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Middle-income trap and factors affecting the risk of growth slowdown in upper-middle-income countries

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Abstract

In this paper, we investigate the macroeconomic, demographic and institutional factors affecting the probability of growth slowdown in upper-middle-income countries within the framework of the growth slowdown methodology developed by Eichengreen et al. (2011). To do so, we use probit regression, and the dataset covers the period 1980-2015. The results show that growth slowdown occurs when per capita income reaches 22 percent of that in the United States. Besides, an increase in the relative income, gross capital formation, trade openness, years of total schooling, old dependency ratio and law and order index increases the risk of growth slowdown, whereas an increase in public debt, inflation variability and years of secondary and higher schooling decreases the risk of growth slowdown.

Keywords: middle-income trap; growth slowdown; probit model
JEL Classification Codes: E13, F43, J11, O11, O43

1. Introduction

The middle-income trap phenomenon entered the economics literature with the World Bank report "*An East Asian Renaissance: Ideas for Economic Growth*" by Gill and Kharas in 2007. It has become one of the frequently debated topics in the growth literature since that year. The middle-income trap, in the most general sense, refers to countries that experience rapid growth for a certain period, which enables them to reach middle-income level but have not been able to move up high income level (Glave and Wagner, 2016). According to another approach that is used to explain the concept, the middle-income country has difficulty in competing with both low-income countries that have a comparative advantage in labor-intensive sectors and rich countries that have advanced technology and innovation-based growth, and it is caught in a middle-income trap (Gill and Kharas, 2007).

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The middle-income trap is usually described in the context of the neoclassical growth theory and Lewis-type development model. The neoclassical steady state equilibrium level where it is not possible to increase per capita income by increasing capital is defined as middle-income trap (Yeldan et al., 2012). The concept of middle-income trap is described as follows within the framework of a Lewis-type development model. During the early phase of development low-income country can compete in international markets by producing low-cost and labor-intensive products by using imported technologies. These low-income countries gain large productivity through shifting labor force from the low-productivity agricultural sectors to high-productivity sectors. However, after reaching middle-income level, labor supply turns to labor shortage and wages begin to rise, thereby countries lose competitiveness. In the end, productivity growth from sectoral reallocation and technology catch-up are eventually exhausted. Countries that become less competitive in international markets are caught in a middle-income trap as a result of the growth slowdown (Agenor et al., 2012).

The concept of middle-income trap which entered the economics literature for the first time with the report by the World Bank in 2007 has been discussed in a descriptive sense in the next few years. In 2011, the cornerstone study by Eichengreen et al. (2011) was published. The authors analyze middle-income trap with an empirical perspective, and define the middle-income trap as a growth slowdown. According to their definition, growth slowdown occurs at time t if, and only if: (1) the seven-year average growth rate of real per capita GDP is 3.5% or greater prior to the slowdown (2) growth slowdown as a decline in the seven-year average growth rate of per capita GDP by at least 2 percentage points and (3) the per capita income is greater than $10000 at t.

The study by Eichengreen et al. (2011) which provided highly significant contributions to the literature on middle-income trap was also subjected to some criticisms, especially in terms of the third condition (Paus, 2014; Fryer and Cattaneo, 2014; Andrianjaka and Rougier, 2017). Due to the higher threshold of per capita income, while several developed countries (high-income countries) are included in the analysis, some developing countries (middle-income countries) are left out of the analysis.

Considering these criticisms, this paper investigates the macroeconomic, demographic and institutional factors that increase (reduce) the likelihood of growth slowdown in a sample consisting of 38 upper-middle-income countries (World Bank Income Classifications) over the period 1980-2015.

