 4th quintile of ASEAN countries. Specifically, this is done by multiplying the coefficients reported in column 1 of Table 1 with the changes of ASEAN countries' natural logarithms of GDP per capita between 1970-2010.⁶

6 This follows from totally differentiating equation (2): $\Delta \text{inequality}_{ct} = \alpha \Delta \ln(\text{GDP p.c.})_{ct}$

The relevant results are reported in Table 2. From Table 2 one can see that economic growth of ASEAN countries between 1970-2010 had a substantial impact on the share of income accruing to the middle class. In column (1) a measure of the middle class is the income share of the 3rd quintile. In column (2) a measure of the upper middle class is the income share of the 4th quintile. For the median ASEAN country growth in GDP per capita between 1970-2010 increased the income share of the 3rd quintile by 6 percentage points. The effect on the 4th quintile is slightly larger, around 8 percentage points.

The ASEAN country with the highest GDP per capita growth rate during 1970-2010 was Singapore. According to Table 2, the income share of the 3rd (4th) quintile was boosted in Singapore due to rapid GDP per capita growth during that period by around 7 (9) percentage points. In contrast, the ASEAN country with the lowest GDP per capita growth rate during 1970-2010 was Brunei. Growth of Brunei's GDP per capita during 1970-2010 increased the income share of the 3rd (4th) quintile by around 3 (4) percentage points.

Table 3 reports the effect that economic growth during 1990-2010 had on the income share of the middle class. Column (1) shows results based on PPP GDP per capita data from the Penn World Table; column (2) shows results based on PPP GDP per capita data from the World Development Indicators. PWT data yields somewhat larger effects than WDI data. One can see that for ASEAN-4 economic growth during 1990-2010 boosted the income share of the 3rd quintile by around 2 percentage points. For Singapore the effect is around 4 percentage points based on PWT data and around 2 percentage points based on WDI data.

3.2. Effect of Rise of the Middle Class on Economic Growth

3.2.1 Econometric Model Estimates

Table 4 shows instrumental variables estimates of the econometric model where log GDP per capita is related to the income share of the middle class. In columns (1) and (2) the instrument for the

income share of middle class is the residual variation in the income share of the middle class that is not due to GDP per capita. Columns (3) and (4) report instrumental variables estimates where an additional instrument is employed: the interaction between the international oil price and the sugar-wheat ratio.⁷ Columns (1) and (3) show estimates based on PWT data; the estimates in columns (2) and (4) are based on WDI data.

Across all four columns of Table 4 one can see that the estimated coefficient on $Q3_{it}$ is significantly negative while the coefficient on $Q3_{it}*\ln y_{it-1}$ is significantly positive. The interpretation of these estimates is that the effect of a rise of the middle class on economic growth depends on initial income: an increase in the income share of the middle class has a negative effect on GDP per capita growth when initial GDP per capita is low but a positive effect when initial GDP per capita is high.

Figure 1 visualises the estimates reported in column (1) of Table 4. On the y-axis is the marginal effect of a change in the income share of the middle class on the change of the natural logarithm of GDP per capita. On the x-axis is the log of initial GDP per capita. The figure shows the contemporaneous, i.e. period t (5-years), effect and the long-run effect. At each level of initial income the contemporaneous effect is larger than the contemporaneous effect. A larger long-run effect is expected in dynamic models where income distribution affects GDP per capita through investment: investment raises the capital stock, which in turn raises national income and saving; higher saving raises investment...and so on. From Figure 1, one can see that the threshold above which an increase in the income share of the middle class has a positive effect on economic growth is around 8 logs of GDP per capita. Below that threshold the growth effect is negative.

An intuitive explanation for the result in Table 4 is that in poor countries, i.e. where average income is low, an increase in the income share of the middle class must come from the upper class (i.e. redistribution from the rich to the middle class). The lower class is too poor in order for

⁷ Scholl and Klasen (2016) used this variable as an instrument for the Gini coefficient.

redistribution to occur from the lower class to the middle class. When the upper class is made poorer, in a country where average income is low, there is a drop in investment. This is because in a low income country, when the upper class is poorer, it cannot as easily obtain a loan to finance the fixed costs of investment. The middle class is richer but -- in a country where average income is low -- the middle class still cannot easily obtain a loan to finance the fixed costs of investment. Thus, in low income countries, investment is confined to the upper class. In rich countries, however, where average income is high, the upper class is so well off that some redistribution to the middle class still enables the upper class to obtain a loan to finance the fixed costs of investment; and, in a country where average income is high, the middle class is able to obtain a loan to finance the fixed costs of investment as well.

