The Impact of Domestic Financing for Investments on Economic Growth: An Applied Study Using Panel Data Analysis

Marwa Biltagy[1], Mahmoud R. Fath-Allah[2], Asmaa Zoreik[3]*

[1]Faculty of Economics and Political Science, Cairo University, Giza, Egypt, [2]Economist at League of Arab States, Egypt, [3]Economist at Central Bank of Egypt and PhD Candidate, Faculty of Economics and Political Science, Cairo University, Egypt. *Email: asmaa.zureik@feps.edu.eg

ABSTRACT

This study examines how reliance on domestic financing for investments, measured by the self-financing ratio (SFR), impacts economic growth. The research also examines how factors such as financial development, government budget balance, and income levels influence this relationship, using annual data from 83 countries (2005 to 2021). A system generalized method of moments (System GMM) is used to study the relationship between SFR and growth. The results show that income level affects the SFR-growth relationship. Specifically, the SFR positively and significantly impacts growth in high-income countries and the total sample. Furthermore, income level influences the relationship between economic growth and the interaction terms of the financial development index and government budget balance with the SFR. This study is considered the first to incorporate the IMF's financial development index as an interaction term with SFR to examine how a country's financial development influences the domestic financing for investments and economic growth relation.

Keywords: Growth, SFR, Domestic Savings, Panel Data Analysis
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1. INTRODUCTION

Domestic financing for investments refers to the use of local financial resources to finance investment projects within the country. In this context, the SFR comes as a measure of the country's ability to finance its investments and economic development using its own resources, especially local savings (Public and private) (Aizenman et al., 2007). The rise in domestic financing resources is seen as a positive indicator of growth potential. It shows that a country is able to generate sufficient income and savings to support its growth and development (Ganioğlu and Yalcin 2015). On the other hand, its decrease may lead to a lower economic growth rate, as well as a heavy reliance on external financing, which may be an indication of the fragility of the economy to external shocks (Bariş, 2020).

Despite this, the relationship between local financing of investments and economic growth is a complex relationship. With opinions that emphasize the positive relationship between the two variables, there are those who doubt its positivity, as if a country relies heavily on its own resources for financing, it may not be able to access benefits of external financing, such as access to capital, technology and expertise. In addition, the mobilization of domestic resources, mainly savings, may negatively affect economic growth if the economy is unable to pump those resources into productive sectors (van Wyk and Kapingura, 2021, Joshi et al., 2019).

Therefore, some studies believe that the relationship between domestic financing for investments and economic growth is complex and multifaceted, and is affected by various factors, including macroeconomic conditions, level of development, the efficiency of the financial system, and the level of government

intervention in the economy. In addition, the relationship may vary across countries and over time due to the change in economic, political and institutional conditions in each country (Athukorala and Sen, 2004).

With limited literature on the relationship between domestic financing for investments and economic growth, more research is needed to better understand the relationship between them and identify the best policies and practices to stimulate economic growth.

For this purpose, this study analyze the relationship between the SFR, which measures the extent to which total investment in the economies under study can depend on domestic saving (both public and private), and economic growth rates, as well as studying the extent to which this relationship is affected by the degree of financial development as measured by the financial development index issued by the IMF, and the fiscal balance as a percentage of GDP, in addition to the extent to which it is affected by the country's level of income.

The rest of the paper is structured as follows; Section 2 presents the literature review (both theoretical background and empirical studies), while section 3 describes SFR index and methodology. Section 4 discusses empirical results and Section 5 concludes.

2. LITERATURE REVIEW

2.1. Theoretical Background

The relationship between saving and economic growth is a basic concept in economic theory, and the basic link to that relationship is an investment, so most studies refer to the relationship between saving, investment, and growth as "Savings-Investment-Growth Nexus". Savings refers to the portion of an individual's or state's income which is not spent on consumption but is allocated for future use or investment. On the other hand, the growth rate indicates the increase in the real GDP of an economy over time.

The most prominent economic theory that dealt with the relationship between the savings rate as a primary source of domestic financing for investments and economic growth, is the Classical economic theory (the most important pioneers of which are Adam Smith, Ricardo, and Robert Malthus), this theory considered saving an important factor for economic growth by stimulating investment. In this context, the interest rate plays an important role, if there is an abundance of savings and a supply of money for investment, the interest rate tends to fall, and this encourages more investment and thus contributes to driving economic growth. Thus, for classical economics, saving enhances the economic growth rate (von Weizsäcker and Krämer 2021).

The Harrod-Domar growth model, which links saving and investment to the rate of economic growth, is a model developed independently by economists Roy Harrod and Evsey Domar in the 1930s and 1940s. According to this model, an increase in the saving rate leads to a higher rate of economic growth, while an increase in the capital factor (the proportion of capital needed to generate one unit of output) leads to a decrease in the growth rate

because a larger amount of capital is needed to produce one unit of output in this case, which reduces the growth rate (Domar, 1946; Harrod, 1939).

Also, the Solow-Swan growth model, developed individually by Robert Solow and Trevor Swan in the 1950s, posits that the savings increase leads to an investment increase, which in turn leads to higher economic growth. The theory concludes that in the long run, the economy will reach a steady state during which the growth rate is determined by the rate of technological progress, population growth, and the savings rate (Solow, 1956; Swan, 1956).

This is the same result as the Ramsey-Cass-Koopmans model, which is the model that emerged from Cass (1965) and Koopmans' (1965) development of Ramsey's (1928) analysis of saving and consumption entitled "A Mathematical Theory of Saving," but the fundamental difference between this model and the Solow model is that this model determined by the savings rate internally "endogenous" not as an external variable "exogenous" (Romer, 2012).

