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Financial Development is Supply-Leading or Demand-following? Empirical Investigation on EU Countries

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ABSTRACT:
This study investigates the complex relationship between economic growth and financial development in 14 European nations from 2002 to 2020. This study compares supply-leading versus demand-following financial evolution assumptions using panel co-integration analysis and vector error correction models. To fully understand financial progress, the research integrates multiple variables. A complex and intricate link is shown by empirical evidence. Short-term supply-leading features include GDP to stock market capitalization and private sector credit. However, monetary liability growth follows demand. The long-term relationship between economic growth and private-sector loans is negative. This study shows that the causal relationship depends on the financial development index used. Additionally, the study distinguishes between transitory changes and lasting equilibrium connections. The study also found a dynamic association between financial development and economic growth as an economy matures. The supply-leading concept states that supply drives the stock market in early development. However, as the economy grows, a demand-following pattern arises, supporting the contradiction. This study offers a deep knowledge of the complex relationship between financial development and economic growth in Europe. The research uses powerful econometric tools and financial development indicators to demonstrate the importance of nuanced understanding for good policy making.

Keywords: Economic Growth, Financial Development, Demand-following, Supply-leading, Panel Cointegration, Vector Error Correction Model, Panel Causality

1. Introduction

The debate surrounding the relationship between financial development and economic growth has a rich history, stretching back to the seminal work of Walter Bagehot in 1873. Bagehot, a prominent economist, posited that a robust financial sector was a critical prerequisite for a nation's successful industrialization. Building upon this notion, Joseph Schumpeter, in his 1912 treatise, further emphasized the centrality of a well-functioning financial system. He argued that such a system serves as the lifeblood of the real sector, facilitating growth and ultimately leading to economic expansion. In essence, Schumpeter contended that enhancements or enlargements within the financial sector directly translate to higher levels of economic growth. Schumpeter's work delved deeper, highlighting the financial sector's vital role in fostering innovation, which subsequently propels economic progress. This theory, which posits a unidirectional causal relationship where financial development leads to economic growth, is well-recognized as the supply-leading hypothesis or positive causation. The supply-leading hypothesis meticulously outlines the mechanism through which financial deepening, characterized by increased access to capital and financial instruments, catalyzes economic growth. The supply-leading

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hypothesis offers a clear mechanism for understanding how financial deepening, characterized by a more developed and accessible financial system, can act as a catalyst for economic growth. This theory emphasizes the pivotal role financial deepening plays in driving economic expansion (Hurlin & Venet, 2008). Proponents argue that the efficient allocation of resources is a direct consequence of advancements within the financial sector.

However, the unidirectional causal relationship proposed by the supply-leading hypothesis, where finance solely influences economic growth, has been challenged. Čihák et al. (2019) present a contrasting perspective, arguing that financial deepening itself may be dependent on economic expansion. This viewpoint forms the basis for the demand-following hypothesis, or growth-led financing. This theory suggests a causal relationship flowing in the opposite direction, with economic expansion driving the development of the financial sector. Hausmann et al. (2007) further contribute to the discussion by introducing the "stage of development" hypothesis. This theory proposes that the relationship between financial development and economic growth is not static, but rather evolves as the economy matures. The hypothesis suggests that the supply-leading hypothesis may be more applicable during the initial stages of economic development, where a robust financial system is crucial for facilitating growth. However, as the economy expands and matures, the demand-following hypothesis may take precedence, with economic activity driving the further development of the financial sector.

In essence, these competing theories highlight the multifaceted nature of the relationship between financial development and economic growth. While the supply-leading hypothesis offers a compelling explanation for how a well-developed financial system can propel growth, the demand-following hypothesis and the "stage of development" concept provide valuable insights into the potential for a more nuanced and dynamic interaction between these two critical factors. The intricate nature of financial markets in developed economies, coupled with the ever-increasing interconnectedness of global economies and the deepening integration of international financial markets in recent decades, compels a critical reevaluation of the potential for a unidirectional causal relationship between finance and economic growth. The notion that these two spheres operate in isolation, with finance solely influencing growth, appears increasingly untenable in light of the present global economic landscape.

Furthermore, the potential for reciprocal influence between finance and economic growth necessitates further exploration. The successful funding of investment projects, recognized as a cornerstone of economic expansion, requires the efficient mobilization of financial resources within an economy. Given this undeniable linkage, this study seeks to investigate the nature of the relationship between financial development and economic growth in European countries. Specifically, the research will examine whether the influence of financial development on economic growth aligns with the supply-leading hypothesis, the demand-following hypothesis, or potentially a more complex dynamic, in both the short-run and long-run contexts. This study leverages a comprehensive dataset encompassing 14 European countries over the period 2002-2020, compiled by the World Bank. The research design contributes to the existing body of knowledge in two key aspects.

