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Does Supply-Leading Hypothesis Hold in Emerging Markets? Empirical Insights from a European Market

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Abstract

This study examines the relationship between financial development and economic growth, and the extent to which the finance-leading hypothesis holds in Hungary by using annual time series data over the period 1970-2019. To test the hypotheses of the study, the autoregressive distributed lag approach and Granger causality test have been applied. The empirical findings show that there is a relationship between financial and economic growth, but the evidence of the supply-leading hypothesis in the long run in Hungary is varied according to the sector. While in the short run, the changes in the ratios of credit to both agencies of the private sector have no statistically significant impact on economic growth. According to the Granger test, there is evidence supporting the neutrality hypothesis for the credit-to-corporate ratio and the feedback hypothesis for the credit-to-household ratio in relation to economic growth. This is a consequence of the fact low levels of efficiency characterized the Hungarian financial system, despite it being characterized by high levels of financial depth. Besides, financial liberalization and financial development increased reliance on external finance, which caused the fragility of the financial system and the effect on its role in economic growth. Policymakers need to target the channels and financial efficiency mechanisms to influence and transform the real economy in all the regions of the country to equally develop goals and economic growth together and ensure stable macroeconomic policies.

هل فرضية قيادة العرض صحيحة في الأسواق الناشئة؟ دلائل تجريبية من سوق أوروبية

فائزة برهوم
توث جورجي

ملخص

تبحث هذه الدراسة في العلاقة بين التطور المالي والنمو الاقتصادي، وإلى أي مدى فرضية قيادة العرض صحيحة في المجر باستخدام بيانات السلاسل الزمنية السنوية خلال الحقبة 1970-2019.لاختبار فرضيات الدراسة، تم تطبيق نهج الانحدار الذاتي للفجوات الزمنية المتباطئة واختبار سببية جرانجر. تظهر النتائج التجريبية أن هناك علاقة بين التطور المالي والنمو الاقتصادي، لكن الأدلة على فرضية العرض الرائدة على المدى الطويل في المجر تتنوع وفقًا للقطاع. في حين في المدى القصير، فإن التغيرات في نسب الائتمان للقطاع الخاص ليس لها تأثير مهم إحصائيًا على النمو الاقتصادي. وفقًا لاختبار جرانجر، هناك دليل يدعم فرضية الحياد لنسبة الائتمان إلى الشركات وفرضية التغذية الراجعة لنسبة الائتمان إلى الأسرة فيما يتعلق بالنمو الاقتصادي. وهذه نتيجة لانخفاض مستويات الكفاءة التي اتسم به النظام المالي الهنغاري، مع أنّ أنه يتسم بمستويات عالية من العمق المالي. إلى جانب ذلك، أدى التحرير المالي والتنمية المالية إلى زيادة الاعتماد على التمويل الخارجي، مما تسبب في هشاشة النظام المالي وتأثيره على دوره في النمو الاقتصادي. يحتاج صانعو السياسات إلى استهداف القنوات وآليات الكفاءة المالية للتأثير على الاقتصاد الحقيقي وتحويله في جميع مناطق البلاد لتطوير الأهداف والنمو الاقتصادي معًا بشكل متساوٍ وضمان استقرار سياسات الاقتصاد الكلي.

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1. Introduction

One of the key objectives of sustainable development is growth. It is a critical component of the long-term growth and stability of a country and is the main reason for the wealth and well-being of millions of people. While some countries' economies expand quickly, others do not (North, 1994). Decision-makers have given this topic a lot of thought over 200 years. Additionally, economists have proposed some ideas on the key variables affecting economic growth, which may help to explain why there are regional differences in economic growth. However, no single theory offers a definitive solution.

One of these drivers is an economy's financial systems' development, which was later introduced by classical economic theory as the key element of economic growth and has gained more attention during the recent thirty decades. However, schools of thought have not reached a consensus that financial development (hereafter FD) is always the cause of economic growth. Theories of finance and growth provide different predictions about the impact of the functioning of financial systems on growth and their connection. For example, FD causes growth (Bagehot, 1873; Schumpeter 1912), or FD is the outcomes of the process of growth (Robinson, 1952), or maybe it is a destabilizing element because it causes macro and financial turbulence through massive risks and its source of crises (Minsky, 1983). Other famous experts, including Nobel laureates in economics, have ignored the function of FD in development and economic growth (e.g., Lucas, 1988). Moreover, since the 2008 financial crisis, the finance-growth nexus has been called into question, despite the substantial and broad evidence of the positive impact of FD in determining a country's economic growth that is at this time written about in the research.

Literature suggests that a well-developed financial system fosters economic growth through its efficient functions in pooling savings, allocating to higher efficient productive investments, reducing transaction costs and risks, and implementing corporate governance (Levine, 2005). Thus, an inadequately developed financial sector is a barrier to economic growth. However, each one of those functions and its effect mechanisms of economic growth is not the same in all economics, but they rely on country-specific and on its institutions and vary over

time as well. Consider that a single-country study would be more useful for assessing the connection between FD and growth and for offering practical policy implications.

Theoretically, Bagehot (1873) and Schumpeter (1912) were among the first to discuss this relationship between finance and growth, and this relationship has been the subject of much literature, especially since emerging the Endogenous Growth Theory (hereafter EGT) in the early 1990s. Over the past thirty years, the literature used various indicators of FD and growth with different econometric approaches, used also aggregate macro (and micro)-level data. However, the questions of whether FD is good or bad for growth and whether FD is a cause /or outcome of economic growth are still without a conclusive answer. In other words, there is no consensus among the researchers about the shape of the relationships and the impact of FD on economic growth, thus, more empirical literature is still needed.

Since the transition process in the 1990s, Hungary has launched various financial restructuring programs. And its financial sector had also two crises that were followed by the economic recession. However, despite the importance of the finance-growth nexus from the perspectives of both scholars and policymakers, there are insufficient empirical studies on the finance-economic growth nexus. In addition, the existing literature shows contradictory and ambiguous results. For example, Varela (2018) pointed out that FD and financial liberalization in 2001 in Hungary promoted economic growth. While Tsaurai (2015) reported, the finance-growth link is not clear in Hungary.

Moreover, a serious concern has risen recently about the finance-growth debate in Hungary, particularly because the financial system in pre-crisis years was one of the most developed in the European region. However, its economic progress has slowed down, leaving the matter unresolved. Hence, the motivation of this paper is driven by the role that may FD plays in the Hungarian economy by allocating financial resources, mobilizing and pooling savings, as well as, reducing risks.

The primary two purposes of the paper are to shine a new light on this debate through an examination of the relationship between FD and economic growth by using Hungary data over the period of 1971 to 2019, and answer the following research question: Does the finance-led growth hypothesis hold in Hungary? Therefore, the study's findings may aid in steering economic and financial policy decisions in the right direction.

The main contributions of this study include: (I) contributing to filling the gap in the scarce extant literature about the specific relationship between FD and growth in Hungary, which is dominated by cross-country analysis; (II) contributing to the discussion of the impact of FD on growth and to the academic literature on the relationship between finance and growth. The Autoregressive Distributed Lag (ARDL) Approach is used for empirical analysis. The findings suggest the existence of a stable long-run relationship between growth and FD in Hungary. However, the finance-led growth hypothesis does not hold with the Hungarian economy.

