ARE THE SAVINGS VOLUME AND ITS DETERMINANTS SIMILAR IN MINT COUNTRIES?

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Abstract

MINT countries stand out with their growth potential among developing countries. Although their structural characteristics, macroeconomic indicators and institutional development differ from each other, MINT countries are expected to become global economic actors in the near future. One of the important determinants of becoming a global economic power is savings rates and, accordingly, the volume of investments. Savings are the most important factor that is effective in increasing investments and accelerating the process of economic growth in developing countries. In this study, the savings rates of MINT countries are examined both in terms of volume and determining variables and similarities and differences between MINT countries are tried to be determined. In the study, ARDL boundary test approach is adopted by considering the period between 1980-2018. According to the results obtained, the factors that are effective in determining savings rates in each country are different from each other; however, it is concluded that the current account deficit, age dependency ratio and foreign direct investment are effective in determining savings rates.

Keywords: *Saving Rate; Current Account Deficit; MINT*
JEL Classification: *B22; F41; O16*

MINT ÜLKELERİNDE TASARRUF HACMİ VE BELİRLEYİCİLERİ BENZER MİDİR?

Öz

MINT ülkeleri, gelişmekte olan ülkeler arasında büyüme potansiyelleri ile ön plana çıkmaktadırlar. Yapısal özellikleri, makroekonomik göstergeleri ve kurumsal gelişimleri birbirlerinden farklı olsa da, MINT ülkelerinin yakın gelecekte küresel ekonomik aktörler arasına girmesi beklenmektedir. Küresel ekonomik güç olabilmenin önemli belirleyicilerinden biri tasarruf oranları ve buna bağlı olarak yatırımların hacmidir. Tasarruflar, gelişmekte olan ülkelerde yatırımların artmasında ve ekonomik büyüme sürecinin hızlanmasında etkili olan en önemli faktördür. Bu çalışmada MINT ülkelerinin tasarruf oranları hem hacim hem de belirleyici değişkenler açısından incelenmektedir ve MINT ülkeleri arasındaki benzerlikler ve farklılıklar tespit edilmeye çalışılmaktadır. Çalışmada 1980-2018 arasındaki dönem ele alınarak ARDL sınır testi yaklaşımı benimsenmiştir. Elde edilen sonuçlara göre her bir ülkede tasarruf oranlarının belirlenmesinde etkili olan faktörler birbirinden farklıdır; ancak tasarruf oranlarının belirlenmesinde cari açık, yaş bağımlılık oranı ve doğrudan yabancı yatırımların etkili olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: *Tasarruf Oranı, Cari Açık, MINT*
JEL Sınıflandırması: B22; F41; O16

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DOI: 10.18092/ulikidince.876891
Makalenin Geliş Tarihi (Recieved Date): 08.02.2021
Yayına Kabul Tarihi (Acceptance Date): 01.10.2021

1. Introduction

Since 2001, a community consisting of Brazil, Russia, India and China called BRIC countries has come to the fore. These countries were determined by the economist O'Neill (2001) and their main common features are their strong economic potential and strong expectations that they will realize a successful growth trend soon. Indeed, the expectations were justified. BRIC countries, especially China, have attracted attention with their economic performance by achieving high growth rates. Since 2013, a new group of countries has emerged. Within this group of countries, Mexico, Indonesia, Nigeria, and Turkey it has again been demonstrated by O'Neill. It is estimated that these countries, which are called MINT countries in short, will become the favorite economies of the world in the coming years. The most important reasons for the positive expectations about MINT countries are that each country has its own unique advantages. Countries differ in terms of history, culture, and geopolitical location. However, their economic advantages bring them closer to each other (Durotoye, 2014: 99).

Developing countries have attracted great attention of multinational companies and investors for a certain period of time, and large amounts of foreign direct investment have been made to these countries. MINT countries also maintain their attractiveness in terms of investment. Both international institutions, organizations, researchers and investors emphasize that these countries are worth investing in. It is believed that they will increase their power in the world economy as a result of the positive indicators they will exhibit in the near future. These expectations are still up to date. The common reasons that make MINT countries attractive can be examined under three main groups. The first important reason is that all MINT countries have a young and dynamic population. The large young population means a large increase in the workforce in the medium term. The existence of a working population and its sustainability for many years is an important advantage for foreign direct investments (Scalera and Todri, 2016, 38-40). For example, China ranks first in the world in terms of total population. However, it has an aging population. Similarly, other countries where the population tends to age are also at a disadvantage in terms of demographic characteristics. However, as in MINT countries, the high young population indicates a sustainable increase in domestic demand. Another advantage of MINT countries is their geographic location. Mexico is geographically close to the United States of America. Being close to a country like the USA with a large population and high consumption expenditures offers a commercial opportunity. As a matter of fact, Mexico has used this opportunity especially in recent years and has increased its exports with the USA. Likewise, Turkey is close to European Union countries, Indonesia is close to Asian markets, while Nigeria is close to the countries in West Africa. This geographical advantage positively affects their trade indicators (Morakinyo and Sibanda, 2016: 39-41).