Firstly, we delve into the intricate interplay between the financial sector and the real economy, with a particular focus on the direction of causality within this relationship. Our findings reveal that the nature of this relationship is contingent upon the specific financial

development measure employed. This nuanced perspective adds valuable insights to the ongoing discussion. Secondly, the study addresses a critical gap in the literature by examining the differential effects of financial development on economic growth in both the short-run and long-run contexts. Our analysis demonstrates that the connection between financial development indicators and economic growth exhibits variations across these distinct timeframes. This comprehensive approach provides a more holistic understanding of the dynamic relationship between these two crucial factors.

The paper is structured to first reviews prior research on the link between financial development and economic growth (Section 2). Then, it details the data used, the chosen econometric model, and the research methods employed (Section 3). The findings from the various statistical tests are presented, followed by a detailed analysis and interpretation of those results (Section 4). Finally, the paper concludes with a summary of its key takeaways and offers policy recommendations based on the analysis (Section 5).

2. Literature Review

This section offers a two-pronged approach. First, it critically examines existing empirical studies to explore the ongoing debate between the supply-leading and demand-following hypotheses regarding the causal direction between financial development and economic growth. Second, it delves into the different measures used in the literature to quantify the level of financial development within an economy.

2.1. Supply-Leading versus Demand-Following Hypotheses

Two primary hypotheses have been advanced to explain the causal relationship between financial development and economic growth: the supply-leading hypothesis and the demand-following hypothesis (Chow et al., 2019). The supply-leading hypothesis posits that financial development acts as a driving force for economic growth. In other words, advancements in the financial sector, as envisioned by Schumpeter (1911) and Hausmann et al. (2007), are believed to stimulate economic expansion within a nation.

2.1.1. The supply-leading approach claims that financial development is the cause of economic growth.

Several studies have explored the connection between financial development and economic growth. King and Levine (1993) posit a positive correlation, suggesting that increased financial development leads to faster economic growth, improved physical capital accumulation, and enhanced economic efficiency. Obstfeld (1994) argues that international stock market integration facilitates risk-sharing across countries, leading to better resource allocation and accelerated economic growth. Demirguc-Kunt and Levine (1996) concur, highlighting that globally interconnected stock markets channel savings towards more profitable investments, thus fostering growth. However, they caution that increased risk-sharing might reduce the incentive to save, potentially hindering long-term growth. They further emphasize that financial development precedes and drives economic growth, not merely following it. Supporting this notion, Levine and Zervos (1998) analyze 47 countries from 1976 to 1993 and find that both the level of bank development and stock market liquidity significantly influence economic growth.

Adding to this body of research, Caporale et al. (2004) demonstrate a strong positive association between stock market development, measured by the ratio of exchanged share value, and economic growth. Proponents further argue that well-developed stock markets are crucial for bolstering monetary policy and promoting economic growth. Christopoulos and Tsionas (2004) investigated ten developing economies and found that financial depth consistently exerts a positive influence on economic growth. Similarly, Kiran et al. (2009) identify a persistent positive relationship between the size of financial resources and economic growth, highlighting the significant beneficial effect of financial system development. Finally, Antonios and Athanasios (2013) establish a causal link between U.S. stock market development and economic growth during the period 1970-2012.

2.1.2. Demand following approach: Economic growth paves the way for financial development

The demand-following hypothesis presents a contrasting perspective. It argues that financial development is not the driving force, but rather responds to economic growth. As Čihák et al. (2012) suggest, the demand for financial services rises alongside a growing and progressing economy. Boulila and Tramelsi (2002) find evidence of Granger causality running from economic growth to finance in developing nations, implying that economic growth precedes financial development. Similarly, Crichton and DeSilva (1989) identify a positive correlation between economic growth and financial development in Trinidad and Tobago (1973-1982), attributing the observed progress in financial intermediation to economic expansion.

This perspective is further supported by studies focusing on specific regions. Agbetsiafa (2003) analyzes eight emerging sub-Saharan African economies and finds unidirectional causality from economic growth to financial development in Ivory Coast and Kenya. Waqabaca (2004) discovers a positive association between these variables in Fiji, but suggests causality flows from economic growth to financial development. Similarly, Vazakidis and Adamopoulos (2009) investigate France (1965-2007) and find that economic growth Granger-causes stock market development. They argue that a mature stock market enhances liquidity and risk mitigation for investors. Koller (2010) strengthens this argument by pointing out that most equity market declines follow the onset of recessions, suggesting economic fluctuations drive stock market movements.

Supporters of the demand-following hypothesis (Eng and Habibullah, 2011) reject the supply-leading hypothesis for three key reasons. First, they argue that regression analysis results may be unreliable (Granger and Newbold, 1974). Second, they suggest the impact of financial development on economic growth weakens over time. Finally, Fry (1998) posits that financial distortions, such as high interest rates and black market exchange rates, can invalidate the supply-leading hypothesis. It is important to note that some research, such as Akbas (2015) and Demetriades and Hussein (1996), does not support either hypothesis.

