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INEQUALITY, AGING, AND THE MIDDLE INCOME TRAP

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Abstract

Based on required growth rate and actual growth rate, this paper proposes a method to construct measures to indicate the probability of a country escaping the middle income trap (MIT). A second contribution of this paper is to model this probability using 1960–2015 cross-country data, focusing on the roles of income distribution or inequality and aging. It is found that: (1) both the level of, and the change in, inequality are important drivers of MIT, with surprisingly large impacts; (2) relative to income distribution, aging is found to be much less important in terms of both magnitude and statistical significance; and (3) total factor productivity growth and structural transformation are fundamental drivers for an economy to escape the MIT. However, earlier industrialization may not generate the expected impact on growth, as the probability of escaping the MIT is found to display a U-pattern relationship with industrialization.

Keywords: middle income trap, growth theory, income distribution, inequality, aging

JEL Classification: D33, D63, O4, O14

Contents

1. INTRODUCTION

Generally speaking, when an economy reaches middle income level, the unemployed and underemployed rural labor force pool drains out. Thus, both rural and urban wages begin to rise, eroding competitiveness. Meanwhile, it becomes more difficult to imitate foreign technologies, and capital accumulation starts to slow down due to decreasing returns. More importantly, as discussed later in the paper, middle income countries usually face the challenges of high inequality and fast aging. These constitute some of the reasons why many economies become stagnant after achieving middle income status. This phenomenon was termed the middle income trap by Gill, Kharas, and Bhattasali (2007).

According to the World Bank (2012), among the 101 middle income countries in 1960, only 13 had stepped out of the middle income trap (MIT) by 2008. In particular, most Latin American countries have been trapped in the MIT for several decades (Gill et al. 2007). Recently, emerging countries have faced significant growth slowdowns (World Bank 2017). Most notably, the People's Republic of China reached a peak growth rate of 14.2% in 2007 and since then has experienced successive reductions in the growth rate—e.g., from 7.3% in 2014 to 6.9% in 2015 to 6.7% in 2016.

The concept of middle income can be defined in absolute or relative terms. The former specifies a range of absolute income level. For example, Spence (2011) considers $5,000–$10,000 per capita income as the range where transition to high income becomes problematic. According to Felipe, Abdon, and Kumar (2012), the range is $2,000–$11,750 per capita gross national income (GNI) (measured at constant 1990 United States [US] dollar). The World Bank and Aiyar et al. (2013) apply the threshold of $1,045–$12,736 per capita GNI (measured at constant 2014 US dollar). On the other hand, middle income can be defined relative to the per capita income in the US. For instance, the World Bank (2012) uses 5%–45% of the US per capita income as the relative range. Woo et al. (2012) use a more stringent range of 20%–55% of US per capita income. The range applied by Robertson and Ye (2015) is 8%–38% of US per capita gross domestic product (GDP).

To define the MIT, the next question is to specify how many years an economy can stay within the middle income range before it is labeled an MIT country. The critical number is 49, as used by Agenor, Canuto, and Jelenic (2012); Aiyar et al. (2013); Bulman, Eden, and Nguyen (2017); and the World Bank (2012). This is just 1 year shorter than Woo et al. (2012) suggest. Felipe et al. (2012) apply the number of 42.

Regarding determinants of the MIT, Vivarelli (2014) lists capability building, structural change, innovation, and entrepreneurship. Eichengreen, Park, and Shin (2012, 2014) find that growth slowdowns are less likely in countries where the population has a relatively high level of secondary and tertiary education and where high technology products account for a relatively large share of exports, which essentially correlates with innovation and capacity or human capital stock.

Two drivers of the MIT that are unique to middle income countries are high inequality and aging (see ADB 2011; Egawa 2013). The well-known Kuznets (1955) hypothesis dictates that middle income countries are likely to face rising and high inequality. Lambert (1994) suggests that migration brought by industrialization in urban areas causes rapid urbanization and income inequality. As summarized by Wan, Lu, and Chen (2006), there are many channels through which rising inequality can harm growth. Firstly, under an imperfect capital market, high levels of inequality imply that more people face credit constraints. This adversely affects investment in human or physical capital (Fishman and Simhon 2002; Galor and Zeira 1993). Secondly, worsening income distribution may lead to rises in the fertility rate among the poor, causing less investment in education (De La Croix and Doepke 2004). Thirdly, large income disparity means weaker domestic demand, as the poor have much higher marginal propensity to consume. Fourthly, growing inequality increases redistributive tax pressures, deterring investment incentives (Alesina and Rodrik 1994; Benabou 1996; Persson and Tabellini 1994). Finally, as is commonly acknowledged, high inequality may lead to a more unstable sociopolitical environment for economic activities (Benhabib and Rustichini 1996).

On the other hand, aging represents another typical challenge faced by many middle income countries. The economics of demography (Becker 1991) dictate that fertility usually declines as an economy grows. This is because economic development is typically accompanied by structural transformation from an agriculture-based to a manufacturing-based economy, where more and more of the population moves to cities. Women who live in urban areas have more schooling and employment opportunities than rural women. Consequently, urban women react by working more, marrying later, and having fewer children. Also, the cost of raising children becomes high as an economy develops and become urbanized. These are some of the reasons why middle income countries typically face slow population growth, resulting in aging. For example, in Viet Nam, the fertility rate has declined significantly from a level of 5.4 in 1980s to 1.8 in 2010 (World Bank 2012). In rich cities such as Shanghai in the People’s Republic of China, the birth rate has fallen below the population replacement rate.

Aging affects growth from a number of channels. An aging population implies less labor input (the supply side problem), fewer savings (the investment problem), and sluggish consumption (the demand problem). Bulman et al. (2017) consider both the level of inequality and its changes, as well as aging in modeling the MIT. They find that countries that 'escaped' the middle income trap have greater equality and lower age dependency ratios, and escapees at all middle income levels are also less likely to see increases in inequality and decreases in the age dependency ratio (i.e., the so-called “demographic dividend”).

