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Pavlo Kerimov (Ukraine)

# FINANCIAL DEPTH-ECONOMIC GROWTH NEXUS: IMPLICATIONS FOR THE UKRAINIAN BANKING SECTOR

## Abstract

The relevance of this study is warranted by changes in the modern understanding of the interrelation between economic growth and financial depth. While earlier studies consider it to be universally positive, newer ones tend to challenge both nature and direction of such a relationship. This paper aims to investigate the nature of the financial depth-economic growth nexus in Ukraine during 2008–2019 based on data provided by the State Statistics Committee of Ukraine and the National Bank of Ukraine, using the standard OLS regression. The resulting model with an adjusted R squared of 0,96 confirms a strong (within a 90% confidence interval) linear relationship between real GDP per capita, denominated in local currency, which was used as a proxy for economic growth, and financial depth, which was assessed using three indicators: the share of bank loans to non-financial institutions in real GDP, the share of non-bank loans to non-financial institutions in real GDP, and the share of stock market capitalization in real GDP. Both bank and non-bank loans to real GDP ratios have a negative impact on economic growth (UAH 2,154 and UAH 78,154 decline per 1% growth, respectively), while market capitalization provides a positive influence (UAH 1,641,130 growth per 1% growth). This implies that, despite concentrating the majority of the resources available to the Ukrainian financial sector, the banking sector does not contribute to its economic growth. This can be alleviated by imposing additional restrictions on the amount of government securities allowed in a bank's capital structure.

**Keywords** financial depth, economic growth, GDP, loans, OLS

**JEL Classification** E44, O11, O47

## INTRODUCTION

Despite near-unanimous agreement on the positive influence of financial development on economic growth, newer research shows deviation from this trend. While this is usually attributed to weak institutions in studies on developing countries, similar conclusions from studies of developed countries imply the existence of certain thresholds in financial development. In other words, after reaching a certain magnitude, the activities of the financial sector of such a country tends to become detrimental to its economic growth. However, financial sector is not uniform, and it should be assessed not via a single indicator, but using a set of indicators that can gauge the contribution of each of its constituents. Since such contributions are supposed to be country-specific, it is advisable to perform such studies on a per-country basis.

Thus, the nature and direction of the nexus between financial depth and economic growth remains largely open to discussion, and there is an increasing evidence of it being country-specific and dependent on indicators chosen to represent both financial depth and economic growth. And while the latter only has a handful of options, most of which are a variation of GDP or GNP per capita ratio, the former has quite a wide spectrum of possible assessment approaches.

The standard financial depth indicator, i.e. the domestic credit to private sector to GDP ratio, includes bank loans, purchase of non-equity securities, trade credits, and other account receivables. It shows the aggregated contribution of the financial sector to economic growth, yet it does not allow inferring whether it is the banking system, non-banking financial institutions or the financial market that are the main drivers behind economic growth. It is an evolution of an older, less precise ratio of total bank assets to GDP, which in turn is an evolution of an even older M2 to GDP ratio, that was used in the early studies of the financial depth-economic growth nexus. The logic behind such transformations is that the financial sector contributes to economic growth via the transformation of financial resources into productive investments, of which only private enterprises that produce goods and services are generally considered to be capable. Therefore, only resources allocated to such enterprises affect economic growth, which justifies excluding the parts of the ratio that do not partake in the process. The more statistics are available, the more specific financial depth ratio becomes. Thus, to use a non-standard financial debt ratio, one has to use statistics provided by local agencies.

As a general rule, local statistics are hard to obtain and/or interpret for a foreigner, and therefore the most of the research is done using standardized statistics provided by international agencies like the World Bank. This opens an opportunity for local-statistics-based country-specific studies to confirm or refute a country's adherence to general trends, set by wider studies, and to spot any additional factors that might define them. This is especially true for studies on the financial depth-economic growth nexus in Ukraine, as there are few of them and most of them are outdated.

