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The Financial Development Index (FDI) Compilation through the Assessment of the Impact of Economic and Financial Indicators. Case of North Macedonia

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ABSTRACT: This article investigates the Financial Development Index (FDI) calculation in North Macedonia (NM) by using yearly secondary time series dataset for a period of 1995-2022. The index compilation follows a wider matrix including variables of financial institutions and markets, using Principal Component Analysis. The empirical analysis uses Vector Autoregression (VAR) models and Granger causality Wald test.

The model tests the relation and positive impact of the sub-indices and other major factors such as GDP, foreign investments, and income, also the negative impact of bank crisis and government expenditures. The extracted results confirm the hypothesis and show that the explanatory variables predict the short run values of the FDI. This result is an added value to the scientific analysis and provides valuable insights for future studies and national strategies of NM and emerging economies.

KEYWORDS: Financial development, VAR, Financial development index (FDI), Emerging economy, North Macedonia.
JEL classification: G1, G2, O16.

I. INTRODUCTION

Financial deepening as a term is used by economists and has gained major importance in the financial literature. It refers to a wide range of factors within the financial sector that define the ratio of financial assets to GDP growth of an economy.

The financial development index of an economy includes many factors that can impact, encourage, and stimulate the economic growth in a country. These factors include both the institutional and market development aspects, such as credits, savings, financial resource allocation, and diversification. Financial deepening leads to financial stability and the reduction of financial crises and panics. Financial development can reduce volatility by avoiding informal asymmetries and by reducing financial constraints. However, there is another view in literature that brings out the opposite side, which says that financial deepening increases the financial volatility by leading to more loaning and greater risk-taking, and it serves as a promoter of crises, particularly in those financial systems that are poorly regulated and less supervised by their central banks.

This article studies the relationship of financial deepening and the impact of other major economic factors in its fluctuations. The financial development index is calculated with regard to its sub-indices and other major factors such as, GDP, government expenditures, foreign investments, bank crisis, and income per capita. These factors have a significant impact in general in financial development of a country. Therefore, we analyse their relation to the FDI in North Macedonia, and make a comparison with previous literature and relevant studies. The study argues that financial deepening is significantly affected by these factors.

In a review of the empirically verified literature background and studies conducted in several countries in the world, we did not find significant empirical evidence on this topic about North Macedonia. Thus, the core aim of this article is to bring forward an important study to serve as a base for comparison.

II. LITERATURE REVIEW

The literature covering the topic of financial deepening is very rich and extensive among journals and books. The theoretical background includes mainly the financial deepening-economic growth relation and also the impact of financial deepening on advanced and emerging economies growth. There is a huge lack of studies regarding the financial deepening index in North Macedonia.

The study that was conducted in a period from 1980-2013 for 176 advanced and low-income economies, confirms the positive relationship between financial development and growth (Sahay et.al. 2015). In this study, the FDI was compiled through a matrix that included the three characteristics (access, depth, and efficiency) of both the financial institutions and financial markets. The authors in previous studies have estimated the results based only on the ratio of domestic credit to GDP and the market capitalisation ratio, which represents a narrow approach.

The process of the FDI compilation uses principal component analysis (PCA) as an approach that considers different indicators such as: market size, market access, financial efficiency, etc.

Many studies, such as (Sugiyanto C 2020) (Hysa 2023) (Stanković 2018), have shown results that confirm the positive relation between financial development and economy, bringing forward the need for regulation of financial markets and institutions in the country.

Also, (Wanjala K. 2020) and (Gezer M.A 2018) argue that financial deepening can impact growth through causal relationships, leading to stability, affecting the growth dynamics. They found that financial deepening indicators had a positive, significant effect on economy.

(Li 2021) Emphasises that financial deepening relies on local-currency-based progress to boost real economy investment and savings channelling, as it is essential for fast investment and requires proactive monitoring and mitigation. Also, a more developed financial access helps small enterprises in their growth and their internationalisation process, as is suggested by the study of (Hasani-Limani V and Tahiri H 2022). Credit access represents a crucial part of the financial development index and a major factor in the development of micro and small enterprises also. Thus, credit access and the size of the company are statistically significant in enterprise development (Hasani-Limani 2022).

(Polemis M., Stengos Th., Tzeremes N, 2020) Focus on reevaluating the relationship between financial depth and growth and finds a positive impact. A study by (Xiaofeng 2022) found that financial deepening enhances growth above the threshold value. Moreover, (Cavallaro E. 2022) suggests that the marginal effects of financial development differ for economies based on their level of development and efficiency of financial systems.

The study conducted by (Afzal A. 2023) found a bidirectional causal relationship between financial deepening and the indicators of economic growth in the short run. Moreover, (Samargandi N. 2015) argued that financial development shows a positive relation with economic growth. According to (Audi 2022) financial innovations have a major impact on financial development. Also, (Imamoğlu 2023) argue that financial development is a significant contributor to economic growth.