Despite the huge interest in and significance of the MIT issue, analytical research is lagging. In particular, more research is needed to pin down factors that contribute to the MIT. As a matter of fact, how to construct or quantify the concept of the MIT is the very foundation of any analytical work. The construction of MIT indicators will facilitate modeling work on the determinants or impacts of the MIT. This paper will propose such indicators and then use them to explore the determinants, focusing on the roles of inequality and aging. These two drivers are unique to most middle income countries.

The plan of this paper is as follows. Section 2 develops the analytical framework where indicators of the MIT will be proposed, and presents stylized facts, demonstrating the prevalence of the MIT under both the relative and absolute definitions. Section 3 discusses empirical results, only using the relative definition, as we believe it makes more sense than the absolute alternative. Finally, Section 4 concludes.

2. MIDDLE-INCOME TRAP INDICATORS

As previously discussed, there are two definitions of middle income. Thus, two indicators measuring the probabilities that a country may escape the middle income trap will be proposed. They are to denoted P_A and P_R, corresponding to the absolute and relative definitions of MIT, respectively. We start with P_A. The middle income range is set as $2,000– $15,000 (at 2010 constant US dollar) and the threshold number of years is 50. In this case, a country is trapped under the MIT if it takes more than 50 years to reach the upper bound of $15,000 after reaching the lower bound of the middle income range ($2,000 GDP per capita). For each year after entering the middle income range, the possibility P_A of escaping the MIT can be defined as:

$$P_A = \begin{cases} \mathrm{R_g}/\mathrm{E_g} & \text{if} \quad 0 < \mathrm{R_g} < \mathrm{E_g} \\ 1 & \text{if} \quad \mathrm{R_g} \geq \mathrm{E_g} \\ 0 & \text{if} \quad \mathrm{R_g} \leq 0 \end{cases} \tag{1}$$

where $\mathrm{R_g}$ represents actual GDP growth rate and $\mathrm{E_g}$ represents the expected GDP growth rate that is required to escape the MIT. The latter, for each year, can be solved for by using $\mathrm{GDP_i} * (1 + \mathrm{E_g})^{50-\mathrm{i}} = 15000$, where i denotes the i-th year of the country after entering the middle income range.

The relative measure P_R can be constructed similarly. In this paper, we use 5%–45% of the US GDP per capita as the range of middle income. The threshold number of years is still 50. In this case, an economy must on average improve its relative income by 0.8% per annum or more to escape the MIT. For the first year after entering the middle income range, the probability of falling into the MIT can be defined as the actual improvement divided by 0.8%. If the computed ratio is negative, the probability is set to be 0; if the computed ratio is greater than 1, it is set to be 1. For the second year, the denominator is adjusted depending on the actual improvement in the first year. Suppose the actual improvement was *h*%, so the relative income of the first year is 5+*h*%. The denominator is to be recalculated as (45% – first year relative income)/49. For other years, the denominator is simply (45% – previous year relative income)/ (50 years elapsed).

Our data sample covers the years 1960–2015. If an economy already surpassed the lower threshold of the middle income range in 1960, we use the average GDP growth rate over 1960–1975 to make inferences about the number of years it was in the middle income status before 1960. Table 1 presents the definitions and data sources of variables and Table 2 reports the summary statistics. The list of countries is presented in the Appendix (Tables A1 and A2).

Table 1: Variable Definitions and Data Sources

Variable	Definition	Data Sources
Gini	Gini coefficient	WIID; SWIID etc.
P_R_GDP	The probability of jumping out of the MIT (relative definition), based on GDP	WDI
P_R_GNI	The probability of jumping out of the MIT (relative definition), based on GNI	WDI
Pop65	Population ages 65 and above (% of total)	WDI
Inv	Gross capital formation (% of GDP)	WDI
LFP	Labor force participation rate (% of total population ages 15–64)	WDI
TFP_gr	TFP growth rate	PWT
Trade	Trade (% of GDP)	WDI
GDP_indu	Industry, value added (% of GDP)	WDI
ln(Inf)	Inflation rate, consumer prices (log, annual %)	WDI
HC	Human capital index	PWT

Table 2: Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Gini	8,068	0.378	0.056	0.209	0.675
P_R_GDP	2,740	0.081	0.245	0	1
P_R_GNI	2,472	0.218	0.388	0	1
Pop65	8,007	6.577	4.488	1.011	23.587
Inv	6,291	22.642	9.564	–13.405	219.069
LFP	3,584	68.125	9.971	41.000	91.500
TFP_gr	4,745	0.005	0.053	–0.657	0.812
Trade	6,569	74.277	50.971	0	504.884
GDP_indu	5,329	29.191	12.046	2.531	96.736
ln(Inf)	5,972	1.797	1.416	–7.393	10.103
HC	6,263	2.066	0.734	1.007	3.734

Table 3 lists countries that have fallen into the MIT according to the absolute definition. Among the 199 countries, 80 countries have fallen into the MIT, with most MIT countries in Africa (16), followed by 15 countries in North America, 15 Asian countries, 11 South American countries, 14 European countries, and 9 countries in Oceania. Categorized by income level, most MIT countries are lower middle and upper middle countries. The former group includes 20 countries while the latter group includes 53 countries. Only seven high income countries have fallen back into the MIT.

Table 3: Countries that have Fallen into the MIT
(absolute definition, by continent)

Asia	Europe	North America	South America	Africa	Oceania
Azerbaijan	Albania	Antigua and Barbuda	Argentina	Algeria	Fiji
Georgia	Belarus	Belize	Brazil	Angola	Kiribati
Indonesia	Bosnia and Herzegovina	Costa Rica	Chile	Botswana	Marshall Islands
Iran	Bulgaria	Cuba	Colombia	Congo	Micronesia
Iraq	Croatia	Dominica	Ecuador	Cote d'Ivoire	Palau
Jordan	Hungary	Dominican Republic	Guyana	Egypt	Samoa
Kazakhstan	Kosovo	El Salvador	Paraguay	Gabon	Tonga
Lebanon	Latvia	Grenada	Peru	Libya	Tuvalu
Malaysia	Macedonia	Guatemala	Suriname	Mauritius	Vanuatu
Maldives	Montenegro	Jamaica	Uruguay	Morocco	
Mongolia	Romania	Mexico	Venezuela	Namibia	
Thailand	Russian Federation	Nicaragua		Nigeria	
Turkey	Serbia	Panama		Seychelles	
Turkmenistan	Ukraine	St. Lucia		South Africa	
West Bank and Gaza		St. Vincent and the Grenadines		Swaziland	
				Tunisia	