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## 1. LITERATURE REVIEW

The mainstream of modern economic thought is mainly uniform in its positive assertion of the influence of financial development on economic growth, even though several prominent researchers (see Lucas, 1998; Robinson, 1952) argued against it. The estimation of such an influence, however, remains an open question. Starting with classical research by Goldsmith (1969), where financial development was asserted using the financial sector's assets to GDP ratio, the number of ways to assess financial development steadily increased. Barro (1991) linked economic growth primarily with the growth of human capital, reduction in government spending and macroeconomic stability. King and Levine (1993), in turn, supplemented Barro's methodological approach with financial indicators, and, four years later, Levine (Levine, 1997, p. 704) proposed the now widely accepted indicator of financial depth, calculated as the sum of liquid liabilities of the financial system in relation to GDP. These studies unanimously concluded upon the positive impact of financial development on economic growth, and financial depth (along with its modifications) became the go-to indicator for empirical studies on the financial development-economic growth nexus.

However, newer research points towards inadequacy of standard financial depth indicators as proxies for financial development. For instance, Hasan et al. (2016), using data from 72 countries during 1960–2011, conclude that financial depth alone is not enough to provide a weighted measure of financial development, and that additional indicators, which represent efficiency of the banking system, should be used, since, unlike classic financial depth factors, they are robustly connected to economic growth. Polemis et al. (2020), based on a sample of 40 developed and developing countries during 1970–2014, argue that standard financial depth indicators such as broad money and domestic credit to GDP ratios appear to have a weak and non-linear impact on economic growth if non-parametric approach is used. Sahay et al. (2015) based their research on a broader tri-fold definition of financial development: financial depth, access to finance and financial institution efficiency, and were able to conclude that financial deepening is the factor that causes the bell-shaped financial-economic growth nexus by reducing total factor productivity growth under certain circumstances (for instance, inadequately paced financial deepening).

There is also growing evidence against original view of the financial development-economic

growth nexus that was based on the notion that the rise in financial development, measured in terms of financial depth, causes economic growth. For instance, Klein and Olivei (1999), upon examining the relationship between the liberalization of capital flows, financial depth and economic growth, concluded that the positive effect of liberalization is only observed in developed countries. Rousseau and Wachtel (2005) proved that updating classical calculations with newer statistics (from 1990 and onward) makes the relationship between financial depth and economic growth noticeably less significant, compared to calculations based on 1960–1980 statistics alone, and increases the importance of individual countries' peculiarities. This is reflected in the deviation of results from maximizing financial depth between different countries. In their later work, Rousseau and Wachtel (2011) explained such occurrence with growth in inflation and weakening of banking systems caused by an excessive increase in financial depth; in other words, local and global financial crises are to be blamed for modern change in the relationship between financial deepening and economic growth. The negative effect of financial deepening on economic growth is also confirmed to be robust, regardless of the metric used to assess financial depth, by Isiaka et al. (2021), based on a sample of 40 middle income countries over 2005–2017. Stolbov (2017), based on a country-by-country analysis of 24 OECD member states during 1980–2013, concludes that a causal relationship of financial depth (which he refers to as “credit depth” and uses the standard domestic credit to GDP ratio to assess it) to economic growth is not widespread, since only 4 out of 12 countries tested had it. Boamah et al. (2018), using data from 18 Asian countries during 1990–2017, found that the impact of financial deepening (assessed via M2 to GDP ratio) on economic growth was negative, unlike the impact of gross capital formation and foreign investment.

The nature of a causal relation between financial development and economic growth is currently highly debated, with different authors reaching different, often mutually exclusive conclusions. For one, Caporale et al. (2009) concluded the existence of one-way causality between financial depth and economic growth, based on panel data from ten new EU member countries during 1994–2007.