Our study suggests that, contrary to what the EGT and some studies claimed, and contrarily to household sector in Hungary, the evidence of the supply-leading hypothesis is weak in Hungary in the case of corporate funding. This is a consequence of the fact that an unhealthy system characterizes the Hungarian financial system and affects the quality and volume of funds available for investment. Although it is characterized by high levels of financial depth and has a range of financial services that are accessible to all sectors and income levels, it does not have adequate high levels of efficiency. As a result, the performing Hungarian financial system is not doing plays an important role in the economy, either by facilitating the accumulation of capital through the efficient direct flow of savings or through the flow of investments in the economy. In addition, financial liberalization and FD increased reliance on external finance, which caused fragility of the financial system and harmed economic growth. Moreover, efficiency challenges and political change issues also contributed to the performance of the financial sector in Hungary. Policymakers need to target the channels and mechanisms through which financial efficiency influences and transforms the real economy, and policy reform for financial development should, therefore, continue to be a priority.

The rest of the paper is organized, as follows: A brief review of the finance-growth nexus would be included in the next section. Section 3 highlights the financial system and economic growth experiences of Hungary. We described the model and data in section 4; section 5 presents the results and analysis of the study. Finally, section 6 provides concluding statements and recommendations.

2. A Brief review on Finance- Growth Nexus

The discussion idea of the finance-growth nexus started with Bagehot (1873), who attributes the success of economic development in British to the efficient role of the financial sector. However, the most valuable contribution came from the work of Schumpeter (1911) who developed the finance-led growth hypothesis (or supply-leading responses hypothesis), in which a well-developed financial sector is a pre-condition and necessary for economic growth, however, economic growth is not a condition for FD. Later, (Goldsmith, 1969; Rinosha and Mustafa, 2021) among others, supported this view empirically.

Interestingly, building on Schumpeter's viewpoint has been later developed the models of EGT. However, someone did not widely accept and delay this viewpoint (because of several reasons such as the impactions of World War, then the Great Depression in 1929, and later the emergence of Keynesian theory in 1936) until the mid-1950s, when Gurley and Shaw (1956) provided evidence that the causality goes from FD to growth, rather than from growth to FD, as Robinson (1952) had claimed.

In the 1970s, the discussion concentrated on the phenomenon of financial repression, especially after the Bretton Woods international monetary system breakdown in 1971. Supporters of financial liberalization theory (McKinnon (1973) and Shaw (1973) suggested that achieving a high economic growth goal would be through financial liberalization policies. Which influence saving and investment in the country due to are considered the primary factors for economic growth for any economy. However, this view has been strongly disputed in the economic discussion (e.g., Minsky, 1983, Van, 1983)) among others. Especially the frequent and severe crises (e.g., the 2008 crisis), that followed the experiences of financial

liberalization and financial innovations in several countries. The liberalization allowed considerable inflows of capital, resulting in weak financial systems to absorb the external shocks, as occurred in Hungary during the years pre-crisis in 2008.

Next to the FD models such as the model of Stiglitz and Weiss (1981), the emergence of the EGT models like the model of Romer (1986), played a mainly role in promoting the contribution of finance to economic growth by improving the rates of technological progress. Indeed, the EGT came because of the failure of neoclassical models to explain why there are higher rates of economic growth in developed countries than in developing countries. And how to improve the rates of technological progress.

According to EGT, technological advance, human capital, and finance (which have a prominent role in capital accumulation and innovation) are prime determinants of growth. And contrarily to neoclassical models, the growth factors are not subject to the law of diminishing returns while being related to the type of investments like investment in technology and knowledge, so the growth is a continuing accumulation of process. Several growth models supported this view in the early 1990s (e.g., Greenwood and Jovanovic, (1990)), wherein FD is the mainly engine of economic growth through the accumulation of capital channel and productivity channel. However, not all those endogenous growth models suggest the importance of finance for growth (e.g., Lucas, (1988)), which suggests that the independent views or neutrality hypothesis between FD and economic growth, and even if any, it will be unimportant.

From the causality relationship concept, in the literature, along with the three hypotheses mentioned earlier, there is the fourth hypothesis related to the causality relationship between FD and economic growth, which is the feedback hypothesis. This hypothesis was developed by Patrick (1966), who assumes that there is a two-way causal link between two variables, and growth is a response to FD, and the latter also is a response to growth and development.

All the above views assume that the relationship between FD and growth is linear, only in the model of Greenwood and Jovanovic, the relationship between finance and growth is non-linear, in a U-shape, a slow economic growth at the early stages of FD before reaching a certain threshold when the growth speeds up. However, this point varies according to the economy of the country's characteristics and other factors.

Contrary, in recent years, there has been an increasing amount of literature studies have raised the issue of "too much finance,", implying that the relation between the two variables is an inverted U-shaped curve, rather than a U-shaped curve. For example, Swamy and Dharani(2019). have pointed out that there is an inverted U-shaped relationship between finance and growth in the long run, with a threshold of credit of 142 percent of GDP, thus more finance is harmful to economic growth in 24 advanced economies with higher levels of financial development, over the period 1983 to 2013.The explanations for the notion of "too much finance" have been summered in several alternative explanations, by Beck (2012), that not all credit is created equal; non-intermediation financial activities help catch up to the productivity frontier, the safety net subsidy; misalignment of talents, as well as, political capture (Panizza, 2014).

Over the past thirty years, these above different views have been empirically substantiated. However, the question of whether financial development affects economic growth positively or negatively is still without a conclusive answer. For example, in their meta-analysis of the literature, (Arestis et al. 2015) stated that the findings of the studies suggest that there is a positive and significant effect on economic growth from FD. The same finding has been reported by Ndako (2017) in Nigeria, and Rinosha and Mustafa (2021) in Sri Lanka in Sri Lanka.

In contrast, there is another pool of studies that have found a negative or weak relationship between financial development and economic growth, implying that the more finance, the lower growth. For example, (Ductor and Grechyna (2015) who used panel data for 101 developed and developing countries between 1970 and 2010, and (Elijah and Hamza 2019) in Nigeria, over the period 1981 to 2015.

Similarly, there are several works of literature also that attempted to explore the comparative performance of a bank-based system or a market-based system. However, the results showed links between aspects of the financial system and economic growth, but there is disagreement over how each one influences growth. For instance, (Peia and Roszbach, 2015) contend that while banking development damages growth in developed nations, stock market expansion promotes it. Contrarily, (Durusu-Ciftci et al., 2017) have discovered that the contribution of bank development to economic growth is positive, and more than the stock market.

The literature evaluation offered on the finance-growth nexus in Hungary is limited, and is dominated by cross-country studies, thus, could not be generalized in the context of Hungary.