2.1.3. Complementary and bidirectional causality

Eng and Habibullah (2011) investigated the relationship between financial development and economic growth in seven Asian countries (1981-1994). While they found a strong positive correlation, the direction of causality appeared to be country dependent. Employing Granger causality tests, their study concluded that the Philippines supported the supply-leading hypothesis, while Malaysia, Myanmar, and Nepal exhibited

evidence for the demand-following hypothesis. Indonesia, Sri Lanka, and Thailand displayed a bidirectional causal relationship between the two variables. Similarly, Murinde and Eng (1994) found support for the supply-leading hypothesis in Singapore.

The discussion then broadens to consider Europe. Damijan et al. (2013) highlight the long-term productivity potential of European economies and their historical success in attracting foreign direct investment (FDI). Adeyeye (2015) examined the causal relationship between financial development and economic growth in Nigeria (1981-2013). The study's findings hinged on the chosen measure of financial development. When measured by the ratio of total monetary liabilities to GDP or the ratio of credit to the private sector to GDP, the results supported the supply-leading hypothesis. Conversely, using the ratio of total monetary liabilities to GDP, credit allocated to the private sector by deposit money banks, or credit to the private sector to GDP as measures, the findings favored the demand-following hypothesis. Overall, Adeyeye's research suggests that the demand-following hypothesis may be more prevalent in the Nigerian context.

Chow et al. (2019) conducted a more extensive analysis, examining both hypotheses in fourteen developing countries (1950-2014) using cointegration tests. Their findings provided evidence supporting both the supply-leading and demand-following hypotheses in some countries, while other countries exhibited no clear causal relationship.

Nguyen et al. (2021) investigated the causal relationship between financial development and economic growth in twenty-two developing countries (1980-2020) using panel Granger causality tests. Their research identified a bidirectional causal relationship when financial development was measured by a broad-based index from the International Monetary Fund (IMF). Additionally, they found a long-run positive linear relationship between the two variables, suggesting that financial development generally exerts a positive influence on economic growth in the studied countries.

2.2. Financial Development

Financial market efficiency plays a critical role in economic growth. Efficient markets allocate scarce resources towards the most promising investment opportunities, accelerating growth. Economic growth, in turn, stimulates the development of the financial sector. This leads to innovative financial products, such as derivative securities and advanced payment mechanisms, that cater to the evolving needs of the real economy. Globalization has further contributed to advancements in financial markets. International traders now leverage sophisticated hedging strategies to mitigate risks associated with cross-border transactions. However, it is important to acknowledge potential consequences associated with demand-driven growth, particularly within stock markets.

Several studies highlight the interconnectedness within the financial system. Caporale et al. (2004) advocate for a unified framework to analyze the relationships between the banking sector, stock market development, and economic growth. Demirguc-Kunt and Levine (1996) observe a positive correlation between developed stock markets and modern banking systems, along with a corresponding weakness in financial intermediaries within countries possessing underdeveloped stock markets. Levine and Zervos (1998) emphasize the importance of considering both stock markets and banks when investigating the relationship between the financial system and long-term economic growth.

2.2.1. Measures of Financial Development

The World Bank utilizes a multifaceted approach to achieve sustainable global production growth and fight poverty. One key aspect of this strategy is the advancement of financial systems (Hussain et al., 2023). Stock market indicators are a crucial area of focus within financial development (Arestis et al., 2001). A growing body of research, exemplified by the work of Demirguc-Kunt and Levine (1995) and Levine and Zervos (1998), explores the relationship between stock market growth and economic expansion.

A well-developed stock market is expected to play a significant role in economic growth. It should encourage savings and efficiently allocate capital towards profitable investments. Stock markets offer a variety of financial instruments that enable savers to diversify their holdings, mobilizing domestic savings. They also provide a significant source of investment capital at a relatively low cost. Additionally, stock market participation allows individuals to spread risk by investing in promising ventures. Furthermore, stock markets help investors manage liquidity risk. They provide a platform for those facing liquidity constraints to sell their shares to unaffected investors. This mechanism prevents premature capital withdrawal from companies to meet immediate liquidity needs. In conclusion, stock markets play a critical role in channeling capital to the corporate sector, thereby exerting a significant influence on the overall economy.

Broad money, defined as the total liquid liabilities of the financial system (M3), serves as an indicator of a nation's financial development (Adjei et al., 2022). It encompasses currency, demand deposits, and interest-bearing liabilities of both banks and non-bank financial intermediaries (Kiran et al., 2009). As discussed by Estrada et al. (2010), broad money provides the most comprehensive measure of a country's financial depth, encompassing the activities of all banks, central banks, and non-financial intermediaries.