Authors also stress on the pivotal role of the banking system and general underperformance of the non-banking system in the development of those countries. Darrat (1999), based on his study of the financial depth-economic growth nexus in three middle-eastern countries (namely, Saudi Arabia, Turkey and UAE), concludes a predominantly strong, although country-specific in details, causal relationship between financial deepening and economic growth in these countries. He also notes that more developed countries tend to benefit from financial deepening in a longer timeframe than less developed ones. Chukwu and Agu (2009), in their study of Nigeria between 1971–2008, concluded that the direction of causality lies from economic growth to financial depth if the broad money to GDP ratio is used as a proxy for financial depth, and reverses if the bank deposit liabilities to GDP ratio is used as financial depth instead. Another study on this country conducted by Okafor et al. (2016), which covers a period 1981–2013, revealed that the broad money to GDP ratio has a positive impact on economic growth, while the domestic credit to GDP ratio has a negative one, and neither of those is significant in the long run if tested using the Granger causality test. This is likely a country-specific occurrence, but it underlines the importance of accounting for such peculiarities. Liang and Reichert (2006) conclude that the causality in the financial depth-economic development nexus runs from the latter to the former. Alrabadi and Kharabsheh, studying the financial depth-economic growth nexus in Jordan over 1992–2014 concluded that the connection between the two only exists in the long term, and the direction of the said connection (uni- or bidirectional) is sensitive to the proxies chosen to represent financial deepening. Türsoy and Faisal (2018) used a non-standard deposit-based ratio to define financial deepening in North Cyprus over 1978–2015 and concluded the existence of unidirectional causality from financial depth to economic growth. Such unidirectional causality was also discovered by Christopoulos and Tsionas (2004), based on a panel of 10 developing countries during 1970–2000. The study of the interrelation between financial depth, economic growth and economic inequality in China during 1980–2013, conducted by Koh et al. (2019), showed the existence of a two-way interconnection between financial depth and economic growth, as well as a tendency of

deepening economic inequality with the growth of any of these indicators in the long run. Similar conclusions, such as the existence of a two-way relation between financial depth and economic growth, were also drawn by Saleem et al. (2021), who studied the relationship between economic growth and financial depth, based on quarterly data from Pakistan for a 2005–2019 time period. Existence of bi-directional causality between financial depth and economic growth is also noted by Apergis et al. (2007) on the basis of their research of 15 OECD and 50 non-OECD countries for 1975–2000. Another global study by Khan and Senhadji (2003), based on the data from 159 countries for 1960–1999, indicates a possibility of a threshold effect, i.e. the existence of a certain minimum level of the financial system development at which financial depth begins to have a positive effect on economic growth and the probability of nonlinearity of the relationship between financial depth and economic growth.

The existence of threshold effect points toward the conclusion that the financial depth-economic growth nexus is non-linear, which contradicts the original assessment. Arcand et al. (2012) found that in the countries where the share of domestic private sector credit in GDP exceeds 80–120%, a further increase in financial depth leads to a decrease in economic growth. Consistent with Arcand's findings is the study by Law and Singh (2014) that, based on a sample of 87 countries over 1980–2010, concludes a non-linear diminishing relationship between financial depth and economic growth, even though their estimation of the finance utility threshold is even more conservative and lies within 88–91% of the GDP interval. The study by Cecchetti and Kharroubi (2014) also indicates this problem; the authors explain it by the tendency of the skilled workforce to forego employment in productive industries that are traditionally considered to be drivers of economic growth (namely, the ones with high R&D intensity) in order to make fast money within the rapidly growing financial system. Thus, they conclude that the rapid growth of a country's financial system is actually detrimental to its economic growth due to resource misallocation. Acedański and Pietrucha (2019) used a financial depth ratio, which, unlike the standard ratio, also included non-bank loans, and a set of panel data from 77 countries

over the 1970–2014 period to confirm the existence of both non-linear financial depth-economic growth nexus and threshold effect from financial depth. According to their calculations, whenever financial depth ratio exceeds 96–124% of GDP, it increases GDP volatility.

A wide variety of studies are dedicated to defining the nature of the financial depth-economic growth nexus in different countries and its policy implications. For instance, based on a comparative analysis of crisis handling in different countries of South America in 1998–2002, Caballero and Krishnamurthu (2004) found that the low level of financial depth in developing countries reduces the effectiveness of fiscal stimulus measures. Ahokpossi et al. (2012) attributed disparities in financial development, assessed via financial depth, between African countries to institutional reasons, namely the policies on banking supervision, judiciary system and credit information circulation. Aluko and Ibrahim (2020) also discovered a connection between the influence of financial depth on economic growth and the level of a country's institutional development, with low-institution countries having greater impact from financial deepening than high-institution ones. Le et al. (2019), based on a study of ASEAN countries in 2000–2014, concluded that the increase in domestic credit to the private sector has a positive effect with a one-year lag, while improved market capitalization of the stock market has an immediate effect. A study by Jun et al. (2007) on the impact of financial deepening on economic growth based on the example of 29 provinces of China in 1987–2001, also confirms a significant positive relationship between economic deepening and economic growth. However, the researchers had to remove loans to state-owned enterprises from their financial depth assessments in order to obtain this result.