Further, the findings of the existing studies, however, are apparently inconclusive on the shape of their relationship and whether FD boosts / or harms growth. For example, Varela (2018) uses Hungarian firm-level data to evaluate the impact of the deregulation of international financial flows on the productivity of firms and found that these procedures enhance aggregate productivity by increasing investment in technology. Similarly, Ono and Iwasaki (2022) found that the impact of FD on growth is helpful in some European countries, including Hungarian. Contrarily, Djalilov and Piesse (2011), who examined the impact of economic and financial development policies in Central Asian countries from 1992 to 2008. They used regression, correlation, and Granger causality. Their findings showed that both the transition reform indicator of the European Bank for Reconstruction and Development and the difference between lending and borrowing rates have a negative growth impact. While, credit to the private sector does not show a significant effect. However, some studies found the results vary according to the financial indicators used as proxies of FD. For example, Petkovski and Kjosevski (2014) found that both indicators of credit to the private sector and the ratio of interest margin harm economic growth, but the ratio of quasi-money boosts growth in Transition Economies including Hungary. Sassi and Gasmi (2014) reported that, in contrast to credit to the household sector, credit to the corporate sector reinforces economic growth in a sample of 27 European countries, including Hungary, between the period 1995 and 2012. Contrary, Angjelkovska et al. (2016) found that

the impact of credit to households on economic growth is ambiguous in thirteen transition economies over the period 1995–to 2007, but they confirmed the positive effect of credit to corporations on growth.

From a brief literature review, although the finance-growth nexus has been broadly addressed, the findings show the relationship is not still conclusive and is still under discussion. And the causality issue is not fully resolved, as well as whether the effect of FD on economic growth is positive or negative is not identified. The relationship between finances and development is heterogeneous across countries, regions, and time periods, and the indicator that is used in studies (Cave et al., 2020). In addition, despite the importance of the finance-growth nexus from the viewpoints of both scholars and policymakers, the literature evaluation offered on the finance-growth nexus in Hungary is insufficient. Moreover, those studies are dominated by cross-country studies, thus, could not be generalized in Hungary, since the impact of finance on growth is not the same and is not a one-size-fits-all approach, but, varies according to several factors such as the level of economic development, and country characteristics, which creates the need for further research.

3. Financial System and Economic Growth Experiences of Hungary

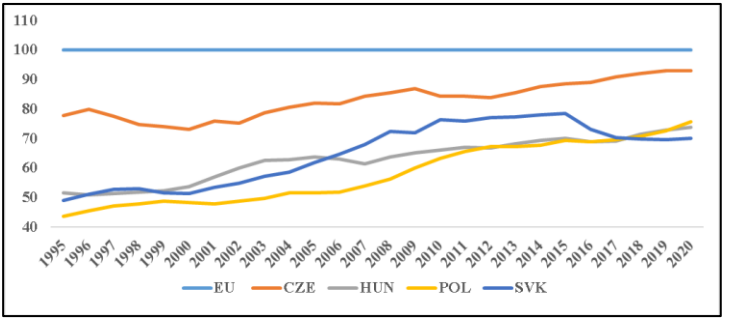
3.1. Economic Growth

Hungary was among the first Eastern European countries to start reform and gradually liberalized the economy in the 1980s (Virág, 2020). In the early 1990s, the Hungarian economy saw quick and substantial transformations, and macro-financial imbalances were a great challenge to economic development alongside other macroeconomic factors (Bod, 2017). Following privatization and the transition to the economic market, several economic and financial reforms were adopted, resulting in a speedy recovery and macroeconomic stability.

Hungary witnessed a significant growth rate between 1997 and 2004, even when compared to Western Europe ratios, which aided in convergence with the EU but was incomparable to regional country ratios. Investments were among the main drivers of this growth, besides both export and consumption. However, the growth was also associated often with some persistent slowdown cases and the middle-income trap because of the incorrectly organized economic model, and total factor

productivity has developed relatively slower than capital accumulation (*Magyar Nemzeti Bank* (MNB), 2014). Which caused decreasing investment and reflected in a slowdown in economic performance since 2005. And its growth became lower than the other Visegrád (Czechia, Poland, and Slovakia) countries and was further exacerbated after the crisis broke (Figure 1)

Figure (1): Gross domestic product, PPS, percentage of EU 27



Source: of data: Eurostat.

Surprisingly, during the first decade of the new millennium, Hungary's financial system was among the most advanced in the region, and credit ratios were high even in regional comparison, but economic development rates were considerably below credit growth rates. Contrary to credit growth ratios, the direction of economic growth was downward, as financial deepening drove low productivity sectors, such as real estate and consumption, rather than a significant increase in production capacities (MNB, 2014). As a result, Hungary's economic progress has slowed, and the accumulation of higher indebtedness, particularly external debt, has weakened the financial system and jeopardized macroeconomics.

Moreover, these factors contributed to a strong decline in the Hungarian economy than in the other Visegrád countries during the years of the crisis and needed longer recovery years. However, the turnaround in both fiscal policy in 2010 and then monetary policy in 2013, helped to balance creating a healthy economic structure and strong growth together in recent years. The Hungarian

economy was able to avoid the international growth slowdown in 2019, but, recently, the coronavirus COVID-19 pandemic has significantly affected economic growth. Additionally, the GDP per capita lagged behind its Visegrád peers since 2011, although growth GDP rates in Hungary were one of the highest rates in the EU in recent years, and that has raised still further questions.

3.2. Overview of the Hungarian Banking System

Because of the presence of state-owned banks and a central bank that oversees all banking decisions, the efficiency of the Hungarian banking system in the 1980s was very low, which affected the function of financial intermediation. Besides, the market capitalization and turnover on the capital market were also low. But the changes and the establishment of the two-tier banking system contributed to the improvement of the banking industry.

Following the government rescue plan that aimed to improve the quality of the portfolios of banks after the crisis in 1991, and as a part of the radical transformation of the economy, this sector has witnessed a significant rapid privatization process. In parallel, the regulatory framework was developed, including the introduction of new laws and regulations for the securities market and credit institutions. The shifting in monetary policy also enhanced financial services and investment transactions further.

Indeed, the European integration process served as some of the driving forces behind improved regulation and monitoring. Where Hungary abolished restrictions on capital movements, for example, the Hungarian central bank adopted a new law in 2001 to conform with EU standards (MNB, 2002). Those improvements are reflected in increasing both FD and the contribution of this sector to economic development through both capital accumulation and productivity channels. Especially, financial liberalisation allowed a considerable amount of inflow of foreign investment into the Hungarian economy.