Table 4: Countries that have Fallen into the MIT
(absolute definition, by income level)

Lower Middle Income	Upper Middle Income		High Income
Congo	Albania	Lebanon	Antigua and Barbuda
Cote d'Ivoire	Algeria	Libya	Chile
Egypt	Angola	Macedonia	Croatia
El Salvador	Argentina	Malaysia	Hungary
Guatemala	Azerbaijan	Maldives	Latvia
Indonesia	Belarus	Marshall Islands	Seychelles
Kiribati	Belize	Mauritius	Uruguay
Kosovo	Bosnia and Herzegovina	Mexico	
Micronesia	Botswana	Montenegro	
Mongolia	Brazil	Namibia	
Morocco	Bulgaria	Palau	
Nicaragua	Colombia	Panama	
Nigeria	Costa Rica	Paraguay	
Samoa	Cuba	Peru	
Swaziland	Dominica	Romania	
Tonga	Dominican Republic	Russian Federation	
Tunisia	Ecuador	Serbia	
Ukraine	Fiji	South Africa	
Vanuatu	Gabon	St. Lucia	
West Bank and Gaza	Georgia	St. Vincent and the Grenadines	
	Grenada	Suriname	
	Guyana	Thailand	
	Iran	Turkey	
	Iraq	Turkmenistan	
	Jamaica	Tuvalu	
	Jordan	Venezuela	
	Kazakhstan		

Under the relative definition, 88 countries have fallen into the MIT, as shown in Table 5. Different from the results using the absolute definition, Europe hosts most MIT countries (20) here, followed by 18 North American countries, 16 Asian countries, 15 African countries, 11 South American countries, and eight counties in Oceania. In addition, four high income countries have dropped back and are trapped in the MIT: Chile, the Seychelles, Trinidad and Tobago, and Uruguay. Similar to earlier results, as shown in Table 6, most MIT countries are from the upper middle income group (53). It seems that the real hurdle to jump to get out of the MIT is stagnant growth after reaching upper middle income status.

Table 5: Countries that have Fallen into the MIT
(relative definition, by continent)

Asia	Europe	North America	South America	Africa	Oceania
Azerbaijan	Albania	Antigua and Barbuda	Argentina	Algeria	Fiji
Georgia	Belarus	Barbados	Brazil	Angola	Marshall Islands
Indonesia	Bosnia and Herzegovina	Belize	Chile	Botswana	Micronesia
Iran	Bulgaria	Costa Rica	Colombia	Congo	Palau
Iraq	Croatia	Cuba	Ecuador	Cote d'Ivoire	Samoa
Jordan	Czech Republic	Dominica	Guyana	Gabon	Tonga
Kazakhstan	Estonia	Dominican Republic	Paraguay	Libya	Tuvalu
Lebanon	Hungary	El Salvador	Peru	Mauritius	Vanuatu
Malaysia	Kosovo	Grenada	Suriname	Morocco	
Maldives	Latvia	Guatemala	Uruguay	Namibia	
Mongolia	Lithuania	Jamaica	Venezuela	Nigeria	
Oman	Macedonia	Mexico		Seychelles	
Thailand	Montenegro	Nicaragua		South Africa	
Turkey	Poland	Panama		Swaziland	
Turkmenistan	Portugal	St. Kitts and Nevis		Tunisia	
West Bank and Gaza	Romania	St. Lucia			
	Russian Federation	St. Vincent and the Grenadines			
	Serbia	Trinidad and Tobago			
	Slovak Republic				
	Ukraine				

Table 6: Countries that have Fallen into the MIT
(relative definition, by income level)

Lower Middle Income	Upper Middle Income		High Income
Congo	Albania	Lebanon	Antigua and Barbuda
Cote d'Ivoire	Algeria	Libya	Barbados
El Salvador	Angola	Macedonia	Chile
Guatemala	Argentina	Malaysia	Croatia
Indonesia	Azerbaijan	Maldives	Czech Republic
Kosovo	Belarus	Marshall Islands	Estonia
Micronesia	Belize	Mauritius	Hungary
Mongolia	Bosnia and Herzegovina	Mexico	Latvia
Morocco	Botswana	Montenegro	Lithuania
Nicaragua	Brazil	Namibia	Oman
Nigeria	Bulgaria	Palau	Poland
Samoa	Colombia	Panama	Portugal
Swaziland	Costa Rica	Paraguay	Seychelles
Tonga	Cuba	Peru	Slovak Republic
Tunisia	Dominica	Romania	St. Kitts and Nevis
Ukraine	Dominican Republic	Russian Federation	Trinidad and Tobago
Vanuatu	Ecuador	Serbia	Uruguay
West Bank and Gaza	Fiji	South Africa	
	Gabon	St. Lucia	
	Georgia	St. Vincent and the Grenadines	
	Grenada	Suriname	
	Guyana	Thailand	
	Iran	Turkey	
	Iraq	Turkmenistan	
	Jamaica	Tuvalu	
	Jordan	Venezuela	
	Kazakhstan		

3. EMPIRICAL ANALYSIS

In essence, the concept of the MIT means growth slowdown. Thus, growth theory can guide the analytical framework and modeling exercise. In reality, the most important and natural questions in the minds of policy makers and other stakeholders are: what is the probability that a middle income country will fall into the MIT? And what are the impacts of various factors affecting this probability? To answer these questions, we replace the usual growth rate by the probability (denoted by *P*) of an economy falling into the MIT in a growth model:

$$P = f(Ine, Aging, X) + u \quad (2)$$

where *u* is a composite error term consisting of country and year fixed effects and the usual white noise; *Ine* is an inequality indicator; *Aging* is an aging indicator; and *X* represents a vector of control variables. Based on economic growth theory, two classic variables are included, namely gross capital formation (percentage of GDP) and the labor force participation rate (percentage of total population aged 15–64).