Financial depth is not a common topic in Ukrainian studies. Those studies that do include this indicator are generally focused on something else, and, as a rule, use exclusively Ukrainian data. In particular, Bereslavs'ka (2012) uses "low levels of financial depth in Ukraine" to justify a wide range of recommendations for anti-crisis financial sector reforms. However, her study does not include any estimations of financial depth



beyond quoting existing statistics available from open sources, nor does it go into details on why the current level of financial depth in Ukraine is supposed to be considered “low”. Kremen and Semenog (2013) state financial depth among the indicators used to gauge the financial sector development and list some ways of calculating it, based on the data available for Ukraine. The authors also state the need for a complex indicator of financial depth, which would reflect the state of a country’s banking and non-banking sectors, as well as the state of its stock market, and even provide a brief calculation for it. Bublyk (2018) uses a wide set of banking-sector-focused indices, mostly adherent to financial depth index calculation variants, to investigate the transformation of the Ukrainian financial sector during 2003–2017. Kondrat and Kots (2018) use regression analysis to study the interrelation between economic growth, which they define as GDP per capita, and financial depth, which they define using the domestic credit to GDP ratio, in order to assess the impact of financial depth on economic growth in 1993–2015. The authors found a clear positive linear relationship between financial depth and economic growth in Ukraine. A more recent study by Bogdan and Lomakovych (2021) mentions the relatively low level of financial depth in Ukraine as a factor that increases domestic credit risk, complicates existing debt service, and exacerbates macroeconomic instability.

To conclude, the relationship between financial depth and economic growth remains undefined, despite the abundance of available research on the topic. All identified patterns are not universal, and the use of the financial depth indicator as a hallmark for fiscal or monetary policy requires a separate substantiation. Besides, somewhat inconsistent usage of the “financial depth” term calls for additional clarifications. This problem is exacerbated in studies on the financial depth-economic growth nexus in Ukraine: while there are a few studies that acknowledge existence of said nexus, even fewer tend to delve into peculiarities of its nature or calculations.

Thus, the aim of the study is to determine the nature, direction and strength of the relationship between financial depth and economic growth in Ukraine. Based on the literature review, a signifi-

cant linear relationship is expected between financial depth, as measured by three individual indicators, and economic growth.

## 2. METHODS

### 2.1. Model specification

The nature, direction and strength of the financial development-economic growth nexus in Ukraine is to be examined using a regression model. The ordinary least squares regression is chosen due to its relative simplicity and versatility. The assumptions behind the model could be formalized as follows:

$$EG = f(FD; ED; EX), \quad (1)$$

where *EG* is economic growth, *FD* is financial depth, *ED* is external debt, and *EX* is export revenue. The relationship between the dependent variable and its factors is presumed to be linear; however, this study tests the possibility of its non-linearity using Ramsey’s RESET test.

### 2.2. Variable specifications

Economic growth is the dependent variable of this model. Due to its near-universal acceptance as a proxy for economic growth, real GDP per capita, denominated in UAH, is used as the economic growth indicator. Real GDP per capita is selected over real GNP per capita due data availability, since GNP is not widely used in Ukrainian statistics.

Financial depth is a factor in this model. Financial depth is defined as the ability of the financial sector to accumulate resources and transform them into productive investments. Financial depth is represented by three indices:

- 1) For gauging the efficiency of the banking sector, a ratio of bank loans to non-financial corporations in relation to real GDP is used; it is a variation of the standard financial depth ratio. It is narrower than the standard financial depth ratio (domestic credit to the private sector to GDP), since it does not include the purchase of non-equity securities, trade credits,

and other account receivables. It does include loans to state-owned non-financial corporations, for these are generally for-profit organizations and large taxpayers in Ukraine.

- 2) For gauging the impact of the non-bank sector, the loans from non-deposit financial corporations to non-financial corporations divided by real GDP ratio is used. Both the first and second ratios are based on statistics provided by the National Bank of Ukraine, and combined they are the rough equivalent of the standard domestic credit to GDP ratio, used as a proxy for financial depth.
- 3) For gauging the impact of the stock market, the stock market capitalization to real GDP ratio is used. Information for its calculation is provided by the annual reports of the Stock Market Commission of Ukraine.

External debt is an independent variable in this model. To gauge its impact, the external debt to real GDP ratio is used.

