Examining financial growth nexus of emerging European countries

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Abstract

Purpose – Besides the extensive research on managerial efficiency in the financial sector worldwide, emerging economies in Europe remain untapped. This research scrutinises the impact of managerial performance and competitive structures on their financial industry growth in terms of services they offer and ability to liquefy stock in capital markets.

Design/methodology/approach – This study contains data from selected emerging European countries' during the period of 2010–2020. This study uses data from the Heritage Foundation's Index of Economic Freedom to control for firm-level indicators. The fixed-effects (FE) method was used to explore the nexus between financial sector growth and management performance as well as competitive firm structure.

Findings – The findings provide evidence of the existing impact of firm indicators on the financial sector's growth. Two-step system the generalized method of moments (GMM) estimations are used for the robustness check of the authors' model. Whilst on a scavenger hunt through existing literature, the authors realise that there is an overwhelming lack of enthusiasm in this field.

Originality/value – With the intention of better assessment, the authors use regulatory contextual variables to look for any possible impacts and surprisingly discover a pattern in the financial growth nexus.

Keywords Management performance, Competitive structure, Firm structure, Europe

Paper type Research paper

1. Introduction

The past decade has witnessed a new era in the economic growth in Europe. According to the report published by World Economic Forum [1] (2016), European economies have entered into strenuous competition and as a result the world is witnessing a more rapid buoyancy of the economy in Europe. There exists an antecedent affiliation between financial sector and a nation's economic growth which has be well recognised by McKinnon (1973) and Schumpeter and Backhaus (2003). Financial growth has long been recognised as the key driving force in setting the foundation of the economic sector of a country that identifies optimistic economic indicators and anticipated growth based on the expansion of industrial enterprises (Arango-Aramburo *et al.*, 2019). The growth in economy caused by the financial sector helps the mobilisation of reserves from financial markets to production markets by supplying overabundance of financial resources from savings operations (Ayadi *et al.*, 2015).

A common trait amongst investors prove that they are more keen to be drawn towards nations that are concerned with the growth of their economies and production stability, nevertheless, pliant ideas can be drafted for ease of adaptation towards financial growth (Singh and Beetsma, 2018). Capping on this, Heijdra *et al.* (2019) added in their paper that, investors can obtain profits in financial markets more efficiently when there is a stable economy. It is essential for legislators and arbitrators to understand financial capital market indicators in order to explore and assess the economy (Barro and Ursúa, 2017). As ongoing

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research and development subsidises to growth in industrialisation and therefore the development of capital markets, the causal relationship also leads to sustainable economic development (Heijdra *et al.*, 2019).

The banking sector's response to modern business policies when looked at from the management's performance and worldwide challenges have been slow (Jeucken, 2002). Prior studies by Yip and Bocken (2018) shed light to the fact that there is an existing issue of proper measures to enhance the manager's performance output in this sector with their analysis on the financial crisis of 2007–2008 and the failure of the World Bank. The sustainable policies adopted by managers and policy makers of this industry around the world have been a key player in the crisis (Jan *et al.*, 2019b). Researchers like Amin and Marimuthu (2016) drew a causal relationship between the inefficiency of management output due to lack of appropriate actions needed and others started to scrutinise the impact of sustainable practices on the managers' key performances and therefore leading to the financial outcomes of this industry (Esteban-Sanchez *et al.*, 2017). The financial performance in the business field of the financial sectors can be determined by different ratios indicating the different business perspectives. For instance, return on Assets (ROA) indicates the management perspective of the financial institution (Mollah and Zaman, 2015), whereas the Net Interest Margin (NIM) indicates the individual institution's profitability and growth efficiency by taking competitive measures to achieve their goal (Nguyen *et al.*, 2020). Platonova *et al.* (2018) in their study used financial sustainability as an independent variable of the financial performance which they argued is dependent on the prior.

The remaining of the paper is organised as follows: the second section covers the background literature and hypothesis. The third section comprises of methodology, data and equations whilst the results along with robustness checks are included in the fourth section. The fifth and final section describes the conclusion and possible research scopes.

2. Background literature and hypothesis development

2.1 Effects of financial intermediaries

The primary group of measures in our analysis contrasts banks' firm-level performances and deposit money banks and other financial institutions relative to each other and relative to gross domestic product (GDP). The indicators in this part discern amongst three groups of financial institutions [2].

(1) Central Banks – Encompasses the central bank and other institutions that accomplish the function of the monetary authority [3].

(2) Deposit Money Banks – Encompasses all financial institutions that have "liabilities in the form of deposits transferable by check or otherwise useable in making payments" (Fund, 1984).

(3) Other Financial Institutions – Encompasses other bank-like institutions and non-banking financial institutions.

2.2 Nexus growth and financial intermediaries' competitive structure

Various event studies [4] have covered the financial crisis of the pandemic hit world on stock market performance (Table 1). Goodell and Huynh (2020) used the criteria set in 26th February, 2020 and fifteen industries with abnormal returns to find that many of the legislator trades can be categorised as "trading ahead of the market". Even during the crisis itself, the stocks in the USA and in European countries react ominously negative with the first declarations of the deaths (Heyden and Heyden, 2021). Chen and Yeh (2021) in their study of the pandemic hit financial market and the financial crisis caused by the global pandemic has

