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Income Traps for Different Income Groups: An Empirical Investigation

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Abstract

This study investigates the existence of income traps for 42 countries with different income levels. These income traps were investigated by employing the Augmented Dickey-Fuller, Zivot-Andrews with one break, and Lee-Strazicich with two breaks test procedures for the 1987-2019 period. The empirical findings reveal the existence of income traps at lower-middle, upper-middle, and lower-high-income levels. The study points out the possibility of a new income trap for countries that have just passed the income threshold that separates upper-middle and high-income countries.

Keywords: *Middle-income trap, Income convergence, Income thresholds, Structural break, Unit Root tests.*

Jel Codes: *O1, O40, 047*

Farklı Gelir Grupları İçin Gelir Tuzakları: Ampirik Bir Araştırma

Öz

Bu çalışma, farklı gelir seviyelerine sahip 42 ülke için gelir tuzaklarının varlığını araştırmaktadır. Bu gelir tuzakları, 1987-2019 dönemi için, Genişletilmiş Dickey-Fuller, yapısal tek kırılmalı Zivot-Andrews ve iki kırılmalı Lee-Strazicich testleri uygulanarak araştırılmıştır. Ampirik bulgular alt-orta, üst-orta ve alt-yüksek gelir düzeylerinde gelir tuzaklarının varlığını ortaya koymaktadır. Çalışma, üst-orta ve yüksek gelirli ülkeleri ayıran gelir eşiğini geçen ülkeler için yeni bir gelir tuzağı olasılığına işaret etmektedir.

Anahtar Kelimeler: *Orta gelir tuzağı, Gelir yakınsaması, Gelir eşikleri, Yapısal kırılma, Birim Kök Testi.*

Jel Kodları: *O1, O40, 047*

1.Introduction

The middle-income trap (MIT henceforth) is defined as the incapacity of some upper-middle-income countries to reach the income level of the advanced countries. Although the MIT literature mainly focuses on the upper-middle-income countries' inability to become high-income countries, some studies also emphasize the possibility of an earlier trap for the lower-middle-income countries (Felipe 2012, Im and Rosenblatt 2013 and Bulman et al. 2017). As a new debate, the countries that newly graduated from the upper-middle-income group and became new members of the high-income level group may not close the gap with the average income level of the "elderly" high-income group members. In this regard, we explore three income traps under one title: "Income Traps for Different Income Groups: An Empirical Investigation" by employing GNI per capita income thresholds calculated by the World Bank through the Atlas method in the "current U.S. dollar" form over the period 1987-2019.

This study proposes a new perspective in terms of empirical investigation of the income traps. The first one is the employment of the World Bank's income thresholds as a more reliable and accepted benchmark to make an empirical investigation. Secondly, three income traps for three income groups are investigated rather than a middle-income trap for all developing countries. Thirdly, the possibility of a new income trap at the high-income level is emphasized. Fourthly, a five-year trend forecast was estimated to make the final decision on the existence of the income trap problem, which expands the time scope of the analysis.

In the remainder of the paper: We made a compact survey of the "MIT" literature and introduced the technical background of our empirical investigation by discussing the test results. And we finalized the study by offering some suggestions for future works.

2.The Literature Review

The literature started with Gill and Kharas's (2007) contribution, who coined the concept "Middle Income Trap" for the first time in a World Bank report. However, the "glass ceiling" metaphor of Ohno (2009) is widely accepted as the classical way of defining the

MIT problem. Accordingly, some countries face difficulties passing through the income threshold, which is portrayed with a "glass ceiling" in this study. Spence (2011) proposed an absolute income threshold for the first time in the literature to specify the middle-income trap while Woo (2012) employed an index for the first time to diagnose the MIT problem. Agenor et al. (2015) defined MIT as productivity decreases that cause economic slowdowns; likewise, Zhuang et al. (2012) described MIT as a problem that causes a slowdown in economic growth and productivity after reaching a certain level of income. Felipe et al. (2012) focused on the time dimension to define the MIT problem. According to their definition, if countries stay more than 14 years in the same income level as lower-middle-income countries and more than 28 years as upper-middle-income countries, they may be characterized as trapped countries. Eichengreen, Park, and Sheen (2012, 2013), one of the most cited studies in the literature, identified three conditions to diagnose the existence of the middle-income trap problem. Accordingly, (i) the average growth rate of the last seven years should be greater than or equal to 3.5 percentage points in the preceding period; (ii) the difference in growth rates of the preceding and current periods should be greater than or equal to 2 percentage points in favor of preceding period; and (iii) the country's per capita income should exceed 10.000 USD in 2005 constant international prices. According to Im and Rosenblatt (2013), the case can be seen as an "economic growth slowdown" rather than an "income trap." However, Islam (2014) brought a new perspective and proposed some definite years like 1980, 1990, 2000, and 2010 to check these slowdowns. Respectively, if a country stays at the same income level in these four checkpoints, it is evaluated as a trapped country. Felipe et al. (2017) updated the previous definition of Felipe et al. (2012). According to the revision, a country is in an income trap if it needs over 55 years as a lower-middle-income country and over 15 years as an upper-middle-income country to move to the next income level respectively.

To summarize, there does not seem to be a consensus in the literature regarding the empirical definition of MIT. Despite differences at the diagnosis phase, there is more or less a consensus about the solution to the MIT problem, which puts emphasis on the improvement of the total factor productivity. Ohno (2009), Kharas and Kohli (2011), and Bulman (2017) underlined the progress in productivity growth directly as the solution for the MIT problem, while some other studies focused on the motivations behind the productivity growth. High-quality education (Spence 2011, Eicheengreen et al. 2012,2013 and Jankowska et al. 2012), investment in R&D activities (Spence 2011), macroeconomic stability (Zhuang et al. 2012, Han and Wei 2017), financial stability (Eichengreen et al. 2012,2013, Han and Wei 2017 and Jankowska et al. 2012), public policies towards advanced infrastructure, protection of property rights, and labor market reforms (Agenor et al. 2012), strong institutional structure, equality in the labor participation rates of both genders, low young and old dependency ratios, widespread and efficient infrastructure (Aiyar et al. 2013), the fair distribution of income (Egawa 2013, Bulman et al. 2017, Glawe and Wagner 2020) were the main policies proposed to solve the MIT problem. Besides, Eichengreen et al. (2012, 2013) and Felipe et al. (2017) stressed the importance of a diversified export basket with

high value-added products as another policy option. The "structural transformation" concept, as Felipe et al. (2017) and Glawe and Wagner (2020) suggested in their studies, seems to be the keyword that increases the effectiveness of all of these policy options. Solution proposals for MIT also indirectly define the source of this problem. Hence, it would be not false to state that the reason for the MIT problem is related to everything, which causes a slowdown or a decrease in the total productivity growth.

In the light of the existing literature, one can conclude that; (i) MIT is about the inability of an upper-middle-income country to become a high-income level country, and (ii) this inability is related directly or indirectly to the slowdown or to the decrease in the total factor productivity of growth, (iii) different policies which lead to an improvement in the total factor productivity can be evaluated as the solution for the MIT problem; (iv) the structural transformation plays an essential role in the success of these policies.