Consistent with the above explanation, Table 5 shows that the effect of the income share of the middle class on the investment-to-GDP ratio significantly varies across countries' initial incomes. The estimated coefficient on $Q3_{it}$ is significantly negative while the coefficient on $Q3_{it}*\ln y_{it-1}$ is significantly positive. The interpretation of the estimates in Table 5 is that when initial average incomes are low, an increase in the income share of the middle class significantly reduces the investment-to-GDP ratio. On the other hand, the investment-to-GDP ratio is significantly boosted by an increase of the income share of the middle class when initial average incomes are high.

3.3.2 Implications for ASEAN Countries

The estimates in the previous section can be used to compute effects that variations in the income share of the middle class had on economic growth of ASEAN countries for various levels of initial income. Panel A of Table 6 reports dynamic effects on log GDP per capita of a 1 percentage point increase in the income share of the 3rd quintile for an initial income equal to PPP GDP per capita in the year 2010. Panel B reports effects for an initial income equal to PPP GDP per capita in the year

1970. The effects on log GDP per capita are computed for various horizons: 5 years (column (1)), 10 years (column (2)), 20 years (column (3)), and 40 years (column (4)). Table 6 is based on PPP GDP per capita data from the Penn World Tables. Table 7 shows that similar results are obtained for PPP GDP per capita from the World Development Indicators (2017).

Figure 2 provides a graphical illustration of the dynamic effects that a rise in the income share of the middle class has on GDP per capita. The figure makes it clear that a permanent rise of the income share of the middle class has an effect on transitional growth. The effect on economic growth is given by the slope of the curve in Figure 2. In absolute value, the slope is positive and decreases over time.

For 2010 levels of PPP GDP per capita an increase in the income share held by the 3rd quintile has a positive effect on GDP per capita for all of the ASEAN countries, except Cambodia. For the median ASEAN country a one percentage point increase in the income share held by the 3rd quintile increases GDP per capita over a 5-year window by around 0.03 logs. The effect on the level of GDP per capita increases over time amounting to around 0.1 logs after 40 years. For the ASEAN-4 average the effects are of similar magnitude.

Among the group of ASEAN countries the largest positive effects on GDP per capita of an increase in the income share of the middle class are in Brunei and Singapore. For 2010 levels of PPP GDP per capita a one percentage point increase in the income share of the 3rd quintile raises these countries' GDP per capita by around 0.1 logs over a 5-year window. The effects are larger over longer time horizons. Over a 10-year window the effect on GDP per capita is around 0.16 logs; over 20 years it is around 0.25 logs. After 40 years GDP per capita is higher by around 0.3 logs. Thus, the effects on GDP per capita cumulate over time. There is a positive effect on economic growth of a permanent increase in the income share of the middle class; the magnitude of the growth effect declines over time and converges to zero in the long run.

Smaller, though still positive effects of an increase in the income share of the middle class

are present in the relatively less developed ASEAN economies for 2010 levels of PPP GDP per capita. In the Philippines a 1 percentage point increase in the income share of the 3rd quintile increases GDP per capita by around 0.02 logs over a 5-year window; the effect goes up to around 0.05 logs over a 40-year window. In Vietnam and Laos the effects are even smaller, amounting to around 0.03 logs and 0.02 logs, respectively, when measured over a 40-year window.

Cambodia is the only ASEAN country for which according to 2010 levels of PPP GDP per capita an increase in the income share of the middle class has a negative effect on growth. The country is just below the threshold above which an increase of the middle class positively affects economic growth. Specifically, for 2010 levels of PPP GDP per capita, a 1 percentage point increase in the income share of the 3rd quintile decreases Cambodia's GDP per capita by around 0.01 logs over a 5-year window. Over 40 years the effect is around -0.03 logs.

