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Macro 1
9/1/20

1. I chose to compare the country of Malaysia to the USA for the Levels Accounting Exercise over the years 1980 – 2017.
   a. **Levels Accounting**

Levels Accounting: Comparison of Malaysia and U.S.A in 1980

Country	Y\L	TFP	K\L	h
MYS	18894.56	7094.10	42262.97	1.78
USA	64810.02	10696.92	212539.38	3.35
Gap(logs)	-1.23	-0.41	-1.62	-0.63
Contribution to Gap (logs)	--	-0.27	-0.54	-0.42
Contribution Percent	--	22.21	43.68	34.11

Levels Accounting: Comparison of Malaysia and U.S.A in 2017

Country	Y\L	TFP	K\L	h
MYS	50068.34	8490.44	189130.81	3.03
USA	114692.51	16540.98	394492.14	3.74
Gap(logs)	-0.83	-0.67	-0.74	-0.21
Contribution to Gap (logs)	--	-0.44	-0.25	-0.14
Contribution Percent	--	53.64	29.56	16.80

Y/L, K/L ,and h were all taken from the Penn World Tables dataset. TFP was computed using the formula:

$$A_t^{1-\alpha} = \frac{y_t}{(k_t^{\alpha})(h_t^{1-\alpha})}$$

In 1980 the largest gap between the U.S. and Malaysia was the capital labor ratio, which accounted for about 44% of the gap between the two countries. On the other hand, in 2017 the largest gap was attributed to Total Factor of

Productivity, TFP. Malaysia over the decades has made significant gains with Human Capital increasing as well as increasing a large amount of capital per worker.