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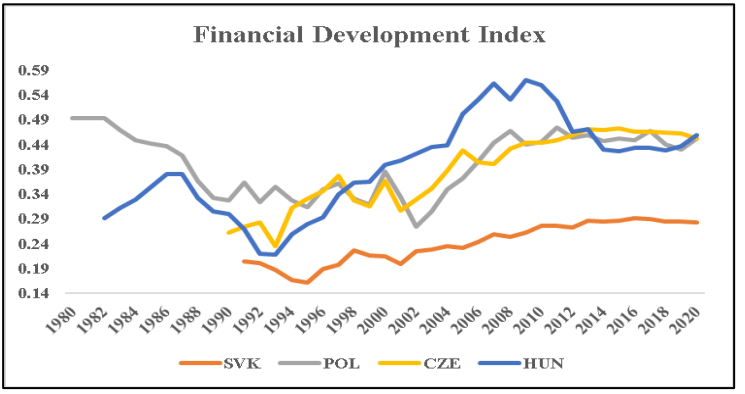
The Hungarian banks became integral parts of large international banking systems and adopted the operational modern models. The millennium's turn marked the beginning of a golden age for banks, with the benefits of sufficiently financed, high profitability, modernized services supported from overseas, and a well-developed banking culture (Bod, 2017; Kovács, 2019). The competition and acquisition processes led to a change in the structure of the financial market and increased concentration. Sales channels and regional branch networks significantly expanded, which promoted access to finance, and Hungary's financial system grew to be one of the most advanced in the area, as illustrated in Figure 1.

Figure (1): FD Indexes in Hungary and Some Comparators



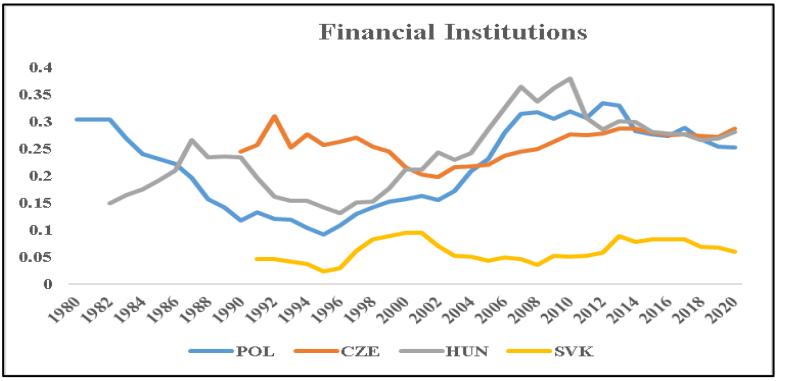
Source: Data from Global Financial Development Database, World Bank. https://www.worldbank.org/en/publication/gfdr/ data/global-financial-development-database.

However, with its heavy reliance on foreign funding, Hungary's banking system became increasingly sensitive to external threats with integration into the global economy. And short-term debt, derivatives, and governmental debt ratios

were high at the start of the 2008 financial crisis. As a result, when the international money market froze, Hungary had a liquidity problem, forcing it to ask for an IMF-EU loan. The financial sector faced considerable challenges, and credit banks' portfolios deteriorated significantly, reflected in declining credit supply) and demand. Many problems relating to the sector (e.g., governmental crisis-response measures and overall economic instability) and its clients (they were less inclined to borrow) led to loss of the competitiveness of the financial sector, especially with cost increases (MNB, 2014).

The government has taken several steps to lessen the effects on banks, including bailing them out with capital injections and using unconventional monetary policy measures to address weak bank lending activity. Two such programs are the Funding for Growth Scheme and the Growth Supporting Program, which have had a significant impact on economic growth, the avoidance of a credit crunch, and the turnaround in corporate lending. Those measures contribute to a turnaround in corporate lending, initially focusing on supporting lending to SMEs that started in 2013 and large corporations and households in 2016 (MNB, 2021).
In terms of financial development indicators in Hungary: First, the financial depth index, which measures the size of the financial sector relative to the Hungarian economy, shows an increased tendency for financial institutions and markets from the era of transition until the crisis of 2008. Because the banking industry in Hungary controls more financial assets than other financial businesses, the financial depth was larger in institutions than in markets. However, as seen in Figure 2, the depth of institutions does not exceed 0.40 for forty years, but when compared across regions, this metric is high.

Figure (2): Financial institutions depth in V4 countries

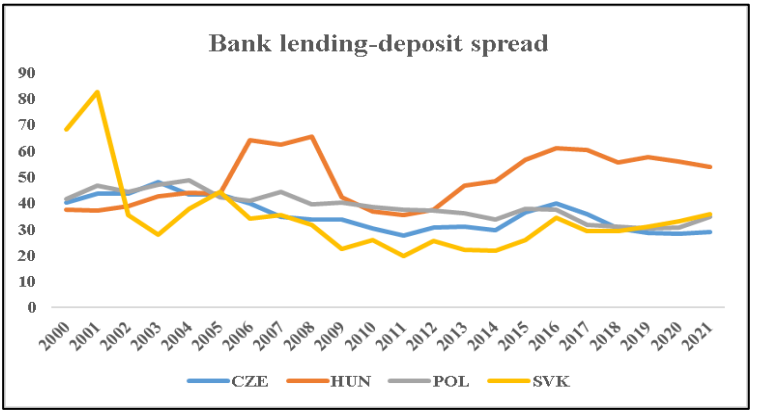


Source: Data from Global Financial Development Database, World Bank

Second, efficiency measures imply that Hungarian banking is characterized by low efficiency, even in regional comparison. These indicators are based on data from the International Financial Statistics (IFS) and the World Bank's Global Financial Development Database (GFDD). The diminished effectiveness of the Hungarian banks is not just a product of the 2008 crisis and its effects because it really began in 2005. For instance, (Pancurova and Lycosa 2013) found that, between 2005 and 2008, Hungarian banks had the lowest efficiency among the v4 countries.

On the other hand, although many steps towards digital convergence have been made by several banks, indicators of those who use internet banking and those who execute payments through the internet Hungary still lags well behind the EU and its regional competitors. Both cost to income and overhead costs to total assets ratios appears that Hungarian banks are still maintaining their relative operational inefficiency. For example, bank overhead costs to total assets ratio was 2.12 % in 2019, which is higher than the EU average, as well as, while the three Visegrád was only 1.53 %. Similar to operating a bank, the bank lending-deposit spread ratio was higher in Hungary (Figure 3).

Figure (3): Efficiency of banking lending



Source: Data from Global Financial Development Database, World Bank

4. Data and Methodology

4.1 Data

The standard literature identified in addition to financial development (FD), control variables (CV) such as trade openness as the sum of exports and imports to GDP (TOP); government final consumption expenditure to GDP (GOV), and (EMP) the number of employees (thousands), are the major determinants of economic growth. Following Schumpeter (1912) we assumed a linear relationship between finance and growth. Thus, we postulate the following model:

$$GDP_t = \beta_0 + FD_t + CV_t + \mu_t \qquad \text{(Eq 1)}$$

Here GDP is real economic growth as measured by the natural logarithm of GDP per capita (LGDP) at constant 2015 U.S. dollars. And FD is financial development as measured by two indicators, the credit to households and NPISHs sector (CHU), and credit to corporations' sector (CCOP), from all sectors, as a percentage of GDP, and CV is a set of three control variables mentioned above.