Source	Sample	Years	Indicators	Research technique	Conclusion
Arestis and Demetriades (1997)	Selected 12 Across Four Continents Based on Bank Data and Capital Markets	1949–1992	M2 to GDP (measure of financial deepening), M2Y, DEPY (ratio of M2 minus currency held outside the banking sector over GDP), LPCY (total credit to private sector over GDP)	Time-Series Analysis, Johansen Co-integration Analysis	Results suggest that the causality between finance and growth depends on the importance of institutional considerations and policy differences differing from bank-based and capital market based financial systems
Yıldırım *et al.* (2013)	Selected 10 European Countries' Banking Industry	1990–2012	Liquid Liabilities to GDP, M2 to GDP	Asymmetric Granger-Causality Analysis	Results show that the causal nexus is sensitive to the measurement of financial development in emerging Europe economies
Muyambiri and Chabaefe (2018)	Selected Country, Botswana for Empirical Analysis	1976–2014	Investment to GDP, Accelerator-Augmented Index of bank-related financial Development Index, Accelerator-Augmented Index of Stock Exchange-based Financial Development Index	Multi-variate Causality Model, ARDL Model, Dickey-Fuller Generalised Least Square (DF-GLS), Granger-Causality Test, Bounds *F*-test for Co-integration	Results reveal that it is chiefly investment the drives the bank-related and stock exchange-based financial sectors in the short run
Levine *et al.* (2000)	Selected 74 countries, where data are averaged over each of the seven 5-year intervals	1960–1995	Liquid Liabilities, Private Credit, Commercial-central Bank	Panel-Data Analysis, GMM Dynamic Panel Estimators, Cross-sectional instrumental-variable estimator	Results suggest that legal and accounting reforms that strengthen creditor rights, contract enforcement and accounting practices can boost financial development and accelerate economic growth

(*continued*)

Table 1.
Literature review of studies on financial growth nexus

Source	Sample	Years	Indicators	Research technique	Conclusion
Nguyen *et al.* (2020)	Selected Country, Vietnam for Empirical Analysis Commercial Bank-based Data	2006–2015	Net Interest Margin, M2 to Nominal GDP, Trends of M2/NGDP identified by Hodrick-Prescott filter (HP) and Baxter–King filter (BK)	System-Generalised Method of Moments, Augmented Dickey-Fuller Test, Fixed-Effects Model	Results indicate that excess liquidity tends to induce banks to reduce lending interest rates so as to expand credit supply which negatively affects net interest margin and makes monetary policy transmission less effective when policy rates increase
Ono (2017)	Selected Country, Russia for Empirical Analysis Based on oil-pricing and foreign Exchange Rates	1999–2008 and 2009–2014	M2 to Nominal GDP, Ratio of bank lending to private and non-financial public sectors to nominal GDP, Real per capita GDP	Vector Auto regression Model, Modified Granger-Causality Test	Results for sub period 1 suggests there is causality from economic growth to money supply and bank lending. However, in sub period 2 economic growth causes bank lending whilst there is no causality from money supply to economic growth which may be related to decrease in amount of intervention in forex market

Table 1. **Source(s):** Table by authors

demonstrated a comparative analysis between the pre-pandemic 2008 financial crisis and the crisis caused by the pandemic.

Literature shows that there exists a one-way causal relationship from financial development of a country to the economic growth (Acaravci *et al.*, 2007). The role of stock market in the development of economy has long been studied and many researchers found a positive effect of the level as well as on the growth (Atje and Jovanovic, 1993; Levine and Zervos, 1996). However, the studies failed to provide any significant relationship between financial intermediaries' liabilities and growth. The time-series analysis and Johansen co-integration analysis conducted by Arestis and Demetriades (1997) demonstrates the scenario of two nations where the banking development in Germany shows an effect on growth whereas the study is solely concerned with the banking industry and no other financial intermediaries.

The impact of exogenous components such as the financial development of a nation on the overall economic growth has been a matter of discussion since the last century even before

Levine *et al.* (2000) conducted their study to find that a significant positive relationship between financial development and growth output on a sample of seventy four developed and less developed countries over a time period of 1960–1995. Regardless of these studies, most of them focus on the macro-economic perspective whilst avoiding the more intricate details of individual firm's efficiency output.

To successfully measure the competitive structure of banks, we use net interest margin (NIM_{it}) as measure of the financial sectors competitive structure as proposed by Beck *et al.* (2000) in their attempt to propose a new database on the structure and development of financial sector. One of the main functions of financial intermediaries is to channel funds from savers to investors although many factors may influence net interest margin (NIM_{it}), it acts as a measure of efficiency providing a competitive structure to the industry (Frederic, 2000; Howells and Bain, 2007; Mishkin and Eakins, 2006).

H1. From efficiency perspective, a competitive structure of the financial intermediaries has a positive impact on their main activities.

H2. A firm's stock market turnover ratio is directly affected by the competitive structure of the financial intermediaries.

2.3 Firm-level managerial efficiency of financial intermediaries

The predominant research results such as Waddock and Graves (1997) and Preston and O'bannon (1997) which outlined an unrefined and dissenting relationship between the policies adopted by financial intermediaries to ensure enhanced performance by managers and financial performance are controversial (Mallin *et al.*, 2014). This is because the studies only offered a conceptual understanding of it. Soytas *et al.* (2019) however, used the stakeholders' theory found a positive association between practices of the company directors and managers with that of the company's financial performance. Other diverse studies on the management practices and enhanced performance of Islamic financial intermediaries in the Gulf Cooperation Council (GCC) region have a significant positive impact on their financial performances (Platonova *et al.*, 2018).