b. Growth Accounting

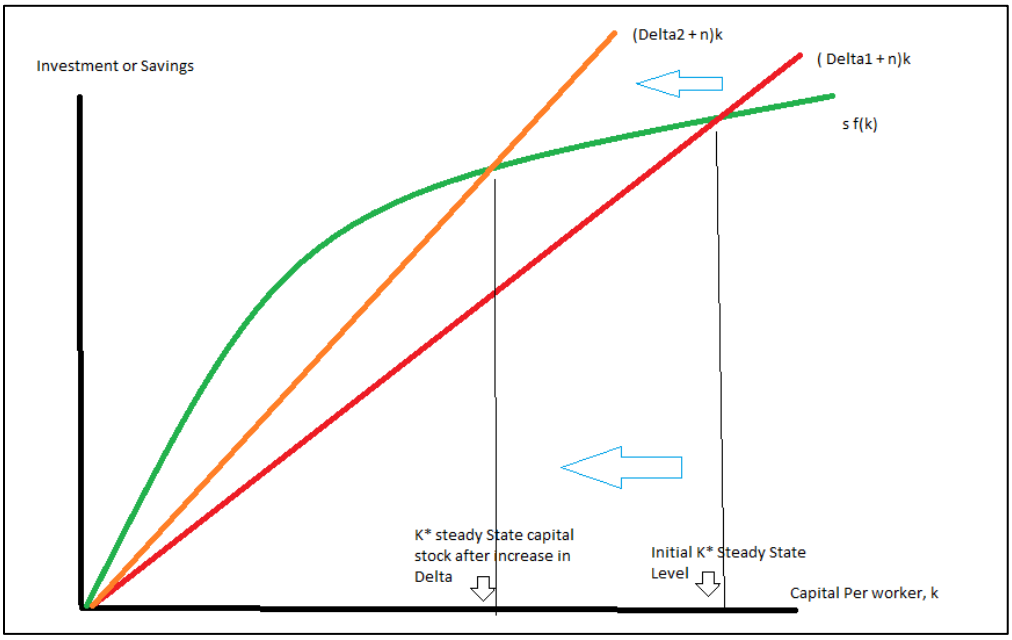
Growth Accounting Malaysia: 1980 & 2017

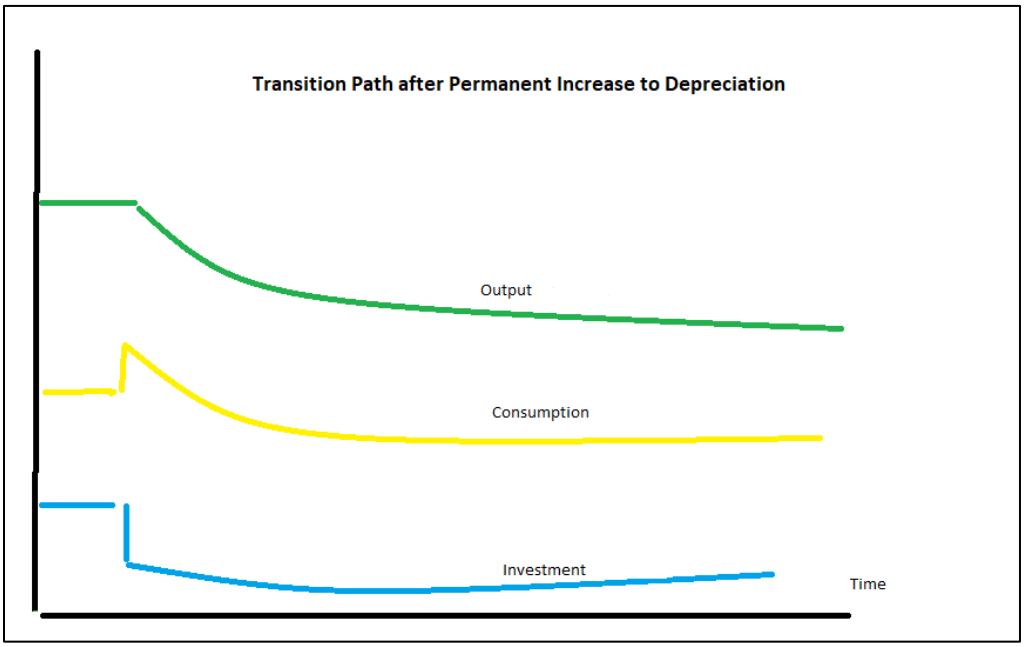
Year	Y\L	TFP	K\L	h
1980	20521.21	7109.39	53912.29	1.78
2017	52357.90	9443.67	174822.67	3.03
(Log) Average Growth	2.53	0.77	3.18	1.44
Gap(logs)	0.94	0.28	1.18	0.53
Contribution to Growth (logs)	--	0.19	0.39	0.36
Contribution to Growth - Percent	--	20.21	41.87	37.92

Examining Malaysia's Economy from a Growth Accounting Perspective we see that GDP per worker grew at an average rate of 2.53% over the past 37 years. Much of that growth can be attributed to growth in K\L which accounts for almost 42% of the gap between Malaysia in 1980 and 2017. The next most significant proximate force is Human Capital or h. Growth in Human Capital accords for almost 38% of the historical difference in Malaysia's economy. Least important is growth in TFP which only accounts for 20.2% of growth in GDP per worker.

2. Solow Model

a. .