Financial development in emerging economies is considered as an important mechanism for poverty as it is proved that in emerging economies is required an enhanced commitment, and the improvement of financial development measures, as argued by ((Musabeh 2020) , (Tsaurai 2020), (Muhsin Kar 2011)). On the other hand, (Tyson 2023) found that capital market and market infrastructure development are crucial factors for further economic development. Capital markets represent a crucial factor for financial development in middle-income countries. (Tanaka 2023). According to (Ahmed 2020), financial development is positively correlated with economic growth in emerging economies.

Regarding the previous studies, where the financial index is measured only by the ratio of domestic credit to private sector, certainly this article will bring a new and broader approach on the topic, which represents a good base for further research studies.

III. METHODOLOGY

A. Index compilation

The paper introduces a comprehensive financial development index, which is derived from the dataset following the matrix of characteristics as it was developed by (Chihak M, Kunt A, Levine E, Feyen E 2012).

The data are divided into groups, and the index is constructed as a new comprehensive index, including both financial institutions and financial markets. The three dimensions of financial development are constructed based on "depth,", "access," and "efficiency."

The subindices and the final index are created using the Principal Component Analysis (PCA). The final index, i.e., the financial development index (FDI), captures the financial institutions index (FII) and the financial market index (FMI). The financial institutions index (FII) includes the financial institutions access (FIA), the financial institutions depth (FID), and the financial institutions efficiency (FIE). The financial market index (FMI) includes the financial markets access (FMA), the financial markets depth (FMD), and the financial markets efficiency (FME). Moreover, this procedure of index calculation is based on previous studies and literature, as in (Chihak M, Kunt A, Levine E, Feyen E 2012) and (Sahay et.al. 2015), and is described in the figure 1.

The figure shows the weight of first-level sub-indices on their respective indices, i.e., the financial institutions index and the financial development index. Based on the results, presented in Figure 1, the FIA variation was 0.78, which means that the financial

institution's access has the greatest weight in the FII and the FDI. The FID variation of 0.2 also shows that financial institution's depth has an important the predicted index, meanwhile the FIE has the least weight. In the Financial market index, except for the FMD which has a weight of 0.14, the other two components have showed no variance.

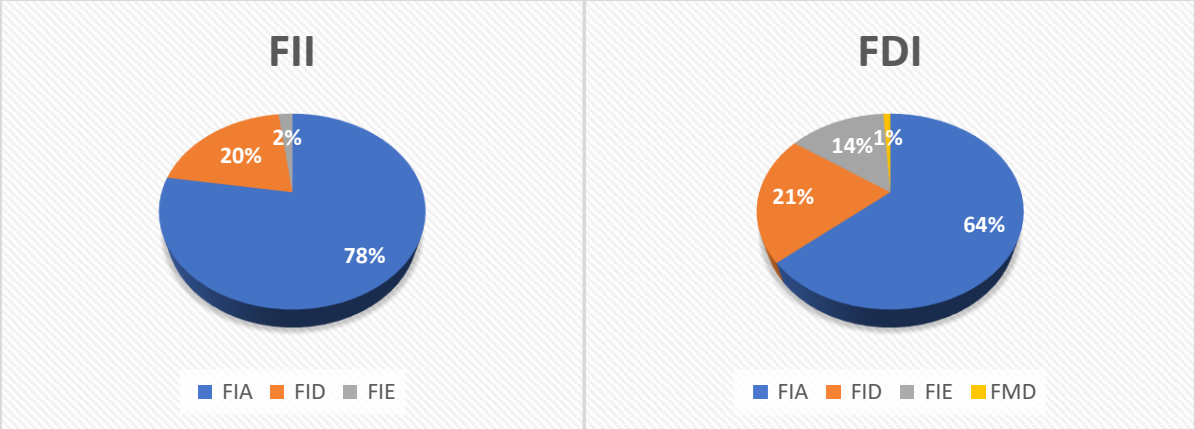

Fig 1. Principal Component Analysis, individual weights on the Financial Institutions index (FII) and the Financial development index (FDI)

Source: The Author

B. Data description

The dataset of this research article uses annual data for a period of time from 1995 to 2022 for North Macedonia. The data is derived from the WB database in the section of global financial development.

Financial development index; $\mathrm{fdi}_{\mathrm{it}}$ is the dependent variable in the model. The data are also winsorized in order to identify and minimize the extreme outliers in both ends for 5 per cent.

GDP; represents the economic growth of the country and the data is gathered from the World Bank data base published on a yearly basis.

Bank crisis; $(\mathrm{B.C.d})$ represents a dummy variable that considers only the financial development index change in the periods of the series when the country has faced crises.

General government final consumption expenditure; gov_expn represents the total expenditure of the government as a percent of GDP.

Foreign direct investment, net inflows; for_invs denotes the total foreign incoming investment flows in the country.

C. Construction of the model

This paper analyses the financial development and provides the REER calculation using a different approach that substitutes the traditional synonyms, which have estimated the financial deepening only by one set of variables.