Export revenue is a factor in this model. It is represented by two indices: ferrous metal exports to real GDP ratio and grain exports to real GDP ratio. These two ratios are chosen because they are among the principal exports of Ukraine. Export revenue is included in the model due to the perceived significance of the influence of export revenues on Ukraine's resource potential.

Inflation is accounted for by using real GDP instead of GDP in all ratios. Some of the variables are relatively closely correlated; they may be excluded if they are found to cause harmful collinearity.

To summarize, the hypothesis for this study is that economic growth, represented by real GDP per

capita, is dependent on financial depth. Financial depth is assessed using the ratios of bank and non-bank loans to real GDP, as well as stock market capitalization to real GDP. The impact of inflation is considered using real GDP instead of GDP in all ratios. The study also accounts for the change in available resources for the Ukrainian economy by incorporating Ukraine's external debt, nominated in UAH, to real GDP ratio, and ratios of Ukraine's gross export of metal and grain to real GDP. The analysis is performed using the least squares method via the "gretl" software package.

### 3. RESULTS

The paper is based on the data for the period 2008–2019. GDP, external debt, population numbers and inflation rate for calculating real GDP for models' ratios, as well as its dependent variable (real GDP per capita) were provided by the State Statistics Service of Ukraine (SSSU). Volume of loans from deposit and non-deposit corporations towards non-financial corporations for calculating financial depth ratios, as well as exchange rates for relevant years for converting external debt from USD into UAH, were provided by the National Bank of Ukraine (NBU). Data on market capitalization was taken from the annual reports of the National Commission on Securities and Stock Market (NCSS). Unlike the statistics provided by the World Bank, this latter source has no gaps in market capitalization data, even though the information on market capitalization from the World Bank and Ukraine's NCSS' reports does not match. An overview of the data used is provided in Table 1.

In contrast to the similarly designed study by Kondrat and Kots (2018), which was based on observations for 1993–2005, this study is limited to

**Table 1.** List of dependent variables

Characteristic	Indicator	Symbol	Source of data
Financial Depth	Bank Loans to Real GDP, %	$BL_{rGDP}$	NBU, SSSU
	Non-bank Loans to Real GDP, %	$NBL_{rGDP}$	NBU, SSSU
	Stock Market Capitalization to Real GDP, %	$MC_{rGDP}$	SSSU, NCSS
External Debt	External Debt to real GDP, %	$Debt_{rGDP}$	NBU, SSSU
Export Revenue	Export of Ferrous Metals to Real GDP, %	$ExM_{rGDP}$	NBU, SSSU
	Export of Grain to Real GDP, %	$ExG_{rGDP}$	NBU, SSSU

**Table 2.** Descriptive statistics

Variable	Minimum	Maximum	Mean	Std. deviation
Real GDP per capita ( $rGDP_{pc}$ )	16,604.121	87,487.191	39,242.769	22,658.944
Bank loans/real GDP ( $BL_{rGDP}$ )	0.191	1.942	1.162	0.647
Non-bank loans/real GDP ( $NBL_{rGDP}$ )	0.203	0.578	0.455	0.123
Stock market capitalization/real GDP ( $MC_{rGDP}$ )	0.009	0.017	0.012	0.002
External Debt/real GDP ( $Debt_{rGDP}$ )	0.826	2.1	1.218	0.431
Export of ferrous metal/real GDP ( $ExM_{rGDP}$ )	0.064	0.233	0.124	0.05
Export of grain/real GDP ( $ExG_{rGDP}$ )	0.021	0.108	0.059	0.029

the data starting from 2008, due to inclusion of loans from non-bank lenders and stock market capitalization, which were not consistently covered before that point in time. Thus, there are only 12 observations per variable. Descriptive statistics for the variables included in the analysis can be seen in Table 2.