On the other hand, the literature we have summarized has some shortcomings. Firstly, the per capita income thresholds show differences in different studies, which cause inconsistency about the final decision whether a country is in MIT or not. Secondly, the possibility of more than one income trap has been rarely emphasized. Thirdly, no future projections for countries have been made in any study in the literature. Fourthly, the case of the newly developed countries which succeeded in passing to the advanced income level was not investigated empirically. Whether these countries are closing the income gap with the high-income countries or not stands as an unanswered question. In this context, this study tries to provide some suggestions about these shortcomings in the literature.

3.Empirical Investigation

The empirical investigation comprises four subsections. In the first subsection, we introduce the income classification of countries proposed by different studies and by the World Bank. In the second subsection, we modified the empirical definition of MIT developed by Robertson and Ye (2013) and revisited by Ye and Robertson (2016). In the third subsection, we introduce the test procedure, which is based on three unit root tests; Augmented Dickey-Fuller (no structural break), Zivot-Andrews (one structural break), and Lee-Strazicich (two structural breaks). Then, we plot the related countries' per capita income series (with breaks if they exist) with the corresponding income thresholds and estimated for the following five years. In the fourth subsection, we interpret our test results with the help of tables and graphics.

3.1.The Income Classification of Countries

The income thresholds are the common benchmark of the empirical MIT investigations; however, the income thresholds differ from study to study. Felipe et al. (2012) divide countries into four groups; low income (less than $2000), lower middle income ($2000-$7250), higher middle income ($7250-$11750), and high income (more than $11.750) countries

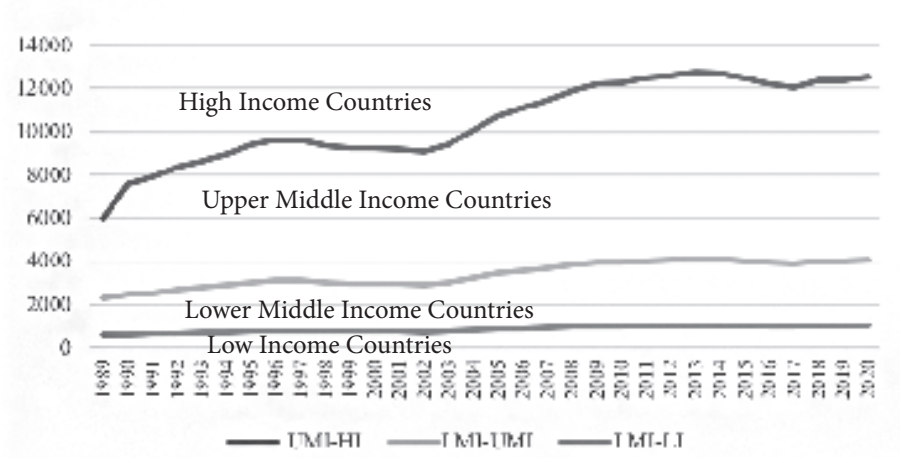
based on the purchasing power parity (PPP) of the year, 1990. Robertson and Ye (2013) define the middle-income band as a range of 8% to 36% of the benchmark country, the U.S., and they choose 2007 as the reference year. The classification of Aiyar et al. (2013) is more straightforward, which classifies countries in two sections based on the PPP of the year 2005; low-income (less than $2000) and high-income countries (more than $15000). Im and Rosenblatt (2013) prefer to classify countries based on the relative income approach. The benchmark country is again the U.S. According to their approach, there are three basic groups; low-income countries (15-30 percent of the U.S.'s GDP per capita), middle-income countries (30-45 percent of the U.S.'s GDP per capita), and upper-middle-income countries (45-60 percent of the U.S.'s GDP per capita). In our study, we prefer to use the income classification of the World Bank, which uses the Atlas Method to construct the income thresholds. This choice provides us to employ a more consistent and widely accepted income classification to explore different income traps of varying income levels.

Table 1. The World Bank GNI per Capita Classification (2020)[1]

Low-income countries	$1036 or less
Lower middle-income countries	$1036-$4045
Upper-middle income countries	$4046-$12535
High-income countries	$12535 or more

Source: *World Bank data blog*

Figure 1. The changing thresholds of different income groups (1989-2020)



Source: *Prepared by the authors based on each year's income threshold announced by the World Bank over the period 1989-2020*

The current thresholds, announced in 2020, can be seen in Table 1 while the change in the income thresholds in the timeline for the four income groups is represented in Figure

1. As can be seen, three income thresholds separate four income groups. Upper Middle Income - High Income (UMI-HI henceforth) line stays between high and upper-middle-income countries. Lower Middle Income-Upper Middle Income (LMI-UMI henceforth) line separates lower-middle and upper-middle-income countries. Subsequently, the Lower Middle Income - Lower Income (LMI-LI) line is the frontier between the lower-middle-income and low-income countries.

The next step is the determination of the countries for empirical investigation. There are 50 lower-middle-income and 56 upper-middle-income countries according to the 2020 classification of the World Bank, which represents our potential research sample. Our fundamental idea is to compare our empirical test results with the test results of Ye and Robertson (2016) by employing the same country sample. However, there are some compulsory differences in the choice of these countries. Ye and Robertson (2016) have referred to the Penn World Table version 7.1. as the source of their dataset while we employ the World Bank's dataset. We exclude some countries like Cuba, Iran, Iraq, Syria, and Venezuela from the analysis due to inaccurate data.

On the contrary, we do not exclude the countries like Chile, Mauritius, Panama, Uruguay, and Romania from our research sample even though they are newly high-income countries according to the 2020 income classification of the World Bank. We apply the same test procedure to these countries to explore the existence of a new income trap at the "lower-high-income level." Besides, we added two important emerging market countries, Nigeria and Russia, into our analysis, which were not in the research sample of Ye and Robertson (2016).

In sum, we explore the existence of an income trap for 12 low-middle, 25 upper-middle, and 5 newly high-income countries following the test procedure suggested by Robertson and Ye (2013) and revisited by Ye and Robertson (2016). The five former upper-middle-income countries, which passed the UMI-HI threshold in the past years, can be seen in Table 2. The upper-middle-income country group comprises 25 countries, including the emerging market countries like China, Brazil, Russia, Mexico, Turkey, Indonesia, and South Africa, which are getting increasingly important for the World economy. The last group comprises 12 lower-middle-income countries, including Nigeria and India, which are expected to become the main rivals of the upper-middle-income countries as the potential provider of many goods and services with cheap production costs. Together, these three groups represent 58.63% of the world's population and 32.57% of the World's GDP in 2020.