The private credit metric is another tool employed by financial analysts and economists to assess a country's financial health. The growth in a nation's private credit relative to its GDP is associated with an increase in the number of financial services offered, signifying enhanced financial intermediation development (King and Levine, 1993; Chow et al., 2019). Private credit is typically measured by the annual growth rate of bank loans extended to the private sector (Kiran et al., 2009). This metric reflects the extent to which banks are lending to businesses within the real economy. Adamopoulos (2010) argues that private credit offers a more precise measure of financial intermediaries' role in directing funds to the private sector, compared to other monetary aggregates.

3. Data and Methodology

3.1. The Data

Building upon prior scholarly investigations, the present paper undertakes an examination of the enduring and immediate dynamics pertaining to the correlation between financial development and economic growth across fourteen European countries namely, Austria, Belgium, Croatia, France, Germany, Greece, Hungary, Ireland, Luxembourg, Netherlands, Poland, Portugal, Romania and Spain. The yearly ***GDP*** growth

rate is employed as a measure of economic growth, whereas three distinct metrics are utilised to assess financial development: the ratio of stock market capitalization (***MCAP***) to GDP, the growth rate of monetary liabilities (***M***), and the growth rate of loans to the private sector (***CR***). To account for inflation and capital formation, we employ the annual inflation rate (***INFL***) and the growth of capital gross formation (***K***), respectively. In this study, the data obtained from the World Bank Development Indicators for the period 2002-2020. Monetary liabilities, which were obtained from the Federal Reserve Economic Data, are the sole exception to this. Table 1 presents comprehensive data pertaining to all factors.

Table (1): Data Summary Statistics

	MCAP	**M**	**CR**	**INFL**	**K**
Mean	51.65322	6.638086	3.483573	2.186192	2.241968
Median	42.1961	6.239446	1.345474	1.956076	2.531233
Maximum	321.9352	48.42118	106.9017	22.53989	50.02995
Minimum	5.403105	-26.7805	-44.2643	-4.4781	-31.8344
Std. Dev.	37.2153	11.888	11.82831	2.41357	10.28477

3.2 The Model

To investigate whether financial development is *Supply leading* or *Demand following*, we estimate two panel data models as follows:

Model (1): Financial Development is Supply Leading

$$Economic\ Growth_{it} = f(Financial\ Development_{it})$$

Model (2): Financial Development is Demand Following

$$Financial\ Development_{it} = f(Economic\ Growth_{it})$$

where *i* represents the country and *t* represents time.

Model (1) depicts that a financially developed country promotes economic growth, while Model (2) depicts that a country's economic growth facilitates its financial development.

3.3 Methodology

3.3.1 Kruskal Wallis test

Kruskal Wallis test is examined in this paper to verify the significant difference between the three chosen measures of financial development. It is a rank based non-parametric test; in which a chi-square statistic is used to evaluate differences in mean ranks to assess the null hypothesis that medians are equal across different independent groups (Kruskal and Wallis, 1952).

3.3.2 Panel unit root test

Panel unit root test, Levin-Lin-Chu test, is employed (Levin et al. 2002).

3.3.3 Johansen-Fisher-Panel co-integration

The Johansen Panel co-integration is a method utilised to assess the relationship between financial development and long-term economic growth. Fisher (1932) proposes a composite test where the outcomes of the individual independent tests are utilised. Maddala and Wu (1999) propose an alternative method for testing for co-integration in panel data by combining tests from individual cross-sections to derive a test statistic for the entire panel, using Fisher's result as inspiration.

If co-integration exists, then long run co-efficient is estimated from the following equation:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + EC_{it} \qquad \text{(Equation 1)}$$

where, *β1* is the long run co-efficient, and *EC* is the error correction term. Co-integration between variables implies that there exists an adjustment process that prevents the errors in long run relationship from becoming larger and drifting apart from the equilibrium. The adjustment process is referred to as "Error Correction". The speed of adjustment towards equilibrium is determined by the Error Correction Model (ECM).

3.3.4 Vector error Correction model

If a long run relationship is established between the variables, then short run dynamics are derived from an error correction model (ECM), which can be estimated from the following equation:

$$\Delta Y_{it} = \alpha_0 + \alpha_1 X_{it} + \alpha_2 EC_{i,t-1} + \varepsilon_{it} \qquad \text{(Equation 2)}$$

where α_0 is constant, α_1 is coefficients of the sshort-rundynamics, α_2 measures the speed of adjustment to long run equilibrium, $EC_{i,t-1}$ is the lagged error correction term derived from the long run equation (Equation (1)) and ε is error term.

4. Empirical Results

4,1 Kruskal Wallis Test

The first step in our analysis is to establish that the three financial development measures are significantly different from each other. The probability value for the *Kruskal Wallis* test reported in Table (2) indicates that they are indeed highly significant.

Table (2): Kruskal Wallis Test results

Chi-square degrees of freedom	Chi-square statistic	Prob.
2	435.209	0.000***

*** shows level of significance at 1%

4.2 Panel Unit Root Test Results

Subsequently, panel unit root tests are performed on all variables at their respective levels. The findings shown in Table 3 indicate that all of the variables exhibit stationarity, as reflected by their integration of order zero.