Literature has thoroughly discussed enhanced managerial policies relating to the financial performances of the firms as measured by ROA_{it} (Ahangar, 2011; El-Chaarani *et al.*, 2022; Taherian and Karampour, 2017). It is important to note that there may be other factors [5] that influence financial performances of the various types of financial intermediaries (Al-Ahdal *et al.*, 2020). Poor management practices such as excessive risk-taking or lack of transparency, can harm financial performance (Adegbite *et al.*, 2012). The implementation of good corporate governance not only enhances risk management and ensures compliance with regulatory requirements but also enables efficient operations, leading to reduced costs and improved customer satisfaction; furthermore, strategic planning enables financial intermediaries to identify and pursue profitable business opportunities whilst managing risk appropriately (Abobakr, 2017; El-Chaarani *et al.*, 2022; Salehi *et al.*, 2021)

In relation to the stakeholders' theory and with a bit of proof of positive relationship for the nexus of heightened management efficiency and the financial performance from Gulf Countries' banks, our research undertakes a similar association between the amplified managerial efficiency and financial performance of the sector. Investigating the impact of adopting efficient approach from a management perspective on the financial intermediaries of emerging European countries from the last decade will allow us to witness the nexus of improved management efficiency and financial performance from a holistic perspective of the financial sector.

H3. From a management perspective, adopting amplified efficient management policies has a positive impact on the main activities of financial intermediaries.

H4. A firm's stock market turnover ratio is positively affected by the adoption of amplified efficient management policies by the firm's management.

3. Methodology

3.1 Data and sample

Our study is based on a sample constructed from the respective European nation's stock market indexes. The sample we used for our analysis only includes data from financial intermediaries such as central banks, deposit money banks and other financial institutions. We used data encompassing countries which has a mixture of financial intermediaries consisting domestic, foreign-owned, investment banks, securities and exchange companies etc. Our choice of countries does not refer to the overall economy of the countries in the dataset rather we attempt to create a contrast amongst the various types of financial sector across Europe. We also use countries like Spain, France, Italy, Sweden and Netherlands with strong financial sector to demonstrate the competitive structure within Europe. Other countries like Bulgaria, Czech Republic, Hungary, Portugal and Slovenia has relatively small financial sector compared to that of the other countries comprising of foreign and domestic banks and the respective country's stock exchange being the focal point of financial development (Fargher and Hallegatte, 2020). This dataset encompasses information regarding the financial structure, market structure and ownership structure over a period from 2010 to 2020 which were gained from Thomson Reuters Eikon. The sample of financial intermediaries used is representative of the companies in their respective markets. We derive contextual variables from the publicly accessible information at country level published by the World Bank and the Heritage Foundation [6]. Additionally, the dataset is limited from companies which are virtually bankrupt (i.e. total equity <0) with an intention to avoid as many biases as possible in the final results. The panel data includes a total of 561 firm year observations and a mean variance inflation factor (VIF) of 2.54. The sample of firms used is representative of the companies in their respective markets.

3.2 Variables

3.2.1 Dependant variables. We use two distinguishable variables to assess the nexus relationship of the financial sector of the fastest growing economies in Europe (Table 2). The financial growth proxy as the dependant variable was measured by: (1) Private Credit by Deposit Money Banks and Other Financial Institutions (PCDM) (% of GDP) and (2) stocks traded, turnover ratio of domestic shares (STO %).

(1) There are two indicators that emphasises on intermediary claims on the private sector: the ratio of private credit by deposit money banks to GDP and the ratio of private credit by deposit money banks and other financial institutions to GDP.

    Both of these measures isolate credit issued to the private sector as opposed to credit issued to governments and public enterprises. Additionally, they focus on credit issued by intermediaries instead of central bank. They amount one of the main activities of financial intermediaries, that is, channelling savings to investors (Beck *et al.*, 2000).

To explain further, these ratios allows more precision in the measurement of the level of credit being extended to the private sector and can therefore assist in identifying any potential imbalances or problems with credit allocation within the economy (International Monetary Fund. African, 2023). In view of the measures of the main activities of the financial intermediaries, we generate PCDM (% of GDP) which is the financial resources provided to private sector by domestic money banks [7] as a share of the GDP.

Variables	Definition and description	Sources
Dependent variables		
STO	Stock Market Turnover Ratio as total value of shares traded during the period divided by the average market capitalisation for the period	Alshubiri (2021)
PCDM	Private Credit by Deposit Money Banks and Other Financial Institutions to GDP (%)	Beck *et al.* (2000)
Independent variables		
NIM	Net Interest Margin calculated as interest paid deducted from net return on investment over average total assets. This is used as a measure of the efficient competitive structure of the financial intermediaries	Haris *et al.* (2019)
ROA	Return on assets calculated as the net income scaled by total assets, used to measure the efficiency of the managers and directors in the financial intermediaries	Jan *et al.* (2019a)
Explanatory and control variables		
Bsize	Board size calculated as the natural log of the total number of board members	Dalton *et al.* (1999)
Size	Firm size resembles the log of the firm's total asset reported	Saona *et al.* (2018)
Bindep	Independent Board Members (%), as a share of the total number of board members is used to represent the extent to which the board decisions are not influenced by insiders' interest	Ma'aji *et al.* (2021)
BMeetA	Board Meeting Attendance as the mean of all the board meeting attendance conducted	Titova (2016)
FinSolv	Financial Solvency calculated as total equity divided by the total asset reported	Haris *et al.* (2019)
Contextual variables		
RQ	Regulatory Quality	Gerged *et al.* (2022)
OIEF	Overall Index of Economic Freedom	Baatour and Othman (2016)

Source(s): Table by authors

Table 2. Description of variables

$$PCDM_{it} = \left\{\frac{1}{2}\left[\frac{F_{it}}{P_{eit}} + \frac{F_{it-1}}{P_{eit-1}}\right]\right\} \div \left[\frac{GDP_{it}}{P_{ait}}\right] \tag{1}$$

The value of $PCDM_{it}$ is calculated using the deflation method where, F is credit to private sector, P_a is the average annual Consumer price index (CPI) and P_e is the end of period CPI [8] [9].