Despite the consensus of previous theories on the positive effect of the saving rate on investment and thus on economic growth, John Maynard Keynes, in his General Theory of Employment, Interest, and Money, pointed out that an increase in national saving does not necessarily lead to higher economic growth. According to Keynes, during a recession, an increase in savings can reduce economic growth because it reduces aggregate demand and slows economic growth (Keynes, 1936).

Concerning theories related to the factors affecting saving, at the forefront is The Life Cycle Hypothesis (LCH), which was presented for the first time by Franco Modigliani in the early 1950s, through which he provided a theoretical framework for most of the determinants of saving behavior used in modern studies (Deaton, 2005). The model is built around an individual's saving behavior that is assumed to maximize the present value of a lifetime utility, subject to budget constraints. The budget constraint equals the present value of net worth plus the present value of the business's expected income over its remaining working life (Athukorala, and Sen, 2004). Regarding the most prominent determinants of saving presented by Modigliani in his various studies, as well as other determinants covered in the literature, they are as follows: (1) Income growth, (2) Age structure of the population, (3) Public finances, (4) Development of the financial and banking sector, (5) Income level in the country.

2.2. Empirical Studies

Studies on the relationship between domestic financing for investments and economic growth provide insight into how a country's ability to finance its development can affect its overall economic performance. The literature on the relationship between the SFR (in the form that will be examined in this study) - as an indicator of domestic financing of investments, and economic growth is relatively limited, as Aizenman et al. (2007) were the first to create an indicator called the SFR, which represents the share of domestic capital that was financed through domestic saving without relying on external borrowing.

This indicator was used to evaluate actual patterns for capital financing in the 1990s. Data were used for 69 economies, divided between developing economies (47 economies) and advanced and high-income economies (22 economies), during the period (1981-2001), and the analysis showed a stable pattern of capital financing throughout the 1990s, in an era that witnessed increasing financial integration. The study indicates that the wave of financial liberalization in the early 1990s had a minimal impact on SFR ratios. Moreover, the study indicates that throughout the 1990s, countries with higher SFRs grew faster than countries with lower SFRs. The study emphasized that financial integration between countries and foreign investment flows are neither sufficient nor a necessary condition for successful economic recovery processes. The evidence for this is that foreign investments did not play an important role in the economic recovery processes in East Asian countries and that the importance of foreign direct investment does not lie in that it increases the size of the capital, but its importance lies in the fact that it enhances trade and economic ties and the transfer of technology. Therefore, for investment flows to be useful, it is necessary to focus on the quality of those investments and what they will provide to the economy to which they are directed. The point is not quantity, but rather quality.

Using the same indicator with minor modifications, the research paper by Ganioğlu and Yalcin (2015), issued by the Turkish Central Bank, studied the relationship between SFRs and growth rates for a sample of 46 countries (24 developed countries and 22 developing countries) during A period from 1993 to 2010 using the methodology of analyzing cross-sectional data over time (Panel data techniques). The study indicated that many developing countries with low savings rates have eased financial restrictions due to the increased availability of foreign savings and the decrease in the cost of financing, which led to a further decline in domestic savings for those countries.

The results of the study provide evidence that higher values of the SFR index generally support growth performance in the medium term, which appeared more clearly for countries with low financial resources and low-middle-income countries, as low-income countries that need technological transfer from abroad may benefit from the presence of a stock of local savings, which can be considered a guarantee that increases the desire of foreign investors to invest in good local projects, as the rise in local savings helps in reducing the extent of financial restrictions imposed by countries. In other words, a decrease in the savings-investment gap (or a rise in the domestic saving rate) may attract foreign capital to good projects that enhance growth, and thus its positive impact on growth is twofold.

A strong belief persists that a higher savings rate promotes increased investment, which in turn drives economic growth. Similarly, a higher savings rate contributes to a more resilient financial system, as it allows households and businesses to better weather financial shocks and recessions. This added stability can support economic growth by softening the impact and frequency of economic downturns. (Ribaj and Mexhuani, 2021; Sellami et al., 2020; Bariş, 2020; Najarzadeh et al., 2014; Keho, 2019; Humbatova et al., 2020).

However, the relationship between the savings rate and economic growth is complex and can vary depending on factors, such as the degree of development of the economy, state intervention in it, the level of income, the state of the financial markets, and the policies of encourage investment. For example, in some countries with underdeveloped financial systems, an increase in the saving rate may not lead to an increase in investment, as the financial system may not be able to channel increased savings into productive investments and thus increased saving does not result in an increase in economic growth rates, but rather in Sometimes, high savings rates may negatively affect growth as a result of reduced consumer and investment spending (van Wyk and Kapingura, 2021; Aghion et al., 2016; Hanafi et al., 2014; Joshi et al., 2019; Budha, 2012; Verma, 2007; Athukorala and Sen, 2004; Kassıe, 2021).

Focusing on the relationship between the efficiency of the financial system, saving, and economic growth, it is clear that an efficient financial system (banking sector and stock market) plays an important role in the relationship between saving and economic growth by facilitating the channeling of saving towards productive investments and providing the necessary financing to support economic activities (Guru and Yadav, 2019). In this context, a bidirectional causal relationship was found in the Ethiopian economy, as economic growth drives financial sector efficiency and savings, while financial sector development and domestic resources bolster economic growth (Anulo, 2024).

Although many studies provide evidence that financial system development has a direct positive impact on economic growth (Hyacinth et al., 2023; Ofori-Abebrese et al., 2017; Guru and Yadav, 2019), some studies have questioned that relationship (Gizaw et al., 2024; Samargandi et al., 2015; Wen et al., 2022), as these studies indicated that what is more important than expanding the financial sector is promoting the appropriate type of financial services as well as paying attention to the quality of financing, in addition to more financing may not always be better in the case of middle-income countries. The impact of financial development also varies across countries, due to the heterogeneous nature of economic structures, institutional quality, financial markets, etc.