The third important and common factor that makes MINT countries advantageous is that each country is rich in natural resources. For example, Indonesia is rich in natural gas and Nigeria is rich in oil. Oil and natural gas constitute approximately 90% of total exports in Nigerian economy. Mexico has natural gas, oil and silver resources. In addition, there are also nuclear power plants and it is a country that uses nuclear energy in energy production. Turkey is one of the MINT countries, unlike the other three countries are not major exporters of natural resources such as oil and gas. Turkey is a country that imports oil and natural gas. However, Turkey stands out with exports of industrial products. In this capacity, it takes its place among other countries (Akın, 2018: 75-76). Turkey is not rich in oil and natural gas resources. However, it has extremely fertile soils in terms of raw material resources such as iron, copper, chrome and boron.

Although MINT countries have expectations that their economies will reach a strong and stable structure in the future, these countries actually have very different structures from each other. It should not be overlooked that both economic and demographic characteristics are different. Although the economic performance of the countries is similar, the reasons that make up this

performance are different from each other. Therefore, the policies to be used in economic growth and development should be different from each other.

Mexico has undergone significant structural changes especially in the last thirty years and has become one of the most promising economies of the world. Mexico is one of the fifteen largest economies in the world according to GDP calculations based on purchasing power parity. It has been celebrated from an oil-dependent economy outlook it exhibited in previous years and has become an important production center. In today's conditions, the main feature that brings the Mexican economy to the fore is the export performance. Mexico is among the world's leading exporters, especially in automobile and television production. It signs trade agreements with other countries and expands to wider markets to maintain this momentum. The exporter identity is an important advantage for the Mexican economy. However, various problems prevent the country from going further. Problems such as high rates of poverty, inability to reduce corruption and crime rates, widespread informal activities, low education level, and failure to comply with the rule of law create risks for the economic performance of the country (Zbinden and Kondova, 2019: 58-59).

Looking at the Indonesian economy, one of the most important developments that have accelerated the country is pursuing a development strategy based on the creative industry. Creative industries make a significant contribution to the growth of countries and support the creative workforce by creating employment opportunities. In Indonesia, in recent years, there has been a growth in creative industries, especially in architecture, interior decoration, visual communication, advertising, publishing, animation. The contribution of these industries to the GDP figures of the country is increasing. Since creative industrial activities are carried out by both small-medium-sized and large-scale companies, their contribution to production and employment is substantial. In Indonesia, it has managed to make good use of the advantages offered by the sector and turn it into an opportunity for its economic development. Indonesia, which is among the emerging economies, applies a model based on innovation and creativity, and the positive results of the applied model will continue in the future. (Ahman et al., 2020: 517-518).

Nigeria is a country that has the potential to be the largest economy in Africa with its natural resources and population characteristics. However, although the country is rich in human and natural resources, it is considered to be risky by investors. The mismanagement process, corruption activities, terrorism and violence, and inefficient use of resources in the country have caused foreign investors to stay away. However, foreign direct investments are of great importance for developing countries such as Nigeria. One of the most important problems in developing countries is the insufficient capital to be used to finance investments. Since the domestic savings rates are insufficient, the support of foreign direct investments is needed. For this reason, necessary conditions should be provided to attract foreign investors to the country, and factors that cause insecurity and high risk factors should be eliminated. Thus, the current potential of the country can be used in the best way (Udeh and Odo, 2017: 11).

Turkey has seen an upward trend in the volume of exports, economic growth rates are relatively high and is rising foreign direct investment inflows. These developments give positive signals for the future. Advantages such as having a young and dynamic population, excessive domestic demand, geographic location advantage due to its proximity to large markets, knowledge and production experience in various industries should be evaluated carefully. With these advantages, an even more successful economic structure can be achieved. But it is also true that there are some problems to be solved of Turkey. Factors such as the share allocated for R&D activities not reaching the desired level, not being able to become a producer of technological innovations, low share of high technology products in exports, and energy-dependent nature are the main problems encountered. In addition, structural problems such as high inflation, weak depth in financial markets, low savings rates, and institutional structure deficiencies must be resolved (Yardımcı, 2006: 112).