3.2.An Empirical Definition of MIT

There are only a few studies that investigated MIT algebraically. Our study used the mathematical definition developed by Robertson and Ye (2013) as a base. According to their mathematical description; the existence of MIT depends on two necessary conditions;

$$\lim_{m\to\infty} E(x_{i,t+m}, I_t) = \bar{x}_i \tag{1}$$

$$\underline{y}_{r,t} - y_{r,t} \le \bar{x}_i \le \bar{y}_{r,t} - y_{r,t} \tag{2}$$

where $x_{i,t}$ is defined as the difference between the natural logarithm of the country ***i***'s and the reference country ***r***'s per-capita income levels, which can be described as follows; $x_{i,t} \equiv y_{i,t} - y_{r,t}$. I_t stands for the information set at the time t and $\bar{x}_i$ is a non-zero constant. $\underline{y}_{r,t}$ and $\bar{y}_{r,t}$ denote the natural logarithm of the lower and upper per capita income thresholds for upper and lower-middle-income countries. The necessary conditions for the middle-income trap are given in the above equations (1) and (2). According to these two equations, if the expected value of a country's per capita income relative to the reference country ***r*** is time-invariant, which satisfies the first condition and lies within the band defined in the second condition, then it is concluded that the country ***i*** is in a trap. In other words, the sample country is evaluated as a candidate for MIT when the income gap with the advanced countries cannot be closed.

In our research, we offer a revision about the second condition that is expected to help to decide more precisely about the existence of the MIT problem. According to Robertson and Ye (2013) and Ye and Robertson (2016), the second condition describes a horizontal line $\bar{x}_i$ and a band. If the horizontal line entirely lies above, below, or within the band, it is possible to say something about the existence of the MIT problem. On the other hand, it is not easy to interpret when the line $\bar{x}_i$ intersects the band, which means that a particular part of this line is inside, and a particular part is outside the band. The weakness of this condition stems from the fact that $\bar{x}_i$ represents the average of $x_{i,t}$'s in the timeline, and we cannot observe the dynamic changes in the $x_{i,t}$ series if we use a non-zero constant term $\bar{x}_i$. So we offer the following revision for the second condition to clear up the ambiguity.

$$\underline{y}_{r,t} - y_{r,t} \le y_{i,t} - y_{r,t} \le \bar{y}_{r,t} - y_{r,t} \tag{3}$$

The above condition provides us with precise information about the movements of the series $x_{i,t}$ in the timeline instead of a non-zero constant $\bar{x}_i$, which seems to be a better choice for determining MIT candidate countries and their trend to get rid of the trap in the future.

3.3.The Empirical Method and The Test Procedure

In this subsection, we investigate the long-term trend of the $x_{i,t}$ which represents the difference between the country ***i*** 's and the reference country's per capita income levels. If the income gap between country (***i***) and reference country (***r***) is closing and $x_{i,t}$ approaches zero as time goes to infinity ($t \to \infty$) we can conclude that the country is not in MIT. In

contrast, if the difference between country (i) and reference country (r) does not approach zero and lies between the thresholds $\underline{y}_{r,t} - y_{r,t}$ and $y_{r,t} - y_{r,t}$ we decide that the sample country is in a middle-income trap. In short, we decide for the MIT if both conditions are satisfied.

First, we used the stationarity ranking procedure of Ye and Robertson (2016). We investigated the stationarity of the $x_{i,t}$ series by employing the ADF unit root test with a constant and a deterministic trend. As it is known, the ADF unit root test tends to fail to reject the non-stationary under a structural break. Since this tendency is sensitive to lag lengths, we started the test procedure with maximum lag length (k=8) and decreased the k step by step, as Perron (1989) used. If the ADF unit root test says that $x_{i,t}$ series are stationary (we reject the null hypothesis) and there is no statistically significant time trend, we conclude that this country is a candidate for an income trap. If the null hypothesis of a unit root cannot be rejected/or rejected, but there is a significant time trend, we repeat the test procedure using Z.A. (Zivot-Andrews) unit root test with one structural break.

Similarly, we started the single-break Z.A. test with a constant term and deterministic trend model. If the null hypothesis is rejected and there is no statistically significant time trend, we suspect the existence of an income trap. If the null hypothesis is still not rejected and there is a significant time trend after the break, we employ the L.M. (Minimum Lagrange Multiplier) unit root test for two structural breaks. Similarly, we repeated the procedure for the L.M. test. We started to test the stationarity with a constant and a deterministic time term model with two breaks. If the null hypothesis is rejected, we decide on the possibility of an income trap. If the null hypothesis is rejected, but there is a significant time trend, or if the null hypothesis is not rejected, we decide that the country is not in an income trap. The test results are given in the next section via Tables 2, 3, and 4.

Second, we follow our revision of the second condition of MIT's empirical definition developed by Robertson and Ye (2013) and visually explore whether $x_{i,t}$ series lie between the thresholds. We also estimate 5-year trend predictions for the same $x_{i,t}$ series. According to the unit root tests, we made trend forecasts with ARMA models for the series, which are stationary. For the remaining series, we employ linear regression models that consider structural breaks. If the 5-year trend forecasts remain among the bands, we have decided that the sample country is a candidate for the middle-income trap. The second condition results for the lower-high-income, upper-middle-income, and lower-middle-income countries can be seen in Figure 2, Figure 3, and Figure 4, respectively.

As a result, if the sample country satisfies the first and the modified second conditions, we decide on an income trap problem. If the country only satisfies one out of the two conditions, we conclude that the result is ambiguous. The results for the lower-high-income, upper-middle-income, and lower-middle-income countries are shown in Tables 2, 3, and 4, respectively.

3.4.Test Results

We have 5 newly high-income, 25 upper-middle-income, and 12 lower-middle-income countries in our sample, which are analyzed for the 1987-2019 period. Tables 2, 3, and 4

indicate the test results for the first condition of the empirical MIT definition developed by Robertson and Ye (2013). The number of observations for each sample country is given in the second column. There are 33 observations for each country except Romania, Paraguay, Lebanon, and the Russian Federation due to the lack of available data. As we mentioned before, all data are taken from the World Bank's WDI database. The empirical method can be seen in the fourth column. The abbreviations ADF represent the Augmented Dickey-Fuller unit root test with no structural break; Z.A. (A) and Z.A. (C) represent the Zivot-Andrews unit root test with one structural break at the level and one break at the level and trend; L.M. (A.A.) and L.M. (CC) represent Minimum Lagrange Multiplier test with two structural breaks at the level and two structural breaks at the level and trend respectively. The mathematical representations of the unit root tests are given in Appendix A.

Alpha (α) corresponds to the coefficient of the autoregressive variable in the ADF, Z.A., and L.M. models. Beta (β) corresponds to the coefficient of the deterministic trend mentioned in the above models. All alpha and beta values summarized in the tables are statistically different from zero at most with a 10% significance level.