By studying the impact of the budget deficit (expenditures exceeding revenues and thus deteriorating government savings) on public savings in member countries of the Organization for Economic Co-operation and Development (OECD), the study by Doménech et al. (2000) concluded that a rise in the budget deficit causes a rise in real interest rates. In the economy, despite this, national savings decline, as the increase in private savings cannot cover the decrease in government savings.

Regarding the relationship between the level of income in the country and the saving rate, studies have agreed that countries that enjoy a higher level of income expressed in the per capita indicator of gross national income usually enjoy a higher rate of saving (Guma and Qnga-Bonga, 2016; Loayza et al., 2000; Gocer, 2019), but the Ariç (2015) reached a different result, as the paper showed that there is a negative relationship between the level of income and saving, which is different from theoretical expectations. However, the study justified this result by the presence of an imbalance in

the distribution of income, which leads to a negative impact on savings.

3. METHODOLOGY

3.1. SFR Index
This section reviews the SFR index, which is calculated to be used as a measure of the country's ability to finance its investments and economic development using its resources, especially domestic savings (Aizenman et al., 2007; Ganioğlu and Yalcin, 2015).

3.1.1. Background on the Index
The index equation is as follows:

$$f_{t;n} = \frac{\sum_{i=1}^{n} S_{t-i}(1-d)^{i-1} + kY_{t-n}(1-d)^{n}}{\sum_{i=1}^{n} I_{t-i}(1-d)^{i-1} + kY_{t-n}(1-d)^{n}}$$

As; (f) Self-financing index, (k) is the ratio of capital to GDP at the beginning of the period (calibrated value), (d) Depreciation rate (calibrated value = 0.1), (Y) real GDP, (I) real gross investment, (S) real domestic savings.

The idea is basically to "backcast," meaning that S and I go back n years (10 years). Therefore, the SFR in period t refers to a ratio calculated using a "backcast" of S and I for n years. As noted in the index formula, more weights are assigned to recent investment and saving figures. The index was calculated using two methods

and the difference between them is the way to calculate (k). in first method, k is a calibrated value and its value is (3), while the second method allows the value of (k) to vary across countries.

It is worth noting that when SFR value is less than (1), this indicates partial dependence on foreign savings, while when the value is equal to (1), it means that the entire domestic capital stock is self-financed, that is, financed by domestic savings.

In the next section, we review the results of estimating the SFR using two different calculation methods, comparing the results of the estimates, in addition to reviewing the results of the index for some countries.

3.1.2. Comparison of index results by income level using two calculation methods
The following figure shows the variation in the index value between groups divided according to income level by calculating the average index for countries in each level. The results show that as income level rises, the index value increases, which is necessarily a result of higher savings rates, which will be reflected in the country's ability to provide domestic financing.

In Figure 1 represents the first method of calculating the index, which considers (k) a calibrated value and its value is (3), while 2 represents the results of the second method, which allows the value (k) to vary across countries[1].

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1   The method of calculating the capital-to-output ratio (K) is based on data from selected previous years and is defined as the ratio of total real investment to the change in output during the period in question, and this period was defined as three years at the beginning of the period based on the study of Wai, U. T. (1985).

Figure I: SFR calculation's results
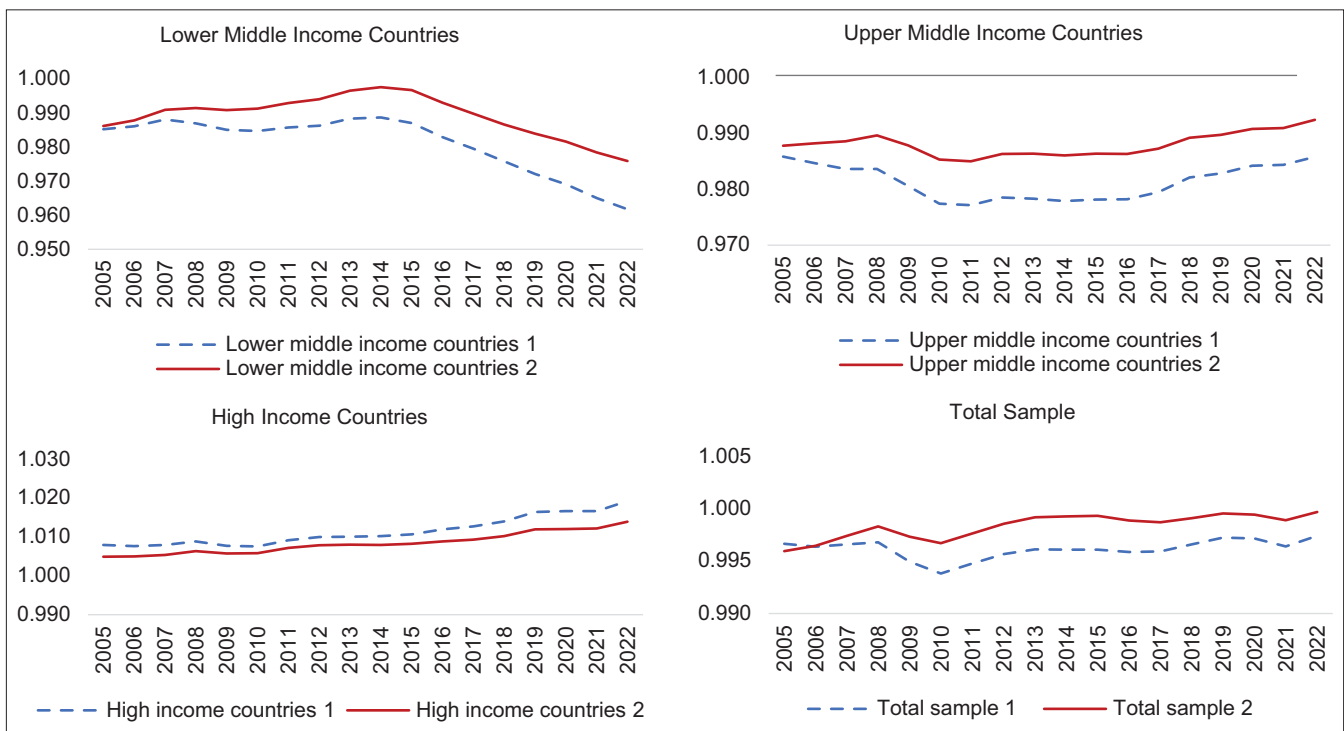
Source(s): Author's calculations

The results show that the index value in lower and upper-middle-income countries is <1 (even with different calculation methods), which means partial reliance on foreign savings to finance investments.