MINT countries are shown among the strong economies of the future. The view that their economic and demographic characteristics have a strong growth potential is dominant. For this reason, research on MINT countries is becoming increasingly common. The performances of foreign direct capital movements, poverty, income distribution, unemployment have been examined by many researchers. However, analyzes on the criteria determining savings rates are very limited. This study was carried out to eliminate the deficiency observed in the literature. One of the most important sources of economic growth is savings rates. It has been tried to determine whether the criteria determining savings in MINT countries are similar or not. Savings rates in MINT countries are relatively low and need to be increased. But are the reasons for low savings rates the same or different? In other words, can the same policies be applied to increase savings rates in these countries? Before determining the policies to be used to increase the savings rates, the factors creating the said result should be determined. With this aspect, it is aimed that the study will be a guide for policy makers. As mentioned before, MINT countries are seen as the strong economies of the future. Investments are of great importance in the growth of an economy. Considering the role of the national savings level in financing investments, the contribution of the analysis to the literature becomes apparent. When the literature is examined, it is seen that MINT countries are examined from many aspects. Performance of MINT countries in different areas such as economic growth, foreign direct investments, foreign trade performance, technological development level, energy consumption has been analyzed. However, studies focusing on how and which factors affect the saving tendency in these countries are limited. The main purpose of the study is to complete the observed deficiency.

The rest of the paper is organized by presenting the relevant review of literature in the following section. Section 3 discusses the data and variables of interest deals with the methodology. Section 4 presents the empirical results. The final section concludes the study.

2. Major Factors Affecting Gross Savings

Factors affecting saving behavior are generally evaluated under two main groups as economic and demographic factors. Economic factors include income, inflation, unemployment rate, real interest rate, and financial markets indicators.

Demographic factors, on the other hand, consist of indicators that are affected by the age distribution of the population, such as the young dependency ratio, the dependency ratio of the elderly population, and the total dependency ratio. Although there are economic factors that come to mind first when it comes to saving, the effect of demographic factors cannot be ignored. Because the relationship and interaction between working and non-working population is extremely important. Although the individuals in the non-working group do not produce, they can lead to a decrease in savings because they engage in consumption activities (Pitoňáková, 2016: 529).

Income and wealth level are the main variables affecting saving rates. Studies show that per capita income has a positive effect on the tendency to save. Because individuals should allocate resources for saving in today's conditions to guarantee their future consumption. For this, their income must be above a certain level. The income of poor individuals is generally spent on basic needs that will enable them to maintain their biological and social existence. Poor individuals have limited resources to save money. The relationship between saving and income level is not only dependent on income level. Income fluctuations also affect the relationship between saving and income level. Income fluctuations that will be experienced can change the saving behavior of individuals, but the level of change depends on certain conditions. In some cases, the effect of response to income fluctuations on saving tendency may be limited. This situation can be expressed as the fact that fluctuations in income are temporary, there is no major change in permanent income, and there is no constraint in the income of individuals due to credit applications (Schmidt-Hebbel, Webb and Corsetti, 1992: 531-532).

One of the most important factors affecting saving behavior is the inflation rate. However, the effect of inflation on saving behavior was realized later. In many previous studies, it was assumed that the general level of prices was not effective on the real consumption of individuals, and therefore the inflation rate was not included among the variables in empirical studies. In the following periods, it was seen that this assumption was not correct, and it was revealed that inflation could have significant effects on saving rates. The inflation rate can affect savings through channels such as changes in interest rates and welfare, monetary deception, and intertemporal substitution. In addition to these channels, inflation also causes uncertainty. However, it cannot be said that the presence of inflation always increases savings. The opposite can be seen. For example, if individuals only earn enough income to support their livelihood and inflation is rising in the country, the purchasing power of money decreases. Depending on this decrease, the resource allocated for consumption increases and the savings rate will decrease. Therefore, it is real income, not nominal income, that determines saving rates, especially in underdeveloped countries (Şengür ve Taban, 2016: 34-35).

Financial depth and financial liberalization are also factoring that affect savings rates. The most used indicators for financial depth are the ratio of money supply M2 to income or the ratio of domestic loans to income. The effect of financial depth and financial liberalization on saving rates occurs through the increase in consumer loans. With the development in financial markets, the level of access to credit opportunities will increase. Thus, the increase in the loans used by the consumers reduces the resources they allocate for savings. However, the point that should not be ignored here is that the effect of financial developments on saving rates can differ significantly from country to country. Different results can be seen depending on the internal dynamics of the countries, the policies they implement in the financial liberalization process, and the methods of measuring the degree of financial deepening and liberalization (Kolasa and Liberda, 2015: 127).

With globalization, the current account deficit has come to the fore among the factors affecting savings rates. It is accepted in the literature that the current account deficit tends to affect domestic savings negatively. Current account deficit, in a sense, refers to foreign savings. Therefore, external savings are a substitute for domestic savings (Ayalew, 2013: 250). With the globalization process, the obstacles to capital movements have been removed. Consequently, the substitutability between internal and external savings has become more evident. When foreign capital inflows are released in a country, the level of efficiency of monetary and fiscal policies used to determine savings rates changes. Current account deficit or current surplus variables are also used as factors determining the level of savings. Therefore, the savings function that applies to countries where capital movements are blocked and countries where capital movements are free will not be the same. While current deficit means savings deficit, current surplus also means savings surplus. It is a common situation that the savings deficit in countries with current account deficits in the world is tried to be balanced with the savings surplus in countries with current account surplus. Generally, current surplus is experienced in oil exporting countries and developed economies. Countries with current account surplus finance the countries with current account deficit and use their savings surplus efficiently (Çolak and Öztürkler: 2012: 8-10).