2. Data and methods

Empirical analyses employ yearly data for 38 upper-middle-income countries (World Bank Income Classification) covering 1980-2015. The data obtained from United Nations Statistics Division (UNSTAT), World Development Indicators (WDI), Penn World Table (PWT) (7.1), Barro-Lee educational attainment data set (2016), Abbas et al. (2010) and The International Country Risk Guide (ICRG) databases. The macroeconomic variables used in this study are GDP per capita (at constant 2005 prices), gross capital formation (% of GDP), trade openness (% of GDP), public debt (% of GDP), high technology export (% of manufactured export), inflation and exchange rate variability; demographic variables, average years of total schooling, average years of secondary and higher schooling, sex ratio, fertility rate, old-age dependency ratio, young-age dependency ratio, urban population (% of total population), population density; institutional variables, bureaucracy quality, corruption, investment profile, democratic accountability, military in politics, law and order.

Table 1. Selected studies on growth slowdown approach.

Author(s)	Time period	Sample	Factors increases the likelihood of growth slowdown	Factors decreases the likelihood of growth slowdown
Eichengreen et al. (2011)	1957-2007	World Sample	Income Relative income Pre-slowdown growth Fertility rate Age dependency ratio (old) Manufacturing emp. share Exchange rate variability Undervaluation of real exc. rate	Trade openness Consumption share of per capita GDP
Eichengreen et al. (2013)	1957-2010	World Sample	Income Relative income Pre-slowdown growth Exchange rate variability Undervaluation of real exc. rate Total years of schooling Investment share of per capita GDP	Trade openness Consumption share of per capita GDP years of schooling, second-ary and higher High technology export
Aiyar et al. (2013)	1955-2009	World Sample and middle-income countries	The size of government Regulation Dependency ratio Sex ratio Gross capital inflows/GDP Investment share	Rule of law Public debt/GDP Agriculture share of value added Service share of value added Trade openness
Zampelis (2015)	1960-2010	Latin America	GDP per capita Lagged growth Gross capital formation (%GDP) Dependency ratio	Trade openness High technology export Financial openness Agricultural share Services share Sex ratio Fertility rate
Giap et al. (2016)	1993-2013	China India Indone-sia	GDP per capita	Literacy rate Employment in tertiary ind. Trade openness
Jayasooriya (2017)	1960-2014	South Asia	Dependency ratio	Fertility rate Population density Demographic profile
Lee (2018)	1960-2014	World Sample	Dependency ratio Fertility rate	Public debt/GDP High technology ex-ports/GDP Manufacturing exports/GDP

To determine growth slowdown years in upper-middle-income countries, the growth slowdown methodology developed by Eichengreen et al. (2011) is applied in this study.

To identify such slowdowns of economic growth, Eichengreen et al. (2011) define year *t* as a growth slowdown year if the following three conditions are satisfied:

- $g_{t,t-n} \geq 0.035$
- $g_{t,t+n} - g_{t,t-n} \geq 0.02$

- $y_t > \$10000$ (2005 constant prices)

where y_t is per capita gross domestic product (GDP), $g_{t,t+n}$, $g_{t,t-n}$ are the average growth rate between year *t* and *t* + *n* and the average growth rate between *t* – *n* and *t*, respectively. Following Hausmann, Pritchett, and Rodrik, authors set n = 7. The first condition requires that the 7-year average growth rate of per capita GDP is 3.5% or greater prior to the slowdown (earlier growth was fast). The second one identifies a growth slowdown with a decline in the 7-year average growth rate of per capita GDP by at least by 2 percentage points (the slowdown is non-negligible). The third condition limits slowdowns to cases in which per capita GDP is greater than $10000 in constant 2005 prices.

As mentioned in the previous part, among these three conditions, especially the third condition has received criticism due to its high threshold value in the literature (Paus, 2014; Fryer and Cattaneo, 2014; Glawe and Wagner, 2016; Andrianjaka and Rougier, 2017). Due to the third condition, several developed countries such as Australia, Japan and the USA are included in the analysis, whereas many developing countries are left out.