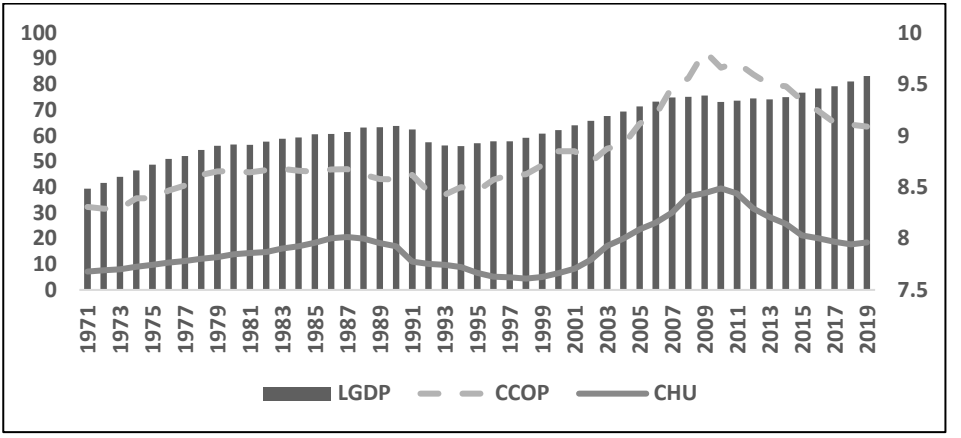
In the literature, the credit to the private sector is used as a proxy for FD, among other proxies, but the contribution of the credit to each sector to economic growth has different trajectories, in different ways and degrees as well. Thus, looking at lending to two sectors separately may help understand how the FD affected Hungarian growth clearly. A priori, it is expected that all those variables positively affect economic growth according to the supply- leading hypothesis.

According to the EGT, along with investments that come from financial services, the FD contributes to economic growth through several channels, such as the human capital building channel, which reflects in increasing employment and productivity. There is mounting evidence that the countries with high inclusive economic growth and sustainability have high human capital levels and employment, such as Singapore and Japan, so that, this paper uses the EMP variable. Similarly, Keynesian ideology is based on the work of Keynes (1936), who claimed that economic activities would increase through the borrowing of money process from the private sector by the government, which spends them on various programs to contribute to raising internal demand. In the demand context also, effectively allocating financial resources to the manufacturing sector spurs economic growth by raising competitiveness, which is reflected in the volume of trade to the economy, and increasing the number of employed people.

This study is based on annual time series data over the period from 1971 to 2019. The data are got from the World development indicators of the World Bank, United Nations Statistics, international financial statistics, and the conference board's total economy database.

By glimpsing Figure 1. Can be seen a schematic diagram of the FD and economic growth indicators, where we can notice that there appears to be a great similarity, especially credit to household sector indicator, suggesting there is a relationship between them.

Figure (4): Hungarian Economic Growth and FD Indicators – 1971-2019



Note: LGDP is the log of GDP per capita at constant 2015 U.S. dollars. CHU is the ratio of credit to households and NPISHs sector (%GDP). CCOP is the ratio of credit to corporations' sector (%GDP).

Source: Author's own work.

Looking at data in Table 1, average value of LGDP is 9.076, and the higher value of the GDP is reached in 2019, while the lower value was in the first year in the series in 1971. Fluctuations in credit to private sector, and especially credit to corporations' sector reflect the ups and downs in international credit market and level of FD. Where the ratios of credit to this sector reached its peak in 2011, and the lower value in the early 1990s.

Table (1): Descriptive Statistics of Variables Under Study

	LGDP	CCOP	CHU	GOV	EMP	TOP
Mean	9.076	53.661	16.755	20.863	4642.735	99.86734
Median	9.036	46.6	16.1	20.624	4446	78.38471
Maximum	9.581	92.9	39.5	27.727	5438	168.2428
Minimum	8.485	31.6	4.4	16.994	3921	46.38165
Std. Dev.	0.264	16.781	9.308	2.018	597.623	45.4181
Observations	49	49	49	49	49	49

Note: Std.Dev is the standard deviation

Source: Author's own work.

4.2 Econometric Methodology

In order to evaluate the assumptions, the paper employed the auto-regressive distributed lag (ARDL) model proposed by Pesaran et al. (2001), because of its below advantages over other cointegration estimating methodologies:

1. It allows for the variables to have different optimal lags;
2. Both the long-run and the short-run can be estimated;
3. can be applied without consideration of the order of integration, such as I (0) or I (1), but not the I (2);
4. It also gives unbiased explanatory coefficients;
5. is a more reliable technique in case of a sample small size like our study.

The following model will evaluate the link between economic growth and FD in Hungary:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{p} \beta_1 \Delta\ GDP_{t-1} + \sum_{i=1}^{k1} \beta_2 \Delta\ CCOP_{t-1} + \sum_{i=1}^{k2} \beta_3 \Delta\ CHU_{t-1} + \sum_{i=1}^{k3} \beta_4 \Delta\ TOP_{t-1} + \sum_{i=1}^{k4} \beta_5 \Delta\ GOV_{t-1} + \sum_{i=1}^{k5} \beta_6 \Delta\ EMP_{t-1} + \delta 1 \mathrm{GDP}t-1 + \delta 2\ \mathrm{CCOP}t-1 + \delta 3 \mathrm{CHU}t-1 + \delta 4 \mathrm{TOP}t-1 + \delta 5 \mathrm{GOV}t-1 + \delta 6 \mathrm{EMP}t-1 + ut \quad \text{(Eq 2)}$$

Where GDP represents economic growth as a dependent variable, while the other variables are independent variables as identified above, $\alpha 0$: Is a constant parameter, Δ: Denotes the first difference operator, β1, …, β6 represent the short-run coefficients, while $\delta 1$, …., $\delta 6$ represents the long-run effects, μ is white noise errors, and k1, …, k5 are the lag length.

According to Pesaran et al. (2001), the bound test is performed after determining the best lag lengths for the ARDL model. In order to check whether there is a co-integrating relationship among the dependent variable and independent variables in the long run, could be a through the test the null hypothesis of no cointegration is that H0: δ1 = δ2 = δ3 = δ4 = δ5 = δ6 = 0, by calculating F-test

developed by Pesaran, et al., (2001). If this null hypothesis is rejected, suggesting there is a long-run relationship between a dependent variable and the independent variables of the study, the long-run coefficient can be conducted.

While the short-run coefficient can be estimated from the following equation with error correction terms (ECT):

$$\Delta \text{LGDP}t = \alpha 0 + \sum_{i=1}^{k} \beta_1 \Delta\ LGDP_{\ t-1+} \sum_{i=1}^{k} \beta_2 \Delta\ CCOP_{\ t-1} + \sum_{i=1}^{k} \beta_3 \Delta\ CHU_{\ t-1} + \sum_{i=1}^{k} \beta_4 \Delta\ TOP_{\ t-1} + \sum_{i=1}^{k} \beta_5 \Delta\ GOV_{\ t-1} + \sum_{i=1}^{k} \beta_6 \Delta\ EMP_{\ t-1} + \lambda \text{ECTt-1} + ut$$

(Eq 3)

Where: λ is the speed of adjustment parameter and ECT is the residuals from the estimated co-integration model of equation (3).