The model is built with endogenous variables and controlling variables. The financial development index (FDI) is considered a dependent variable in the model. The model estimation uses the Vector Autoregression (VAR) estimation in the model as follows:

$$FDI_{it} = \alpha FDI_{i,t-1} + \beta_0 GDP_{it} + \beta_1 B.C.d_{it} + \beta_2 INCpcp_{it} + \beta_3 F.Inv_{it} + \beta_4 Gov.Exp_{it} + \varepsilon_{it} \quad (1)$$

IV. RESULT AND DISCUSSION

The approach in this research study was based on and intrigued by the well-known traditional measures of financial deepening, which have considered the financial depth measurement based on a small number of variables. The results derived in the empirical analysis are presented in Table 1, where is presented the Vector Autoregression (VAR) result.

Table 1. Results from the Vector Autoregression model

	Coefficient	z	P>z
FDI			
L2.	0.495	3.040	0.002
L3.	-0.006	-0.360	0.719
FIA			

L2.	-0.507	-0.830	0.407
L3	1.018	1.580	0.115
FMD			
L2	-1653	-0.660	0.511
L3	4.487	2.190	0.029
GDP	0.04	0.760	0.448
B.C.d	-0.613	2.37	0.170
Inc.pcp	0.002	2.790	0.005
For.Inv	0.167	3.520	0.000
gov.exp	-0.178	-2.600	0.009
cons	10.238	3.170	0.002
Obs	R-sq	chi2	P>chi2
25	0.72	65.555	0.000

Notes: **** p<.01, ** p<.05, * p<.1*

Source: The author

With regard to the results presented in Table 2, we emphasise that the estimations confirm the expected results based on previous theoretical background, as discussed at the beginning.

The VAR model result show a positive coefficient of FDI in lag 2 with a 1% significance level. The financial institution (FIA) access shows a less significant coefficient in lag 2, meanwhile the financial markets depth shows a positive coefficient (i.e. 4.48) with a 1% significance level. GDP also show a positive coefficient with a small significance. The bank crisis shows a significant negative impact by -0.61 at a 5% significance level. The government expenditures have a negative impact by -0.17 at a 1% significance level. The other variables, income per capita and foreign investments, have the greatest positive impact on FDI at a 1% significance level. The R squared show an explanation of the dependent variable by 72 per cent, meanwhile, the chi squared shows a great overall significance of the model at 1 % level.

Table 2. Lag-order selection statistics

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	31.912				0.000	-0.659	-0.347	0.519
1	74.462	85.101	16	0.000	0.000	-2.872	-2.351	-0.908
2	86.988	25.051	16	0.069	0.000	-2.582	-1.853	0.166
3	149.263	124.55*	16	0.000	1.1e-07*	-6.43861*	-5.501*	-2.90445*

Source: The author

The optimal lag order selection is determined as a postestimation test in order to choose the optimal lag of the variable. The Likelihood Ratio (LR), the Final Prediction Error, and the Akaike Information Criterion (AIC) suggest the optimal lag of 3 as the optimal lag in the model at a 5% level of significance

Table 3. Granger causality Wald tests

Equation	Excluded	chi2	df	Prob>Chi2
fdi	fia	2.632	2	0.268
fdi	fid	4.598	2	0.100
fdi	fmd	5.217	2	0.074
fdi	ALL	16.687	6	0.011

Source: The author

The result of the Granger Causality Wald Test shows that the REER variable in the model Granger-causes the current account. According to the p-value of 0.000, we can conclude that the past values of the sub-indices in the model help us to predict the future values of FDI at 1%.

V. CONCLUSION

The core aim of this study was to analyse the impact of financial deepening on economic growth in emerging economies such as North Macedonia. The estimations are done by utilising the Vector Autoregression (VAR) models in Stata. The empirical examinations were preceded by the compilation of sub-indices and the final index of the financial development. The index compilation process uses Principal Component Analysis and follows a well-known matrix that considers several variables of the financial institution and financial markets.

Another exceptional contribution of this article is the main concept of financial development index (FDI) compilation. The FDI analysis in both empirical models in this study includes numerous characteristics of financial institutions (FII) and financial markets (FMI) in a well-constructed matrix that considers their access, depth, and efficiency. The research estimations show that the major part of the final index is influenced by the sub-indices of financial access and financial depth. The financial markets sub-indices played a minor role in the final index due to their delayed and underdeveloped state in every country in the sample.

The final results confirm the theoretical background on this topic and the hypothesis that says that there is a positive relation and significant impact of financial deepening. The FDI shows a positive and significant relation with economic growth, income per capita and foreign investments of the country. There is noticed a significant negative impact with the bank crisis and government expenditure. This result is in line with the literature and studies carried out by many aforementioned authors, and represent a great contribution for policymakers in order to increase their efforts in the regulation of the financial sector its further development.

This study confirms that financial deepening index in North Macedonia is significantly affected by the economic and financial indicators in the model. This indicates a strong recommendation for the country to devote its institutional capacities in order to focus on the implementation of regulations and in developing policies for financial development and financial policies.

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