In line with the criticisms, in this study, the third condition is not considered, and instead, this study is based on World Bank income classification. According to the World Bank income classification, middle-income countries are divided into two groups as upper-middle-income and lower-middle-income countries. Based on this classification, the upper-middle-income countries are the closest to reaching the category of high-income group, so there is a higher risk/potential of middle-income trap in upper-middle-income countries rather than lower-middle-income countries. For this reason, analysis part of the study considered only the group of upper-middle-income countries.

In this study, with the revised third condition, the conditions that determine the growth slowdown are as follows:

- $g_{t,t-n} \geq 0.035 \qquad n = 7,$
- $g_{t,t+n} - g_{t,t-n} \geq 0.02$
- Upper-middle-income countries (World Bank Income Classification)

In this study, a probit model is used to link growth slowdowns with several variables. The probit model:

$$P = (Y = 1|X) = \int_{-\infty}^{x'\beta} \phi(t)dt = \phi(x' \beta) \qquad (1)$$

The function $\phi(.)$ is a commonly used notation for the standard normal distribution. (Greene, 2003).

Following Eichengreen et al. (2011), we next assign the value of 1 to the three years centered on the year of the growth slowdown, i.e. the dummy equals 1 for $t = t - 1$, t and $t + 1$ and 0 otherwise.

3. Results

3.1. Macroeconomic environment

The Table 2 shows the effect of several macroeconomic variables on the likelihood of growth slowdown. As shown in Table 2, relative income[1] is the most important variable: both relative income and its squared are highly significant. The results (column 2) suggest that a growth slowdown typically occurs when per capita income reaches 22 percent of that in the US.

[1] per capita GDP relative to the US.

Table 2. Macroeconomic environment.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
per capita income	0.001 [c]		-0.001					
	(0.000)		(0.001)					
per capita income^2	-0.000		0.000					
	(0.000)		(0.000)					
relative income		74.188 [a]	123.467 [a]	74.140 [b]	64.281 [c]	59.341 [c]	65.809 [b]	52.560
		(22.547)	(46.382)	(31.595)	(37.248)	(31.759)	(33.223)	(47.906)
relative income^2		-165.480 [b]	-315.471 [b]	-218.165	-119.031	-165.596	-186.581	-50.368
		(79.862)	(158.856)	(135.228)	(169.043)	(133.555)	(148.398)	(192.539)
gross capital for.				0.097 [a]	0.083 [a]	0.112 [a]	0.121 [a]	0.125 [a]
				(0.023)	(0.025)	(0.020)	(0.023)	(0.025)
openness					0.094 [a]			0.010
					(0.032)			(0.009)
openness^2					-0.000 [a]			
					(0.000)			
public debt						-0.003 [a]		
						(0.001)		
exchange rate var.							-0.074	
							(0.075)	
inflation var.							-0.001 [b]	
							(0.000)	
high tech. export								0.056
								(0.034)
openness*high tech. export								-0.001 [c]
								(0.000)
AIC	772.598	732.391	729.498	548.614	512.952	500.458	437.763	346.938
Log-Likelihood	-382.299	-362.196	-358.749	-269.307	-249.476	-244.229	-211.881	-165.469
Wald	26.66 [a]	52.46 [a]	56.53 [a]	86.97 [a]	87.47 [a]	74.94 [a]	70.38 [a]	58.75 [a]
Pseudo R^2	0.029	0.078	0.087	0.036	0.067	0.036	0.035	0.073

Note: Numbers in parentheses are robust standard errors. a, b and c indicate significance at the 1%, 5%, 10% level, respectively.

The results of the probit regressions show that gross capital formation, trade openness and its square, public debt, inflation variability are significantly related to growth slowdown. The relative income, gross capital formation and trade openness increase the likelihood of growth slowdown over the relevant range. Public debt and inflation variability[2], in contrast, do appear to decrease likelihood of growth slowdown. Exchange variability and high technology export do not have a significant effect on the likelihood of growth slowdowns. Although there is a positive relationship between trade openness and likelihood of growth slowdown, the interaction of the share of high-tech exports with trade openness has negative and significant effect on likelihood of growth slowdown.