As for the total sample, as it is clear from the figure, the index value is also <1 even with different calculation methods, which is because most countries in the sample have an index value <1, except for most high-income countries. It is also clear from the previous figures that the general trend of the index tends to increase during the study period, except for lower-middle-income countries.

Regarding the comparison between the index results according to the two calculation methods, in general, the index values using the first method are less than those calculated using the second method in lower and upper-middle-income countries as well as in the total sample. On the contrary, in high-income countries, the index values using the second method are less than those calculated using the first method, which is mainly due to mathematical principles, namely that the index results for the first group are <1, meaning that the numerator is less than the denominator, and thus with the addition of a positive number to each of them - as a result of the estimated value of (k) increasing over that calibration, the index value becomes greater. On the contrary, in the high-income group, in which the index value exceeds 1 in the first calculation method, and thus with the addition of a number to the numerator and denominator, the index value becomes less.

3.2. Data
This paper uses a sample of 83 countries that belong to the high- and middle-income segments, according to the World Bank classification for the year 2022, so that the division of the countries under study is as follows: (41 high-income countries, 42 middle-income countries). It is worth noting that the availability of data was the primary factor in selecting these countries from among the total countries that belong to those segments. The difference in income levels of the research group will help in studying the extent to which the relationship under study changes with differences in income levels and then savings levels. This is in addition to the fact that Egypt falls into one of the income segments under study, and thus the possibility of benefiting from the results of this study for application to the Egyptian economy.

Annual data will be used covering the period (2005-2021). The World Bank database was used to obtain the data under study, except for the indicators of the financial development index and the investment rate, which were obtained from the IMF database.

3.3. Description of Variables
This paper focuses on studying how domestic financing for investments affects economic growth rates, The SFR index will be used as a measure of the country's ability to finance its investments and economic development using its resources, especially domestic savings (both public and private). Two interaction variables are calculated and included in the model, which are the interaction between SFR and both the Financial development index and Government balance to study the extent of the impact of these two indicators on the relationship between domestic financing of investments and economic growth Table 1.

In addition, there are four control variables included in the model, that affect the economic growth rate, these variables are trade openness, inflation rate, foreign direct investment, and investment rate.

3.4. Hypotheses
This paper aims to study the impact of the SFR on enhancing economic growth rates, as well as studying the extent to which the degree of financial development and government balance, in addition to the level of state income, influence the relationship in interest. Then, the main hypotheses are:

H_1: There is a positive relationship between SFR and GDP Growth.
H_2: Higher Financial development has a positive impact on the relationship between SFR and GDP Growth.
H_3: Government balance has a significant impact on the relationship between SFR and GDP Growth.
H_4: The income level has a significant impact on the relationship between SFR and GDP Growth.

3.5. Model Specification
A system GMM is used to contain dynamic factors and also to control the endogeneity problem when studying the relationship between SFR and growth. The presence of endogeneity leads to biased and less efficient estimates in pooled OLS, fixed effects, and random effects models (Schultz et al., 2010).

To address the challenge of endogeneity the paper (Ganioğlu and Yalcin, 2015) used system-GMM technique due to its suitability relies on several conditions similar to those in the present study, including a limited number of periods and a large number of individuals, a linear relationship, a dynamic dependent variable, and independent variables that are not strictly exogenous (Roodman, 2009). Specification tests, such as the Arellano and Bond test of autocorrelation errors and the Hansen tests of overidentification, will be conducted to verify the system's GMM estimator's reliability.

The system GMM model consists of one equation to analyze the relationship between the SFR and economic growth rates including the interaction and control variables as mentioned,

$$gdp_{i,t} = \beta_0 + \beta_1\, gdp_{i,t-k} + \beta_2\, sfr_{i,t} + \beta_3\, sfr\_findix_{i,t}$$
$$+\beta_4 sfr\_govbal_{i,t} + \sum_{j=1}^{k} \delta_j X_{it,j} + \lambda_t + \eta_i + \varepsilon_{it}$$

Where; $i = 1,….,83$, $j = 1,….,k$ and t, respectively refer to country, number of control variables, and time series element of the data. ε is the error term. The dependent variable, gdp is the gross domestic product growth rate, sfr represent self-financing ratio, and sfr_findix and sfr_govbal are the interaction between SFR and both the Financial development index and Government balance respectively, Other regressors used in this model are represented by the vector of control variable X, involve trade openness (TO), investment rate (INVEST), the share of foreign direct investment in GDP (FDI) and inflation rate (INFL), also λt represents a vector of period dummies, ηi is a country-specific fixed effect.