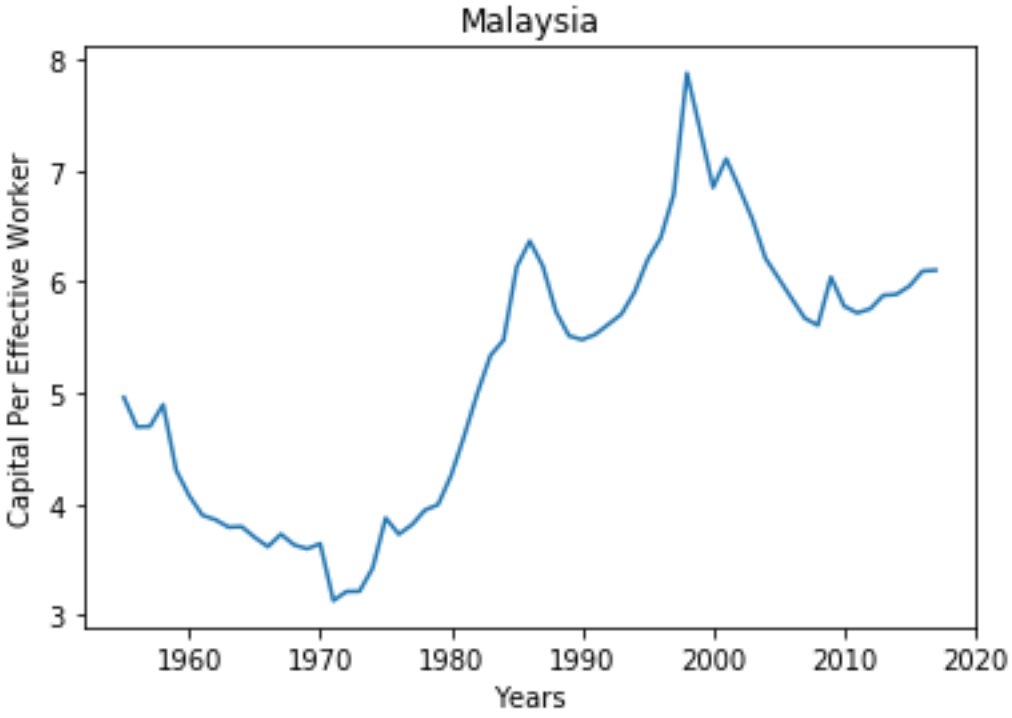


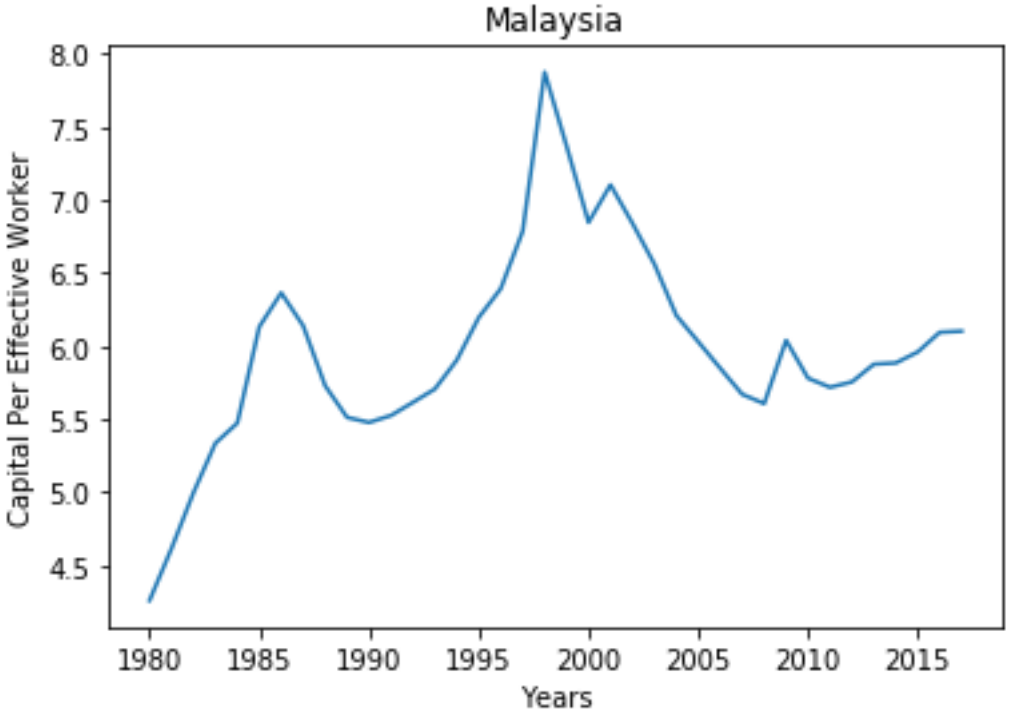


The permanent depreciation shock causes a transition to a new lower steady state level of capital. This causes output, consumption, and investment to all fall together over time.

b. .

i. .