Table (3): Levin-Lin-Chu unit root test

Variable	Level		Order of integration
	statistic	Prob.	
GDP	-6.468	0.000***	I(0)
MCAP	-4.225	0.000***	I(0)
M	-7.341	0.000***	I(0)
CR	-6.184	0.000***	I(0)
INFL	-5.058	0.000***	I(0)
K	-10.81	0.000***	I(0)

*** shows level of significance at 1%

4.3Johansen-Fisher Panel co-integration Results

The findings from the Johansen co-integration test, as presented in Table 4, indicate that there is evidence of a co-integrating relationship between the GDP and the three financial development metrics examined, as well as the control variables. This conclusion is supported by both the trace and maximum eigenvalue test statistics.

Table (4): Johansen- Fisher Panel co-integration results

	Hypothesized No. of CE(s)	Fisher Statistics from Trace Test	P-value	Fisher Statistics from Max-Eigen Test	P-value
GDP & MCAP	None	234.3	0.000***	169.1	0.000***
	At most 1	97.20	0.000***	72.92	0.000***
	At most 2	50.15	0.006***	38.28	0.093*
	At most 3	57.27	0.000***	57.27	0.000***
GDP & M	None	218.3	0.000***	151.3	0.000***
	At most 1	95.85	0.000***	78.33	0.000***
	At most 2	45.30	0.02**	27.79	0.476
	At most 3	68.39	0.000***	68.39	0.000***
GDP & CR	None	184.6	0.000***	165.0	0.000***
	At most 1	56.26	0.001***	38.85	0.083*
	At most 2	37.26	0.1133	26.79	0.529
	At most 3	52.02	0.0038**	52.02	0.004***

*** , ** and * show level of significance at 1% , 5% and 10%, respectively

4.4 Cointegrating Equations & Vector Error Correction Model

The existence of co-integration implies investigating the long-run and short-run relationships in both models (1) and (2), for each of the three financial development measures. Hence, the co-integrating equations are derived to find out the long-run relationships. In addition, the vector error correction model is estimated to derive the short-run relationships.

4.4.1 GDP and MCAP Results

Table 5 presents the cointegrating equations and vector error correction (VEC) models for Models (1) and (2) examining the relationship between ***GDP*** and market capitalization ***MCAP***. Both models are statistically significant, as evidenced by the F-statistic.

In Model (1), the VEC model reveals a significant short-run influence of ***MCAP*** on **GDP**, suggesting a supply-leading effect. This finding aligns with the results reported by Eng and Habibullah (2011) for some Asian countries, as well as Nguyen et al. (2021) for developing countries (though Nguyen et al. observed a long-run, rather than short-run, supply-leading effect). An increase in stock market capitalization is theorized to boost short-run economic growth by stimulating aggregate demand components such as consumer spending and investment (Caporale, 2004). While both control variables, inflation (***INFL***) and capital stock (***K***), exhibit a positive and significant long-run influence on GDP, the positive coefficient of the error correction term (ECt-1) in the VEC model indicates divergence from, rather than convergence towards, long-run equilibrium. Therefore, the model does not support a long-run supply-leading effect of MCAP.

Conversely, Model (2) suggests a long-run relationship between ***GDP*** and ***MCAP***, with a positive coefficient for GDP in the co-integrating equation. However, the positive coefficient of the error correction term (ECt-1) in the VEC model again indicates divergence from long-run equilibrium. Additionally, both control variables have a negative and significant long-run impact on ***MCAP***. While ***GDP*** is statistically insignificant in the short run, ***INFL*** exhibits a negative short-run effect on ***MCAP***. This negative impact of inflation on MCAP is well-documented in the literature. High inflation creates uncertainty and volatility in the stock market, potentially hindering economic activity (Boyd et al., 1996; Spyrou, 2001; Ioannides et al., 2005). In conclusion, Model (2) does not support the hypothesis of MCAP being demand-following.