At the early stages of economic development a rise of the middle class would have had a negative effect on economic growth. For the median ASEAN country, at 1970 PPP GDP per capita, a one percentage point increase in the income share held by the 3rd quintile would have decreased GDP per capita over a 5-year window by around 0.07 logs. In absolute value, the effect on the level of GDP per capita increases over time: it is around -0.12 over a 10-year window, and around -0.19 over a 20-year window. After 40 years, GDP per capita would have been lower by around 0.24 logs due to a 1 percentage point increase in the income share of the 3rd quintile if it would have occurred at 1970 levels of GDP per capita. For the ASEAN-4 average the effects are of similar magnitude as for the median ASEAN country. Thus, in contrast to recent levels of economic development in ASEAN, as measured by PPP GDP per capita in the year 2010, a rise of the middle class would have decreased economic growth of ASEAN if it would have occurred at the early stages of economic development.

4. Conclusion

This paper provided estimates of the relationship between the income share of the middle class and GDP per capita. At early stages of economic development, as measured by GDP per capita in 1970, a rise of the middle class would have decreased GDP per capita growth in the majority of ASEAN countries. However, for current levels of GDP per capita an increase in the income share of the middle class increases economic growth in ASEAN. For the median ASEAN country the growth is relatively modest: in the long-run a 1 percentage point increase in the income share of the 3rd quintile will increase GDP per capita by around 0.1 logs; over a 5-year window GDP per capita will increase by around 0.03 logs. As average incomes of ASEAN economies rise, the growth benefit of an increase in the income share of the middle class will increase. The paper documented that investment is an important channel through which the rise of the middle class affects economic growth.

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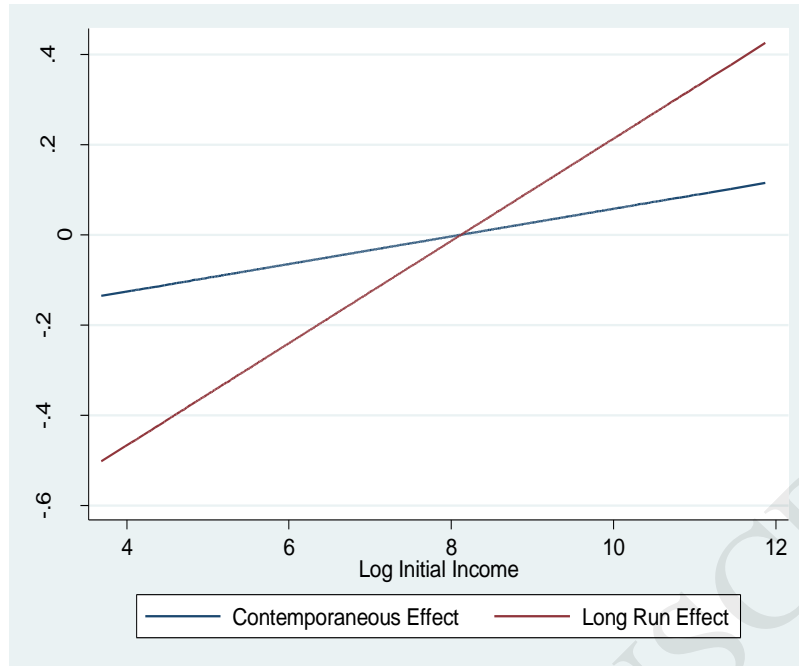
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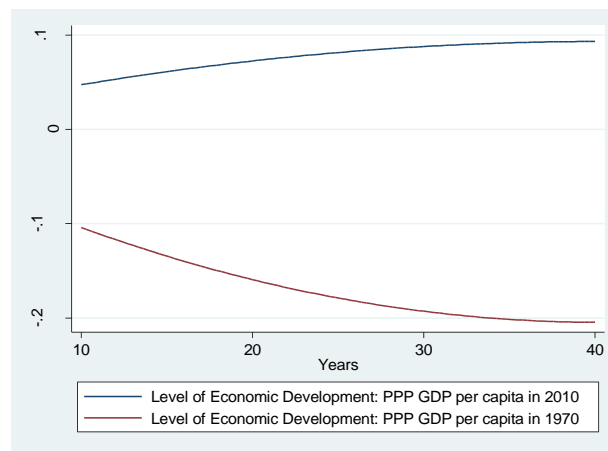
Figure 1. Effects of the Income Share of the Middle Class on GDP per capita