Table 2. Lower High-Income Countries

Country	Obs.	k	Model	Alpha	Breakpoints	Beta
Chile	33	6	LS(AA)	-0.7804	1998 / 2014	0.0768
Chile	33	6	LS(CC)	-0.9592	2000 / 2013	0.1209
Mauritius	33	8	ADF	0.6133	-	-0.8057
Mauritius	33	8	LM(AA)	-1.1364	2001 / 2004	-0.0315
Mauritius	33	8	LM(CC)	-1.5351	1999 / 2003	0.0828
Panama	-	-	-	-	-	-
Romania	30	8	LS(CC)	-2.0285	2001 / 2008	-0.3571
Uruguay	33	1	ADF	-0.1457	-	-
Uruguay	33	1	ZA(A)	0.7167	2001	-0.5616
Uruguay	33	1	ZA(C)	0.7197	2001	-0.5216
Uruguay	33	1	LS(AA)	-0.2126	1999 / 2007	0.0259
Uruguay	33	1	LS(CC)	-1.2713	2004 / 2015	0.1221

Source: *Authors' calculations*

Table 4 shows that the lower high-income countries except Panama satisfy the first condition. The $x_{i,t}$ series of these countries are stationary, whether at none, one, or two structural breaks. Only the $x_{i,t}$ series of Panama is not stationary in none of these cases. Therefore, we decide that Mauritius, Chile, Romania, and Uruguay may be in an income trap although they have graduated from the upper-middle-income group.

Likewise, in Table 3, we determine that 23 out of 25 upper-middle-income countries in our sample seem to be in the UMIT. China and Guatemala are the two countries that pass the tests and can be evaluated as candidates for membership in the high-income-country group.

Table 3. Upper Middle-Income Countries

Country	Obs.	k	Model	Alpha	Breakpoints	Beta
Albania	33	7	ZA(C)	-0.3205	2008	0.1401
Albania	33	7	LM(AA)	-0.2286	2000 / 2004	-0.2930
Argentina	33	2	ZA(AA)	-0.3923	2001	0.0235
Argentina	33	2	ZA(CC)	0.4108	2001	0.0078
Botswana	33	8	LM(AA)	-0.6697	2002 / 2014	0.0201
Brazil	33	2	LM(AA)	-0.3467	2006 / 2016	0.0087
Brazil	33	7	LM(CC)	-1.4577	2000 / 2014	0.0990
Bulgaria	33	3	LM(CC)	-1.1943	1998 / 2009	-0.4454
China	-	-	-	-	-	-
Colombia	33	1	LM(AA)	-0.1886	2006 / 2016	0.0032
Colombia	33	7	LM(CC)	-1.3526	2001 / 2011	-0.0161
Costa Rica	33	8	ADF	-0.4661	-	0.0130
Costa Rica	33	8	ZA(A)	0.2730	2003	-1.8385
Costa Rica	33	8	ZA(C)	0.2997	2003	-1.6964
Costa Rica	33	8	LM(AA)	-0.5425	2007 / 2009	-0.0311
Costa Rica	33	8	LM(CC)	-0.6403	2000 / 2016	-0.0183
Dominican R.	33	1	ADF	-0.3389	-	-0.9492
Dominican R.	33	1	ZA(A)	-1.6255	2002	0.4614
Dominican R.	33	1	ZA(C)	-2.0901	2002	0.3305
Dominican R.	33	8	LM(CC)	-0.9103	2001 / 2006	-0.0248
Ecuador	33	2	ZA(C)	0.5398	2000	-1.2068
Gabon	33		ADF	-0.5364	-	-0.9404
Guatemala	-	-	-	-	-	-
Indonesia	33	1	ZA(A)	0.5032	1997	-1.8891
Indonesia	33	1	ZA(C)	0.4813	1997	-1.8616
Indonesia	33	7	LS(CC)	-1.4700	1997 / 2009	-0.095

Jamaica	33	5	ADF	-0.3208	-	-0.6936
Jordan	33	1	ADF	-0.4115	-	-1.2139
Jordan	33	1	ZA(A)	0.5509	2006	-1.3007
Jordan	33	1	ZA(C)	0.5484	-	-1.3209
Lebanon	30	1	ADF	-0.2523	-	-0.4558
Malaysia	33	1	ZA(A)	0.6055	1997	-0.8279
Malaysia	33	8	LS(CC)	-4.1140	2003 / 2012	0.1499
Mexico	33	4	LM(CC)	-1.7918	2008 / 2011	0.0153
Namibia	33	8	ADF	-0.2607	-	-0.5900
Paraguay	25	1	ADF	-0.1479	-	-0.5197
Paraguay	25	8	LS(AA)	-0.3455	1998 / 2006	-0.0036
Paraguay	25	8	LM(CC)	-2.2774	2000 / 2007	-0.5922
Peru	33	8	ADF	-1.0174	-	-3.1204
Peru	33	8	ZA(A)	-0.1282	-	-3.4859
Peru	33	4	LM(AA)	-0.1931	2001 / 2016	-0.0094
Peru	33	7	LM(CC)	-0.8816	2001 / 2010	0.0307
Russia	29	5	ADF	-0.2531	-	-0.7222
Russia	29	6	LM(AA)	-0.2578	1997 / 2004	-0.0689
Russia	29	7	LS(CC)	-1.0243	1997 / 2010	-0.1382
Thailand	33	2	LM(AA)	-0.2118	1998 / 2007	0.0141
Thailand	33	8	LM(CC)	-2.2694	2004 / 2011	0.4864
Turkey	33	8	LM(AA)	-0.3173	2000 / 2004	0.0316
Turkey	33	3	LM(CC)	-1.7174	2002 / 2011	-0.0238
South Africa	33	1	ADF	-0.1818	-	-0.3514

Source: *Authors' calculations*

Table 4 shows the test results for the first condition for the lower-middle-income group. As can be seen, all countries in these groups seem to be in LMIT since they all satisfy the stationarity feature at none, one or two structural breaks.