(2) Considering the stocks traded, the turnover ratio of the domestic shares (STO %) is calculated as the ratio of the value of total shares traded during a period to the average real market capitalisation. Using the deflation method for the denominator;

$$STO_{it} = \frac{T_{it}}{P_{ait}} \div \left\{\frac{1}{2}\left[\frac{M_{it}}{P_{eit}} + \frac{M_{it-1}}{P_{eit-1}}\right]\right\} \tag{2}$$

Where, P_a is the average annual CPI [10], P_e is the end of period CPI [11], T is the total value traded and M is the stock market capitalisation. For financial intermediaries, the stock turnover ratio can impact their profitability and risk management (Gaur *et al.*, 2005). For financial intermediaries like brokerage firms, a higher stock turnover ratio can indicate increased trading activity and as a result more commission fees (Hançerlioğulları *et al.*, 2016).

Instead, firms that invest in stocks (such as hedge funds, mutual funds etc.) uses STO as an indicator for active management and focus on generating more returns (Yan, 2008). Lastly STO can also be a measure of risk management, a higher ratio can indicate a firm is taking a lot of risk (Pearl and Rosenbaum, 2013).

3.2.2 Independent variables. We use two specific independent variables for our analysis. The first is the measure of efficiency, the net interest margin (NIM_{it}). This amounts to the accounting value of a bank's net interest revenue as a share of the total assets and can also be used as an indicator for the financial sector's competitive firm structure, although many factors may have an influence on it (Beck *et al.*, 2000). The notion that net interest margin (NIM_{it}) is commonly employed as a measure of financial intermediary's efficiency in generating profits from the spread between the interest rate paid on deposits and the interest rate charged on loans has been argued by researchers in the past (Berger and Mester, 1997; Saunders and Cornett, 2008). We calculate net interest income by deducting interest cost/expense from interest income and therefore measure net interest margin (NIM_{it}) as a ratio of net interest income to the average earning assets in a given financial year.

$$NIM_{it} = \frac{Interest\ Income - Interest\ Expenses}{Average\ Earning\ Assets} \tag{3}$$

The second independent variable is a representative of the financial performance due to the adoption of enhanced managerial policies contributing to better management efficiency and performance of the financial intermediaries in the form of ROA_{it} from the management perspective (Platonova *et al.*, 2018). Effective Management practices, such as good corporate governance, effective operations and strategic planning can lead to better financial performances and pursue profitable business opportunities whilst managing risks appropriately in financial intermediaries (DeYoung and Roland, 2001; Lagasio, 2018; Sathye, 2003).

$$ROA_{it} = \frac{Net\ Income\ After\ Taxes}{Total\ Assets\ Reported} \tag{4}$$

3.2.3 Explanatory, control and contextual variables. We devise a few explanatory, control variables and contextual variables as we believe may have statistical impact on our dependant variables.

Corporate governance measures such as, board size ($BSize_{it}$) calculated as the natural logarithmic transformation of the total number of board members, board independence ($Bindep_{it}$) calculated as percentage of independent board members and board meeting attendance ($BMeetA_{it}$) calculated as the mean of all the board meeting attendance conducted, all have explanatory impact on the nexus growth.

We employ two firm-level control variables to derive accurate estimation findings regarding any associations. The size of the financial intermediaries ($Size_{it}$) is measured as the logarithmic transformation of the firm's total asset reported and the financial solvency ($FinSolv_{it}$) of the companies are computed using the formula,

$$FinSolv_{it} = \frac{Total\ Shareholders'\ Equity}{Total\ Assets\ Reported} \tag{5}$$

Finally we consider two country level contextual variables representing regulatory quality (RQ_{it}) obtained from World Bank's Worldwide Government Effectiveness Index (WGI) which changes over time t and country c. This is one of the six country-level governance characteristics with each indices ranging from −2.5 to +2.5 and takes greater values as the government at the country level improves. The second contextual variable, overall index of

economic freedom ($OIEF_{it}$) is the contextual covariate measuring the economic freedom based upon twelve quantitative and qualitative factors, grouped into the following four broad categories of economic freedom: rule of law, government size, regulatory efficiency and open markets [12]. In the end, time and country dummy variables are used to control for temporal and cross-country FE.

Based on our hypothesis, we derive;

$$NEX_{it} = \beta_0 + \beta_1 FPE_{it} + \beta_2 EXP_{it+}\beta_3 CONT_{it+}\beta_4 CONTX_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (6)$$

where NEX_t represents the nexus growth in terms of both financial credit growth ($PCDM_{it}$) as well as stocks traded (STO_{it}). FPE_{it} represents the financial performance and efficiency such as the NIM_{it} and ROA_{it}. EXP_{it} stands for the explanatory variables such as board size ($BSize_{it}$), board independence ($Bindep_{it}$) and board meeting attendance ($BMeetA_{it}$). $CONT_{it}$ is representation of two firm-level control variables, that is the size of the financial intermediaries ($Size_{it}$) and the financial solvency ($FinSolv_{it}$) of the companies. $CONTX_{it}$ is representative of the contextual covariates like the overall index of economic freedom ($OIEF_{it}$), regulatory quality (RQ_{it}) and the dummy temporal and country variables.