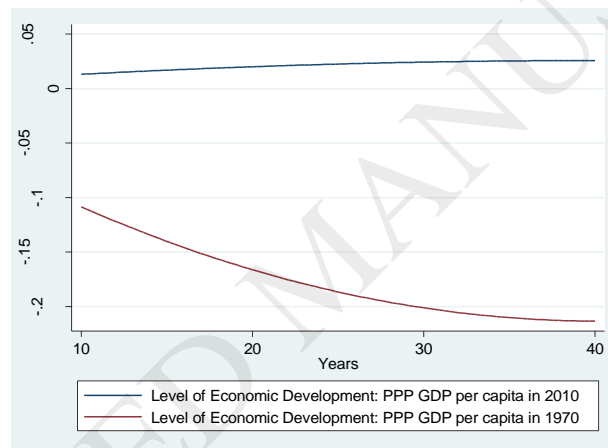
Note: The figure is based on the estimates shown in column (1) of Table 4. $\ln(y)$ stands for log GDP per capita of country i in period t ; $Q3$ is the income share of the 3rd quintile of country i in period t . *Log Initial Income* is the log of GDP per capita of country i in period $t-1$.

Figure 2: Effects of a 1 Percentage Point Increase in the Income Share Held by the Middle Class on Log GDP per capita in ASEAN Countries

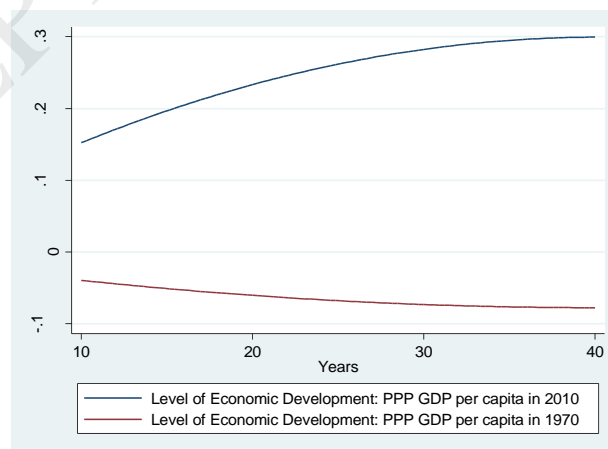
Panel A: ASEAN-4 Average



Panel B: ASEAN Median



Panel C: Singapore



Note: The figures are based on the estimates shown in column (1) of Table 4. $\ln(y)$ stands for log GDP per capita of country i in period t ; $Q3$ is the income share of the 3rd quintile of country i in period t .

Table 1. Econometric Model I

Dependent Variable is:		Q3 _{it}		
GDP Data Source:	PWT	PWT	WDI	WDI
Panel A: Dependent Variable is Q3 _{it}				
ln(y _{it})	0.020* (0.011)	0.020* (0.011)	0.026* (0.014)	0.026* (0.014)
Q3 _{it-1}		0.16* (0.09)		0.15* (0.09)
Hansen J-test, p-value	0.62	0.68	0.70	0.74
Cragg Donald F-Statistic	22.09	22.28	14.43	14.73
Panel B: Dependent Variable is Q4 _{it}				
ln(y _{it})	0.025*** (0.009)	0.025*** (0.009)	0.033*** (0.012)	0.033*** (0.012)
Q4 _{it-1}		-0.08 (0.13)		-0.07 (0.12)
Hansen J-test, p-value	0.78	0.93	0.67	0.79
Cragg Donald F-Statistic	22.09	22.28	14.43	14.73
First Stage: ln(y _{it})				
OPS	2.64** (1.15)	2.64** (1.15)	1.81* (1.11)	1.81* (1.11)
TWWI	0.50*** (0.09)	0.50*** (0.09)	0.39*** (0.09)	0.39*** (0.09)
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	311	311	300	300

Note: The method of estimation is two-stage least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. OPS is the interaction between the natural logarithm of the international oil price and countries' net-export GDP shares of oil. TWWI is trade-weighted world income.

Table 2. Effects of Economic Growth During 1970-2010 on the Share of Income Held by the Middle Class

	Predicted Effect on Income Share Held by 3 rd Quintile	Predicted Effect on Income Share Held by 4 th Quintile
	(1)	(2)
Brunei	3.12	3.88
Cambodia	4.66	5.80
Indonesia	6.74	8.39
Laos	6.22	7.74
Malaysia	6.82	8.49
Philippines	4.24	5.28
Singapore	7.24	9.01
Thailand	6.08	7.57
Vietnam	6.36	7.92
ASEAN-4 Average	5.97	7.43
ASEAN Median	6.22	7.74

Note: The table reports effects (in percent) of changes in the natural logarithms of GDP per capita between 1970 and 2010 on the share of income held by the 3rd quintile (column (1)) and 4th quintile (column (2)). The GDP data are from the Penn World Tables.