However, the ARDL tests do not reveal the effect direction of the relationship among the variables, So, in order to test the causality among the variables, we performed a Granger causality test (1969) to examine the presence and direction of a causal relationship between FD and economic growth (LGDP). The Granger causality test has three different directions, unidirectional causality or one-way causality between Y as a dependent variable and X as independent (e.g., X⇒Y), two-way causality or feedback causality relationship (X ⇔Y), and independence causality (neither variable Granger-causes the other).

The causality connection is founded on a pair of ideas, according to Granger's definition from 1980, the independent variable has predictive power over the dependent variable, because it occurs before its effect on the dependent variable, and it possesses specific knowledge of the future values of its effect as well. In other words, if xt (the independent variable) affects yt (the dependent variable), it would be wise to predict yt based on prior data from xt rather than yt alone. Given these two Granger assumptions about causality, we propose to test the following hypothesis for the identification of a causal effect of FD on GDP:

$$LGDP_t = \delta 0 + \sum_{i=1}^{p} \delta i \ {}^{LGDP}_{t-i} + \sum_{i=1}^{p} \alpha i \ {}^{FD}_{t-i} + \mu 1t \quad \text{(Eq 4)}$$

$$FD_t = \beta 0 + \sum_{i=1}^{p} \beta i \ {}^{FD}_{t-i} + \sum_{i=1}^{p} \varepsilon i \ {}^{LGDP}_{t-i} + \mu 2t \quad \text{(Eq 5)}$$

Where μ is a white Gaussian random vector.

The null hypothesis that FDt does not cause LGDPt consists in testing the joint nullity of the parameters, $H0$: α1 = …= αp = 0. The null hypothesis that LGDPt does not cause FDt consists in testing the joint nullity of the parameters, $H0$: ε1 = …= εp = 0.

4.3 Hypothesis

Considering the discussion above, the contradictory predictions about the finance-growth nexus in the prevailing economic theories, and insufficient empirical evidence about this relationship in Hungary, the hypotheses that will be tested are:

P:

H1: There is a significant relationship between FD and economic growth in Hungary over the period of 1971 to 2019.
H2: The finance-led growth hypothesis holds in Hungary:
H2a: Hungarian economic growth is influenced positively by the ratios of credit to households over the period of 1971 to 2019.
H2b: Hungarian economic growth is influenced positively by the ratios of credit to the corporation's sector over the period of 1971 to 2019.

5. Empirical Results

5.1 Unit Root Test

Before estimating the base model to test the above hypotheses, it is necessary to check whether there is perfect collinearity among the variables of our study to determine their order of integration and to ensure that the variables are not I (2) stationary as well, for avoiding spurious results. This study uses different unit root tests. Table 2 shows the unit root test results in Augmented Dicky-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests.

According to the KPSS test, all series are stationary at the level only the share of government consumption to GDP is not. Contrary, in ADF and PP tests, all series are stationary at the first difference and are significant, ranging between 1 or 5 per cent level of significance, only the employment indicator is not stationary according to the PP test. Thus, suggesting that the variables are integrated at I (0) and I (1).

Table (2): Unit Root Test

Variables	At Levels			At 1st Difference		
	ADF	PP	KPSS	ADF	PP	KPSS
LGDP	-0.7374	-1.2294	0.8545	-3.6098	-2.7887	0.117308
Prob.	0.827	0.6542	0.739***	0.0092 ***	0.0063***	0.119
CCOP	-1.8926	-1.3935	0.6742	-2.5657	-5.7608	0.107
Prob.	0.3328	0.5778	0.463**	0.0114**	0***	0.119
CHU	-2.3055	-1.8068	0.3694	-2.8046	-2.8952	0.075117
Prob.	0.1745	0.3729	0.347*	0.006***	0.0047***	0.119
EMP	-1.9647	-1.3269	0.6709	-2.2262	-2.3596	0.1331
Prob.	0.301	0.6096	0.463**	0.0265**	0.1585	0.119*
GOV	-2.5115	-1.8676	0.2611	-5.7574	-5.6938	0.0426
Prob.	0.1192	0.3444	0.347	0***	0***	0.216
TOP	-0.3083	-0.3083	0.813261	-5.4981	-5.8453	0.1289
Prob.	0.9158	0.9158	0.739***	0***	0***	0.119*

Note: ***and** indicate statistical significance at the 1% and 5% levels, respectively.

Therefore, these results give support to the use of the ARDL bounds approach rather than one of the alternative Co-integration tests. On another hand, given that all the variables are stationary at I (0) and I (1), imply the variables are not I (2) stationary, thus, the condition to implement an ARDL model is achieved.

5.1. Testing for Cointegration

Figure.5 shows the optimal model ARDL (3,4,2, 4, 4, 1) which was selected based on 20 different ARDL models and a lower value of Akaike information criteria. Where three lags for economic growth, four lags, and two lags for both FD indicators. Two lags for both government expenditure and a number of employees and one lag for openness trade level have been selected.

Figure (5): The Optimal Model Using the Akaike Criterion

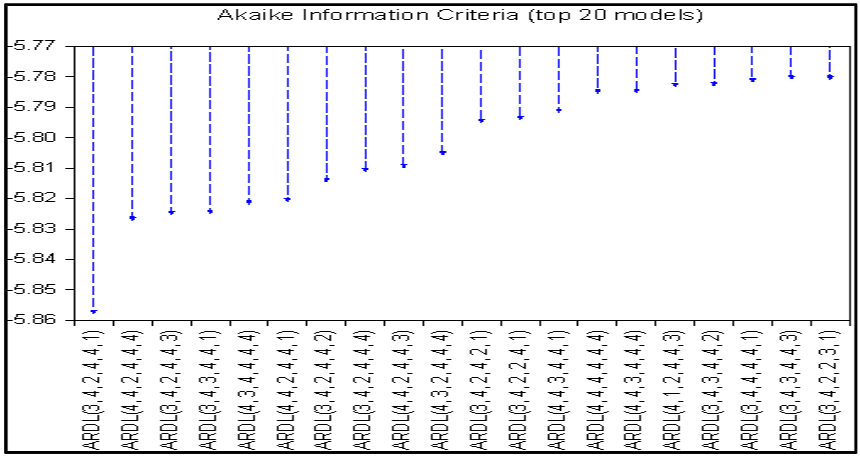


Table (3) shows the results of the bound-test, the calculated F-statistic is 11.70084, which is higher than the lower and upper bound critical values at 1%, 2.5%, 5%, and 10%, and therefore, there is a long-run equilibrium relationship between economic growth and FD in the presence of other macroeconomic variables. Implying that growth in Hungary is affected by the change in the level of FD along with the other determinants.

Table (3): The Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	11.70084	10%	2.08	3
k	5	5%	2.39	3.38
		2.50%	2.7	3.73
		1%	3.06	4.15

Source: Author's own work.