A linear regression model based on these variables can be expressed using the following equation:

$$\begin{aligned}
 rGDP_{PC} = & -2,112.35 \cdot BL_{rGDP} - \\
 & -149,178 \cdot NBL_{rGDP} + \\
 & +1,731,100 \cdot MC_{rGDP} + \\
 & +5,301.85 \cdot Debt_{rGDP} - \\
 & -6,050.55 \cdot ExM_{rGDP} + \\
 & +83,914.2 \cdot ExG_{rGDP} + 78,429.1.
 \end{aligned} \quad (2)$$

The quality of the model is good – it has an adjusted R squared of 0.997, which means that the variables in the model explain 99.7% of the variation of the dependent variable. The F-statistic significance value of 613.98 is more than its p-value ( $5.32e \cdot 10^{-7}$ ), indicating that the model's variables improve its fit for the data over a model with no independent variables. Only non-bank loans and market capitalization ratios are significant, but they lie within the 99% confidence interval. Non-banking loans negatively affect economic growth, while market capitalization has a positive effect.

However, including all of these variables in the model simultaneously results in possible autocorrelation, which is indicated by the Durbin-Watson statistics of 2.558, and multicollinearity, which is evident from both correlation matrix (Table 3) and collinearity analysis. Correlation less than 0,9 is generally considered not high enough to war-

rant exclusion of a variable by itself. However, a variance inflation factor above 10 is a clear sign of collinearity, and across the study's variables, there are three such instances:  $NBL_{rGDP}$  (20.132),  $Debt_{rGDP}$  (23.561) and  $ExG_{rGDP}$  (21.774).

**Table 3.** Correlation matrix for variables

Variable	$BL_{rGDP}$	$NBL_{rGDP}$	$MC_{rGDP}$	$Debt_{rGDP}$	$ExM_{rGDP}$	$ExG_{rGDP}$
$BL_{rGDP}$	1	0.815	-0.528	0.432	-0.214	0.169
$NBL_{rGDP}$	-	1	-0.602	0.722	-0.15	0.337
$MC_{rGDP}$	-	-	1	-0.109	0.383	0.053
$Debt_{rGDP}$	-	-	-	1	0.108	0.419
$ExM_{rGDP}$	-	-	-	-	1	0.856
$ExG_{rGDP}$	-	-	-	-	-	1

Multicollinearity is generally alleviated by excluding variables with the highest mutual correlation on condition that they have a variance inflation factor over 3.5. The most highly correlated variables are exports for metal and grain, loans from banking and non-banking institutions, and lastly, external debt and loans from non-banking institutions. Since it is impossible to eject the indicators that are constituents of financial depth (because these are the main indicators being tested), debt and export of metal ratios are to be excluded for the next model. There are no variables in the resulting model that are not significant in it (Table 4).

**Table 4.** Regression outputs

Variable	Coefficient	Std. error	t-ratio	p-value
$NBL_{rGDP}$	-78,124.2	3,7783.79	-25.02	4.16e-08***
$MC_{rGDP}$	1,641,130	217,238	7.555	0.0001***
$BL_{rGDP}$	-2,154.98	1,015.08	-2.123	0.0714*
$ExG_{rGDP}$	156,798	14,277.2	10.98	1.15e-05***

Note: \*\*\* – variable significant within the 99% confidence interval; \* – variable significant within the 90% confidence interval.



The quality of this new model is generally on par with the previous one. It has an adjusted R-squared of 0.9969 and an F-statistic significance value of 907.72, exceeding its p-value of 1.40-09. This model retains similar levels of the Durbin-Watson statistic of 2.545. However, none of the variables that remain in the model has a value inflation factor over 3.5, which means that existing collinearity is not nearly enough to skew the model's outputs.

To determine the correctness of the functional form, the RESET Ramsey test with square and cubic  $\hat{y}$  is performed. Test results indicate the correctness of the linear dependence. Thus, it can be concluded that Khan and Senhaji's (2003) predictions about non-linearity of the economic growth-financial depth nexus cannot be replicated in this instance, the likely reason being a vastly smaller scale of this research. Breuch-Pagan's test shows that the homoscedasticity of the model residues is insufficient to distort the standard regression errors. Therefore, this model has significant coefficients and standard errors, and correctly denotes the impact of independent variables on the dependent variable, and thus can be used to draw conclusions. The model can be transcribed into the following equation:

$$\begin{aligned} rGDP_{PC} = & -2,154.98 \cdot BL_{rGDP} - \\ & -78,124.2 \cdot NBL_{rGDP} + \\ & +1,641,130 \cdot MC_{rGDP} + \\ & +156,798 \cdot ExG_{rGDP} + 78,124.2. \end{aligned} \quad (3)$$