Table 3. Effects of Economic Growth During 1990-2010 on the Share of Income Held by the Middle Class

	(1)	(2)
	PWT Data	WDI Data
Brunei	-0.22	-0.18
Cambodia	3.23	.
Indonesia	1.06	1.64
Laos	2.80	2.34
Malaysia	3.56	1.82
Philippines	1.13	0.88
Singapore	4.25	1.95
Thailand	3.39	1.79
Vietnam	2.98	2.86
ASEAN-4 Average	2.29	1.53
ASEAN Median	2.98	1.88

Note: The table reports effects (in percent) of changes in the natural logarithms of PPP GDP per capita between 1990 and 2010 on the share of income held by the 3rd quintile. Column (1) is based on GDP data from the Penn World Tables; column (2) World Development Indicators.

Table 4. Econometric Model II

Dependent Variable is:	ln(y _{it})			
	(1)	(2)	(3)	(4)
GDP Data Source:	PWT	WDI	PWT	WDI
Q3 _{it}	-24.86*** (9.28)	-29.87*** (8.41)	-11.58*** (3.79)	-24.64*** (6.43)
Q3 _{it} *ln(y _{it-1})	3.06** (1.27)	3.73*** (1.10)	1.26*** (0.52)	3.03*** (0.82)
ln(y _{it-1})	0.71*** (0.06)	0.76*** (0.06)	0.77*** (0.05)	0.78*** (0.05)
Cragg Donald F-Statistic	9.63	32	28.13	25.62
Hansen J-test, p-value			0.29	0.94
	First Stage: Q3 _{it}			
Residual Q3 _{it}	0.86*** (0.04)	0.78*** (0.04)	0.86*** (0.04)	0.78*** (0.04)
Residual Q3 _{it} *ln(y _{it-1})	0.01** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.02*** (0.00)
SWratio _i *Oil price _{t-2}			-0.62 (0.40)	-0.64* (0.39)
SWratio _i *Oil price _{t-2} *ln(y _{it-1})			0.07* (0.04)	0.07* (0.04)
	First Stage: Q3 _{it} *ln(y _{it-1})			
Residual Q3 _{it}	4.60*** (0.49)	3.97*** (0.37)	3.94*** (0.44)	3.63*** (0.43)
Residual Q3 _{it} *ln(y _{it-1})	0.29*** (0.07)	0.43*** (0.05)	0.42*** (0.06)	0.50*** (0.06)
SWratio _i *Oil price _{t-2}			-0.23*** (0.04)	-0.12*** (0.04)
SWratio _i *Oil price _{t-2} *ln(y _{it-1})			0.03*** (0.01)	0.01*** (0.00)
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	311	300	290	258

Note: The method of estimation is two-stage least squares. Bootstrapped standard errors are shown in parentheses. $Residual\ Q3_{it} = Q3_{it} - \alpha \ln(y_{it})$, where α measures the effect that $\ln(y_{it})$ has on $Q3$. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 5. Econometric Model III

Dependent Variable is:	ln(INV/GDP) _{it}			
	(1)	(2)	(3)	(4)
GDP Data Source:	PWT	WDI	PWT	WDI
Q3 _{it}	-7.13** (3.04)	-5.74* (3.23)	-2.72* (1.39)	-5.10* (2.84)
Q3 _{it} *ln(y _{it-1})	0.99** (0.42)	0.74* (0.41)	0.39** (0.17)	0.66* (0.33)
ln(y _{it-1})	-0.05*** (0.02)	-0.02 (0.03)	-0.03* (0.02)	-0.02 (0.02)
Cragg Donald F-Statistic	9.63	32.19	37.92	25.62
Hansen J-test, p-value			0.11	0.31
First Stage: Q3 _{it}				
Residual Q3 _{it}	0.86*** (0.04)	0.78*** (0.04)	0.86*** (0.04)	0.78*** (0.04)
Residual Q3 _{it} *ln(y _{it-1})	0.01** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.02*** (0.00)
SWratio _i *Oil price _{t-2}			-0.62 (0.40)	-0.64* (0.39)
SWratio _i *Oil price _{t-2} *ln(y _{it-1})			0.07* (0.04)	0.07* (0.04)
First Stage: Q3 _{it} *ln(y _{it-1})				
Residual Q3 _{it}	4.60*** (0.49)	3.97*** (0.37)	3.94*** (0.44)	3.63*** (0.43)
Residual Q3 _{it} *ln(y _{it-1})	0.29*** (0.07)	0.43*** (0.05)	0.42*** (0.06)	0.50*** (0.06)
SWratio _i *Oil price _{t-2}			-0.23*** (0.04)	-0.12*** (0.04)
SWratio _i *Oil price _{t-2} *ln(y _{it-1})			0.03*** (0.01)	0.01*** (0.00)
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	311	300	290	258