Table 4. Lower Middle-Income Countries

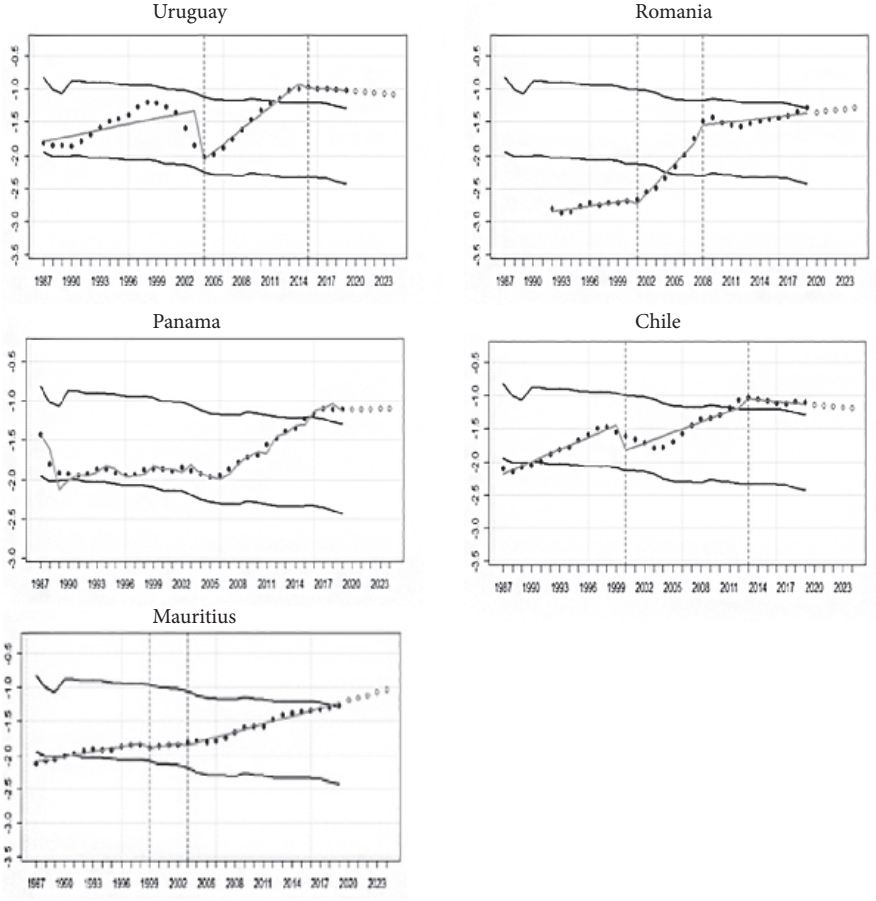
Country	Obs.	k	Model	Alpha	Breakpoints	Beta
Algeria	33	6	ADF	-0.3061	-	0.2017
Algeria	33	6	ZA(A)	0.4552	2015	0.2992
Algeria	33	6	ZA(C)	0.5144	2011	0.2997
Algeria	33	4	LM(AA)	-0.1264	2001 / 2012	-0.0725
Algeria	33	6	LM(CC)	-0.9564	1999 / 2004	-0.2095
Angola	33	7	ADF	-0.3015	-	-0.2563
Bolivia	33	7	LM(CC)	-0.7905	1997 / 2002	-0.0378
Egypt	33	1	ADF	-0.2248	-	-0.0441
Egypt	33	1	ZA(A)	0.7000	1996	-0.0602
Egypt	33	1	ZA(C)	0.7066	2002	-0.1366
El Salvador	33	4	LM(AA)	-0.1772	2006 / 2016	0.0152
El Salvador	33	7	LM(CC)	-1.2638	2000 / 2010	-0.0644
Honduras	33	8	ADF	-0.7060	-	0.0805
Honduras	33	8	ZA(A)	0.1057	2012	0.0666
Honduras	33	8	ZA(C)	0.7502	2012	-0.0185
Honduras	33	5	LM(CC)	-0.6965	1997 / 2011	-0.1284
India	33	1	ADF	-0.2485	-	-0.3346
Mongolia	33	2	ADF	-0.1303	-	-0.1322
Morocco	33	6	ADF	-0.4053	-	0.1208
Morocco	33	6	ZA(A)	0.4760	2009	0.0853
Morocco	33	6	ZA(C)	0.1999	2001	0.1375
Morocco	33	6	LM(CC)	-1.1432	2000 / 2012	0.0774
Nigeria	33	1	ADF	-0.1666	-	-0.1992
Sri Lanka	33	7	ADF	-0.9844	-	-0.8031
Tunisia	33	6	LM(AA)	-0.2226	1998 / 2006	0.0117
Tunisia	33	7	LS(CC)	-1.6015	2001 / 2009	-0.0827

Source: *Authors' calculations*

The modified second condition should also be added to the analysis to decide about the existence or ambiguity of MIT. The revised version of the second condition of the MIT definition can be seen in the following three figures.

Figure 2 shows a time series plot of the second condition of newly high-income countries with breaks. As can be seen, all countries in this category passed the UMI-HI threshold. On the other hand, the trends of the $x_{i,t}$ series for Chile and Uruguay have made us think of the possibility of a new income trap for these countries. Besides, the first condition results for these countries support our suspicion about this new trap that we called the "lower-high-income trap" (LHIT).

