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The impact of good governance on the development of financial markets considering government size, investment and technology and education: a case study of OECD countries.

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Abstract:
The purpose of this research was to contribute to the literature on the link between good governance and the development of the financial sector by considering the role of other variables such as the role of the government, investment, technology and education. Quantitative regressions and generalized GMM moments estimation method were used to model the relationships investigated in this study. The statistical sample of the research was 30 selected OECD member countries during the years 2010 to 2022. The main findings show that the quality of governance institutions is related to the level of development of the financial sector, so that the increase in the good governance index has led to the improvement of the level of financial development in the countries under review. It was also observed that the variables of domestic investment and foreign direct investment, technology and education had positive effects on financial development in the countries under review, while the effect of the government size parameter on the level of financial development was negative and significant. Based on this, it is concluded that in order to improve the level of financial development in the studied countries, in addition to strengthening the quality of governance, it is possible to act through the mechanisms of strengthening the level of technology, education and investment, as well as controlling the size of the government.

Keywords: good governance, financial development, government and taxes, investment, technology and education.

1. Introduction

In the late 1980s, there was a widespread embrace of the market-oriented development approach as numerous reforms were implemented concurrently. This occurred at a time when the Washington Consensus issued policy directives advocating market liberalization, privatization, and regulatory reforms as the sole means of rescue. Ironically, the policy prescriptions failed in most cases because the Washington Consensus provided only a set of policy prescriptions but not the institutional framework necessary to implement the policies. At the same time, many countries moved to political systems that were, at least formally, more democratic than their predecessors and gave increased attention to the role of institutions in development processes (Bekana, 2024).

For analyzing the relationship of institutions with financial development, creating a comprehensive conceptual framework is crucial. Policymakers make decisions regarding the development or non-development of the financial sector by implementing reforms. The decision on the type of reforms to be implemented may be influenced by government-centric and society-centric forces, and during implementation, these forces may either steer or deviate from the path of reforms. Institutional constraints have been added under the influence of these forces, determining the extent to which the set objectives are met at the time of reform approval. Therefore, the outcomes of reforms are perceived as a result of the interaction of multiple factors, requiring analysis to understand the context of success or failure in a country's efforts to develop the financial sector (Casson et al., 2021; Cheeseman, 2023).

Financial development determines the level of national savings. In transitioning economies, the development of the financial sector requires institutional and economic reforms to enhance the performance of official institutions and, consequently, promote economic growth (Law and Azman-Saini, 2022). The theoretical argument linking financial development to growth is that a well-developed financial system performs several vital functions to increase intermediation efficiency by reducing information, transaction, and monitoring costs (Kurabachew et al., 2022). A modern financial system, by identifying and financing good business opportunities, promotes investment, mobilizes savings, monitors managerial performance, facilitates buying and selling, provides risk coverage, and enables risk diversification, thereby facilitating the exchange of goods and services. These functions lead to the efficient allocation of resources, faster accumulation of physical and human capital, and rapid technological progress, ultimately fueling economic growth (Mohsin et al., 2020).

There are various indicators used in different studies related to financial development. Some of these include broad money, the ratio of domestic credit to the private sector, market value of stocks, and central bank assets. Many researchers in the economic literature (Demetriades and Fielding, 2019; Dogan et al., 2023) have used the ratio of broad money (M2) to nominal gross domestic product as an indicator of financial development. Another indicator of financial development is the ratio of domestic credit to the financial sector to nominal gross domestic product. As this metric represents the quantity and quality of investment provided by the financial sector, previous studies have used it as an indicator of financial sector development (Wachtel and Zhou, 2019; Hoechle, 2017; Huang, 2020). Central bank assets are also a key indicator of the overall financial services and the strength of a country's financial system. Therefore, the ratio of central bank assets to nominal gross domestic product is used as the third variable indicative of financial sector development (Kaouthar and Mondher, 2024; Kaufmann et al., 2023).