4. Empirical analysis and results

4.1 Descriptive statistics

The descriptive statistics for our test variables (percentage of local currency GDP as PCDM and the outcome of financial intermediaries due to efficient competitive structure as STO) in their home markets is defined in Table 3. With the least mean value of 60.475 Bulgaria shows very less statistical link to long term economic growth; it is also likely to be linked to

Country of headquarters	N	Mean	Median	Standard deviation	Skewness	Min	Max
Panel A: private credit by deposit money banks and other financial institutions (GDP %)							
Bulgaria	80.000	60.475	63.316	6.552	−0.507	49.805	67.887
Czech Republic	16.000	48.922	49.451	1.485	−0.854	46.048	50.536
France	40.000	95.073	94.942	1.012	0.263	93.580	96.809
Hungary	64.000	46.272	45.377	10.341	0.059	32.409	60.087
Italy	8.000	89.484	89.671	4.596	−0.291	81.955	95.660
Netherlands	48.000	113.986	114.517	1.802	−0.460	110.936	116.265
Portugal	8.000	136.914	140.798	21.294	−0.319	105.146	159.034
Slovenia	32.000	65.684	66.079	16.154	−0.054	44.570	84.508
Spain	72.000	141.164	144.068	24.797	−0.183	104.946	170.232
Sweden	40.000	125.959	126.710	2.922	−0.825	120.158	129.255
Panel B: stock market turnover (STO %)							
Bulgaria	80.000	1.733	0.000	2.269	0.561	0.000	5.050
Czech Republic	16.000	11.716	0.000	15.791	0.585	0.000	36.361
France	40.000	39.823	53.135	32.068	−0.364	0.000	74.514
Hungary	64.000	54.542	51.220	16.786	1.167	37.941	91.913
Italy	4.000	28.638	0.000	57.276	1.155	0.000	114.551
Netherlands	48.000	45.485	61.194	36.904	−0.296	0.000	92.786
Portugal	8.000	34.202	45.375	29.371	−0.300	0.000	68.667
Slovenia	32.000	6.384	6.110	1.513	1.546	4.587	10.011
Spain	72.000	96.508	93.667	12.563	0.698	79.824	121.313
Sweden	40.000	31.262	0.000	41.079	0.547	0.000	90.460

Source(s): Authors' calculations

Table 3. Descriptive statistics of PCDM and STO against sample financial intermediaries by country

poverty reduction in the respective nations. However, the same cannot be said for Spanish banks and other financial institutions as it has the largest mean value of 141.164. Private credit by deposit money banks are useful for private sector development and investment, typically for poverty mitigation. Private market growth is considered the driving force productivity enhancement, efficient job creation and greater incomes. With proper regulatory body from the government, this can be great help to provide assistance to the economically poor –improving health, infrastructure and education. In a different instance, Table 3 provides us a similar conclusion in terms of the least mean value (1.733) when the country is defined by the number of times their financial intermediaries have "turned over" or replaced in a year (STO), but seems to be positively skewed unlike PCDM. A similar trait is also observed in case of Spain with the highest mean (96.508) but a positive skewness unlike that of PCDM.

Table 4 depicts the basic descriptive statistics of all of our test variables used in the analysis. Firstly, we test for the null hypothesis of both of our dependant variables, that is, PCDM and STO. As evident from Table 4, both the mean values of our dependant variables are way above zero which rejects the null hypothesis and we accept that the mean values are different from zero. These initial results are a proof that there is a significant contribution in the stock market turnover ratio (STO) and the private credit by domestic money in our sample. This is in alignment with previous research from Nigerian financial intermediaries (Kolapo *et al.*, 2018). Although not the primary focus of our research, Table 4 shows board size (BSize) with a mean value of 2.553 which proves that board level indicators may also impact in the nexus of individual financial intermediary's performance and the financial sector growth (Noordin *et al.*, 2022).

Alternately, ROA, which is representative of the efficient managerial performance adopted by the banks and other financial institutions, has a mean of 0.016 showing slight deviation from the proposals of the normal distribution histogram plot (the graph is positively skewed). With a much more prominent shift NIM is at a mean of 2.270 meaning there is a prominent shift in competitive structure of the financial intermediaries than those previously used traditional approaches (the graph is positively skewed with a typical right tail).

Apart from the statistical analysis, we perform numerous OLS assumptions, including multi-collinearity issues amongst the variables before inspecting our main study. Table 5 represents the correlation matrix to test for multi-collinearity problems. Generally, the Pearson product-moment correlation co-efficient indicates that no serious multi-collinearities amongst all the variables is used. In addition, an extensive statistical regression analysis

Variable	Observation	Mean	Std. Dev	Min	Max
PCDM	408	90.617	38.077	32.409	170.232
STO (%)	404	40.556	39.654	0.000	121.313
ROA	504	0.016	0.037	−0.101	0.210
NIM	408	2.270	1.148	0.652	4.559
BSize	256	2.553	0.360	1.099	3.367
Bindep	256	0.604	0.262	0.000	1.000
BMeetA	204	95.800	3.529	83.000	100.000
RQ	510	1.051	0.467	0.532	2.047
OIEF	561	67.871	4.216	58.800	77.000
FinSolv	519	0.235	0.264	−0.105	0.995
Size	514	23.296	3.531	14.223	28.543