According to this model, a 1% growth in the bank loans to real GDP ratio results in a decrease of per capita real GDP of 2,154 UAH, while a 1% growth in the non-bank loans to real GDP ratio reduces real GDP per capita by 78,124 UAH. This deviates from the initial expectations of a positive influence of banking and non-banking loans on the economic growth in Ukraine. The difference between magnitudes of the variable's coefficients can be explained by the relative shares of the banking and non-banking sector in Ukraine, while the direction of the relationship between economic growth and these two financial depth ratios is consistent with Roussau and Wachtel's (2005) and Arcand's et al. (2012) findings. However, a 1% growth in the market capitalization to real GDP ratio actually increases real GDP per capita by 1,641,130 UAH.

This can be connected with the stock market's impact on the economy or indicate that they tend to grow and shrink simultaneously. A 1% growth in the grain exports to real GDP ratio also increases real GDP per capita by 156,798 UAH. Thus, based on the available data, economic growth in Ukraine during 2008–2019 was positively related to an increase in stock market capitalization and grain exports and negatively related to both bank and non-bank loans volumes.

## 4. DISCUSSION

During the study period, Ukraine's level of financial depth only barely breached the lower threshold levels for financial depth (80-120% of GDP), established by Arcand et al. (2012). This means that the "too much finance" hypothesis is not supposed to be applicable to the current Ukrainian situation, and therefore the financial depth-economic growth nexus in Ukraine is supposed to be positive. Other research indicates that such a threshold is likely to be individual to every country, and it is supposed to be lower for less developed countries. Thus, either the financial depth threshold for Ukraine is below 30% (which is the current level of financial depth), or there is another explanation. The bell-shaped relationship between financial depth and economic growth, if presumed to be true, implies not only the higher threshold, but a lower threshold as well. This, in turn, can mean that the current financial depth level in Ukraine is insufficient to warrant a positive relation. It is also worth noting that even though this study shows a linear relation, its scope is not sufficient to capture the entirety of the curve, thus the fact that the relationship is linear in the short term does not mean it is linear in the long term.

Thus, a negative relationship between financial depth and economic growth, discovered by Rousseau and Wachtel (2005), may show a long-term trend of such a relationship, since their period of study was much broader both in terms of time period (1960–2003) and the number of countries studied (84). Besides, the authors used a broader indicator (which includes the indicator used in this study) and did not gauge the impact of market capitalization and loans from state bank and non-bank institutions. This makes results of the model described in previous section not di-

rectly comparable to Rousseau and Wachtel's (2005) conclusions. Nevertheless, this study's conclusion about a negative relation of the share of bank loans to non-financial institutions to economic growth may indicate significance of the credit burden in the detrimental effect of financial depth on economic growth.

The study of the financial depth-economic growth nexus in Ukraine, conducted by Kondrat and Kots (2018) is based on a longer time period (22 years) than this study (12 years), and uses the standard domestic credit to GDP ratio taken from the World Bank database, thus being more directly comparable to Rousseau and Wachtel's (2005) results. However, the relationship between financial depth and GDP growth in Ukraine, discovered by Kondrat and Kots (2018), is both positive and linear. This diverges from the findings of this study, since the model, described in the previous section, gives out a linear and negative relation. After recreating Kondrat and Kots' (2018) findings, it was possible to conclude that while the relation for Ukraine remains linear regardless of methodology used, the direction of the financial depth-economic growth nexus reverses based on the currency of estimation. If the dependent variable is taken in UAH, the relationship is negative, while if it is taken in USD, the relation is positive. This dependence of the relationship direction on the currency of estimation appears to be a technicality not researched by anyone yet. The possible reasons are high inflation levels in Ukraine and this study's timescale, which captures the most volatile period in exchange rate UAH ever had.

To summarize, the linearity of the financial depth-economic growth nexus is based on the length of the period studied: for 12 or 22 years it is linear, while studies based on 40 or more years' worth of observations return non-linear relation. The direction of the financial depth-economic growth nexus reverses based on the currency of the dependent variable, even though USD is used as a currency of dependent variables, all of the independent variables lose their significance.

In addition, the use of three separate indicators to gauge financial depth in this study allows conclusions to be drawn on the impact of each segment of the financial sector on economic growth.