3.2. Demography

The estimates of probit regression for demographic variables are displayed below in Table 3.

The probit analysis finds that the old dependency ratio and sex ratio are significantly related to slowdown probabilities. That is, a high ratio of older dependants to workers, and an increase in the ratio of men to women both increase the probability of a growth slowdown.

In contrast old dependency ratio and sex ratio, urban ratio enters negatively and significantly; as urban population rises, the probability of slowdown falls. However, young dependency ratio, fertility rate and population density have positive coefficients though not statistically significant.

[2] the variability of inflation and exchange rate is calculated as the standard deviation of inflation and exchange rate from t-7, to t-1.

Table 3. Demography.

	(1)	(2)	(3)	(4)	(5)
relative income	63.915 [b]	50.290 [b]	65.618 [b]	62.879 [b]	81.377 [b]
	(26.779)	(24.750)	(29.324)	(27.511)	(37.140)
relative income^2	-162.774	-119.177	-167.927	-159.765	-266.942
	(107.680)	(99.147)	113.568	(109.076)	(163.144)
sex ratio	31.331 [a]	24.935 [a]	32.244 [a]	31.017 [a]	33.404 [a]
	(9.041)	(8.531)	(11.001)	(8.971)	(8.724)
urban population	-0.028 [b]	-0.033 [b]	-0.028 [b]	-0.028 [b]	-0.026
	(0.013)	(0.014)	(0.014)	(0.013)	(0.016)
old dependency ratio		0.118 [b]			
		(0.046)			
young dependency ratio		0.001			
		(0.014)			
fertility rate			0.043		
			(0.242)		
population density				0.000	
				(0.001)	
years of schooling, sec-ondary and higher					-0.344
					(0.470)
years of schooling, total					0.234
					(0.244)
AIC	264.252	258.828	266.183	266.228	203.193
Log-Likelihood	-126.126	-121.414	-126.092	-126.114	-93.597
Wald	19.87 [a]	25.02 [a]	19.54 [a]	19.94 [a]	16.600 [a]
Pseudo R^2	0.012	0.012	0.021	0.019	0.018

Note: Numbers in parentheses are robust standard errors. a, b and c indicate significance at the 1%, 5%, 10% level, respectively.

Table 4. Institutions.

	(1)	(2)	(3)	(4)	(5)	(6)
relative income	88.054	98.908 [b]	82.226 [b]	78.054 [b]	81.057 [b]	93.951 [b]
	(68.115)	(39.796)	(36.972)	(38.374)	(37.277)	(44.831)
relative income^2	-159.794	-227.793	-163.486	-142.948	-158.067	-162.590
	(288.664)	(169.730)	(150.104)	(155.620)	(150.499)	(184.096)
bureaucracy quality	0.606					
	(0.421)					
corruption		0.251				
		(0.247)				
investment profile			0.046			
			(0.103)			
democratic accounta-bility				0.158		
				(0.185)		
military in politics					0.137	
					(0.255)	
law and order						0.565 [a]
						(0.185)
AIC	392.513	400.253	404.539	402.024	403.963	372.606
Log-Likelihood	-191.257	-195.126	-197.270	-196.012	-196.981	-181.303
Wald	47.89 [a]	44.02 [a]	43.13 [a]	44.43 [a]	41.86 [a]	59.81 [a]
Pseudo R^2	0.133	0.121	0.111	0.118	0.112	0.138

Note: Numbers in parentheses are robust standard errors. a, b and c indicate significance at the 1%, 5%, 10% level, respectively.

3.3. Institutions

The probit regressions in this part show the relationship between growth slowdown and several institutional variables. In every case the lower the risk point total, the higher the risk, and the higher the risk point total the lower the risk (Howell, 2014:3). The democratic accountability variable represents how responsive government is to its citizens. The law and order variable is constructed by assessing "law" and "order" variables separately. While "law" element represents the strength and impartiality of the legal system, "order" element measures observance of the law. Bureaucracy quality is a shock absorber that reduce revisions of policy when government change. Corruption variable measures corruption in the political system, which is especially important in attracting foreign investment to the country. Investment profile is an assessment of factors affecting the risk to investment that are not covered by other economic, political and financial risk components. Military in politics variable measures the degree of military participation in politics. Military's involvement in politics reduces democratic accountability (Howell, 2014).