Given this background, there is a need for a better understanding of the linkages between governance institutions and financial development. Financial literature indicates that financial development is sustainable over time. Therefore, it is logical to argue that the impact of good governance on financial sector development varies based on the existing level of financial development. The impact is more pronounced when the level of financial development is higher. Additionally, the roles of other factors influencing financial development, such as government and governmental policies, investment, technology, and education, should not be overlooked. Hence, the fundamental research questions include:

- How does good governance influence financial development?
- How do government policies and taxation impact financial development?
- How does investment affect financial development?
- How do technology and education influence financial development?

2. Theoretical Foundations and Literature Review

2.1 The Impact of Good Governance on Financial Development

Does good governance influence financial development? Institutional theory suggests that improving the quality of institutions is crucial for social and economic development (Acemoglu and Johnson, 2015; Alesina and Perotti, 2016; Abu-Bader and Abu-Qarn, 2018; Anayiotos and Toroyan, 2019; Anagnostopoulos et al., 2021). Institutions constitute a network of formal and informal rules to establish order in economic and social life, enhancing the enforcement and monitoring mechanisms based on the optimal use of national resources (Alina, 2022). Institutions form an environment that can positively or negatively impact the economic and social activities of a country. Strong legal, political, and economic institutions are essential prerequisites for liberalization, as they play a crucial role in creating and enforcing important laws and regulations (Asongu, 2023).

According to North (1981), institutions are defined as "the rules of the game in a society, or more formally, the humanly devised constraints that shape human interaction." Among the institutions vital for economic growth are those enabling a country to allocate capital to its most productive uses. Such institutions uphold strong property rights, an effective legal system, and a sound and efficient financial system. In recent years, the economic development domain has concluded that institutional laws are crucial for economic growth. As argued by Frunza (2011), institutions represent a network of formal and informal rules to establish order in economic and social life, providing mechanisms for enforcement and monitoring of these rules with the goal of optimal resource utilization. Empirical literature has established that institutions play a significant role in financial development (Asongu and Nwachukwu, 2022). Based on this, institutions contribute to the formulation of policies targeting institutional reforms aimed at enhancing growth-oriented financial systems (Asteriou and Siriopoulos, 2023; Beck et al., 2020; Blackburn and Forgues-Puccio, 2021). Primarily, the work of Levine (2007) integrates institutional factors as elements that prefer a conducive framework for financial development.

However, there is ongoing discussion in the existing literature about the fundamental factors that hinder the development of a country's financial sector. As a general consensus, macroeconomic stability is crucial for the growth of financial services. According to Krane et al. (2024), countries need to adopt appropriate macroeconomic policies, encourage competition in the financial sector, and establish a strong and transparent institutional and legal framework for financial activities. In particular, the need for prudential regulations and oversight, strong creditor rights, and contract enforcement is emphasized. However, in transitioning economies, the institutional and legal frameworks to serve and support financial sector development through regulation, oversight, and competition are often weak (Bekana, 2024).

In this context, Bekana (2024) in a study examined the impact of good governance on financial sector development using a cross-sectional dataset from 45 African countries over the period 1996–2020. He used four dimensions of good governance (overall, political, economic, and institutional) for the study. The empirical analysis was based on quantile regression and sub-sample approaches. The methodology of the study is based on the argument that the impact of good governance on financial sector development depends on the level of existing financial development, and governance policies on financial development should be tailored according to different levels of financial development in countries with low, medium, and high levels of financial development. The main findings are as follows: Firstly, governance institutional development enhances financial sector development. Secondly, the impact of good governance is mostly pronounced at the upper quantiles of the overall, economic, political, and institutional governance distributions. Thirdly, the impact of governance institutions is significantly higher at the upper quantiles of the economic governance distribution.