Table 1: The description of variables

Indicator	Symbol	Definition	Source
GDP growth rate (dependent variable)	gdp	The rate of change in the monetary value of final goods and services produced in a country in a given period of time (usually a year)	World Bank
Self-financing ratio	Sfr3	An indicator that (approximately) determines the share of domestic capital financed by cumulative domestic savings without relying on external borrowing	Author's Calculations
Trade openness	to	Average exports and imports as a percentage of GDP, an indicator that measures the importance of foreign trade in the overall economy	Author's Calculations
Inflation rate	infl	Rate of change in the general number of consumer prices	World Bank
Foreign direct investment (% GDP)	fdi	Net inflows of foreign investment to acquire a permanent share in management (10% or more of voting shares) in an enterprise operating in an economy other than the investor's economy	World Bank
Investment rate (% GDP)	invest	Gross capital formation ratio as a percentage of GDP	International Monetary Fund
Labor force size	lf	Proportion of the working-age population (15-64 years) to the total population	World Bank
Financial development index	findix	An indicator that measures the development of financial institutions and financial markets in a country in terms of depth, reach and efficiency	International Monetary Fund
Interaction between financial development index and self-financing rate	sfr_findix	Product of the financial development index and the self-financing ratio	Author's Calculations
Government budget balance	govbal	The difference between government revenues and expenditures as a percentage of GDP	World Bank
Interaction between government budget balance and self-financing rate	sfr_govbal	Product of the government budget balance and the self-financing ratio	Author's Calculations

The model has been applied to the whole sample at first, and then to two sup-groups of samples which are high-income and middle-income countries. Also, the model for the three groups is applied twice for the two ways to calculate the SFR as mentioned previously.

Panel data often face challenges such as autocorrelation, heteroscedasticity, and potential multicollinearity. Neglecting these issues can significantly compromise the reliability of statistical inferences. To address these concerns, various diagnostic tests have been performed, including the Breusch-Pagan test for heteroscedasticity, the Wooldridge test for autocorrelation, and the variance inflation factor (VIF) test for multicollinearity (Wooldridge, 2001). The results of these diagnostic tests, presented in Table 2, indicate significant levels of heteroscedasticity, and autocorrelation in the data. The Heteroscedasticity and Autocorrelation Consistent (HAC) robust variance estimator was employed to address issues related to both heteroskedasticity and autocorrelation. and multicollinearity was ruled out, as the mean VIF was 1.24 Table 2.

4. EMPIRICAL RESULTS

4.1. Descriptive Analysis

In general, there is a large disparity between the highest and lowest values of the displayed variables, which is mainly due to two factors, which are; (a) the disparity between the sample items, as the sample includes countries with different income levels, and therefore these countries witness individual disparities between them. (b) the period that witnessed several violent economic changes, such as the global financial crisis of 2008-2009, and the Covid-19 pandemic in 2020 Table 3.

Table 2: The results of diagnostic tests

Breuscha-Pagan test	Wooldridge test	Mean VIF
Prob >Chi-square=0.000	Prob >F = 0.000	1.24

Source (s): Done by authors using STATA software

Table 3: The descriptive statistics of the study's variables

Variables	Observations	Mean	Standard Deviation	Min	Max
gdp	1,411	2.982	3.989	−23.508	24.475
to	1,411	46.203	32.189	10.652	221.313
infl	1,411	3.763	4.283	−7.114	59.220
fdi	1,411	5.755	18.973	−117.419	279.361
invest	1,411	23.671	5.577	7.200	54.800
lf	1,411	69.720	8.571	43.724	89.450
findix	1,411	0.456	0.246	0.078	0.997
govbal	1,411	−2.446	3.931	−32.108	28.214
sfr3	1,411	0.996	0.085	0.798	1.606
sfrvary	1,411	0.998	0.074	0.775	1.582

Source (s): Stata

The value of some indicators ranges between negative and positive values for the sample during the study period, most notably the economic growth rate, as the lowest value of the indicator reached about −23.5 and was recorded in the Bahamas in 2020 as a result of the effect of the Covid-19 pandemic, while the highest value of the indicator was recorded at about 24.5% in Ireland in 2015, which is mainly due to changes in the accounting standards for measuring output, which led to this boom in the growth rate in 2015 (Khder et al., 2020). Among the other indicators that range between negative and positive values are the inflation rate, foreign direct investment, and the budget deficit. The values of the remaining indicators ranged between positive values, but they witnessed large variations, which is mainly due to the reasons mentioned above.

The large variation in the financial development index, as the lowest value of the index is about 0.078, which was recorded by Cameroon in 2014, while the highest value of the index among the sample countries was about 0.997, which was recorded by Switzerland in 2007.

Regarding the SFR using the two different calculation methods, it is clear that the lowest value of the index does not exceed 0.7, while the highest value of the index not exceeds 1.5.

4.2. Discussion of Results

This section presents the empirical findings on the relationship between economic growth and the SFR. The results are organized into three subsections based on income-level subgroups and the overall sample. Additionally, this section shows the model's results using two different methods for calculating the SFR.

4.2.1. High income countries

Table 4 shows that in model (1) while using the first method of calculating SFR (k = 3), there is a positive and significant relation between economic growth and SFR in the high-income country group (41 countries), which means that the economic growth positively affected by the country's ability to finance its investments using its resources which is consistent with the first hypothesis and in line with the reference papers (Aizenman et al, 2007; Ganioğlu and Yalcin, 2015) Table 4.

The interaction between the financial development index and the SFR has a negative and significant effect on economic growth which is contrary to the second hypothesis. This result might seem counterintuitive since financial development typically aids economic growth by mobilizing savings, facilitating investments, and improving capital allocation. While these results can be supported by some previous studies which show that certain factors and dynamics could create a negative correlation between the

financial development index and economic growth, for example, countries with highly developed financial sectors might experience more severe economic downturns during financial crises due to stronger interlinkages with global markets like what happened in the global financial crises 2008/2009 (Čižo, 2020). other studies indicated that what is more important than expanding the financial sector is promoting the appropriate type of financial services as well as paying attention to the quality of financing (Samargandi et al., 2015; Wen et al., 2022).