The average age of the population comes first among the demographic factors affecting saving rates. Studies show that increasing the dependency rate of the elderly population will lead to a decrease in saving rates. The main reason for this is that the income level decreases with aging. The elderly population prefers to use its assets, especially financial assets, to sustain consumption. However, some surveys reveal that there are individuals who continue to save savings after retirement. On the other hand, the impact of aging on saving rates may differ depending on countries' pension regimes, public debt ratio and future expectations regarding public debt. Because economic and household behaviors between countries are heterogeneous, it makes it difficult to point out a clear relationship between saving behavior and age. Therefore, it is possible to say that the relationship between the saving rate and the dependency rate of the elderly population may be uncertain (Serres and Pelgrin, 2003: 125).

3. Literature Review

Athukorala and Sen (2004) analyzed the factors determining private saving rates in India in their study. In the analysis covering the years 1954-1998, variables such as increase in disposable income, population growth rate, inflation, real wealth, expatriate income, public saving rate were used. As a result of the analysis, the relationship between saving rates and population growth rate and wealth variables was found to be insignificant. Income, the number of branches, interest rates and inflation rates positively affect private savings. On the other hand, expatriate income and public savings have a negative effect.

Smooth (2009), Turkey has created a private savings by examining the factors that determine econometric models with data covering the years 1987 to 2007 and was used as a method of time series analysis. According to the findings public savings in Turkey, money supply, interest rate and inflation rate have a negative impact on private savings. Foreign savings, on the other hand, have been found to have positive effects on private savings.

Horioka and Terada-Hagiwara (2012) examined twelve developing Asian countries and tried to determine the factors that determined saving rates in these countries between 1966-2007. According to the estimation model based on the dependency rate, income level, development level in the financial sector and real GDP per capita, it was observed that savings rates increased in developing Asian countries during the period under consideration. However, although the upward trend in saving rates is common, it is emphasized that the main reasons for this increase differ from country to country. In addition, it was concluded that the effects of income level and financial development level are not linear.

Kudaisi (2013) examined the factors that determine savings in West African countries. Panel data method was used in the study examining the years 1980-2006. Dependency rate and interest rate affect domestic savings negatively. GDP growth and the development of financial markets in West Africa positively affect savings. However, the effects of dependency rate, interest rate and GDP growth were statistically insignificant. The effects of inflation rate and budget surplus are statistically significant. The effects of real interest rate and terms of trade on savings are insignificant.

Kandil (2015), in his study, tried to explain the reasons for the decrease in saving rates in the USA starting from the mid-1990s. Boundary Test Approach (BTA) and Autoregressive Distributed Lag (ARDL) methods were used. In this study, the share of the population over the age of 45 in the total population, the real interest rate, the ratio of net wealth to disposable income and the variables of public saving rate are discussed. There is a positive relationship between saving rates and real interest rate and productivity growth in the long run. The impact of the increase in the share of the elderly population, net wealth and public savings on saving rates is negative.

Kolasa and Liberda (2015) examined the determinants of saving rates in Poland and made a comparison with other OECD countries. The variables of unemployment rate, real interest rate, inflation rate, dependency rate, dependency rate in foreign trade, urbanization rate, income per capita, ratio of financial wealth to income, ratio of money supply M2 to income and the ratio of household financial wealth to income were used. The findings obtained in the study show that Poland exhibits a different structure in some ways compared to other OECD countries. Private savings and household savings rates in Poland are more affected by the financial deepening process. Private and household savings exhibit higher sensitivity to public and firm savings.

Arıç (2015) discussed the factors that determine the savings rates in his study and examined a group of sixteen countries. These countries are members of the Asia-Pacific Economic Cooperation Forum (APEC). The data belong to the years 2000-2013. Panel data was used as a method. According to the results, the variables that positively affect the savings rates are income level, dependency ratio, ratio of young population, rural and urban population. Financial depth, on the

other hand, has a negative effect on savings. The effects of inflation and the elderly population are insignificant.

Ozioma et al. (2016), the determinants of private domestic savings in Nigeria were tried to be determined. Cointegration test, vector error correction model and Granger causality test were used in the analysis performed using data between 1980-2015. According to the analysis results, the interest rate has a positive long-term effect on the domestic savings rates in Nigeria in the period under examination and has an insignificant effect in the short term. Income has a negative effect in the long run, and its effect is insignificant in the short run.