Malaysia
Capital Per Effective Worker
Years
8
7
6
5
4
3
1960
1970
1980
1990
2000
2010
2020

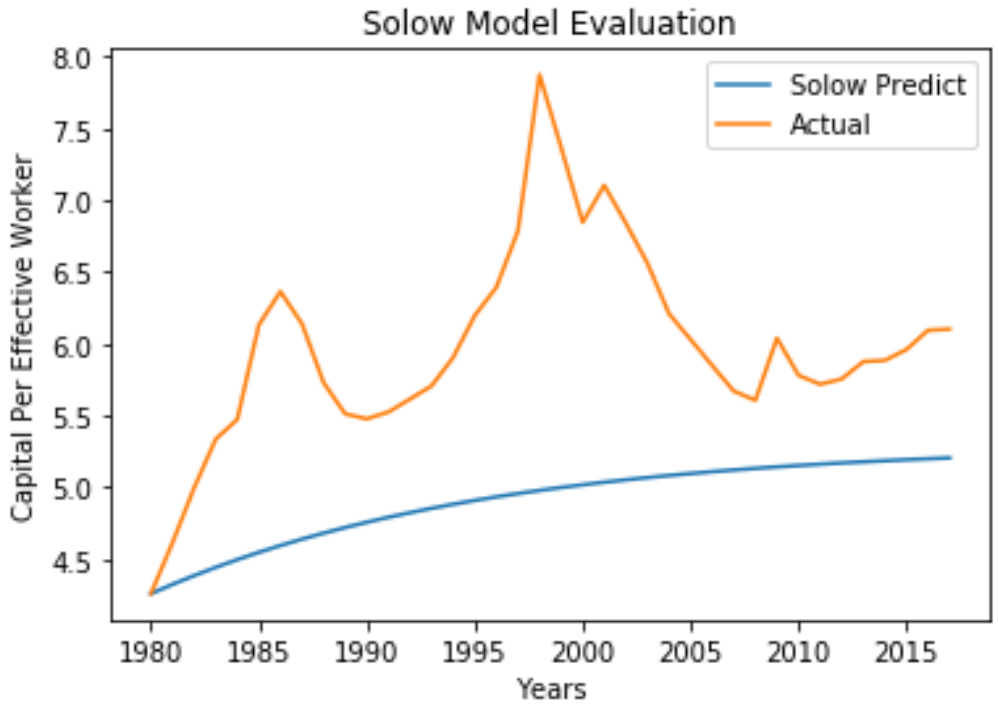

Malaysia
Capital Per Effective Worker
Years
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
1980
1985
1990
1995
2000
2005
2010
2015

ii. The parameters for the Solow Growth model are, δ, the depreciation rate. S, which is the national savings rate. The average TFP growth rate over the period, γ, and n which is the labor force growth rate. The parameter, δ, was exogenously determined and set to 0.05, while the other parameters were endogenously determined by computing the log average growth rate over the time period. Also, included in the table is the steady state prediction for capital for Malaysia. The steady state solution is given by the equation:

$$K^* = [\frac{S}{\delta + \gamma + n}]^{\frac{1}{1-\alpha}}$$

Parameter	Value
δ	0.05
S	0.31
γ	0.02
n	0.03
K*	5.34

iii.