Following Eichengreen et al. (2012), an important control variable is total factor productivity (TFP). The authors asserted that 85% of economic growth slowdown is due to TFP and only 15% due to capital accumulation. Similar results were found by Daude and Fernandez-Arias (2010) using data from Latin American and Caribbean countries. We use the TFP growth rate from Penn World Table 9.1. Needless to say, international trade is one of the most crucial determinants of growth. Lewis (1980) viewed trade as the engine of growth. This variable will be indicated by the ratio of total trade to GDP from WDI.

Structural transformation is another driver of development. As pointed out by Kuznets (1955, 1963), Lewis (1955), Rostow (1959), and Kaldor (1967), during the initial stages of development, poor countries can grow by reallocating labor from low productivity agriculture to high productivity manufacturing. We use the GDP share of the manufacturing sector and its square to account for structural transformation. Moreover, the inflation rate or consumer price index is included to control macroeconomic stability.

Before discussing empirical modeling results, some preliminary data analysis of our key independent variables will be presented. Figure 1 demonstrates that the mid-1980s was a crucial period. Before then, inequalities shared a similar trend irrespective of group of countries. After then, middle income countries have tended to experience fast rises in income inequality and income inequality in high income countries has remained more or less stable.

Regarding aging, Figure 2 confirms that the proportion of the population aged 65 and above is much higher in middle income countries than in low income countries, although it is lower than that in developed or already aged high income countries. Note that the slope of the curve in Figure 2 is almost flat for low income economies and most steep for developed countries, with middle income countries in between.

Figure 1: Income Inequality, by Country Groups

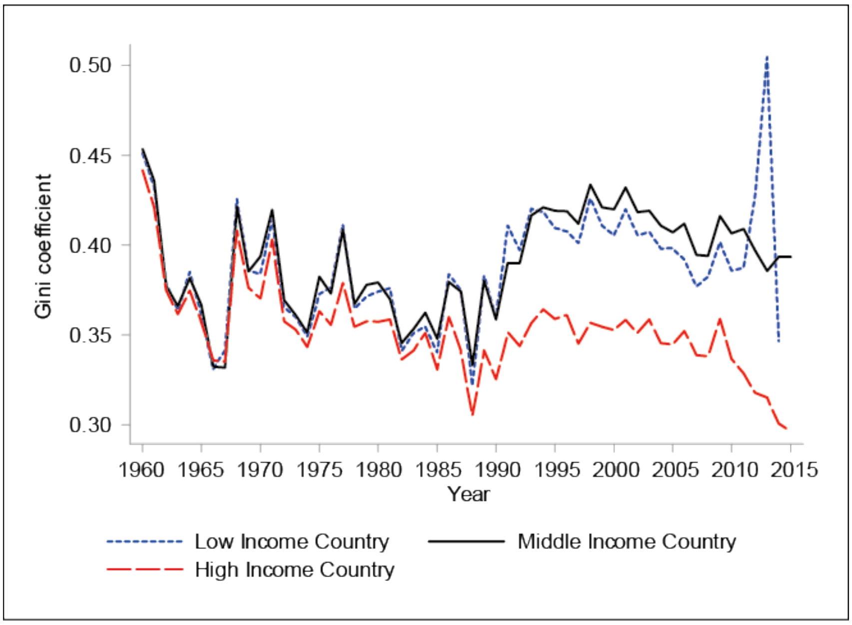
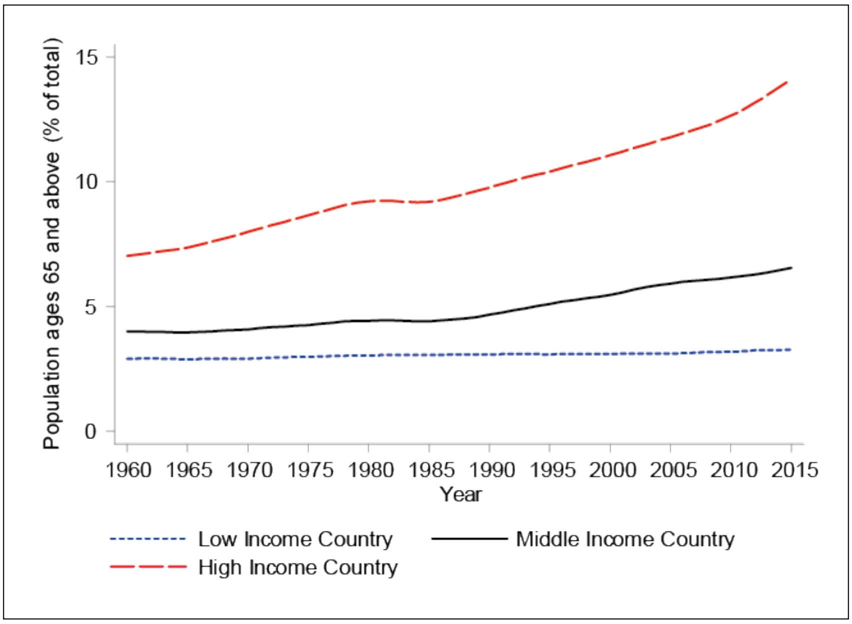
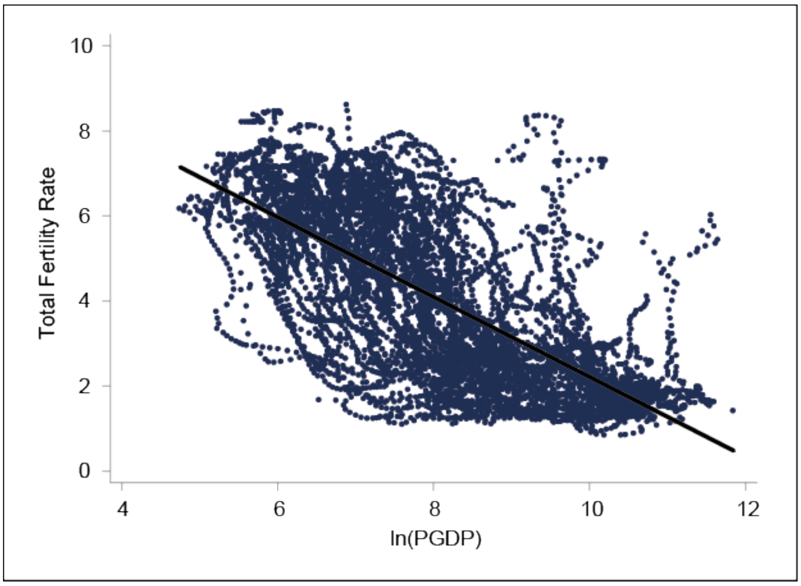