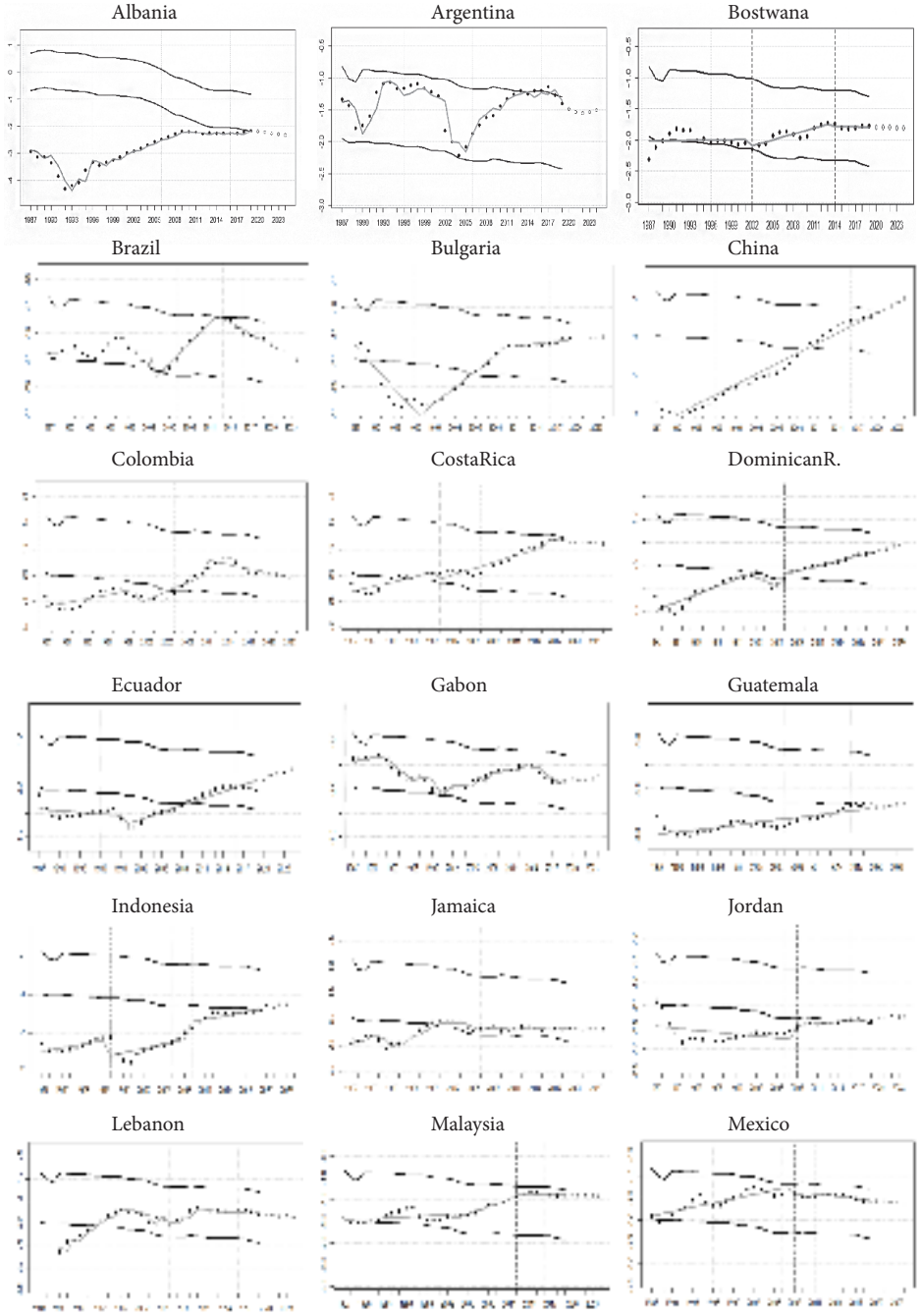
Figure 2. Newly High-Income Countries



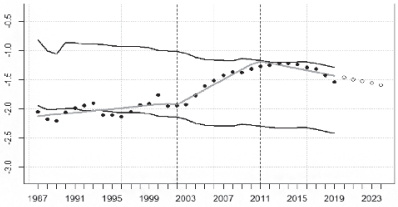
Source: *Authors' calculations*

Figure 3 represents the results of the modified second condition for the upper-middle-income countries. The trend of the $x_{i,t}$ series shows that Bulgaria, China, Dominic Republic, Ecuador, and Thailand are on the way to passing the UMI-HI thresholds. Besides, the $x_{i,t}$ series of Indonesia, Guatemala, Paraguay, and Jordan have positive trends. On the other hand, these countries have just passed the LMI-UMI threshold. So more time is needed to investigate the existence of an upper-middle-income trap for these countries.

Figure 3. Upper Middle-Income Countries



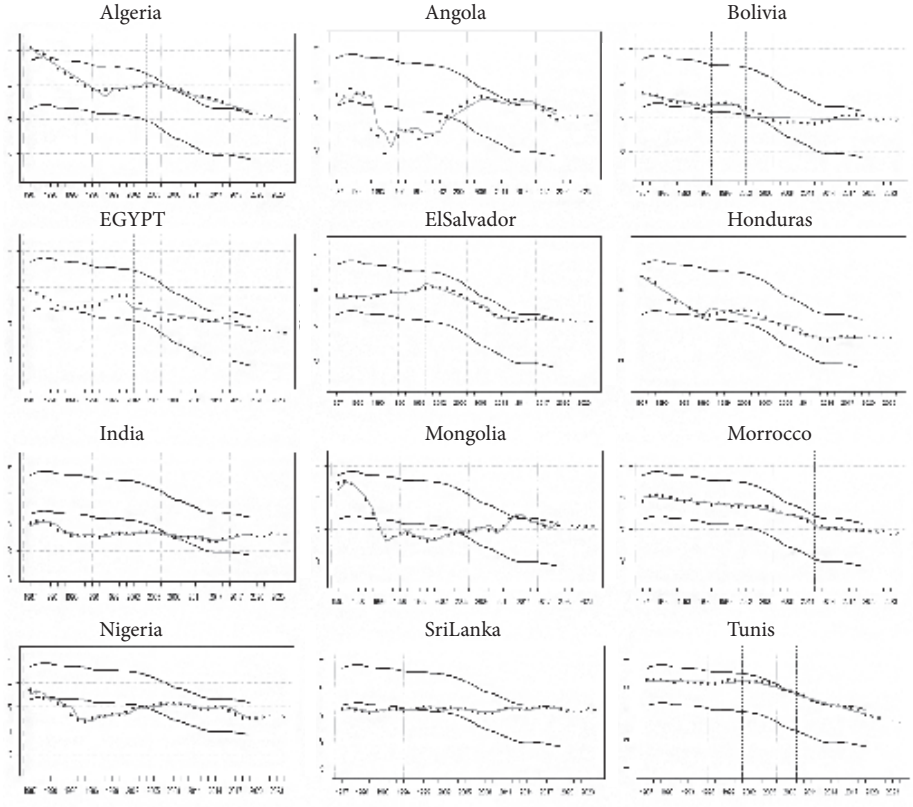
Turkey



Source: *Authors' calculations*

Figure 4 represents the modified second condition results for the lower-middle-income countries. The trends of the $x_{i,t}$ series of Angola and Sri Lanka are positive and may be evaluated as a sign to get out of the lower-middle-income trap, while the $x_{i,t}$ series of the other lower-middle-income countries indicate a high possibility to stay as lower-middle-income countries for years.

Figure 4. Lower Middle-Income Countries



Source: *Authors' calculations*

So far, we have investigated the first and second conditions of the MIT definition for three income groups. Tables 5, 6, and 7 are prepared to summarize the test results based on these two conditions. In all tables, the second and the third column represents the results of the first and second conditions, respectively. As shown in Table 5, all newly high-income countries except Panama satisfy the first condition while Chile and Uruguay only satisfy the second condition. Hence we decide that Panama is on the way to reaching the average income level of the high-income group, but the position of Mauritius and Romania are ambiguous. On the contrary, Chile and Uruguay seem to be staying at the lower level of the high-income group for a while which is likely to be a kind of income trap, which we mentioned before as a "lower-high-income trap (LHIT)".

Table 5. Newly high-income countries

Country	Condition 1	Condition 2	Result
Chile	LHIT	LHIT	LHIT
Mauritius	LHIT	not in LHIT	ambiguous
Panama	not in LHIT	not in LHIT	not in LHIT
Romania	LHIT	not in LHIT	ambiguous
Uruguay	LHIT	LHIT	LHIT

Source: *Authors' calculations*

Tables 5 and 6 use the abbreviations UMIT and LMIT, respectively. UMIT stands for the "upper-middle-income trap", and LMIT stands for the "lower-middle-income trap". The fourth column represents our final decision about the country. We decide about the existence of the MIT problem only if a country satisfies both conditions, which means "UMIT" for the first and second conditions. If a country meets only one of the two conditions, we evaluate the case as "ambiguous". Table 6 shows the test results only for the upper-middle-income countries. As can be seen, according to the empirical investigation, China has been the only country that is not in the UMIT. The final decision for Bulgaria, Dominic Republic, Ecuador, Guatemala, and Indonesia is ambiguous. Our investigation shows that Guatemala is not in UMIT according to both conditions. Still, this country has just passed the LMI-UMI threshold, which leads us to call the country's condition "ambiguous". The same fact is also valid for Indonesia and Jordan. Hence, we write "newly UMI country" in the related cells about the second condition, which means more time is needed to evaluate their performance in escaping from the UMIT. The other UMI countries are Albania, Argentina, Botswana, Brazil, Colombia, Costa Rica, Gabon, Indonesia, Jamaica, Jordan, Lebanon, Malaysia, Mexico, Namibia, Paraguay, Peru, Russia, Thailand, Turkey, and South Africa, all seem to be in the UMIT.