While the interaction between the government budget balance and the SFR has a positive but insignificant effect on economic growth, meaning that the third hypothesis doesn't apply.

Regarding the control variables, the variable (invest) which represents the gross capital formation ratio as a percentage of GDP has a positive and significant effect on economic growth, while the other variables (to, fdi, infl) are insignificant.

Model (2) which used the second method of calculating SFR (k vary across countries), revealed almost the same result as model (1) except for the SFR relation with economic growth, as the relation became insignificant.

4.2.2. Middle income countries

According to model results in Table 5, the relations between SFR and the interaction between SFR and financial development index (sfr_findix) with GDP are insignificant in the middle-income country group (42 countries)[2]. The relation between the interaction

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2   It worth noting that the upper and lower middle-income countries are summed in one group because of the difficulty of running the model for the lower-middle income countries as of the insufficient number of groups that was less than the minimum number of instruments.

Table 4: The model results of the relation between GDP growth and SFR in high-income countries

GDP	Model (1)	Model (2)
lgdp	0.1798* (0.099)	0.1842* (0.097)
l2gdp	−0.1797*** (0.005)	−0. 1872*** (0.004)
l3gdp	0.0026 (0.967)	−0.0004 (0.995)
invest	0.1093** (0.02)	0.0995* (0.072)
to	0.0098 (0.788)	−0.0093 (0.789)
fdi	−0.0368 (0.371)	−0.0335 (0.442)
infl	−0.0093 (0.936)	0.0554 (0.748)
sfr3	22.9328* (0.079)	-
sfrvary	-	33.7415 (0.141)
sfr3_findix	−2.2525* (0.063)	-
sfrvary_findix	-	−2.4402* (0.083)
sfr3_govbal	0.0397 (0.730)	-
sfrvary_govbal	-	0.05432 (0.661)
AR (1) pr.	0.001	0.002
AR (2) pr.	0.248	0.253
Hansen test pr.	0.449	0.319
No. of instruments	40	40

The P-value of each variable is shown between brackets, ***P<0.01, **P<0.05, *P<0.10
The main response variable is GDP, while the control variables include trade openness, investment rate, the share of foreign direct investment in GDP and inflation rate. Time dummy variables are considered, but the results are not reported
Source (s): Stata

Table 5: The model results of the relation between GDP growth and SFR in upper-middle-income countries

GDP	Model (1)	Model (2)
lgdp	−0.3160* (0.084)	−0.3249* (0.081)
l2gdp	−0.0039 (0.975)	−0.0103 (0.936)
l3gdp	−0.0157 (0.869)	−0.0176 (0.858)
invest	0.2571** (0.024)	0.2611** (0.026)
to	0.0266 (0.601)	0.0259 (0.610)
fdi	−1.1062 (0.164)	−1.1212 (0.159)
infl	−0.0765 (0.471)	−0.0691 (0.532)
sfr3	19.4724 (0.309)	-
sfrvary	-	23.151 (0.302)
sfr3_findix	−6.8714 (0.207)	-
sfrvary_findix	-	−6.4092 (0.185)
sfr3_govbal	0.7642***(0.003)	-
sfrvary_govbal	-	0.7870***(0.003)
AR (1) pr.	0.007	0.009
AR (2) pr.	0.138	0.136
Hansen test pr.	0.414	0.454
No. of instruments	40	40

The P-value of each variable is shown between brackets, ***P<0.01, **P<0.05, *P<0.10
The main response variable is GDP, while the control variables include trade openness, investment rate, the share of foreign direct investment in GDP and inflation rate. The negative sign of lgdp is due to the decreasing or fluctuating gdp data for most of group members even with running the model in different periods. Time dummy variables are considered, but the results are not reported
Source (s): Stata

Table 6: The model results of the relation between GDP growth and SFR in the total sample

GDP	Model (1)	Model (2)
lgdp	0.1371** (0.038)	0.1493 ** (0.032)
l2gdp	−0.0891** (0.012)	−0.0909 ** (0.012)
l3gdp	0.0099 (0.844)	0.0054 (0.921)
invest	0.1485*** (0.000)	0.1470*** (0.000)
to	−0.0052 (0.310)	−0.0044 (0.379)
fdi	0.0065 (0.457)	0.0048 (0.447)
infl	−0.0121 (0.832)	−0.0103 (0.853)
sfr3	7.6204* (0.090)	-
sfrvary	-	8.1893* (0.097)
sfr3_findix	−3.551 *** (0.000)	-
sfrvary_findix	-	−3.3632*** (0.000)
sfr3_govbal	0.1112 (0.168)	-
sfrvary_govbal	-	0.1188 (0.150)
AR (1) pr.	0.000	0.000
AR (2) pr.	0.163	0.179
Hansen test pr.	0.227	0.179
No. of instruments	72	72

The P-value of each variable is shown between brackets, ***P<0.01, **P<0.05, *P<0.10
The main response variable is GDP, while the control variables include trade openness, investment rate, the share of foreign direct investment in GDP and inflation rate. Time dummy variables are considered, but the results are not reported
Source (s): Stata

between SFR and government balance (sfr_govbal) with GDP is positive and significant which could be justified that when the government balance is positive, the government will not use the domestic resources (mainly domestic savings) to finance its deficit, so that the domestic resources are available to be invested and used by other sectors to stimulate the economic growth, in addition, this will increase the total domestic savings. This result is supported by the positive and significant relation between the investment rate and GDP growth and in line with some previous studies, such as (Chinn et al., 2014; Chun, 2006; Doménech et al., 2000) Table 5.

For the other control variables, there is a negative and significant relation between trade openness and GDP growth, that could be justified by the trade deficit in most of group members, while the effect of other variables is insignificant. These results are consistent with the third hypothesis while the first and second hypotheses aren't applied to this income group. It's worth noting that there is no difference in the results between the two models 1 and 2.