Table (5): Cointegrating Equations and Vector Error Correction model GDP &MCAP

(Model 1) Dependent variable: *GDP*		**(Model 2) Dependent Variable: *MCAP***	
Co-integrating Equation			
	Co-efficient (t-statistic)		Co-efficient (t-statistic)
MCAP	0.003 [0.606]	***GDP***	356.377 [6.132]
INFL	0.327 [3.608]***	***INFL***	-116.751 [3.406]***
K	0.464 [20.319]***	***K***	- 165.292 [8.286]***
Vector Error Correction model			
EC_{t-1}	0.146 [0.919]	EC_{t-1}	-0.001 [-0.385]
$D(MCAP)_{t-1}$	0.049 [4.657]***	$D(MCAP)_{t-1}$	-0.548 [-7.935]***
$D(MCAP)_{t-2}$	0.025 [2.225]***	$D(MCAP)_{t-2}$	-0.343 [-4.658]***
$D(GDP)_{t-1}$	-0.68 [-4.208]***	$D(GDP)_{t-1}$	-0.264 [-0.249]
$D(GDP)_{t-2}$	-0.268 [-2.16625]**	$D(GDP)_{t-2}$	0.377 [0.464]
D(INFL)t-1	-0.614 [-3.829]	***D(INFL)t-1***	-0.332 [-0.314]
D(INFL)t-2	-0.216 [-1.362]	***D(INFL)t-2***	0.426 [0.409]
D(K)t-1	0.114 [1.981]	***D(K)t-1***	0.272 [0.718]
D(K)t-2	0.004 [0.105]***	***D(K)t-2***	0.082 [0.294]
Constant	0.515 [-2.132]**	***Constant***	-0.364 [-0.229]
Adj. R-squared	0.287926	Adj. R-squared	0.27601
F-statistic	10.12***	F-statistic	8.218***
SE equation	3.4	SE equation	22.34

*** and ** show level of significance at 1% and 5%, respectively

4.4.2 GDP and M Results

The analysis presented in Table 6 examines the relationship between money supply (***M***) and GDP using cointegrating equations and vector error correction models (VEC) for Models (1) and (2). Both models are statistically significant, as indicated by the F-statistic.

In Model (1), the cointegrating equation suggests that ***M*** has a negative long-run impact on ***GDP.*** This means that a higher money supply is associated with lower ***GDP*** growth in the long term. Conversely, both control variables, inflation (***INFL***) and capital stock (***K***) have a positive and significant long-run influence on GDP growth. However, the coefficient of the error correction term (ECt-1) in the VEC model is positive. This indicates that the model is diverging from long-run equilibrium, rather than converging towards it. Consequently, these findings do not support the hypothesis that M is supply-leading, meaning that increases in money supply do not necessarily lead to long-term economic growth in this model. Among the control variables, inflation has a negative and significant short-run impact on GDP. This aligns with the idea that macroeconomic instability and a limited private sector can hinder economic growth in the short term.

In contrast, Model (2) reveals a significant short-run coefficient for ***GDP*** in the VEC model. This suggests that ***M*** exhibits a demand-following relationship with ***GDP***, which is consistent with the findings of Adeyeye et al. (2015). In essence, higher economic growth in the short term is associated with an increase in money supply. This typically leads to lower interest rates, facilitating access to financing for further investments and stimulating financial development.

Regarding the control variables, capital stock (***K***) has a negative and significant short-run impact on ***M***. This implies that higher investment demand raises interest rates, which in turn reduces money supply in the short term. However, in the long run, both inflation and capital stock exert a positive and significant influence on ***M***.

Table (6): Cointegrating Equations and Vector Error Correction model GDP &M

(Model 1) Dependent variable: *GDP*		**(Model 2) Dependent Variable: *M***	
Co-integrating Equation			
	Co-efficient (t-statistic)		Co-efficient (t-statistic)
M	-2.909 [-10.245]***	***GDP***	- 0.344 [-0.609]
INFL	3.929 [3.418]	***INFL***	1.351 [4.017]***
K	2.289 [8.941]	***K***	0.787 [4.049]***
Vector Error Correction model			
EC_{t-1}	-0.017 [-1.309]	EC_{t-1}	-0.9140 [-10.813]
$D(M)_{t-1}$	0.0491 [1.827]	$D(M)_{t-1}$	0.109 [1.792]
$D(M)_{t-2}$	0.029 [1.227]	$D(M)_{t-2}$	-0.322 [-6.066]***
$D(GDP)_{t-1}$	-0.451 [-4.844]***	$D(GDP)_{t-1}$	0.508 [2.399]**
$D(GDP_{)t-2}$	-0.229 [-2.358]**	$D(GDP_{)t-2}$	0.742 [3.358]***
D(INFL)t-1	-0.737 [-4.293]***	***D(INFL)t-1***	-0.018 [-0.046]
D(INFL)t-2	-0.313 [-1.849]	***D(INFL)t-2***	0.323 [0.843]
D(K)t-1	0.008 [0.275]	***D(K)t-1***	-0.475 [-6.913]***
D(K)t-2	0.026 [-0.909]	***D(K)t-2***	-0.364 [-5.633]***
Constant	-0.581 [-2.311]**	***constant***	0.364 [0.636]
Adj. R-squared	0.184	Adj. R-squared	0.586634
F-statistic	6.569***	F-statistic	36.164***
SE equation	3.648	SE equation	8.295