Figure 2: Aging, by Country Groups



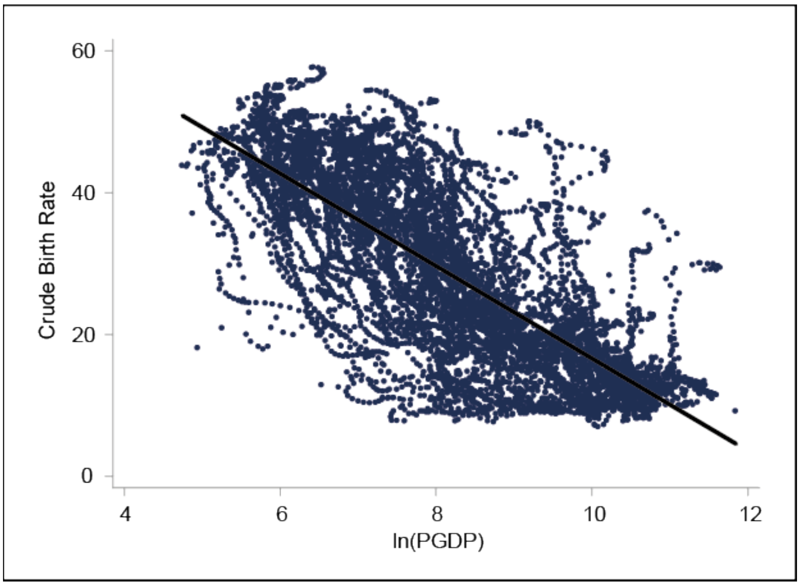
How is aging related to GDP? Figure 3 plots per capita GDP (in logarithm) against total fertility rate. It clearly shows a negative correlation. This negative correlation remains strong when crude birth rate is used instead of fertility rate, as shown in Figure 4.

Figure 3: Total Fertility Rate and GDP per Capita



Note: 1960–2015, 217 countries and regions, data from WDI.

Figure 4: Crude Birth Rate and GDP per Capita



Note: 1960–2015, 217 countries and regions, data from WDI.

As mentioned earlier, the modelling exercise will be conducted using the relative definition of the MIT only, as the absolute definition makes less sense to us. Table 7 reports our baseline results, with both year and country fixed effects controlled for Models 3–7. In Table 7, the first column includes only the inequality indicator and in the second column both inequality and aging are considered. Other control variables are added in subsequent columns. The results demonstrate that inequality is negatively and significantly correlated with the likelihood of escaping the MIT. For every unit of reduction in the Gini index, the probability of falling into the MIT drops by 20%–30%, which is surprisingly high. Similarly, aging is a significant driver of the MIT. For every 10% decrease in the proportion of aged population, the likelihood of avoiding the MIT rises by 0.5%, which is economically much less important than the impact of income distribution. Consistent with earlier studies, the beneficial impact of TFP is quite pronounced, along with investment and industrialization. Trade has positive coefficient estimates but they are insignificant.

Table 7: Baseline Result

Variables	(1) P_R_GDP	(2) P_R_GDP	(3) P_R_GDP	(4) P_R_GDP	(5) P_R_GDP	(6) P_R_GDP	(7) P_R_GDP
Gini	-0.258**	-0.229**	0.108	-0.262*	-0.260*	-0.295**	-0.335**
	(0.0972)	(0.0917)	(0.113)	(0.130)	(0.128)	(0.124)	(0.135)
Pop65		0.000756	-0.0135**	-0.0472***	-0.0511***	-0.0579***	-0.0589***
		(0.00191)	(0.00539)	(0.0146)	(0.0158)	(0.0185)	(0.0198)
Inv				0.00563***	0.00564***	0.00632***	0.00659***
				(0.00111)	(0.00111)	(0.00115)	(0.00125)
LFP				-0.00176	-0.00184	0.000259	0.000796
				(0.00148)	(0.00146)	(0.00184)	(0.00191)
TFP_gr				0.618***	0.617***	0.839***	0.840***
				(0.199)	(0.196)	(0.208)	(0.227)
Trade					0.000333	0.000361	0.000328
					(0.000281)	(0.000298)	(0.000318)
GDP_indu						-0.0227***	-0.0242***
						(0.00644)	(0.00705)
$(GDP\_indu)^2$						0.000270***	0.000292***
						(7.72e-05)	(8.69e-05)
ln(Inf)							0.000599
							(0.00591)
Constant	0.183***	0.165***	0.0633	0.585**	0.596**	0	0.971***
	(0.0407)	(0.0407)	(0.0825)	(0.231)	(0.231)	(0)	(0.291)
Country	N	N	Y	Y	Y	Y	Y
Year	N	N	Y	Y	Y	Y	Y
Observations	2,740	2,717	2,717	1,045	1,045	994	976
Adjust R-squared	0.005	0.004	0.585	0.715	0.715	0.713	0.713
Within R-squared			0.065	0.163	0.164	0.187	0.192
Number of groups	107	105	105	57	57	56	56

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

The baseline results are obtained using GDP per capita as the welfare measure. To check the robustness of the baseline results, we use GNI instead. The modeling outputs can be found in Table 8. It is clear that the earlier finding on the inequality impact appears robust. However, the aging variable becomes insignificant, although in two thirds of the cases the coefficients are still negative. Remember that the impact of aging on the MIT is quite minor in any case.