The results in Table 4 show that only law and order has significant effect on the likelihood of growth slowdown but surprisingly not expected sign. The improvement in the legal system increases the likelihood of growth slowdown in upper-middle-income countries.

3.4. Broad model

In this section, macroeconomic, demographic and institutional variables are included to regression models. While forming the broad model, backward elimination method which has some advantages over forward selection model and stepwise regression is used. Because it is possible for a set of variables to have considerable predictive capability even though any subset of them

Table 5. Broad model.

	(1)
relative income	87.806 [b]
	(41.542)
relative income^2	-118.391
	(185.102)
gross capital formation	0.188 [a]
	(0.031)
openness	0.029 [a]
	(0.009)
public debt	-0.023 [b]
	(0.012)
inflation variability	-0.003 [a]
	(0.001)
years of schooling, total	0.898 [b]
	(0.448)
years of schooling, secondary and higher	-3.140 [a]
	(0.864)
old dependency ratio	0.334 [a]
	(0.090)
law and order	1.016 [b]
	(0.439)
AIC	167.877
Log Likelihood	-71.938
Wald	42.90 [a]
Pseudo R^2	0.065

Note: Numbers in parentheses are robust standard errors. a, b and c indicate significance at the 1%, 5%, 10% level, respectively.

does not. Forward selection and stepwise regression will fail to identify them. Because the variables don't predict well individually, they will never get to enter the model to have their joint behavior noticed. Backwards elimination starts with everything in the model, so their joint predictive capability will be seen (Dallal, 2016).

According to the results, the macroeconomic variables that significantly affect the likelihood of growth slowdown are gross capital formation, trade openness, public debt and inflation variability. While an increase in the gross capital formation and trade openness increases the likelihood of growth slowdown, an increase in public debt and inflation variability decreases the probability of growth slowdown.

The average years of total schooling and the average years of secondary level and higher schooling, which have not significant effects on the likelihood of growth slowdown in the demographic models, enter the model significantly with positive and negative signs respectively. The secondary level and higher schooling might reduce the likelihood of experiencing a slowdown, whereas total years of schooling might increase it. Old dependency ratio is positively and significantly related to the probability of growth slowdown as expected.

According to the probit regression results, the only institutional variable that significantly affects the probability of growth slowdown in upper-middle-income countries is law and order.

4. Conclusions and discussions

This study investigates the macroeconomic, demographic and institutional factors affecting the likelihood of growth slowdown in 38 upper-middle-income countries over the period 1980-2015 within the framework of growth slowdown methodology developed by Eichengreen et al. (2011).

According to panel probit regression results, an increase in relative income, gross capital formation and trade openness significantly increases the likelihood of growth slowdown, on the other hand an increase in public debt and inflation variability significantly decreases the probability of growth slowdown.

Limiting the sample to upper-middle-income countries led to some remarkable results. One of the significant findings of the study is the income level where growth slowdown occurs in the upper-middle-income group. The findings in the study by Eichengreen et al. (2011) showed that growth slowdown typically occurs when per capita income reaches 58% of that in the United States. However, when we limit the sample to upper-middle-income countries, the results show that growth slowdown occurs when per capita income of a country reaches 22 percent of that in the US. This result is reasonable because sample consists of only upper-middle-countries. Another finding that may be interesting is the direction of the effect of trade openness on growth slowdown. In the literature on growth slowdown, the studies have mostly concluded that an increase in trade openness reduces the likelihood of growth slowdown (Eichengreen et al., 2011; Eichengreen et al., 2013; Aiyar et al., 2013; Zampelis, 2015; Giap et al., 2016). However, the results in this study show that an increase in trade openness increases the likelihood of growth slowdown in upper-middle-income countries. This result is reasonable because there are many studies showing that the trade openness may affect economic growth in different way in different income groups. Besides, we also conclude that the direction of the effect of openness in upper-middle-income countries on the probability of growth slowdown is related to trade structure. The results show that, as the share of high-technology exports increase, trade openness reduces the risk of middle-income trap.