Şengür and Taban (2016) investigated the determinants of household savings in Turkey. They focused on factors other than income. Household Budget Surveys between 2002-2013 were used. Logistic regression models were applied in the study. The variables that have a positive impact on household savings are education level, ownership of the residence, owning a second home, and annual disposable income of over ten thousand lira. Owning a car, living in a rural area, household size, and temporary or seasonal work factors negatively affect savings.

Tunay (2017) analyzed data from 1995 to 2015 to identify the macroeconomic determinants of household savings for 23 different economies, including both industrialized and developing countries. Panel data method was used in the study. It differs from other studies in that it includes output gap and unemployment gap variables. It has been determined that wealth level and long-term interest rates have important effects in determining savings. While long-term interest rates, inflation negatively affect savings; household debt has a positive effect.

Aka and Arıcan (2019) studied the factors determining savings behavior of households in Turkey and have used data from 1996 to 2017. The Least Squares Method (LSM) was used in the analysis. As variables, per capita GDP, inflation rate, money supply and youth dependency rate are included in the model. GDP per capita and inflation rate had a positive impact on saving rates in the period under review. However, the money supply and the youth dependency ratio have had negative effects on savings. Effects for all variables are statistically significant.

When the studies on the determinants of saving rates are examined, it is seen that the factors of real interest rate, inflation rate and the dependency rate of the population are included in almost all models. However, it can be said that there are different uses in the saving rate indicator, which is used as a dependent variable. Household saving rate was used in some studies, public saving rates in some studies, and total savings in others. In addition to these, there are also studies in which different variables such as urbanization rate, housing and stock prices, credit constraint is included in the models. Studies using current account deficit indicators are extremely limited. In this study, data on current account deficit will also be used. Thus, it will be investigated whether the theoretical framework between the current account deficit and the savings rate can be supported empirically.

4. Modelling Framework and Data Management

4.1. Data Description

Variables used for empirical analysis are selected by considering prepositions and available empirical evidence in line with theoretical studies. In addition, data availability of the four countries studied is considered. This study uses an annual time series of the MINT countries over the period 1980 and 2018. This period is chosen based on full data availability in all four countries. The data are collected from the World bank and International Money Fund.

The main purpose of the paper is to investigate the determinants of gross savings. Gross saving, which is gross national income less total consumption, plus net transfers. GDP per capita growth (annual %), inflation, consumer prices (annual %), current account balance (% of GDP), financial development index prepared by the IMF taking into account the depth, access, and efficiency of financial markets and age dependency ratio is the ratio of dependents.

Considering the variables used in the literature, the structural features of the MINT countries and the accessibility to the data of these four countries, the gross saving function is created as equation 1.

$$\mathbf{SAV_t = f(GDP_t,\ INF_t,\ CAB_t,\ FDI_t,\ AGE_t)} \quad (1)$$

Where subscript t denotes time. SAV is the gross saving, GDP is annual growth of gross domestic product per capita, CAB is current account balance, FDI is financial development index and AGE is age dependency ratio.

A positive relationship is expected between the increase in gross national product, which expresses the increase in disposable income, albeit indirectly, and savings rates. The relationship between inflation and savings is controversial. The fact that more nominal spending is inevitable with the increase in the general price level means a decrease in savings, but the high inflation expectation may positively affect precautionary savings. It is expected that the current account deficit, which occurs with the increase of imports in foreign trade transactions, will negatively affect savings. The results of the applied studies have failed to show consensus on the relationship between FDI and savings, but a bidirectional relationship is expected between the two variables. The relationship between age dependency ratio and savings rates is relatively clear. Individuals under the age of 15 and over the age of 65 are not able to save due to the lack of a productive population in the labor market. The working population, on the other hand, increases their savings by taking into account retirement years throughout their working life.

4.2. Methodology

This paper uses the ARDL bounds testing procedure advanced by Pesaran, Shin, and Smith (1996), Pesaran and Shin (1999), and Pesaran, Shin, and Smith (2001) to investigate the long-run relationships between the saving rate and its determinants. Although various methods are used to examine the saving function in the literature, ARDL approach is used in this paper due to some advantages. First, the ARDL boundary test approach does not require that all variables are integrated at the same level. Traditional cointegration approach where only I (1) integration order is required for cointegration test; however, ARDL test can be applied to I (0) and (1) integration order. Its ability to be applied in different integration order adds flexibility to the model.

In addition, the ARDL approach provides better results for small sample sizes in time series data than other cointegration techniques (Pesaran et al., 2001). In this approach, all variables are assumed to be endogenous, and the long-term and short-term parameters of the model are estimated simultaneously (Khan et al., 2005). The fact that the causal relationship between savings rates and macroeconomic variables cannot be determined in advance, and that bidirectional relationships between variables are possible, makes the ARDL approach preferable. Lastly, the appropriate lags in the ARDL model are corrected for both serial correlation and endogeneity problems.