Table 4.
Descriptive statistics

Source(s): Authors' calculations

Table 5.
Pearson correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Private credit by deposit money banks	1.000										
Stock market turnover ratio	0.507*	1.000									
	(0.000)										
Return on assets	−0.025	−0.127	1.000								
	(0.635)	(0.014)									
Net interest margin	−0.713*	−0.370*	0.072	1.000							
	(0.000)	(0.000)	(0.162)								
Bsize	−0.029	0.241*	−0.174*	−0.008	1.000						
	(0.682)	(0.001)	(0.005)	(0.911)							
Bindep (%)	0.120	−0.179	0.127	−0.380*	−0.465*	1.000					
	(0.092)	(0.012)	(0.043)	(0.000)	(0.000)						
BMeetA	0.199	0.060	0.077	0.000	−0.096	−0.026	1.000				
	(0.011)	(0.456)	(0.272)	(0.999)	(0.171)	(0.712)					
RQ	0.527*	0.163*	−0.009	−0.583*	−0.590*	0.496*	−0.058	1.000			
	(0.000)	(0.001)	(0.844)	(0.000)	(0.000)	(0.000)	(0.411)				
OIEF	0.426*	0.175*	0.055	−0.299*	−0.612*	0.178*	0.019	0.769*	1.000		
	(0.000)	(0.000)	(0.214)	(0.000)	(0.000)	(0.004)	(0.782)	(0.000)			
FinSolv	−0.297*	−0.263*	0.461*	0.366*	−0.152	0.188*	0.064	−0.169*	−0.026	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.015)	(0.003)	(0.366)	(0.000)	(0.557)		
Size	0.669*	0.317*	−0.178*	−0.771*	0.281*	0.288*	−0.158	0.550*	0.206*	−0.629*	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.024)	(0.000)	(0.000)	(0.000)	

Note(s): The correlation matrix depicts the strength and sign of the relationship amongst the variables. Standard errors in parentheses; *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively
Source(s): Authors' calculations

were performed (for brevity not mentioned here but is available on request) in order to check for other OLS assumptions before examining our hypothesis further.

4.2 Regression analysis

Whilst we intend to thoroughly scrutinise our dataset, we find proof of econometric limitations of unobservable heterogeneity such as firm culture, board diversity (these are specific time-variant characteristics of each firm) (Gormley and Matsa, 2013) etc. At the same time, we also face endogeneity problems (Baltagi, 2008; Roberts and Whited, 2013; Wintoki *et al.*, 2012) which arises due to the correlation of omitted variables with that of the independent variables (i.e. the included variable becomes correlated to the error term). For instance, ignoring total assets turnover of the host financial intermediary will cause omitted variable bias in assessing the effects of the company's growth (i.e. net interest margin) on the stock market turnover ratio. This is because the total asset turnover ratio is correlated with both the net interest margin as well the stock market turnover ratio. We formulate a careful methodology to deal with firm-level difference and endogeneity problems due to the endogeneous characteristics of the independent variables in our research (Roberts and Whited, 2013).

Firstly, we conduct panel-data regression model with FE to deal with unobservable heterogeneity. We are able to reject the null hypothesis that individual effects are uncorrelated with the other regressors in the model specifications (Hausman, 1978) by comparing fixed effects and random effects as shown in Table 7. After testing Hausman (1978), we also use Breush–Pagan test to check for heteroscedasticity [13]. Higher chi-squared value shows the variables are heteroskedastic so we reject the null hypothesis of homoscedasticity. After preliminary assessments, Breush-Pagan test rejected the absence of each intermediary's specific effect, hence, the ordinary least squared (OLS) estimation is inconsistent and consequently we move forward with FE estimations. This method allows control for unobservable individual intermediary's specific heterogeneities across countries over a period of time (this could affect the relationship between our dependant and independent variables) (Glass *et al.*, 2016; Ntim and Soobaroyen, 2013).

Although in only a small number of estimations, considering the small dataset the effect is high, the null hypothesis of homoscedasticity distributed at chi-squared was rejected in the FE estimations. As a result, we chose feasible generalised least squared (FGLS) method for estimations. This strategy allows estimation in the presence of first-order auto-correlation within panels and cross-sectional correlation and heteroscedasticity across panels. Feasible generalised least square (FGLS) specifications produce co-efficient standard errors that are severely underestimated (Beck and Katz, 1995). When explanatory variables are characterised by substantial persistence, the Panel-corrected standard error (PCSE) estimator falls short in comparison for FGLS (Reed and Webb, 2010). Since this complies with our case, we follow FGLS.

At last, the panel-data GMM two-step system estimator (GMM-SE) is used to condition for endogeneity problems and individual heterogeneity of the financial intermediaries in our sample dataset (Blundell and Bond, 1998). Unlike the previous models, this uses adjusted standard errors for potential heteroscedasticity as a higher estimation model (Blundell and Bond, 1998) compared to that of dynamic GMM and requires a proper choice of instrument for those variables that are seemingly endogenous (Alonso-Borrego and Arellano, 1999). Hence, the key decision in handling the endogeneity problem likes in the proper choice of instruments (Bond, 2002). The benefits that panel data have over time-series data or cross-sectional data denote to greater degrees of freedom, less multi-collinearity and more variation in the data, ultimately resulting in more efficient estimators (Arellano, 2003; Badi Hani Baltagi and Baltagi, 2008; Baltagi *et al.*, 2013; Hsiao, 2007).

4.3 Multi-variate analysis

In this section, we discuss the general scenario of the variables used in the empirical analysis. For robustness of our findings, we used various panel-data models and present our results for our regression analysis using FE and feasible generalised least square (FGLS) in Tables 6 and 7, respectively, whereas Table 8 shows generalised method of moments with the GMM estimator.

All of these tables are evident of the robustness of our methods and analysis throughout the panel estimations. Table 6 signifies the results of our base model using individual time-invariant effect (FE). This helps us take care of the unstoppable heterogeneity problem. The pertinence of conducting a FE method is determined by running a Hausman test, which specifies the unobserved company specific variables are insignificantly connected to those of the other companies across the sample countries.