Table 8: Robustness Checks: Relative Jump Probability based on GNI

Variables	(1) P_R_GNI	(2) P_R_GNI	(3) P_R_GNI	(4) P_R_GNI	(5) P_R_GNI	(6) P_R_GNI	(7) P_R_GNI
Gini	–1.159***	–1.045***	0.600***	–0.446**	–0.439*	–0.343*	–0.386*
	(0.240)	(0.209)	(0.206)	(0.216)	(0.227)	(0.193)	(0.221)
Pop65		0.00391	–0.00276	–0.00387	0.0121	–0.0177	–0.0217
		(0.00453)	(0.00904)	(0.0147)	(0.0148)	(0.0151)	(0.0174)
Inv				0.00917***	0.00886***	0.0110***	0.0110***
				(0.00169)	(0.00178)	(0.00172)	(0.00160)
LFP				0.00640	0.00670	0.00544	0.00582
				(0.00426)	(0.00419)	(0.00463)	(0.00449)
TFP_gr				0.795***	0.812***	0.736***	0.710**
				(0.272)	(0.267)	(0.244)	(0.275)
Trade					–0.00150*	–0.000521	–0.000355
					(0.000836)	(0.000765)	(0.000859)
GDP_indu						–0.0161	–0.0138
						(0.0122)	(0.0116)
$(GDP\_indu)^2$						0.000124	9.45e-05
						(0.000163)	(0.000154)
ln(Inf)							–0.0119*
							(0.00636)
Constant	0.676***	0.601***	–0.475***	–0.435	0	0	0.103
	(0.109)	(0.101)	(0.159)	(0.375)	(0)	(0)	(0.339)
Country	N	N	Y	Y	Y	Y	Y
Year	N	N	Y	Y	Y	Y	Y
Observations	2,359	2,336	2,336	956	956	923	906
Adjust R-squared	0.034	0.034	0.535	0.635	0.638	0.642	0.643
Within R-squared			0.219	0.209	0.215	0.222	0.224
Number of groups	105	103	103	62	62	61	60

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Since the models are estimated using Driscoll-Kraay standard errors (Driscoll and Kraay 1998), the order of autocorrelation is set to be 1. For robustness checks, we set the order of autocorrelation to 2, 3, 4, 5, and 10, respectively. The results as tabulated in Table 9 are quite consistent with our baseline findings and they are robust to different orders of autocorrelation. It is useful to note that the magnitudes of the estimates for our key independent variable are remarkably stable, confirming the reliability of our conclusions.

Table 9: Robustness Checks: Different Orders of Autocorrelation

Variables	(1) L.2	(2) L.3	(3) L.4	(4) L.5	(5) L.10
Gini	–0.335**	–0.335**	–0.335**	–0.335**	–0.335***
	(0.152)	(0.141)	(0.138)	(0.128)	(0.111)
Pop65	–0.0589***	–0.0589***	–0.0589***	–0.0589***	–0.0589***
	(0.0202)	(0.0200)	(0.0193)	(0.0185)	(0.0183)
Inv	0.00659***	0.00659***	0.00659***	0.00659***	0.00659***
	(0.00134)	(0.00136)	(0.00133)	(0.00128)	(0.00102)
LFP	0.000796	0.000796	0.000796	0.000796	0.000796
	(0.00215)	(0.00219)	(0.00224)	(0.00222)	(0.00222)
TFP_gr	0.840***	0.840***	0.840***	0.840**	0.840**
	(0.257)	(0.280)	(0.294)	(0.302)	(0.302)
Trade	0.000328	0.000328	0.000328	0.000328	0.000328
	(0.000327)	(0.000320)	(0.000301)	(0.000281)	(0.000248)
GDP_indu	–0.0242***	–0.0242***	–0.0242***	–0.0242***	–0.0242***
	(0.00686)	(0.00683)	(0.00661)	(0.00671)	(0.00650)
$(GDP\_indu)^2$	0.000292***	0.000292***	0.000292***	0.000292***	0.000292***
	(8.03e-05)	(7.72e-05)	(7.26e-05)	(7.41e-05)	(6.92e-05)
ln(Inf)	0.000599	0.000599	0.000599	0.000599	0.000599
	(0.00584)	(0.00565)	(0.00567)	(0.00565)	(0.00386)
Constant	0.971***	0.971***	0.971***	0.971***	0.971***
	(0.294)	(0.280)	(0.268)	(0.250)	(0.208)
Country	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y
Observations	976	976	976	976	976
Adjust R-squared	0.643	0.643	0.643	0.643	0.643
Within R-squared	0.192	0.192	0.192	0.192	0.192
Number of groups	56	56	56	56	56

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Bulman et al. (2017) point out that larger increases in income inequality are associated with slower growth. To examine if rises in inequality, rather than the actual level of inequality, really matters, we replace the Gini observations with the changes and repeat the baseline estimations. The results of Table 10 are in line with Bulman et al. (2017), in the sense that worsening income distribution does erode the probability of escaping the MIT, although the level of statistical significance is not high. Other estimation results are consistent with expectations, or with those in the baseline estimations.

Table 10: Robustness Checks: Gini Growth Rate

Variables	(1) P_R_GDP	(2) P_R_GDP	(3) P_R_GDP	(4) P_R_GDP	(5) P_R_GDP	(6) P_R_GDP	(7) P_R_GDP
Gini	0.00527	–0.00593	–0.0497*	–0.105*	–0.105*	–0.105*	–0.103[a]
	(0.0378)	(0.0357)	(0.0249)	(0.0525)	(0.0524)	(0.0567)	(0.0607)
Pop65		0.00250	–0.0165***	–0.0467***	–0.0512***	–0.0575***	–0.0581***
		(0.00196)	(0.00505)	(0.0144)	(0.0157)	(0.0185)	(0.0197)
Inv				0.00548***	0.00549***	0.00617***	0.00636***
				(0.00114)	(0.00114)	(0.00119)	(0.00130)
LFP				–0.00137	–0.00144	0.000517	0.00102
				(0.00150)	(0.00148)	(0.00190)	(0.00197)
TFP_gr				0.621***	0.619***	0.839***	0.840***
				(0.197)	(0.194)	(0.206)	(0.226)
Trade					0.000380	0.000418	0.000399
					(0.000294)	(0.000309)	(0.000332)
GDP_indu						–0.0227***	–0.0241***
						(0.00635)	(0.00692)
$(GDP\_indu)^2$						0.000272***	0.000293***
						(7.62e-05)	(8.52e-05)
ln(Inf)							0.000561
							(0.00590)
Constant	0.0786***	0.0611***	0.141**	0.455**	0.467**	0	0
	(0.00612)	(0.0122)	(0.0540)	(0.192)	(0.191)	(0)	(0)
Country	N	N	Y	Y	Y	Y	Y
Year	N	N	Y	Y	Y	Y	Y
Observations	2,661	2,641	2,641	1,038	1,038	987	970
Adjust R-squared	0.240	0.239	0.604	0.715	0.715	0.713	0.713
Within R-squared			0.055	0.163	0.164	0.187	0.191
Number of groups	100	99	99	57	57	56	56

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
[a] marginally significant P=0.105.