In the second stage, we estimate the long-run coefficients of the selected (3,4,2, 4, 4, 1) ARDL model, which are reported in Table (4), which shows that economic growth as measured by the GDP per capita is associated negatively with FD (proxied by private credit to corporate to GDP), but not statistically significant. Contrarily, the coefficient of FD (proxied by private credit to households and to GDP), is positively associated with economic growth and is significant at 5% level. And a one percentage point (hereafter, pp) increase in the ratio of credit to the household sector will increase economic growth in Hungary by nearly 0.018 pp in the long run. Those suggest that the evidence of the supply-leading hypothesis in the long run in Hungary is vary according to the sector, however, we can arguable it is weak because it doesn't valid in the corporate sector which is the main real economic growth sector.

The results of the effects of FD indicators on growth are inconsistent with the work of (Sassi and Gasmi,2014; Angjelkovska et al., 2016), who confirmed the positive effect of the ratio of credit to corporations on growth, and a negative of the ratio of credit to the household sector.

This result may be owing to several factors, like the Hungarian financial sector being insufficient, which is clearly in all the efficiency indicators and reflected in the low mobilization of domestic savings. Thus, reliance on external finance.

Moreover, mis-allocation of the financial resources to unproductive sectors harms the quality of investment and economic growth. In addition, the large existing

foreign investments in Hungary do not depend on domestic credit, but have alternative funding sources such as access to foreign or intergroup financing, as well, even local-owned companies have access to EU funds at lower costs.

Table (4): Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CCOP	-0.016711	0.01013	-1.649657	0.1139
CHU	0.018053	0.007784	2.319362	0.0305
EMP	0.000324	0.000109	2.983217	0.0071
GOV	0.102635	0.027821	3.689169	0.0014
TOP	0.009177	0.002637	3.479785	0.0022
C	5.31237	1.18189	4.494809	0.0002

Source: Author's own work.

Moreover, the control variables, the employment number, government consumption level, and trade openness are positive and significant at 1% level associated with growth, which means that a higher level of these indicators will enhance economic growth.

Having finished the long-run analysis, we estimate the ARDL-VECM model, the results support the presence of co-integration evidenced by the ECMt-1, which is equal to -0.178559 and significant at 1% level. This means that the speed of adjustment from the short-run in economic growth is corrected by 17.85 % percent each year over a long span of time. This speed of adjustment of 17.8 percent annually is a bit moderate, one pretext for this low speed of adjustment may be the volatility of the financial market, due to the nature of dependence on the international market.

The short-run estimations somewhat don't support the initial findings obtained by the long-run regression, and they have a different sign from the long-run estimation. The effect of both FD indicators on economic growth is not significant. Implying the change in the ratios of credit to both agencies of the private sector in the short run is not important for economic growth. However, the ratio of

credit to household becomes significant and positive for further one order, while lagged credit to corporations for three periods is negative and statistically significant.

Similarly, changes in the share of trade openness don't affect growth as well. However, the two control variables, the employment number, and government consumption level are associated positively and significantly with GDP per capita in short-run estimation.

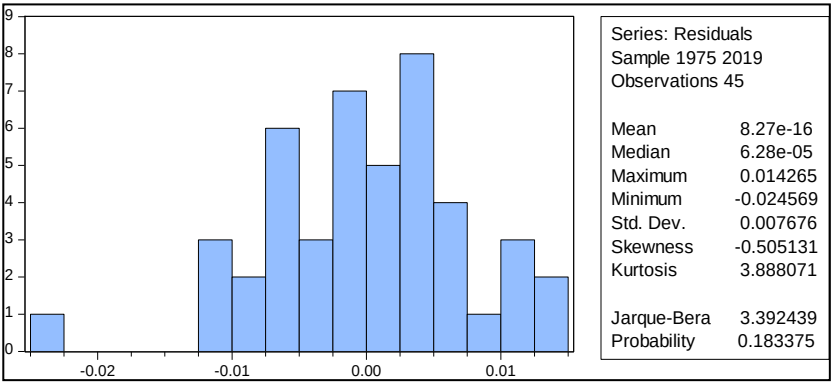
Table (5): ARDL Error Correction Regression

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Δ(CCOP)	0.000393	0.000633	0.620761	0.5414
Δ(CHU)	-0.00000772	0.001197	-0.006449	0.9949
Δ(EMP)	0.000185	0.0000335	5.512629	0
Δ(GOV)	0.007223	0.00266	2.715007	0.013
Δ(TOP)	0.000358	0.000243	1.472349	0.1558
CointEq (-1)*	-0.178559	0.0174	-10.26195	0
R-squared	0.998837	Adjusted R-squared		0.997564
F-statistic	784.4445	Durbin-Watson stat		2.074755
Prob (F-statistic)	0	Akaike info criterion		-5.85718

Source: Authors's own work.

The result of the coefficient of determination (R2) shows that about 99.8 % of the value of GDP per capita is caused by the explanatory variables. The Durbin-Watson statistics are 2.075 which shows the absence of serial correlation. Besides, to ensure the fitness of the model and to ascertain its efficiency, Jarque-Bera test is applied for normality testing (see Figure 6), showing that we can't reject the null hypothesis since (p-value) is very high.

Figure (6): Checking Normality



We used also different diagnostic tests, as we see in Table 6, that all P. values are greater than the critical values of 0.05. Thus, the residuals are characterized by being free from heteroscedasticity, and serial correlation between them.

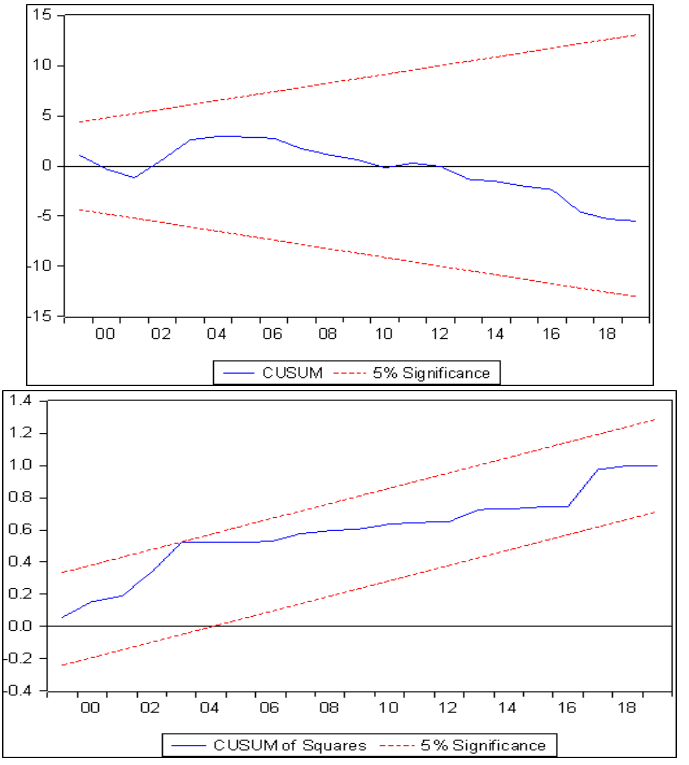
Table (6): Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test:	F-statistic	1.361381	Prob. F(3,19)	0.2802
	Obs*R-squared	5.640363	Prob. Chi-Square (3)	0.0596
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-statistic	0.444985	Prob. F (23,21)	0.9692
	Obs*R-squared	14.74514	Prob. Chi-Square (23)	0.9035
Heteroskedasticity Test: ARCH	F-statistic	0.338727	Prob. F(3,38)	0.7974
	Obs*R-squared	1.093895	Prob. Chi-Square (3)	0.7785

Source: Authors's own work.