2-2. The Impact of Government Size on Financial Development

International experience in economic and institutional reforms has allocated a central role to the idea of the government and markets in economic development. The prevailing idea since World War II is that the government can perform better than the market, and thus, it should play a crucial role in guiding societies lacking strong entrepreneurial classes toward the path of sustainable growth. The debate culminates in the conclusion that society has little or no knowledge of how to transition from the vicious cycle of poverty to the virtuous cycle of wealth accumulation, and therefore, it needs to be guided by government policymakers and planners (Norman et al., 2023).

According to Fanelli and Popov (2020) and Louyza and Sotto (2023), government policymakers have used tools such as manipulating relative prices, protectionism, and intervening in the financial intermediation process to influence resource allocation in a desired direction. However, in the 1970s, issues began to emerge, highlighting the flaws of the model in the form of increasing government financial burdens resulting from the inefficiency of state-owned enterprises, bloated bureaucracies, low productivity, and foreign exchange shortages. This led to a reduction in the role of the government and a reliance on market mechanisms (Toh, 2019).

The fact that government-imposed constraints negatively impact the development of the financial sector is well documented in economic literature. For instance, in developing countries, constraints imposed by governments such as high inflationary taxes, high reserve requirements, directed or subsidized credit, collusion contracts between state-owned enterprises and banks, credit rationing, and interest rate ceilings on deposits and loans (or return rates) are among the limitations that can lead to "financial repression." Numerous studies, including those by Roubini and Salai-Martin (1992), Khan and Senhadji (2017), Favara (2019), and Creane et al. (2024), have demonstrated that these financial repression policies undermine economic growth. Therefore, weak institutional and legal frameworks for supervision, regulation, and enhancing competition in the financial sector, coupled with government-imposed constraints hindering financial sector development, lead to arguments in favor of institutional and macroeconomic policy reforms as essential considerations for financial sector development.

Kumar (2024) conducted a study examining financial underdevelopment and the increasing coefficient of government expenditures. He stated that developing countries with underdeveloped financial markets exhibit a significant share of informal sectors in economic activities. The evidence suggests that countries with less developed financial sectors have a lower coefficient of increasing government expenditures. This article determines the coefficient of increasing government expenditures in India using a new Keynesian DSGE model with two types of players in the market: formal and informal and imperfect financial markets. In this model, informal players are excluded financially, and the banking sector operates competitively with constraints on collateral and sticky interest rates. The results indicate that the coefficient of increasing government expenditures is significantly less than one in all horizons. The coefficient of increasing government investment expenditures is also considerably less than one in shorter horizons but approaches one in longer horizons.

Afonso et al. (2023) conducted a study examining the relationship between financial development and the efficiency of government expenditures. They present a new set of efficiency scores for government expenditures in OECD countries and then assess how capital markets contribute to understanding the efficiency of government rankings as part of the determinants of sovereign credit ratings. Efficiency scores are calculated through data envelopment analysis. Covering 35 OECD countries during the period 2007-2021, the study observes that the increase in the efficiency of public expenditures is rewarded through higher sovereign credit ratings by financial markets. Additionally, higher inflation and government debt lead to a decrease in government rankings, while higher foreign reserves contribute to an improvement in rankings.

2-3. The Impact of Investment on Financial Development

In recent decades, financial development has attracted considerable attention from scholars, academics, economists, and policymakers (Durusu Ciftci et al, 2024). Many scholars have considered investment as a blessing to the economy due to the technological spillovers it generates (Iamsiraroj, 2021). Investment is an intermediary force in financial systems due to its ability to mobilize financial resources (Yeboua, 2019). Investment brings management experience through the adoption of advanced technologies, thereby further enhancing technological progress and economic growth. Moreover, investment can lead to job creation. However, the existing studies have paid less attention to the impact of investment on financial development.