Recall that both Eichengreen et al. (2014) and Jimenez, Nguyen, and Patrinos (2012) stressed the importance of human capital, which has not been considered so far in model estimation. Adding the human capital index of Penn World Table (PWT) into the baseline model does not alter our previous findings regarding the impacts of income distribution or aging. Interestingly, the human capital variable turns out to be insignificant once control variables are added (see Table 11). One possible reason may lie in the fact that it is highly correlated with TFP. In other words, the impact of human capital on growth goes through the productivity channel.

Table 11: Robustness Checks: Missing Variable—Education (PWT Human Capital Index)

Variables	(1) P_R_GDP	(2) P_R_GDP	(3) P_R_GDP	(4) P_R_GDP	(5) P_R_GDP	(6) P_R_GDP	(7) P_R_GDP
Gini	–0.138	–0.145*	0.0701	–0.269**	–0.267**	–0.299**	–0.342**
	(0.0829)	(0.0827)	(0.133)	(0.129)	(0.127)	(0.124)	(0.136)
Pop65		–0.000445	–0.0172***	–0.0467***	–0.0503***	–0.0571***	–0.0583***
		(0.00347)	(0.00604)	(0.0145)	(0.0156)	(0.0183)	(0.0196)
Human capital index	0.0151*	0.0172	–0.177***	–0.0801	–0.0742	–0.0655	–0.0704
	(0.00815)	(0.0185)	(0.0564)	(0.0647)	(0.0632)	(0.0541)	(0.0599)
Inv				0.00556***	0.00557***	0.00625***	0.00652***
				(0.00111)	(0.00110)	(0.00115)	(0.00125)
LFP				–0.00185	–0.00191	0.000162	0.000726
				(0.00145)	(0.00144)	(0.00186)	(0.00194)
TFP_gr				0.623***	0.622***	0.845***	0.843***
				(0.198)	(0.195)	(0.206)	(0.225)
Trade					0.000302	0.000334	0.000307
					(0.000267)	(0.000282)	(0.000304)
GDP_indu						–0.0223***	–0.0236***
						(0.00591)	(0.00634)
$(GDP\_indu)^2$						0.000265***	0.000285***
						(7.11e-05)	(7.87e-05)
ln(Inf)							0.000315
							(0.00598)
Constant	0.0998**	0.101**	0.599***	0.818**	0.810**	1.143***	1.163***
	(0.0405)	(0.0388)	(0.198)	(0.303)	(0.298)	(0.361)	(0.389)
Country	N	N	Y	Y	Y	Y	Y
Year	N	N	Y	Y	Y	Y	Y
Observations	2,357	2,357	2,357	1,045	1,045	994	976
Adjust R-squared	0.003	0.003	0.584	0.715	0.715	0.713	0.713
Within R-squared			0.089	0.164	0.165	0.188	0.193
Number of groups	80	80	80	57	57	56	56

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
[a] marginally significant P=0.105.

Two other results are worth noting. Industrialization is found to exert a nonlinear impact on the MIT. The probability of escaping the MIT displays a U-pattern as industrialization proceeds. Another finding relates to the variable of inflation, which is not significant in any of the models. As is commonly practiced, inflation is a proxy indicating macroeconomic stability. These counter-intuitive results deserve further research efforts.

4. SUMMARY AND CONCLUSIONS

Many countries are concerned about the possibility of falling into the middle income trap (MIT), not only those that have been experiencing stagnant growth, but also emerging economies. The emergence of the recent de-globalization wave reinforces such a concern. Even the PRC is confronted with the MIT challenge. On the other hand, carefully constructed indicators for rigorously analyzing the MIT issue are lacking or largely absent.

This paper contributes to the literature and policy debate by proposing a simple but intuitively appealing technique which can be used to estimate the probability of an economy escaping the MIT, irrespective of how the MIT is defined (in the absolute sense or the relative sense). This probability is then regressed on inequality and aging indicators, along with control variables. These two key independent variables are unique to middle income countries.

Several robust results or findings are worth reiterating. Firstly, both the level of and the change in inequality (indicated by the Gini index) are important drivers of the MIT, with surprisingly large impacts. This helps substantiate the conventional perception that Latin American countries are trapped in the MIT largely due to their high and lasting income inequality. Secondly, relative to income distribution, aging is found to be much less important in terms of both magnitude and statistical significance. This does not necessarily mean that aging is not correlated with growth. Rather, it may imply that the issue of aging can be addressed before a country reaches high income status and becomes an aged society. It is questionable if the same can be said about income disparity. Thirdly, TFP growth and structural transformation are fundamental drivers for an economy to escape the MIT. However, earlier industrialization may not generate the expected impact on growth, perhaps depending on development strategies related to openness, urbanization, and so on. Finally, the accumulation of human capital may not be useful unless it helps promote innovation and productivity growth.

The policy messages from this paper are quite profound. Fighting inequality and improving income distribution are a must if a country does not wish to fall into the MIT, while the issue of aging is secondary. For many countries—particularly the lower middle income countries—rural-urban disparity constitutes the largest component of national inequality and can be reduced through well-managed urbanization, which simultaneously helps promote innovation and productivity growth. In short, successful urbanization could be the single most important force driving developing countries out of the MIT.