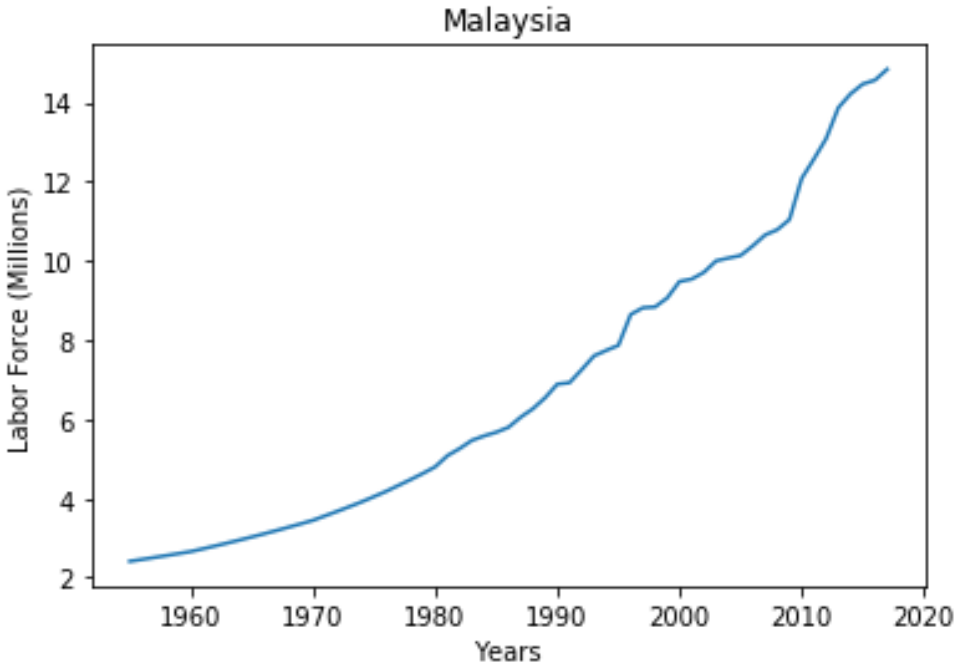


iv. The Solow Growth Model predicts Capital per Effective Worker in Malaysia from 1980-2017 moderately well. The correlation coefficient between the model predictions and the actual data is 0.502. Thus, the Solow Growth Model captures a moderate positive linear relationship in the data. Considering the model is over 60 years old we can set it as a baseline for the rest of the models we will learn throughout the semester.

I am most interested in the spike in Capital per Effective worker during 1995-2000. The maximum value of capital per effective worker occurs in 1998, this is also when the residual between the predicted values and the actual data is also maximized. I know that the Asian Financial Crisis began in July of 1997 and continued into the early 2000's. Thus, by examining the Asian Financial Crisis we can understand what might account for differences between the Solow Model and the Data.

We know that the Solow Model does not account for shocks to the economy such as a financial crisis.
Hypothesis I*: The residual between the model and the data can be explained primarily by unemployment.*

One of the consequences of the Great Recession or the "American Financial Crisis" was the labor force contracting sharply and unemployment reaching very high levels. My hypothesis was that during the Asian Financial Crisis Malaysia's labor force would have also contracted significantly thus causing capital per effective worker to increase dramatically. When I went to test this hypothesis, the data showed that unemployment had virtually no effect on Malaysia's capital per effective worker during the financial crisis. The correlation coefficient was low and a graph of the labor force over the time period show a steady positive linear trend much different then the capital per effective worker data.

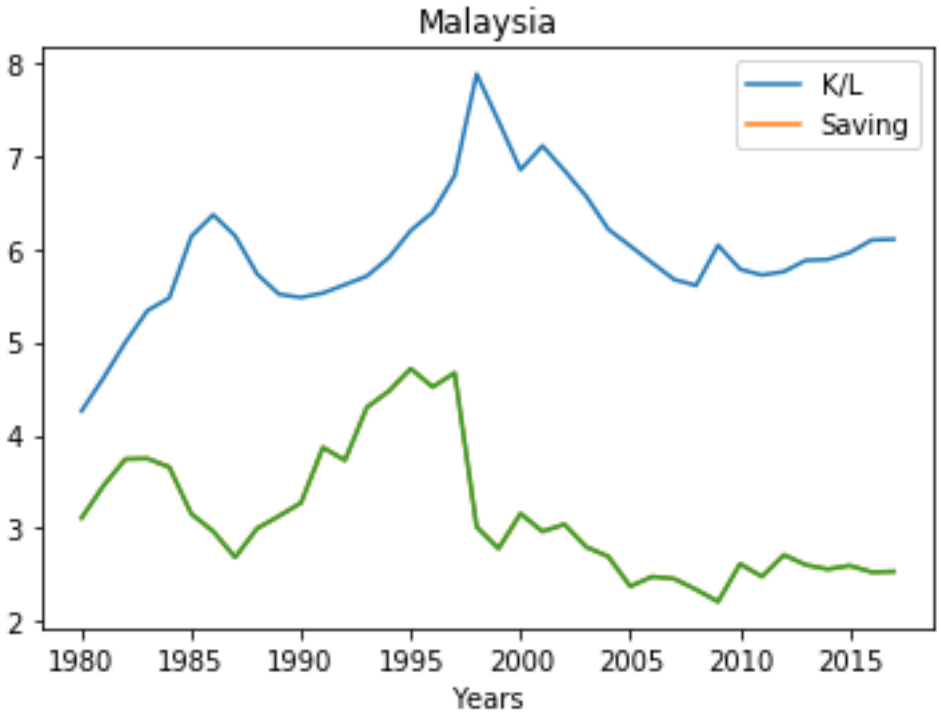


My next thought was about the savings rate. A major component of the Solow Model is the savings rate which determines the rate of investment in new capital. Thus, perhaps Malaysia experienced a sharp decline in investment at the