Table 6. The empirical results for the upper-middle-income trap (UMIT)

Country name	Condition 1	Condition 2	Result
Albania	UMIT	UMIT	UMIT
Argentina	UMIT	UMIT	UMIT
Botswana	UMIT	UMIT	UMIT
Brazil	UMIT	UMIT	UMIT
Bulgaria	UMIT	not in UMIT	ambiguous
China	**not in UMIT**	**not in UMIT**	**not in UMIT**
Colombia	UMIT	UMIT	UMIT
Costa Rica	UMIT	UMIT	UMIT
Dominic Republic	UMIT	not in UMIT	ambiguous
Ecuador	UMIT	not in UMIT	ambiguous
Gabon	UMIT	UMIT	UMIT
Guatemala*	not in UMIT	not in UMIT	ambiguous
Indonesia	UMIT	not in UMIT country	ambiguous
Jamaica	UMIT	UMIT	UMIT
Jordan	UMIT	not in UMIT country	ambiguous
Lebanon	UMIT	UMIT	UMIT
Malaysia	UMIT	UMIT	UMIT
Mexico	UMIT	UMIT	UMIT
Namibia	UMIT	UMIT	UMIT
Paraguay	UMIT	UMIT	UMIT
Peru	UMIT	UMIT	UMIT
Russia	UMIT	UMIT	UMIT
Thailand	UMIT	UMIT	UMIT
Turkey	UMIT	UMIT	UMIT
South Africa	UMIT	UMIT	UMIT

* *Guatemala has just passed the LMI-UMI threshold, so more time is needed to decide about the existence of the MIT problem.*

Source: *Authors' calculations*

Table 7 represents the results for the lower-middle-income countries. Likewise, we decide on the existence of the LMIT if only a country satisfies both conditions simultaneously. Hence Algeria, Bolivia, Egypt, Honduras, India, Morocco, Nigeria, and Tunisia seem to be in LMIT according to our analysis, while the condition of Angola, El Salvador, Mongolia, and Sri Lanka is ambiguous.

Table 7. The Empirical Results for The Lower-Middle-Income Trap (LMIT)

Country name	Condition 1	Condition 2	Result
Algeria	LMIT	LMIT	LMIT
Angola	LMIT	not in LMIT	ambiguous
Bolivia	LMIT	LMIT	LMIT
Egypt	LMIT	LMIT	LMIT
El Salvador	LMIT	not in LMIT	ambiguous
Honduras	LMIT	LMIT	LMIT
India	LMIT	LMIT	LMIT
Mongolia	LMIT	not in LMIT	ambiguous
Morocco	LMIT	LMIT	LMIT
Nigeria	LMIT	LMIT	LMIT
Sri Lanka	LMIT	not in LMIT	ambiguous
Tunisia	LMIT	LMIT	LMIT

Source: *Authors' own calculations*

The test results of the empirical investigation show that 18 upper-middle-income and 8 lower-middle-income countries in our sample satisfy both conditions, indicating an income trap for these countries. The findings are ambiguous for 6 out of 25 upper-middle-income and 4 out of 12 lower-middle-income countries. The only country, which seems not to be in an income trap, has been China. Besides, the empirical investigation shows that Chile and Uruguay are in the lower-high-income trap (LHIT), which is a new discussion topic. The case is ambiguous for Mauritius and Romania, while Panama seems to close the income gap with the "elderly" high-income countries.

Like this study, some other studies in the literature employ many countries to empirically investigate the MIT problem's existence by using different methods. Eichengreen et al. (2012,2013), Felipe et al. (2012, 2017), Zhuang et al. (2012), Robertson and Ye (2013), and Ye and Robertson (2016) are the best-known and pioneering examples. The comparison of the findings of these studies shows; (i) the results may differ according to the selected period, the empirical method, and the data source, (ii) regardless of the chosen period and research method, some countries are more often identified as "trapped countries" like

Uruguay, Panama, Argentina, Botswana, Brazil, Costa Rica, Lebanon, Peru, South Africa, Thailand, Turkey, Egypt, El Salvador, (iii) regardless of the chosen period and research method, some countries are described as "not trapped countries" like China, India, Indonesia, Russia, Nigeria, Bulgaria, Mongolia, Sri Lanka. This study also finds out that China will be the only country that appears not to be in an income trap, at least empirically.

Many studies claim that China is facing an income trap, bringing the results of this study on China into the discussion. (see Glawe and Wagner 2020 for a detailed survey) The lack of a consensus about the conceptual basis of the MIT raises the main reason for the inconsistency between the findings of different studies. On the other hand, different results about China do not change the fact that there has been a slowdown in China's economic growth since 2011. In other words, even if China is not in the middle-income trap, it may take a very long time for the country to reach the per capita income levels of the "elderly" high-income countries.

Furthermore, the income gap between China and advanced countries may never close. This possibility of such an income trap at the early stages of the high-income level has been firstly introduced by Yao (2015), as far as we know. Otsuka et al. (2017), Huang (2018), and Wagner (2019) are other researchers who have also underlined such a possibility in their studies.

4.Conclusion

The MIT literature has been growing since 2007 with the increasing interest in the emerging market countries and their economic performance in the last two decades. The main research topic is about the inability of developing countries to reach the per capita income levels of high-income countries. This fact has been discussed by many researchers from different perspectives, both theoretically and empirically. As a common feature of these studies, the discussion has been made directly or indirectly around productivity and growth slowdowns. This study can be seen as one of these empirical studies that show the following differences from the empirical literature. First, World Bank income thresholds were used as a more reliable source for the empirical investigation. Second, three-income traps at the lower-high-income, upper-middle-income, and lower-middle-income levels were explored instead of investigating only the "middle-income trap". Third, a five-year trend forecast strengthened the decision about whether these countries can escape from the income trap in the future or not.

Our empirical investigation shows that 18 out of 25 upper-middle-income countries and 8 out of 12 lower-middle-income countries are in the upper- and lower-income trap, respectively. The conditions of six upper-middle and four lower-middle countries are ambiguous. China seems to be the only country that may escape empirically from the middle-income trap. The findings of the five newly high-income countries indicate that Uruguay and Chile face the risk of being stuck at the lower-high income level, which may be called the "lower-high income trap". The case for Romania and Mauritius is ambiguous. On the other hand, Panama seems to catch up with the high-income group, at least empirically.

In the light of our findings and the previous studies, the conclusions we have reached are as follows; (i) in addition to the fact that per capita income has no other alternative yet, there may be a better way to describe to high-income status since the MIT problem could not be solved only by surpassing an income threshold, (ii) there should be a consensus about the definition of the high-income countries since the usage of different definitions causes obtaining different empirical results, (iii) there could be different income traps like "lower-middle-income trap" or "lower-high-income trap" besides the "middle-income trap", (iv) the differences about the choice of the data, empirical method and the research period can lead to get different empirical findings by different studies which make them incomparable, (v) country-specific facts are important since the MIT problem and the suggested solutions could not be effective similarly for the big and small emerging market countries; (vi) the effectiveness of the macroeconomic policies towards the solution of the MIT problem at aggregate level may have different impacts as the size of the country differs, (vii) a provinces level investigation of the MIT problem may provide more realistic outcomes for the big emerging market countries since the provinces in these countries show observable income differences from each other.