In terms of demographic structure, we find that old dependency ratio, sex ratio and total years of schooling affect the likelihood of growth slowdown positively. On the other hand, an

increase in urban population and years of secondary and higher schooling decreases the likelihood of growth slowdown. These findings are in line with those reported in the literature (Eichengreen et al., 2011; Eichengreen et al., 2013; Aiyar et al., 2013; Jayasooriya, 2017; Lee, 2018).

Another noteworthy finding is the effect of total years of schooling and years of secondary and higher schooling on the likelihood of growth slowdown. While these variables are statistically insignificant in the models that contains demographic variables only; they enter the broad significantly. An increase in the total years of schooling increases the likelihood of growth slowdown, whereas an increase in the years of schooling at the secondary level and higher decreases the likelihood. In the models established in a demographic framework, economic controls that form the basic sources of growth such as physical capital and labor force (dependency rate) are missing. Therefore, in the absence of the basic sources of growth, the significant effect of human capital might not emerge. On the other hand, in the presence of more economic controls that explain growth such as physical capital and labor in the broad model, it is likely for the significant effect of human capital on growth slowdown to emerge.

To overcome the trap, middle-income countries have to shift their production structure from low-value added sectors to high-value added sectors and gain comparative advantage in high-technology and knowledge intensive sectors. To achieve this goal, they need to increase their human capital (Ohno, 2009; Aoki, 2011, Tho, 2013; Eichengreen et al., 2013). Countries that gain comparative advantage in international markets by producing low-technology products with the help of cheap labor force easily jump from low-income to middle-income level. Basic education may be enough for these countries to produce low-value added, low technology products, but then find it harder to move up market when challenged from below by other late-industrializing, low-labor cost countries. More advanced education may be especially important for middle-income countries seeking to avoid a slowdown by moving into more the production of more technologically sophisticated goods and services (Eichengreen et al., 2013).

According to new institutional economics, there is a positive link between economic growth and institutional quality. In this context, it is expected that progress in institutional quality will decrease the probability of growth slowdown. But the test results are mixed. The results show that there is no significant link between growth slowdown and institutional quality except for one variable which is law and order. Among the six variables that represents institutional structure, only the variable of law and order has a significant effect on the likelihood of growth slowdown. However, the direction of the relationship is not the one that is expected. The results indicate that an improvement in the legal system in upper-middle-income countries increases the likelihood of growth slowdown. This finding may be explained by that, in countries where law is perfectly operational, and rules are strictly enforced, the investor is hesitant in dealing with hard bureaucracy. In this case, investors may prefer an environment where they are able to do business easily and fast without exposure to legal barriers, and legal sanctions are relatively weak (Öz, 2018:151).

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Appendix

Variable	Database
GDP per capita	UNSTAT
gross capital formation (% of gdp)	WDI
trade openness (% of gdp)	PWT 7.1
public debt (% of gdp)	Abbas et al. (2010)
inflation	WDI
exchange rate	WDI
high technology export (% of manufactured export)	WDI
years of schooling (secondary and higher)	Barro-Lee (2016)
total years of schooling	Barro-Lee (2016)
sex ratio	WDI
urban population (% of total population)	WDI
age dependency ratio (old)	WDI
age dependency ratio (young)	WDI
fertility rate	WDI
population density	WDI
bureaucracy quality	ICRG (2014)
corruption	ICRG (2014)
investment profile	ICRG (2014)
democratic accountability	ICRG (2014)
military in politics	ICRG (2014)
law and order	ICRG (2014)