Similarly, stability tests associated with the selected model have been checked, both the stability tests show the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMQ) estimates are structurally stable (see Figure 7).

Figure (7): The Plots of the Stability Tests



Note: The straight lines represent critical bounds at a 5% significance level.

Test Results for Granger-Causality

After we confirmed, the existence of a long-run equilibrium relationship between variables according to the results of the ARDL cointegration test implies that Granger causality exists at least in one direction, and variables might share similar stochastic trends (Granger, 1988). We should now turn to test for the direction of Granger-Causality. Table 2, shows that the time series is not stationary at the level values but is stationary at the first differences according to the Augmented Dickey-Fuller test (ADF) unit root test. The study used an information criterion, such as the Akaike information criterion and the Schwarz information criterion, to determine the optimal lag length (Table 7).

Table (7): VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-855.1116	NA	1.68E+09	38.27163	38.51251	38.36143
1	-524.3488	558.6215	3494.954	25.17106	26.85728	25.79966
2	-437.8198	123.0635*	403.2824*	22.92532	26.05687*	24.09273*
3	-399.1681	44.66421	454.0737	22.80747	27.38435	24.51368
4	-359.198	35.52893	635.0296	22.63102*	28.65323	24.87604

* Indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Source: Authors's own work.

From the above table, the optimal lag length according to the AIC criterion is four, thus, when four lags are employed at the 5% level of significance, the Granger causality results in (Table 8), indicating that there is two bi-directional causality between economic growth and both CHU and GOV, giving testimony to the feedback hypothesis between the variables. While the neutrality hypothesis is found in the case of the credit-to-corporate ratio and economic growth. And, there is unidirectional causality flowing from EMP and TOP to LGDP, supply-leading hypothesis holds in Hungary between those variables. Therefore, we can reject both the null hypothesis that CCOP, CHU, GOV, and TOP do not Granger cause

economic growth and the null hypothesis that economic growth does not Granger cause CHU.

These empirical results are in line with the view of the EGT that more credit to households spurs economic growth through stimulate consumer demand and increasing employment. In addition to increasing the competitiveness of the economy. Similarly, are in line with the thinking of the Keynesian hypothesis in the context of public expenditure, and consistent with findings by Abu-Eideh (2015).

Table (8): Test Results for Granger-Causality

Null Hypothesis	**Chi-sq**	**Prob.**	**Direction of causality**
CCOP does not cause GDP	1.54875	0.209	No causality
LGDP does not cause CCOP	1.41386	0.2491	
CHU does not cause GDP	3.15329	0.0254	Bidirectional causality
LGDP does not cause CHU	3.25204	0.0224	
EMP does not cause GDP	3.44451	0.0175	Unidirectional Causality - EMP to GDP
LGDP does not cause EMP	0.32789	0.8574	
GOV does not cause GDP	3.81503	0.011	Bidirectional Causality - GOV to GDP
LGDP does not cause GOV	3.00382	0.0309	
TOP does not cause GDP	2.7658	0.0421	Unidirectional Causality - TOP to GDP
LGDP does not cause TOP	0.83177	0.5139	

Source: Authors's own work.

5.2 Hypothesis Test

First Hypothesis Test

We can test the first hypothesis by looking at the value of the calculated F-statistic (11.70084) of the bound test, which is higher than the lower and upper bound critical values at 1%. Therefore, the null hypothesis, no cointegration is rejected, and the study confirms the existence of long-run cointegration between economic growth and FD in the presence of other macroeconomic variables. Also, the value of the error correction model (ECM-1) has a negative sign and is

significant at 1 percent level, which is other evidence for the existence of short-run cointegration.

The Second Hypothesis Test

We can test the second hypothesis by testing both H2a and H2b and looking at the signs of the coefficients of credit to both agencies of the private sector. According to the (H2a) hypothesis, we can accept it only in the long run since the sign of the coefficient of credit to the household and NPISHs sector (% GDP), is positive and significant. While it is negative in the short run, but is not significant. The Granger test also shows that credit to this sector causes economic growth.

While in the case of testing the (H2b) hypothesis, we rejected the hypothesis in both long-short runs, and even in the Granger causality test, since the sign of the coefficient of the ratio of credit to corporations is not significant. Consequently, the second hypothesis is rejected, and the finance-led growth hypothesis doesn't hold in Hungary in the case of corporate funding.

6. Conclusion and Recommendations

This study examines the relationship between FD and economic growth, whether FD influences economic growth and the degree to which the finance-led growth hypothesis is true in Hungary. Using annual time series data covering the years 1970–2019, the ARDL bound test approach was employed to validate the test study hypotheses. In the empirical analysis, the researchers reached several results, the most important of which are:

1. There is a long-run equilibrium relationship between economic growth and financial development in Hungary in the presence of control of other variables, including trade openness to GDP, government final consumption expenditure to GDP, and the number of employees.
2. Contrary to the EGT, the change in the yearly rate of corporate sector credit to GDP as a proxy for FD has no effect on economic growth.

3. While the change in the annual rate of household sector credit to GDP promotes growth in the short run and doesn't affect it in the long run. This confirms that consumption is an important determinant of economic growth in Hungary in the long run.
4. Consumption in the long run is an important determinant of economic growth, however, is not sufficient for economic growth, it is necessary but it must be also accompanied by introducing policies to support real economic growth such as government expenditure either to provide infrastructure or public goods.
5. The evidence of the supply-leading hypothesis is weak in Hungary in the context of corporate funding.

Those results could be explained by the fact that the Hungarian financial system is characterized by high levels of financial depth and has a range of financial services that are accessible to all sectors and income levels but do not have adequate high levels of efficiency.

The inefficient allocation of resources leads to a weakening of the productive capacity of the economy, where financial institutions allocate credit to the low-productive sectors at a high cost. And on the other hand, the financial system does not contribute to growth through improving through using innovations or through even human capital accumulators, thus, productivity remained low even compared to the European level. This affects also the quality and volume of funds available for investment and increases the possibility of expansion vulnerability to economic and financial shocks. In addition, high costs of lending compared to the Europe region, affect the quality of investments, and lead to an increasing reliance on the external finance market to fund growth, which in turn causes fragility of the system and harms macroeconomics.

Accordingly, policymakers need to target the channels and mechanisms through which financial efficiency influences and transforms the real economy, and ensure stable macroeconomic policies, as well as, financial policy reform should therefore continue to be a priority, focusing on institutional change particularly. In addition, improving Human capital that is a crucial determinant of economic growth

due to it being a factor of productivity and employment together, in particular, the study suggests the importance of increasing the number of employees to GDP per capita. Moreover, increased external trade and an improved investment environment, particularly, the SMEs that are restrained by a frequently changing regulatory environment and entry barriers in network industries are among the obstacles to increasing the contribution of those firms to the national economy in Hungary.

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