The indicator for competitive structure of the companies (NIM) show a negative relationship with the stock market turnover ratio (STO) therefore, according to ordinary least squared-fixed effects (OLS-FE) in Table 6, our second hypothesis (H2) is rejected as there is no significant impact. However, our proxy for the main activities of the financial intermediaries

Variables	(1) STO	(2) STO	(3) PCDM	(4) PCDM
NIM	−8.760		1.3454	
	(7.202)		(2.9390)	
ROA		80.5064		−19.5360
		(153.0029)		(62.2818)
RQ	−33.51	−54.108**	4.368	7.563
	(30.289)	(25.7579)	(12.2868)	(10.4340)
OIEF	−3.852	−2.3406	5.8509***	5.6304***
	(2.487)	(2.1394)	(0.9968)	(0.8562)
FinSolv	−317.529***	−355.4267**	−94.3491*	−84.6715
	(116.855)	(143.8152)	(47.7481)	(58.5291)
BMeetA	−2.052**	−2.0053**	−0.3609	−0.3678
	(0.840)	(0.8440)	(0.3416)	(0.3417)
Bsize	98.294***	97.8921***	19.2337*	19.4186*
	(24.452)	(24.7261)	(10.0111)	(10.0768)
Bindep (%)	−1.897	−1.4223	10.0807	9.9870
	(28.746)	(28.8814)	(11.7178)	(11.7209)
Size	−62.385***	−64.5993***	−17.2097***	−16.6353**
	(15.853)	(16.6951)	(6.4670)	(6.7842)
Constant	1,994.403***	1,963.2639***	151.8616	148.9271
	(472.532)	(490.8851)	(192.3504)	(199.2117)
Observations	158	158	161	161
R-squared	0.259	0.252	0.421	0.420
Number of iden	26	26	26	26
Ind. FE	Yes	Yes	Yes	Yes
Country FE	YES	YES	YES	YES
Sigma_u	85.21	92.21	40.22	39.28
Sigma_e	28.11	28.25	11.52	11.53
Adj-R^2	0.062	0.053	0.271	0.270
F-test	5.424	5.223	11.56	11.53
p-value	7.29e-06	1.22e-05	0	0
Rho	0.902	0.914	0.924	0.921

Note(s): Standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' calculations

Table 6. Estimations with OLS-FE

Variables	(1) STO	(2) STO	(3) PCDM	(4) PCDM
NIM	−5.4026		−0.6196	
	(4.6755)		(1.4710)	
ROA		56.6426		2.2154
		(97.2147)		(16.3636)
RQ	−35.145*	−47.793***	8.795*	6.923
	(19.973)	(17.048)	(4.675)	(4.267)
OIEF	−0.7326	0.5706	1.1123***	0.9889***
	(1.7390)	(1.2443)	(0.3602)	(0.3438)
FinSolv	−6.1011	−16.5690	−1.2749	−1.1748
	(23.6819)	(29.7364)	(5.0230)	(6.3282)
BMeetA	−0.9151*	−0.8519*	−0.0490	−0.0455
	(0.4879)	(0.4837)	(0.1115)	(0.1049)
BSize	26.4980**	27.2091**	4.1583	3.2258
	(10.6840)	(10.7158)	(2.9603)	(2.7249)
Bindep (%)	−4.1439	−4.1975	1.6156	0.6149
	(15.1688)	(15.6417)	(4.2778)	(4.2411)
Size	−3.2217	−3.2670	−0.3595	−0.2643
	(2.6391)	(2.7551)	(1.0733)	(1.0650)
Constant	193.7871	92.9403	−36.3506	−27.0865
	(156.6547)	(124.9650)	(37.0837)	(36.6458)
Observations	158	158	161	161
Number of iden	26	26	26	26
Ind. FE	Yes	Yes	Yes	Yes
Country FE	YES	YES	YES	YES
Durbin Wu Hausman	654.7	603.3	3860	4346

Note(s): Standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' calculations

Table 7.
Estimations with FGLS-FE

(i.e. private credit to deposit money banks PCDM), shows positive relationship with the competitive structure of the financial intermediaries (NIM). This evidentiary support shows very limited backing to the first hypothesis (H1) of our research without strong significant impact. From management perspective, we find positive relationship between ROA and stock market turnover ratio. Although not significant, this satisfies our fourth hypothesis (H4) meaning that efficient management due to adoption of enhanced policies has an explanatory relationship with a company's ability to easily buy or sell their stocks.

After witnessing a higher error term in OLS-FE (Table 6) we decide to implement further tests in Tables 7 and 8 respectively – FGLS-FE and GMM-SE – the relationship between the dependent and independent variables. Table 7 shows that for both STO and PCDM, NIM seems to have a negative impact. This regression rejects both H1 and H2 although without any strong significance in its part. On the contrary, ROA reacts positively to both STO and PCDM, the first of which is in line with our previous estimations with OLS-FE. This is also in line with our third and fourth assumptions (H3 and H4). Unfulfilled with these test results, we proceed with GMM-SE in Table 8 only to find a strong positive (significant at 1%) relationship between NIM and STO, however, no relationship with PCDM. Similarly, ROA shows no relationship with PCDM whilst there exists a negative relationship with STO (although not significant). These findings although provide explanatory power for our second and fourth hypothesis (H2 and H4) but puts the other two assumptions (H1 and H2) in an unstable position. This could be due to the Sargan value for those regressions being 0 meaning that the instruments are not in coincide with the regression.