4.2.3. Total sample
In the total sample group (83 countries), the model results reported in Table 6 reveal that the SFR is estimated to be positive and statistically significant which is consistent with the first hypothesis, which supports the view that countries with high SFRs grow faster as concluded in the reference papers (Aizenman et al, 2007; Ganioğlu and Yalcin, 2015). While the interaction between the financial development index and the SFR (sfr_findix) has a negative and significant effect on economic growth, which contradicts the second hypothesis, and the interaction between the government budget balance and the SFR (sfr_govbal) has a positive but insignificant effect on economic growth indicating that the third hypothesis doesn't apply, this mainly driven by the results of that relation in the high-income group Table 6.

Regarding the control variables, gross capital formation ratio as a percentage of GDP has a positive and significant effect on economic growth, while the other variables (to, fdi, infl) show insignificance.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This study provides valuable insights into the role of domestic financing in driving economic growth across countries with varying income levels. By focusing on the SFR—an indicator that captures the extent to which domestic investments could be funded by cumulative domestic savings—the paper examined how this metric influence economic growth rates, particularly in the context of financial development, government intervention, and income level. Using a system GMM approach allowed us to address dynamic factors and control for endogeneity, leading to robust findings, the model was run using annual data from 83 countries from 2005 to 2021.

The results reveal that the relationship between the SFR and economic growth is significantly positive in high-income countries and the overall sample. In middle-income countries, while the SFR also showed a positive relationship with growth, this effect was not statistically significant. Additionally, income levels were found to affect the relationship between economic growth and interactions of both the financial development index and government budget balance with the SFR, demonstrating that income status influences how domestic financial dynamics impact growth. The results don't capture major differences in the relations of interest when using the two different calculation methods for the SFR.

Based on the findings of this study, several recommendations can be made to enhance economic growth through domestic financing strategies; Encourage Savings and Investment Policies in High-Income Countries, given the positive and significant impact of the SFR on economic growth in high-income countries, policies that promote domestic savings and channel them into productive investments could sustain or even accelerate growth in these economies. Tax incentives for savings, improved access to financial services, and favorable interest rate policies could bolster domestic capital formation.

Strengthen Financial Development in Middle-Income Countries, since the SFR-growth relationship in middle-income countries was positive but not statistically significant, financial development could be a key area for improvement. Policymakers in these countries should prioritize strengthening the financial sector, expanding access to credit, and supporting financial inclusion to enable more effective mobilization of domestic savings for investment.

Enhance Government Budget Management to Support Growth, the study shows that the interaction between government budget balance and the SFR impacts economic growth in middle-income countries. Governments could improve their budget management practices to complement domestic financing, focusing on

minimizing fiscal deficits and allocating budgetary resources more effectively to support domestic investment.

Tailor Financial Development Initiatives to Income Levels, given that income level influences the relationship between financial development and the SFR's impact on growth, financial development policies should be adapted to the economic contexts of specific countries. High-income countries might focus on advanced financial products and services, while middle-income countries could prioritize access to fundamental financial infrastructure and inclusive banking services.

The study does have some limitations, the difficulty of dividing the middle-income group into upper and lower subgroups due to data limitations. The study period ends in 2021 because of the delay in issuing the financial development index by the IMF.

REFERENCES

Aghion, P., Comin, D.A., Howitt, P. (2006), When does domestic saving matter for economic growth? IMF Economic Review, 64, 381-407.

Aizenman, J., Pinto, B., Radziwill, A. (2007), Sources for financing domestic capital-is foreign saving a viable option for developing countries? Journal of International Money and Finance, 26(5), 682-702.

Arellano, M., Bond, S. (1991), Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. The Review of Economic Studies, 58(2), 277-297.

Ariç, K.H. (2015), Determinants of savings in the Middle East countries. Kocaeli Üniversitesi Sosyal Bilimler Dergisi (KOSBED), 29, 23-36.

Athukorala, P.C., Sen, K. (2004), The determinants of private saving in India. World Development, 32(3), 491-503.

Bariş, S. (2020), Are savings the determinant of economic growth in the D8 countries? Manisa Celal Bayar University Journal of Social Sciences, 18(2), 403-414.

Budha, B. (2012), A Multivariate Analysis of Savings, Investment and Growth in Nepal. MPRA Paper 43346. Munich Personal RePEc Archive.

Cass, D. (1965). "Optimum Growth in an Aggregative Model of Capital Accumulation." Review of Economic Studies Vol. 32 No 3, pp. 233–240.

Chinn, M.D., Eichengreen, B., Ito, H. (2014), A forensic analysis of global imbalances. Oxford Economic Papers, 66(2), 465-490.

Chun, Y.J. (2006), Population Aging, Fiscal Policies, and National Saving: Predictions for the Korean Economy. NBER Working Papers 12265. National Bureau of Economic Research.

Čižo, E., Lavrinenko, O., Ignatjeva, S. (2020), Analysis of the relationship between financial development and economic growth in the EU countries. Insights into Regional Development, 2(3), 645-660.

Deaton, A. (2005), Franco Modigliani and the Life Cycle Theory of Consumption, Research Program in Development Studies and Center for Health and Wellbeing. United States: Princeton University.

Domar, E.D. (1946), Capital expansion, rate of growth, and employment. Econometrica, 14(2), 137-147.

Doménech, R., Taguas, D., Varela, J. (2000), The effects of budget deficit on national saving in the OECD. Economics Letters, 69(3), 377-383.

Ganioğlu, A., Yalcin, C. (2015), Domestic savings-investment gap and growth: A cross-country panel study. Central Bank Review, 15, 39-63.

Gizaw, T., Getachew, Z., Mancha, M. (2024), Financial development and economic growth: Evidence from emerging African and Asian countries. Cogent Economics and Finance, 12(1), 2398213.