Note: The method of estimation is two-stage least squares. Bootstrapped standard errors are shown in parentheses. $Residual\ Q3_{it} = Q3_{it} - \alpha \ln(y_{it})$, where α measures the effect that $\ln(y_{it})$ has on $Q3$. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 6. Effects on Log GDP per capita of a 1 Percentage Point Increase in the Income Share Held by the Middle Class

	(1)	(2)	(3)	(4)
Effects Over:	5 Years	10 Years	20 Years	40 Years
Panel A: Initial Level of Economic Development is PPP GDP per capita in 2010				
Brunei	0.09	0.16	0.25	0.32
Cambodia	-0.01	-0.02	-0.02	-0.03
Indonesia	0.03	0.05	0.07	0.10
Laos	0.01	0.01	0.01	0.02
Malaysia	0.06	0.10	0.15	0.19
Philippines	0.02	0.03	0.04	0.05
Singapore	0.09	0.16	0.25	0.32
Thailand	0.04	0.07	0.11	0.14
Vietnam	0.01	0.02	0.02	0.03
ASEAN-4 Average	0.04	0.06	0.09	0.12
ASEAN Median	0.03	0.05	0.07	0.10
Panel B: Initial Level of Economic Development is PPP GDP per capita in 1970				
Brunei	0.04	0.07	0.11	0.14
Cambodia	-0.08	-0.13	-0.21	-0.28
Indonesia	-0.10	-0.17	-0.25	-0.33
Laos	-0.10	-0.17	-0.26	-0.33
Malaysia	-0.06	-0.11	-0.17	-0.21
Philippines	-0.06	-0.11	-0.17	-0.21
Singapore	-0.02	-0.04	-0.06	-0.08
Thailand	-0.06	-0.11	-0.16	-0.21
Vietnam	-0.10	-0.17	-0.26	-0.33
ASEAN-4 Average	-0.07	-0.12	-0.19	-0.24
ASEAN Median	-0.06	-0.11	-0.17	-0.21

Note: The reported effects are based on PPP GDP per capita data from the Penn World Tables.

Table 7. Robustness WDI Data: Effects on Log GDP per capita of a 1 Percentage Point Increase in the Income Share Held by the Middle Class

(Initial Level of Economic Development is PPP GDP per capita in 2010)

	(1)	(2)	(3)	(4)
Effects Over:	5 Years	10 Years	20 Years	40 Years
Brunei	0.09	0.16	0.26	0.36
Cambodia	-0.01	-0.02	-0.03	-0.04
Indonesia	0.03	0.05	0.08	0.11
Laos	0.01	0.01	0.01	0.02
Malaysia	0.05	0.10	0.16	0.21
Philippines	0.02	0.03	0.04	0.06
Singapore	0.09	0.16	0.26	0.36
Thailand	0.04	0.07	0.11	0.16
Vietnam	0.01	0.01	0.02	0.03
ASEAN-4 Average	0.03	0.06	0.10	0.13
ASEAN Median	0.03	0.05	0.08	0.11

Note: The reported effects are based on PPP GDP per capita data from the World Development Indicators.

Appendix Table 1. Descriptive Statistics

Variable	Mean ASEAN	Standard Deviation ASEAN
3rd Quintile Income Share	0.14	0.01
4th Quintile Income Share	0.21	0.01
Ln GDP per capita	7.38	1.73
Investment/GDP	0.23	0.12

Appendix Table 2. List of ASEAN Countries' Log GDP per capita in 1970 and 2010

Country	Log GDP per capita in 1970	Log GDP per capita in 2010
Brunei	9.47	11.03
Cambodia	5.48	7.81
Indonesia	5.00	8.37
Laos	4.91	8.02
Malaysia	6.13	9.54
Philippines	6.07	8.19
Singapore	7.38	11.00
Thailand	6.09	9.13
Vietnam	4.89	8.07