height of the financial crisis which would explain the decrease in capital starting in 1998.

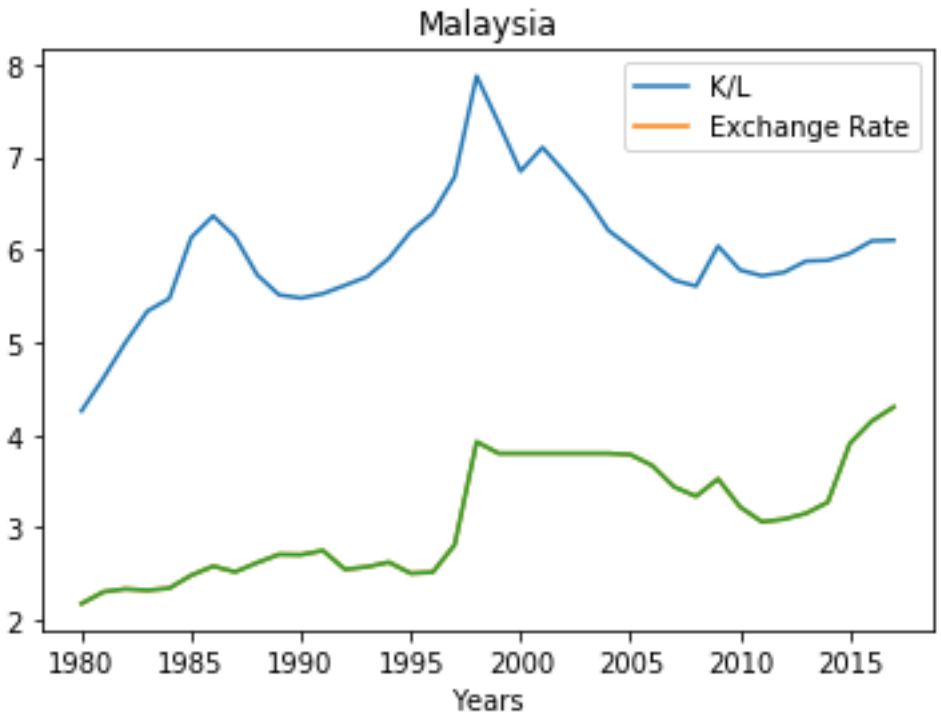
***Hypothesis II**: The residual between the model and the data can be explained primarily by changes in the savings rate.*

This hypothesis seemed to fair much better than hypothesis I. The savings rate for Malaysia in 1997 was 46.7% and dropped to 30.1 % in 1998 right during the middle of the Asian Financial Crisis. Additionally, the graph of the savings rate and capital per effective worker seemed to follow a general trend in tandem.



I applied a monotonic transformation of the savings rate so the units could be compared on the same graph.

So, what would cause such a dramatic decrease in the savings rate for Malaysia? I knew that Malaysia was an emerging economy that had consistent strong growth for the past few decades. Also, foreign investment in these emerging markets such as Korea, Malaysia, and Indonesia was significant relative to other times in each country's history. Thus, the question became if I were an investor in Asia in the late 1990's what would cause me to withdraw my investment?



I believe looking at the graph of the Exchange Rate over the same time is informative and provides the answer. Again, at the height of the Asian Financial Crisis the Malaysia Ringgit depreciated significantly. The exchange rate spiked and investors seeing their investments losing value pulled their foreign investment from Malaysia which in turn reduced the capital stock in the subsequent periods.

The Solow Model obviously would not be able to explain this trend as we only model one market the goods market and lack agents that would experience shocks.