*** and ** show level of significance at 1% and 5%, respectively

4.4.3 GDP and CR Results

Table (7) displays the cointegrating equations and vector error correction model for models (1) and (2) in the case of ***GDP*** & ***CR.*** Both models are significant as noted

by the F-statistic. Regarding model (1), the coefficient of ***CR*** in the long run indicates a negative effect on ***GDP*** in the long run according to the result reported in the co-integrating equation. As regards the control variables, both ***INFL*** and ***K*** have a positive significant effect on ***GDP*** in the long run. Yet, the speed of adjustment EC_{t-1} reported in the vector error correction model is positive indicating divergence from long-run equilibrium rather than convergence in the long run. Yet, ***INFL*** has a negative effect on ***GDP*** in the short run according to the results reported in the vector error correction model. Financial market investors are deeply interested in the correlation between inflation and other macroeconomic variables like economic growth. Participants in the financial markets are perpetually enthused about the correlation between inflation and macroeconomic variables, including economic development. Growth rate and inflation have an inverse connection, as empirically demonstrated by Fischer (1993) and Barro (1995). They contended that because inflation has detrimental consequences on efficiency and productivity, it has a negative effect on an economy's growth rate.

On the other hand, model (2) showed that ***GDP*** has a negative significant co-efficient in the long run according to the result reported in the co-integrating equation. Regarding the control variables, both ***INFL*** and ***K*** have positive significant effect on ***CR*** in the long run. Besides, the speed of adjustment EC t-1 reported in the vector error correction model is negative indicating convergence in the long run equilibrium between GDP & CR. While the co-efficient of ***GDP*** is positive significant in the short run according to the results reported in the vector error correction model. Therefore, ***CR*** is demand-following in the short run; which conforms to the results of (Adeyeye 2015). Lowering the restrictions imposed on credit policies would increase productivity and enhance the quality of the products, which will then increase the exports and the economic growth rate of the given country (Choi 2023). Yet, ***INFL*** & ***K*** have negative significant effect on ***CR*** in the short run. A rise in inflation rates contributes negatively to the increase in credit to the private sector (Tinoco-Zermeno 2014).

The long run negative relationship between CR and GDP might be attributed to the perspective of boosting productivity to generate bigger profits, which in turn enables greater dependence on internal finances. This, henceforth, reduces the need for credit. Households may choose to raise their debt levels to maintain consistent spending when their income momentarily falls below anticipated levels. (Kiss et al. 2006). Moreover, the research by Antoshin et al. (2017) investigates if there is a point at which financial progress ceases to positively impact economic growth. Their findings indicate that the impact of finance on output growth turns negative after credit to the private sector approaches 100% of GDP. This aligns with the concept of the "vanishing effect" of financial development and are not influenced by output volatility, banking crises, poor institutional quality, or variations in bank supervision or regulation. Furthermore, throughout our date sample period Europe suffered Global financial crisis during which the growth rate of credit declined. Antoshin et al. (2017) referred to this period as “bust” (2009-2011) and” sluggish” (2012-2016) when

assessing the credit growth in Europe, which supports our findings of a long run negative relation between ***GDP*** and ***CR***.

Table (7): Cointegrating Equations and Vector Error Correction model GDP &CR

(Model 1) **Dependent variable: *GDP***		**(Model 2)** **Dependent Variable: CR**	
Co-integrating Equation			
	Co-efficient (t-statistic)		Co-efficient (t-statistic)
CR	- 0.18 [-4.974]***	**GDP**	- 5.543 [-3.9245]***
INFL	1.508 [8.372]***	**INFL**	8.361 [9.856]***
K	0.432 [11.771]***	**K**	2.397 [4.937]***
Vector Error Correction model			
EC_{t-1}	0.084 [0.816]	EC_{t-1}	-0.138 [-2.497]**
$D(CRD)_{t-1}$	0.007 [-0.273]	$D(CRD)_{t-1}$	-0.259 [-3.495]***
$D(CRD)_{t-2}$	-0.513 [-4.147]***	$D(CRD)_{t-2}$	-0.297 [-4.495]***
$D(GDP)_{t-1}$	-0.256 [-2.455]**	$D(GDP)_{t-1}$	1.116 [3.064]***
$D(GDP)_{t-2}$	-0.619 [-3.526]***	$D(GDP)_{t-2}$	0.667 [2.168]**
D(INFL)t-1	-0.244 [-1.449]	***D(INFL)t-1***	-1.247 [-2.407]**
D(INFL)t-2	0.065 [1.612]	***D(INFL)t-2***	0.374 [0.752]
D(K)t-1	0.006 [0.183]	***D(K)t-1***	-0.236 [-1.999]
D(K)t-2	-0.691 [-2.768]	***D(K)t-2***	-0.209 [-2.16]**
constant	0.173 [0.756]	***constant***	-0.593 [-0.806]
Adj. R-squared	6.16***	Adj. R-squared	0.206
F-statistic	3.679	F-statistic	7.399***
SE equation	9.456	SE equation	10.846

*** and ** show level of significance at 1% and 5%, respectively

4.4 Robustness Test

The Pair Wise Causality test is employed to conduct a robustness test. The term "Granger cause" refers to the ability of past values of variable x to be utilized in predicting changes in variable Y (Granger, 1988). In the Pair Wise Granger Causality test, the null hypothesis states that there is no Granger causality, whereas the alternative hypothesis states that there is Granger causality. The results of Pair Wise Granger Causality, as shown in Table 8, indicate that ***MCAP*** Granger causes ***GDP***, suggesting a supply-leading relationship. Furthermore, the ***GDP*** Granger cause both ***M*** and ***CR***, which are indicative of demand following. Hence, the outcomes of the robustness test corroborate the findings that were previously documented.