Considering the variables used in the literature, the structural characteristics of the MINT countries and the data availability of these four countries, the ARDL equivalence below is specified as equation 2.

$$\begin{aligned}\mathrm{SAV_t} = \ \delta_0 + \sum_{i=1}^{p} \delta_{1i}\Delta\mathrm{SAV_{t-i}} + \sum_{i=1}^{p} \delta_{2i}\Delta\mathrm{GDP_{t-i}} + \sum_{i=1}^{p} \delta_{3i}\Delta\mathrm{INF_{t-i}} \ + \sum_{i=1}^{p} \delta_{3i}\Delta\mathrm{CAB_{t-i}} \\ + \sum_{i=1}^{p} \delta_{4i}\Delta\mathrm{FDI_{t-i}} + \sum_{i=1}^{p} \delta_{5i}\Delta\mathrm{AGE_{t-i}} + \lambda_i\mathrm{SAV_{t-1}} + \lambda_2 GDP_{t-1} + \lambda_3 INF_{t-1} \\ + \lambda_4 CAB_{t-1} + \lambda_5 FDI_{t-1} + \lambda_6 AGE_{t-1} + e_t\end{aligned} \quad (2)$$

Where e, δ and λ are, respectively, the white-noise error term, the short-run coefficients and Δ is the first difference operator.

In the first stage, Bound F-statistics (boundary test for cointegration) is calculated to establish a long-term relationship between variables and to determine the existence of long-term relationships between variables. The calculated value of the F statistics is compared with the two critical p-value sets in Pesaran, Shin, and Smith (2001) and Kripfganz and Schneider (2018).

With the finding that the variables are cointegrated, the error correction model can be estimated. The error correction model equivalence below is specified as equation 3.

$$\Delta \mathrm{SAV_t} = \alpha_0 + \sum_{i=1}^{p} \delta_{1i} \Delta \mathrm{SAV_{t-i}} + \sum_{i=1}^{p} \delta_{2i} \Delta \mathrm{GDP_{t-i}} + \sum_{i=1}^{p} \delta_{3i} \Delta \mathrm{INF_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{p}} \delta_{4\mathrm{i}} \Delta \mathrm{CAB_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{p}} \delta_{5\mathrm{i}} \Delta \mathrm{FDI_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{p}} \delta \Delta \mathrm{AGE_{t-i}} + \eta_i ECM_{t-1} + u_t \quad (3)$$

Where η, is the coefficient of the error correction term and ECM means error correction model. The error correction model is an approach used to predict both the short-term and long-term effects of one time series on another. The ECM coefficient refers to the rate at which a dependent variable returns to equilibrium after a change in variables. ECM express the rate at which a dependent variable returns to equilibrium after a change in other variables.

5. Empirical Results and Discussion

Although the ARDL boundary test provides more freedom compared to other cointegration techniques, the series should not be stationary at I(2) for the application of this approach. Unit root tests are performed to determine the stationarity levels. In this study, augmented Dicky-Fuller (ADF, 1979) and Phillips Perron (PP, 1988) unit root tests are used.

Table 1. **Unit-Root Analysis**

ADF Unit-Root Test

	Level				**First Difference**				
Variable	**Mexico**	**Indonesia**	**Nigeria**	**Turkey**	**Mexico**	**Indonesia**	**Nigeria**	**Turkey**	
SAV	-2.769***	-2.691***	-2.491	-2.337	-9.483*	-6.351***	-5.878*	-7.872*	I(0)
GDP	-5.599*	-4.574*	-4.130*	-6.800*	-9.237*	-8.134*	-9.943*	-10.69*	I(0)
INF	-4.244*	-4.921*	-2.886***	-1964	-4.474*	-7.437*	-5.586*	-7.188*	I(0)
CAB	-3.191**	-2.184	-2.663***	-3.320**	-6.449*	-6.303*	-5.525*	-7.609*	I(0)
FDI	-1.540	-4.312*	-1385	-0.942	-6.607*	-5.858*	-4.209*	-6.257*	I(1)
AGE	-7.986*	-3.026*	2.064	-4.387*	-0.277	-0.949	-6.052*	-0.186	I(0)

PP Unit-Root Test

	Level				**First difference**				
Variable	**Mexico**	**Indonesia**	**Nigeria**	**Turkey**	**Mexico**	**Indonesia**	**Nigeria**	**Turkey**	
SAV	-2.908**	-2.538	-2.610***	-2.142	-9.135*	-14.53*	-8.367*	-7.872*	I(0)
GDP	-6.128*	-4.608*	-4.149*	-7.049*	-15.22*	-25.02*	-10.27*	-22.59*	I(0)
INF	-2.123	-4.921*	-2.757***	-2.025	-8.763*	-25.68*	-9.427*	-7.484*	I(1)
CAB	-3.090**	-2.179	-2.552	-3.436**	-7.051*	-6.990*	-7.882*	-10.38*	I(0)
FDI	-1.427	-3.363**	-1.407	-0.949	-7.246*	-5.200*	-5.800*	-6.255*	I(1)
AGE	-11.729*	-5.309*	-1.007	-6.524*	-0.277	-0.965	-2.620***	-0.199	I(0)