The financial market has the strongest impact on economic growth in Ukraine. Its share in Ukrainian financial sector is slightly less than 1%, and the activity of the financial market in Ukraine is virtually non-existent. However, its relation to economic growth is highly positive. Such strong connection to economic growth can only be explained by the fact that historically the financial market in Ukraine only grew during the periods of economic growth, and thus it is not the financial market that drives economic growth, but vice versa.

The second most potent impact on economic growth in Ukraine belongs to its exports. The influence of exports is positive, which reflects that at least part of the exports revenues are re-used for productive investments, even though those investments usually concern the very entities that created said export. Export of grains is included in the final model as a proxy for exports as a whole; however, ferrous metal exports and even external debt ratios provide a similar, although weaker, impact. That means that the deficit of financial resources in the Ukrainian economy is partly covered by external debt and exports, as predicted by Bogdan and Lomakovich (2021).

The third most potent impact on economic growth in Ukraine belongs to its non-financial sector, and the relationship between it and economic growth is negative. Non-financial institutions in Ukraine take up roughly 5% of assets of its financial sector and are mostly represented by insurance agencies and various financial companies. Ukraine lacks the bulk of private pension funds, which tend to be significant, albeit conservative, investors in developed economies, and existing financial companies are few and more focused on non-trading activities due to only nominally existent local stock exchange. Hence, the lack of positive impact of non-financial institutions on economic growth in Ukraine can be explained by the fact that they tend to not involve themselves into industry-related activities.

The banking system has the least impact on economic growth in Ukraine. This means that while the banking sector in Ukraine has the overwhelming share of overall assets in the financial sector (around 94%), and also the highest rates of return,

it contributes the least to economic growth. The scope of the study does not allow drawing definitive conclusions on why it is the case, but there is a number of indicators that can provide possible explanations. For one, the share of credit to related parties in overall bank credit in Ukraine fluctuates from 64 to 95% (2020), based on the size of a borrower. This means that the majority

of credit is given out on non-market terms, which does not contribute to productive investments. Secondly, Ukrainian banks are the biggest buyers of Ukrainian government bonds, up to the point where they owned 52% of overall state debt in 2020. In other words, Ukrainian banks generally exist to sustain Ukrainian banks and are hesitant to lend to non-related parties.

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## CONCLUSION

This study demonstrates a significant linear relationship between economic growth, represented by real GDP per capita, and financial depth, represented by three indicators: bank loans to non-financial corporations to real GDP ratio, non-bank loans to non-financial corporations to real GDP ratio, and stock market capitalization to real GDP ratio, as well as grain exports to real GDP ratio, which reflects an economy's resource potential. The impact of banking and non-banking loans on economic growth in Ukraine is negative, while the impact of market capitalization and exports is positive. In other words, to improve economic growth in Ukraine, an effort should be made to stimulate stock market development and export maximization, while seeking out and resolving issues of aversion of both banking and non-banking institutions to participating in industry-related credit activities.

Although not directly compatible with the results achieved by other researchers who use domestic credit to the private sector divided by GDP to assess the impact of financial depth on economic growth, the study's findings allow supplementing them with the country-specific by-sector breakdown of said impact. The effect of banking institutions on economic growth in Ukraine is stunted by the general lack of bank participation in crediting industry-related productive investments; banks tend to only loan to related parties (which reduces the risk of imperfect information, however bears the moral risk and often results in non-performing loans) and invest in low-risk high-reward government securities. The latter can be alleviated by enforcing additional restrictions on the amount of government securities banks are allowed to own; the former, however, is harder to solve due to generally low creditworthiness of Ukrainian enterprises, which, along with the other requirements to a bank's credit portfolio structure, makes it difficult to actually find a borrower that can be officially granted a credit. Non-financial institutions in Ukraine contribute little to economic growth due to only nominally existent stock market, and thus stimulating stock market development should alleviate this issue. The problem with the stock market in Ukraine lies with its inability to act as a source of financial resources due to its low liquidity and number of participants, which stems both from the lack of interest from the potential participants (those Ukrainian firms that do trade on the stock exchange prefer foreign ones), and overregulation. Another reason for choosing foreign stock markets is the generally weak protection of ownership rights in Ukraine. Cross-country analysis of the impact of bank and non-bank loans, as well as stock market capitalization on economic growth, could be useful to see whether the pattern found for Ukraine is universal.

## AUTHOR CONTRIBUTIONS

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