Gocer, I. (2019), Determinants of domestic saving rate in Turkey: A new generation econometric analysis. Theoretical and Applied Economics, 3(260), 135-150.

Guma, N., Qnga-Bonga, L. (2016), The relationship between savings and economic growth at the disaggregated level, Economia Internazionale/International Economics, 70, 1-24.

Guru, B.K., Yadav, I.S. (2019), Financial development and economic growth: Panel evidence from BRICS. Journal of Economics, Finance and Administrative Science, 24(47), 113-126.

Hanafi, M., Martawardaya, B., Parewangi, A.M.A. (2014), The Contributions of Savings and Loans on GDP Growth: The Case of Indonesia. In: EcoMod Conference Proceedings. Ecomod Press.

Harrod, R.F. (1939), An essay in dynamic theory. The Economic Journal, 49(193), 14-33.

Humbatova, S.I., Tanriverdiev, S.M., Mammadov, I.N., Hajiyev, N.G.O. (2020), Impact of investment on GDP and non-oil GDP in Azerbaijan. Journal of Entrepreneurship and Sustainability Issues, 7(4), 2645-2663.

Hyacinth, C., Ngong, C.A., Onwumere, J.U.J. (2023), Empirical evidence of the financial development and economic growth nexus in sub-Saharan Africa (1995-2022): An index approach. Journal of Economic and Administrative Sciences. https://doi.org/10.1108/JEAS-01-2023-0006.

Joshi, A., Pradhan, S., Bist, J.P. (2019), Savings, investment, and growth in Nepal: An empirical analysis. Financial Innovation, 5(1), 39.

Kassıe, N.M. (2021), The effects of financial development on economic growth in Africa: Does The quality of institutions matter? Journal of Business Economics and Finance, 10(4), 166-177.

Keho, Y. (2019), Relationship between savings and economic growth in Cote d'Ivoire. International Journal of Economics and Financial Issues, 9(6), 202-207.

Keynes, J.M. (1936), The General Theory of Employment, Interest, and Money. London: Macmillan.

Khder, M. B., Montornès, J., & Ragache, N. (2020). "Irish GDP Growth in 2015: A Puzzle and Propositions for a Solution". Economie et Statistique, Vol. 517 No. 1, pp 185-203.

Koopmans, T. C. (1965). "On the Concept of Optimal Economic Growth." In the Economic Approach to Development Planning. Amsterdam: Elsevier.

Loayza, N., Schmidt-Hebbel, K., Servén, L. (2000), Saving in developing countries: An overview. The World Bank Economic Review, 14(3), 393-414.

Najarzadeh, R., Reed, M., Tasan, M. (2014), Relationship between savings and economic growth: The case for Iran. Journal of International Business and Economics, 2(4), 107-124.

Ofori-Abebrese, G., Pickson, R., Diabah, B. (2017), Financial development and economic growth: Additional evidence from Ghana. Modern Economy, 8(2), 282-297.

Olkamo, D.A. (2024), Exploring the Linkages between Financial Development, Savings, and Economic Growth in Ethiopia: Empirical Evidence Based Analysis. MPRA Paper No. 120335. University Library of Munich.

Ramsey, F. P. (1928). "A Mathematical Theory of Saving." Economic Journal Vol. 38 No. 152, pp. 543–559.

Ribaj, A., Mexhuani, F. (2021), The impact of savings on economic growth in a developing country (the case of Kosovo). Journal of Innovation and Entrepreneurship, 10(1), 1.

Romer, D. (2012), Advanced Macroeconomics. 4th ed. New York: McGraw-Hill Irwin.

Roodman, D. (2009), How to do xtabond2: An introduction to difference and system GMM in Stata. The Stata Journal, 9(1), 86-136.

Samargandi, N., Fidrmuc, J., Ghosh, S. (2015), Is the relationship between

financial development and economic growth monotonic? Evidence from a sample of middle-income countries. World Development, 68, 66-81.

Schultz, E. L., Tan, D. T., & Walsh, K. D. (2010). "Endogeneity and the corporate governance-performance relation". Australian journal of Management, Vol. 35 No. 2, pp 145-163.

Sellami, A., Bentafat, A., Rahmane, A. (2020), Measuring the impact of domestic saving on economic growth in Algeria using ARDL model. Les Cahiers du Cread, 36(4), 77-109.

Solow, R.M. (1956), A contribution to the theory of economic growth. Quarterly Journal of Economics, 70(1), 65-94.

Swan, T.W. (1956), Economic growth and capital accumulation. Economic Record, 32(2), 334-361.

Van Wyk, B.F., Kapingura, F.M. (2021), Understanding the nexus between savings and economic growth: A South African context. Development Southern Africa, 38(5), 828-844.

Verma, R. (2007), Savings, investment and growth in India: An application of the ARDL bounds testing approach. South Asia Economic Journal, 8(1), 87-98.

Von Weizsäcker, C.C., Krämer, H.M. (2021), Saving and Investment in the Twenty-First Century: The Great Divergence. Berlin, Germany: Springer Nature.

Wai, U.T. (1985), Study of ICOR in developing countries. Savings and Development, 9(3), 225-263.

Wen, J., Mahmood, H., Khalid, S., Zakaria, M. (2022), The impact of financial development on economic indicators: A dynamic panel data analysis. Economic Research-Ekonomska Istraživanja, 35(1), 2930-2942.

Wesiah, S., Onyekwere, S.C. (2021), The relationship between financial development and economic growth in the United Kingdom: A granger causality approach. Quantitative Economics and Management Studies, 2(1), 47-71.

Wooldridge, J.M. (2001), Applications of generalized method of moments estimation. Journal of Economic Perspectives, 15(4), 87-100.