The results of the ADF and PP unit-root tests are presented in Table 1. The results of the ADF unit-root tests show that the time series of gross saving, annual growth of gross domestic product per capita, inflation, current account balance, age dependency ratio are stationary at level I(0) and financial development index is the first difference I(1). PP test results are similar to ADF test results

except for inflation. According to PP test results inflation is stationary at the first difference I(1). All the variables fit I(0) or I(1) which satisfies the requirements of Pesaran, Shin, and Smith (2001) so the ARDL model can be applied for MINT countries.

Table 2. **Bounds Testing Co-İntegration Analysis**

Countries	**Mexico**	**Indonesia**		**Nigeria**		**Turkey**
	ARDL(1,4,0,1,1,0)	ARDL(4,4,3,1,0,0)		ARDL(2,0,0,0,0,0)		ARDL(4,1,4,3,4,3)
ARDL F-Statistics	5.254*	5.810*		7.324*		7.786*
		Pesaran, Shin, and Smith (2001)		Kripfganz and Schneider (2018)		
	Significance level	1%	5%	1%	5%	
	Lower bounds	3.41	2.62	4.39	3.04	
	Upper bounds	4.68	3.79	6.49	4.62	

The bounds-testing procedure identifies the long-run relationship between a gross saving and its determinants. The critical bounds value for a small sample and a large sample are given by Pesaran et al. (2001) and Kripfganz and Schneider (2018) respectively. As shown in Table 2, the bounds testing results suggest that at 1% level of significance, the estimated F-statistics for all countries exceeds the upper critical bound value of 4.68 and 6.469. These results confirms the existence of cointegration among the selected variables.

Table 3. **Results Of Long-Term Analysis**

	Mexico		**Indonesia**		**Nigeria**		**Turkey**	
Variable	**Coef**	**t-value**	**Coef**	**t-values**	**Coef**	**t-value**	**Coef**	**t-value**
GDP	1.389**	3.74	2.577	1.37	-1.836**	-3.36	0.7765	0.93
INF	-0.023	-0.94	-0.478	-1.00	-0.192	-1.37	-0.132	-2.05
CAB	1.540***	5.00	0.5472	0.45	1.937***	3.79	2.992	1.37
FDI	0.598**	3.00	0.1315	0.64	-2.700***	-3.96	3.779	1.11
AGE	0.314*	2.48	-0.1541	-0.75	3.637**	3.28	5.759	1.28
Diagnostic Test Statistics And P-Values								
Adjusted R^2	0.825		0.864		0.534		0.845	
χ2 ARCH	0.640		0.917		0.919		0.803	
χ2 B-PAGAN	0.742		0.405		0.238		0.378	
χ2 NORM	0.154		0.547		0.491		0.038	
χ2 RESET	0.448		0.584		0.222		0.115	

Long-term estimation results are presented in Table 3. Long-term estimation results differ from country to country. The results for Mexico and Nigeria show that the variables GDP, CAB, FDI and AGE are statistically significant; however, INF is not significant. The current account deficit has a positive effect on saving for both countries. The coefficient on CAB is 1.540 and 1.937 respectively, which means that in the long term a 1% increase in current account deficit to an increased 1-2% savings, all things equal otherwise. Contrary to expectations, the foreign trade deficit and savings are moving in the opposite direction. It seems possible that the two countries, which have been deficits for many years for structural reasons, will increase their savings for precautionary reasons. The Mexican results show that foreign Direct Investment and savings are moving in the same direction, but according to the Nigerian results, these two variables are moving in the opposite direction. The ratio of foreign Direct investments to GDP is very different for the two countries. In Nigeria, this ratio, which is much smaller, may be one of the reasons why the results of the analysis differ.

The results of Indonesia and Turkey show that the independent variables included in the analysis did not have a meaningful impact on savings. The fact that both countries are developing, experiencing frequent economic crises and the fragile local currencies may have led to this result. Ramsey'S RESET test shows whether there is an identification error in the model, and the examined results indicate that the model is correctly specified.

Table 3 shows the results of different diagnostic statistics for each country. A time series exhibiting conditional heteroscedasticity is said to have autoregressive conditional heteroscedastic (ARCH) effects (Engle 1982) ARCH test is used to determine heteroskedasticity in series. The results of 4 countries show that no problem of heteroscedasticity exists in the models. Breusch-Pagan-Godfrey results also show that no problem of heteroscedasticity exists in the models. The results of Skewness-Kurtosis Test refer to the fact that data sets are modeled for normal distribution, except for Turkey. As there are decent observations, the analysis has also been continued for Turkey, even if the assumption of normality is not provided.