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APPENDIX

Table A1: List of Countries (by continent)

Asia		Europe		North America	South America	Africa		Oceania
Afghanistan	Maldives	Albania	Malta	Antigua and Barbuda	Argentina	Algeria	Madagascar	Australia
Armenia	Mongolia	Andorra	Moldova	Aruba	Bolivia	Angola	Malawi	Fiji
Azerbaijan	Myanmar	Austria	Monaco	The Bahamas	Brazil	Benin	Mali	Kiribati
Bahrain	Nepal	Belarus	Montenegro	Barbados	Chile	Botswana	Mauritania	Marshall Islands
Bangladesh	Oman	Belgium	Netherlands	Belize	Colombia	Burkina Faso	Mauritius	Micronesia
Bhutan	Pakistan	Bosnia and Herzegovina	Norway	Bermuda	Ecuador	Burundi	Morocco	Nauru
Brunei Darussalam	Philippines	Bulgaria	Poland	Canada	Guyana	Cabo Verde	Mozambique	New Zealand
Cambodia	Qatar	Croatia	Portugal	Costa Rica	Paraguay	Cameroon	Namibia	Palau
PRC	Saudi Arabia	Czech Republic	Romania	Cuba	Peru	Central African Republic	Niger	Papua New Guinea
Cyprus	Singapore	Denmark	Russian Federation	Dominica	Suriname	Chad	Nigeria	Samoa
Georgia	Sri Lanka	Estonia	Serbia	Dominican Republic	Uruguay	Comoros	Rwanda	Solomon Islands
Hong Kong, China	Tajikistan	Faroe Islands	Slovak Republic	El Salvador	Venezuela	Dem. Rep. Congo	Sao Tome and Principe	Tonga
India	Thailand	Finland	Slovenia	Greenland		Congo	Senegal	Tuvalu
Indonesia	Timor-Leste	France	Spain	Grenada		Cote d'Ivoire	Seychelles	Vanuatu
Iran	Turkey	Germany	Sweden	Guatemala		Djibouti	Sierra Leone	
Iraq	Turkmenistan	Greece	Switzerland	Haiti		Egypt	South Africa	
Israel	United Arab Emirates	Hungary	Ukraine	Honduras		Equatorial Guinea	South Sudan	
Japan	Uzbekistan	Iceland	United Kingdom	Jamaica		Eritrea	Sudan	
Jordan	Viet Nam	Ireland		Mexico		Ethiopia	Swaziland	
Kazakhstan	West Bank and Gaza	Isle of Man		Nicaragua		Gambia	Tanzania	
Republic of Korea	Yemen	Italy		Panama		Ghana	Togo	
Kuwait		Kosovo		Puerto Rico		Guinea	Tunisia	
Kyrgyz Republic		Latvia		St. Kitts and Nevis		Guinea-Bissau	Uganda	
Lao PDR		Liechtenstein		St. Lucia		Kenya	Zambia	
Lebanon		Lithuania		St. Vincent and the Grenadines		Lesotho	Zimbabwe	
Macau, China		Luxembourg		Trinidad and Tobago		Liberia	Gabon	
Malaysia		Macedonia		United States		Libya		

Table A1: List of Countries (by income level)

Low Income	Lower Middle Income		Upper Middle Income		High Income	
Afghanistan	Armenia	Nicaragua	Albania	Libya	Andorra	Republic of Korea
Benin	Bangladesh	Nigeria	Algeria	Macedonia	Antigua and Barbuda	Kuwait
Burkina Faso	Bhutan	Pakistan	Angola	Malaysia	Aruba	Latvia
Burundi	Bolivia	Papua New Guinea	Argentina	Maldives	Australia	Liechtenstein
Central African Republic	Cabo Verde	Philippines	Azerbaijan	Marshall Islands	Austria	Lithuania
Chad	Cambodia	Samoa	Belarus	Mauritius	The Bahamas	Luxembourg
Comoros	Cameroon	Sao Tome and Principe	Belize	Mexico	Bahrain	Macau, China
Dem. Rep. Congo	Congo	Solomon Islands	Bosnia and Herzegovina	Montenegro	Barbados	Malta
Eritrea	Cote d'Ivoire	Sri Lanka	Botswana	Namibia	Belgium	Monaco
Ethiopia	Djibouti	Sudan	Brazil	Palau	Bermuda	Nauru
Gambia	Egypt	Swaziland	Bulgaria	Panama	Brunei Darussalam	The Netherlands
Guinea	El Salvador	Tajikistan	PRC	Paraguay	Canada	New Zealand
Guinea-Bissau	Ghana	Timor-Leste	Colombia	Peru	Chile	Norway
Haiti	Guatemala	Tonga	Costa Rica	Romania	Croatia	Oman
Liberia	Honduras	Tunisia	Cuba	Russian Federation	Cyprus	Poland
Madagascar	India	Ukraine	Dominica	Serbia	Czech Republic	Portugal
Malawi	Indonesia	Uzbekistan	Dominican Republic	South Africa	Denmark	Puerto Rico
Mali	Kenya	Vanuatu	Ecuador	St. Lucia	Estonia	Qatar
Mozambique	Kiribati	Viet Nam	Equatorial Guinea	St. Vincent and the Grenadines	Faroe Islands	Saudi Arabia
Nepal	Kosovo	West Bank and Gaza	Fiji	Suriname	Finland	Seychelles
Niger	Kyrgyz Republic	Yemen	Georgia	Thailand	France	Singapore
Rwanda	Lao PDR	Zambia	Grenada	Turkey	Germany	Slovak Republic
Senegal	Lesotho		Guyana	Turkmenistan	Greece	Slovenia
Sierra Leone	Mauritania		Iran	Tuvalu	Greenland	Spain
South Sudan	Micronesia		Iraq	Venezuela	Hong Kong, China	St. Kitts and Nevis
Tanzania	Moldova		Jamaica	Gabon	Hungary	Sweden
Togo	Mongolia		Jordan		Iceland	Switzerland
Uganda	Morocco		Kazakhstan		Ireland	Trinidad and Tobago
Zimbabwe	Myanmar		Lebanon		Isle of Man	United Arab Emirates
					Israel	United Kingdom
					Italy	United States
					Japan	Uruguay