Table (8): Pair Wise Granger Causality Test results

Null Hypothesis	P-Value
MCAP doesn't homogenously cause GDP	0.000***
GDP doesn't homogenously cause MCAP	0.222
M doesn't homogenously cause GDP	0.148
GDP doesn't homogenously cause M	0.000***
CR doesn't homogenously cause GDP	0.461
GDP doesn't homogenously cause CR	0.014**

*** & ** show level of significance at 1% and 5% respectively

To summarise, the research approach examined the enduring and immediate associations between ***GDP*** and several indicators of financial development. The empirical findings indicate that in the short run, ***MCAP*** has a supply-leading behaviour which is consistant with the results of Eng and Habibullah (2011) and Nguyen et al. (2021), whereas ***M*** and ***CR*** demonstrate a demand-following behaviour which is consistant with results of Adeyeye et al. (2015). Therefore, it can be observed that both hypotheses are present in European countries, aligning with the findings of Eng and Habibullah (2011), Chow et al. (2019), and Nguyen et al. (2021), who have posited a reciprocal association between economic growth and financial development. Nevertheless, the distinction is in the quantification of financial advancement and if the duration is of a short-term or long-term nature. Regarding ***MCAP***, an expanding stock market stimulates increased tangible investments, hence enhancing economic growth. Furthermore, a rise in ***CR*** in the short term contributes to the expansion of the economy. Conversely, a growing economy expands the money supply and promotes the growth of the financial sector.

5. Conclusion and Policy Recommendation

The present study aims to examine the correlation between financial development and economic growth across a sample of fourteen European countries. The analysis focuses on two main hypotheses: the supply-leading hypothesis, which posits that financial

development is the driving force behind economic growth, and the demand-following hypothesis, which implies that economic growth comes before financial development.

A panel co-integration analysis and vector error correction models are utilised in this work to examine the long-term and short-term associations among the variables. The yearly GDP growth rate is a metric used to quantify economic expansion. Financial development can be assessed using three specific indicators: (1) the yearly ratio of stock market capitalization to GDP, (2) the yearly increase in monetary liabilities, and (3) the yearly increase in credit extended by banks to private sectors.

The findings from the empirical analysis demonstrate a complex and multifaceted connection between financial development and economic growth, which is dependent on the specific metric used to assess financial development. When examining the relationship between financial development and either stock market capitalization to GDP or loans to the private sector, it becomes evident that in the short term, there is a supply-leading effect. The results are consistent with the findings of Nguyen et al. (2021). In contrast, the findings of Adeyeye et al. (2015) support the notion that there is a demand-following relationship in the near term, as indicated by the yearly increase rate of monetary liabilities. It is noteworthy that there exists an unfavourable correlation between credit extended to the private sector and economic growth in the long run.

This study underscores the contingent nature of the correlation between financial development and economic growth, so adding to the continuing discussion. The results indicate that countries seeking to enhance their economic performance in the immediate future may find it advantageous to cultivate a dynamic stock market as a viable approach. A robust stock market has the potential to bolster investor confidence, so fostering heightened investment in equities. This, in turn, can drive business investment, production, and ultimately contribute to the rise of Gross Domestic Product (GDP). Likewise, the facilitation of loans to the private sector has the potential to stimulate investment and foster economic growth. In the medium term, these data provide support for the supply-leading concept.

Therefore, the implementation of measures that seek to liberalise credit markets may provide advantageous outcomes. According to the findings of Chaney (2016) and Ciani and Bartoli (2020), it has been indicated that more stringent loan limitations may hinder the progress of financial growth. An advanced financial system, distinguished by a substantial pace of economic expansion, promotes investment prospects, commerce, and entrepreneurial activities (Giri et al., 2021). Furthermore, a strong financial system allows for effective distribution of resources and promotes the movement of cash, resulting in enhanced productivity and economic expansion (Manova, 2013; Chow et al., 2019). Nevertheless, in the case of nations undergoing swift economic expansion, the demand-following concept may possess a certain degree of validity. Increasing the money supply in such instances can expedite financial development. It is imperative for policymakers to thoroughly evaluate these data in order to formulate economic and financial policies.

Nevertheless, the study has some limitations; mainly the the economic and social diversity of the aforementioned European countries which might affect the generalizability

of the findings. Besides, the limited availablitiy of data for the rest of the European countries hindered from taking a larger sample of European countries. Furthermore, some relevant factors are not included in the analysis such as institutional factors and technology which can be the ground for future research.

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