Table 4. **Results Of Short-Term Analysis**

	Mexico		**Indonesia**		**Nigeria**		**Turkey**	
Variable	**Coef**	**t-value**	**Coef**	**t-value**	**Coef**	**t-value**	**Coef**	**t-value**
GDP	0.349***	5.19	0.480	1.99	-0.940**	-3.41	-0.450*	-2.82
INF	-0.121	-0.93	-0.124	-1.70	-0.0983	-1.33	-0.060	-1.65
CAB	1.305***	9.36	0.814*	2.20	0.992***	4.24	-0.452	-1.32
FDI	0.146*	2.15	0.049	0.63	-1.382***	-3.79	0.877***	4.66
AGE	0.166*	2.44	-0.058	-0.55	1.862*	2.58	23.095***	4.64
ECM_{-1}	-0.527*	-3.91	-0.377	-1.74	-0.512*	-5.49	-0.4193	-1.15

The results of the short-run relationship between gross saving and independent variables are reported in Table 4. The error correction models show a coefficient significantly different from zero and negative for all countries. The error correction term expresses the speed adjustment to restore equilibrium in the dynamic model and it should have a statistically significant coefficient with a negative sign. The short-term results of Mexico and Nigeria are similar to the long-term results. Unlike the long-run in the short- run, CAB has significantly affected the gross saving for Indonesia. Turkey's short-term results differ with the long-term. GDP, FDI and AGE have significantly affected the gross saving.

5. Conclusions

This study examines the nexus between 'gross savings rates and some determinants of savings' for MINT countries using annual data for the period of 1980–2018. To analyse the impact of macroeconomic variables on gross savings, the ARDL bounds testing approach have been applied. Although the analysis results differ from country to country. In the short run, the results for Nigeria and Mexico are similar. Similar to Dirschmid and Glatzer (2003), Athukorala and Sen (2004) and Ariç (2015), there is a positive relationship between GDP and savings. Looking at the general results in the literature, the positive relationship between FDI and savings is also valid for Nigeria and Mexico; however, there is no general relationship between the dependency ratio and savings. Kudaisi (2013) concluded that there was a negative correlation between the two variables, while Arıç (2015) and Tunay (2017) concluded that there was a positive correlation. The results of Mexico and Nigeria show that there is a positive relationship between the two variables. While the analysis for MINT countries shows that the effect of inflation on savings is insignificant, generally estimates (Jongwanich, 2010; Hondroyiannis, 2006, Dirschmid & Glatzer, 2003) find a positive relationship between the two variables; Smooth (2009), on the other hand, concluded that there is an inverse relationship between inflation and savings. Long-term analysis results indicate that the

independent variables subject to analysis do not affect savings rates for Indonesia and Turkey. In the short term, however, the results show that more variables can affect gross savings.

Perceiving these four countries, which differ in terms of economic size and structural features, as belonging to the same category with the name of MINT can pose a problem. There are great differences among the macroeconomic data of MINT countries. These differences are also seen in the analysis results. One of the common aspects of these four countries, which are at different stages of development, is the volatility of savings rates. Lack of savings in these countries, which are severely affected by global economic conditions; shows that investments can be sustained with borrowing and involuntary savings.

One of the policies to be implemented towards increasing the savings rates is the development of financial systems. More reliable to financial markets with high financial depth and resistant to external shocks. Thus, individuals and companies use their savings in the financial system. Access to financial systems should be easy, product variety should be increased, and small-scale investors should be encouraged to make savings. Rearranging pension systems can also help increase savings. In particular, individual pension systems should be encouraged and state support should be increased. Since the private pension system requires regular savings, it will enable individuals to look to the future with confidence. It should be known how to manage savings, how to invest in efficient financial instruments. Individuals should be made aware of the basic features of the financial system and the benefits of financial instruments. For this, financial literacy rate should be increased by attaching importance to financial education. Firms should be encouraged to adapt to innovations and to increase their productivity. As firms grow and increase their production levels, their tendency to save will increase. However, it should not be forgotten that even if increasing the saving rates is important, it is not enough. It is also of great importance to which areas the savings are directed.

Saving, which is the determinant of investments and growth, is one of the issues that developing countries generally failIn cases where countries have insufficient savings, investments are made only by borrowing. Therefore, countries should increase the measures to increase savings with a long-term plan. It should also develop behavioral measures to guide individuals to save. However, increasing savings alone is not enough. Apart from increasing savings, MINT countries should make institutional arrangements that will provide the market environment that will optimally direct savings to investment, and at the same time give guarantees that investors will work in a safe environment.

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