In this context, our suggestions for future work are as follows; (i) a more comprehensive revision of the definition of a high-income country, taking into account the causes of the middle-income trap, (ii) taking country-specific differences into account before making country-specific policy recommendations regarding escaping any income trap and, (iii) focusing on the provinces level solutions of the MIT problems for the big emerging market countries where the income inequality is high, and where each province is as big as a small emerging market country. In addition, the "lower-high income trap" concept stands out as an issue that needs to be emphasized.

References

Aiyar, M. S., Duval, M. R. A., Puy, M. D., Wu, M. Y., & Zhang, M. L. (2013). Growth slowdowns and the middle-income trap (No. 13-71). International Monetary Fund.

Agénor, P. R.; Canuto, O & Jelenic, M. (2012). Avoiding Middle-Income Growth Traps. Economic Premise; No. 98. World Bank.

Agénor, P. R., & Canuto, O. (2015). Middle-income growth traps. Research in Economics, 69(4), 641-660.

Bulman, D., Eden, M., & Nguyen, H. (2017). Transitioning from low-income growth to high-income growth: is there a middle-income trap?. Journal of the Asia Pacific Economy, 22(1), 5-28.

Eichengreen, B., Park, D., & Shin, K. (2012). When fast-growing economies slow down: International evidence and implications for China. Asian Economic Papers, 11(1), 42-87.

Eichengreen, B., Park, D., & Shin, K. (2013). Growth slowdowns redux: New evidence on the middle-income trap (No. w18673). National Bureau of Economic Research.

Egawa, A. (2013). Will Income Inequality Cause a Middle-income Trap in Asia? (Vol. 797). Bruegel.

Felipe, J., Abdon, A., & Kumar, U. (2012). Tracking the middle-income trap: What is it, who is in it, and why?. Levy Economics Institute, Working Paper, (715).

Felipe, J., Kumar, U., & Galope, R. (2017). Middle-income transitions: trap or myth?. Journal of the Asia Pacific Economy, 22(3), 429-453.

Gill, I. S., & Kharas, H. (Eds.). (2007). An East Asian renaissance: ideas for economic growth. The World Bank.

Glawe, L., & Wagner, H. (2020). China in the middle-income trap?. China Economic Review, 60, 101264.

Han, X., & Wei, S. J. (2017). Re-examining the middle-income trap hypothesis (MITH): What to reject and what to revive?. Journal of International Money and Finance, 73, 41-61.

https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021

Huang, B., Morgan, P. J., & Yoshino, N. (2018). Avoiding the middle-income trap in Asia: the role of trade, manufacturing, and finance. Asian Development Bank Institute.

Im, F. G., & Rosenblatt, D. (2013). Middle-income traps: a conceptual and empirical survey. The World Bank.

Islam, N. (2014). Will inequality lead China to the middle-income trap? Frontiers of Economics in China, 9(3), 398-437.

Jankowska, A., Nagengast, A., & Perea, J. R. (2012). The product space and the middle-income trap.

Kharas, H., & Kohli, H. (2011). What is the middle-income trap, why do countries fall into it, and how can it be avoided?. Global Journal of Emerging Market Economies, 3(3), 281-289.

Ohno, K. (2009). Avoiding the middle-income trap: renovating industrial policy formulation in Vietnam. ASEAN Economic Bulletin, 25-43.

Otsuka, K., Higuchi, Y., & Sonobe, T. (2017). Middle-income traps in East Asia: An inquiry into causes for slowdown in income growth. China Economic Review, 46, S3-S16.

Perron P., (1989). The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis, Econometrica , Nov., 1989, Vol. 57, No. 6, 1361-1401

Robertson, P. E., & Ye, L. (2013). On the existence of a middle-income trap. Available at SSRN 2227776.

Spence, M. (2011). The next convergence: The future of economic growth in a multispeed world. Farrar, Straus and Giroux.

Wagner, H. (2019). Structural Change, Rebalancing and the Danger of a Middle-Income Trap in China. International Journal of China Studies, 10(1), 1-25.

Woo, W. T. (2012). China meets the middle-income trap: the large potholes in the road to catching-up. Journal of Chinese Economic and Business Studies, 10(4), 313-336.

Yao, Z. (2015). How Can China Avoid the Middle Income Trap?. China & World Economy, 23(5), 26-42.

Ye, L., & Robertson, P. E. (2016). On the existence of a middle- income trap. Economic Record, 92(297), 173-189.

Zhuang, J., Vandenberg, P., & Huang, Y. (2012). Growing beyond the low-cost advantage: How the People's Republic of China can avoid the middle-income trap. Asian Development Bank.

Appendix A.

For the Augmented Dickey-Fuller (ADF) test, the following

$$\Delta(x_{i,t}) = \mu + \alpha(x_{i,t-1}) + \sum_{j=1}^{k} c_j \Delta(x_{i,t-j}) + \beta t + \varepsilon_{i,t} \quad (1)$$

equation is used. Equation (1) is obtained by differencing a random walk model so, $\alpha=\rho-1$. As a result, the null (H_o) and the alternative hypothesizes (H_1), $x_{i,t}$ is not stationary, namely, $\alpha=0$ and $x_{i,t}$ is stationary, namely $\alpha<0$ respectively. Not only rejecting the null hypothesis will be enough to conclude that a country is not MIT but a significant positive value of β.

For Zivot Andrews (Z.A.) test,

$$\Delta(x_{i,t}) = \mu + \alpha(x_{i,t-1}) + \sum_{j=1}^{k} c_j \Delta(x_{i,t-j}) + \beta t + \theta DU_t + \varepsilon_{i,t} \quad (2)$$

$$\Delta(x_{i,t}) = \mu + \alpha(x_{i,t-1}) + \sum_{j=1}^{k} c_j \Delta(x_{i,t-j}) + \beta t + \theta DU_t + \gamma DT_t + \varepsilon_{i,t} \quad (3)$$

equations are used; where DU_t is an indicator dummy variable for a mean shift occurring at each possible break-date (T.B.) while DT_t is corresponding trend shift variable

$$DU_t = \begin{cases} 1 & if\ t > TB \\ 0 & otherwise \end{cases}$$

$$DT_t = \begin{cases} t - TB & if\ t > TB \\ 0 & otherwise \end{cases}$$

The null hypothesis in the two models is $\alpha=0$, which implies that the series x_t contains a unit root with a drift that excludes any structural break.

For Lee Strazicich (2003) LM test,

$$\Delta(x_t) = d'\Delta Z_t \phi \tilde{S}_{t-i} + \sum_{1}^{p} \gamma_i \Delta \tilde{S}_{t-i} + \eta_t \qquad t = 1,2,3, \dots T \quad (4)$$

is used where the detrended series $\tilde{S}_t$ is defined as $\tilde{S}_{t-i} = x_t - \tilde{\psi}_x - Z_t$, $t=2,\dots,T$; and $\tilde{\psi}_x = y_1 - Z_1\tilde{\delta}$ and $\tilde{S}_t$is a coefficient vector from the regression of Δx_t on ΔZ_t. The lagged terms $\Delta \tilde{S}_{t-i}$ are for correcting serial correlation.

Lastly, all unit root tests were done by using R Programming v4.1.0 and EViews 10 programs.