Variables	(1) STO	(2) STO	(3) PCDM	(4) PCDM
STO (%) = L	0.7405***	0.4470		
	(0.2424)	(.)		
PCDM to GDP (%) = L			1.0011***	1.1275
			(0.0000)	(.)
NIM	17.2722***		0.0000	
	(4.1589)		(0.0000)	
ROA		−903.1561		0.0000
		(.)		(0.0000)
RQ	−88.3229	38.1403	0.0000	0.0000
	(98.6122)	(.)	(0.0000)	(0.0000)
OIEF	−1.5482	−30.3101	0.0000	0.0000
	(9.7702)	(.)	(0.0000)	(0.0000)
FinSolv	−30.4449	226.6507	0.0000	0.0000
	(72.6911)	(.)	(0.0000)	(0.0000)
BMeetA	−2.7206	2.4537	−0.0005***	−0.1200
	(8.5299)	(.)	(0.0000)	(.)
BSize	−10.4842	201.8555	0.0000	0.0000
	(110.1568)	(.)	(0.0000)	(0.0000)
Bindep (%)	−43.3555	−266.8322	0.0000	0.0000
	(136.0432)	(.)	(0.0000)	(0.0000)
Size	−11.3048	−48.9117	0.0000	0.0000
	(21.2760)	(.)	(0.0000)	(0.0000)
Constant	810.9381	2616.0041	0.0000	0.0000
	(2268.8623)	(.)	(0.0000)	(0.0000)
Observations	139	139	143	143
Number of iden	25	25	26	26
AR(1)	0.0993	0.0717	0.0133	0.0216
ARTests	2	2	2	2
Hansen	0.491	0.594	0	0
Sargen	0.0310	0.0994	0	0
Number of instruments	21	21	22	22

Note(s): Standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' calculations

Table 8.
Estimations with two-step system GMM-FE

Although not the main focus of our study, the control variables (company specific characteristics) have shown statistical connections with both the proxies for financial sector's growth. Notably, financial solvency (FinSolv) and board meeting attendance (BMeetA) of the companies have shown significant negative relationship across all three of our estimations in Tables 6–8. Rather, the companies' board size (BSize) has shown significant positive relationship with both stock market turnover ratio (STO) and private credit by deposit money banks and other financial institutions (PCDM) across all of our estimations in OLS-FE, FGLS-FE and GMM-SE (Tables 6–8). Considering our contextual variables, regulatory quality of the country's government seems to have a significant impact (either positive of negative) on both STO and PCDM of the financial intermediaries (Tables 6 and 7). Similarly, overall index of economic freedom (OIEF) also has significant statistical impact on both of our dependent variables (STO and PCDM) as shown in Tables 6 and 7.

5. Conclusions

The results on the empirical tests supports the hypothesis that both STO and PCDM has relationship with the growth of the financial sector of emerging economies in Europe in the

last decade. The results also suggest that both NIM (net interest margin in terms of efficiency through competitive structure of financial intermediaries) and ROA in terms of efficient management through adoption of better policies) has explanatory statistical power for our proxies STO and PCDM. The fastest growing economies in Europe is subjected to explanatory research. It is inevitable that company size and financial sector themselves alone are important factors, but the difference between the countries suggest that there is much to this sector that needs micro level attention.

It is clear that the variable selected in our research has statistical explanatory power, however, in most cases our findings does not claim to be uniformly positive. Further research is required to explain this phenomenon. In another situation, our research may lack in generating a better instrument for robustness check through GMM-SE to explain PCDM in our regression.

Our research explores and contributes to the extant financial nexus growth literature in perspective of some of the fastest growing economies in Europe over the last decade. First we illustrate a picture of the emerging European countries and their respective financial sectors. Second, we explore STO as a proxy for possible explanation of the growth of financial growth and contribute to the existing debate as well as try to identify relationship of efficient management through innovative and efficient policy adoption with the growth of the financial sector through banks and other financial institutions. We offer support towards further studies as the outcome of our research shows promising outcomes of the variables used. Our belief lies in the usage and experimentation of various datasets with varying geo-political landscape to discover more promising outcomes of the nexus of growth of financial sector's managerial efficiency and competitive structure of the individual institutions. We look forward to when such study is conducted and hope our data collection and analytical processes will provide helpful precedent. For diversity purposes we use 10 countries however limiting the number of financial intermediaries to 561 given that the whole research is only limited to the financial sector. We suggest caution whilst using a constricted dataset and avoid certain firm structures such as real estate in order to avoid risk of multi-collinearity.

Notes

1. Europe's 10 fastest growing economies | World Economic Forum (weforum.org)
2. For further clarification, please see IMF report for the year 1984. The three groups are in agreement with lines 12, 22 and 42 of the International Financial Statistics.
3. The commonly utilised monetary authority amongst institutions separate than central banks' balance sheet are exchange stabilisation. The central bank may also perform commercial banking tasks and these are excluded from the central banks' balance sheet, where possible, when reported in International Financial Statistics.
4. Event studies are joint tests of market efficiency and a model of expected returns (Fama, 1970). For further information, please visit: https://www.sciencedirect.com/topics/economics-econometrics-and-finance/event-study
5. Most common factors include, market conditions, regulatory environment, competition etc.
6. https://www.heritage.org/index/about
7. This domestic money banks includes commercial banks and other financial institutions that accepts transferable deposits (e.g. demand deposits).
8. The raw data are from IMF's International Financial Statistics. GDP is in the local currency (IFS line NGDP); end of period CPI (IFS line PCPI); private credit by deposit money banks (IFS line 22 and FOSAOP); average annual CPI is measure using monthly CPI values (IFS line PCPI).

9. For clarification please refer to "Private Credit by Deposit Money Banks to GDP for United States" retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/DDDI01USA156NWDB
10. IFS line 64.ZF (from the IMF's International Financial Statistics. Standard & Poor's, Global Stock Markets fact book and supplemental S&P data).
11. IFS line 64M.ZF or, if not available, 64Q.ZF (from the IMF's International Financial Statistics. Standard & Poor's, Global Stock Markets fact book and supplemental S&P data).
12. Each of the categories are graded on a scale of 0–100, and a nation's overall index is derived by averaging the scores. The greater the value of the index, the better the economic freedom and, therefore, its underlying categories.
13. i.e. whether the estimated variance of residuals is dependent on the values of independent variables.

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