Most studies on this subject have emphasized that a country needs a sufficiently mature financial market to attract investment and surplus resources for comprehensive economic growth (Alfaro et al., 2020). Only a few studies have focused on the impact of investment on financial development in developing or emerging countries. Majeed et al. (2023) conducted a study examining the effects of foreign direct investment on financial development. They stated that foreign direct investment is perceived as a prerequisite for obtaining and maintaining competitiveness. Simultaneously, the relationship between foreign direct investment and financial development has significant implications for the researched economy and its competitiveness. This area has not been sufficiently explored and is accompanied by diverse and contradictory findings in the literature. Therefore, this study investigates the impact of foreign direct investment on financial development for 102 selected countries participating in the Belt and Road Initiative across Asia, Europe, Africa, and Latin America. Based on data from 1990 to 2021, a set of quantitative techniques, including feasible generalized least squares and groupwise augmented mean group techniques, were employed in this study. The findings indicate that foreign direct investment, trade openness, government consumption, and inflation have a statistically significant relationship with financial development.

Foreign direct investment, trade openness, and government spending boosted financial development in Asia, Europe, and Latin America but hurt it in Africa. Inflation had a negative effect on financial development on all continents.

In a study by Soumaré et al. (2018), the empirical relationship between investment actions and financial development was examined for a group of 29 developing countries during the years 1994-2015. Researchers found a two-way causal relationship between investment and stock market development indicators. A sufficiently stable monetary system facilitates the efficient distribution of economic resources and enhances the ability to attract investment inflows. Saidi (2020) empirically investigated

the link between investment, financial development, and economic growth in low-income countries using data from 1990 to 2018. The results indicated that investment initiators could provide significant benefits in terms of technology acquisition, investment inflow, job creation, human capital development, and improvement in corporate growth levels for low-income countries. Additionally, a long-term co-occurrence and a two-way causality between investment and financial development were found in low-income countries. In contrast, Bayar & Gavriletea (2022) suggest that investment flows do not significantly impact financial development in the long and short term. However, a one-way causality from financial sector development to investment flows was identified in Central and Eastern European Union countries.

Therefore, it is observed that the extant literature does not provide a coherent theoretical framework that explains the direct link between investment and financial development. However, the causal relationship between investment and financial development can be demonstrated in three ways. First, Desai et al. (2016) argue that higher investment inflows increase the aggregate funds available to the domestic economy, facilitating financial intermediation through money markets. The banking industry can enhance dealings with foreign investors. Second, a reasonably functioning money market can attract stockholders who always consider such a financial market as a symbol of a stable economy, transparency by government officials, and an investor-friendly business environment. A well-developed stock market increases the investible funds available to listed companies and can eventually lower the cost of capital, making the country attractive for further and new investment. Third, Kholdi and Sohrabian (2018) use a political economy model to argue that investment reduces the relative influence of elites in the country, which may force political elites to undertake business-friendly regulatory reforms that facilitate financial sector development.

2-4. The Impact of Technology and Education on Financial Development

Despite the increasing number of individuals participating in the modern world using new technologies, Donou-Adonsou (2019) argues that adequate levels of education are necessary to fully realize the benefits of the modern economy. There is a longstanding debate in the literature regarding the relationship between education, technology, economic growth, and financial development, with the latter being distinct. For example, Habibi and Zabardast (2020) provide evidence from OECD countries that technological improvement can lead to economic growth, and education can enhance individuals' performance. Jepsen and Drahokoupil (2021) present an alternative view that technology may have a negative impact on economic growth, as it can initially replace unskilled and repetitive jobs, which are more prevalent in emerging economies. Therefore, depending on the income levels of countries, technological innovation can have contradictory effects on economic growth. Furthermore, Stiglitz and Greenwald (2019) extensively discuss how technological innovation, rather than capital accumulation, leads to better living standards. Additionally, they argue that improving information transparency and elevating educational levels significantly enhance economic growth (Horobet et al., 2024).

Thus, specifically, while the link between technology and economic growth has been established for at least 60 years, when Solow (1956) noted that income growth should be more attributed to technological progress than capital accumulation, the nexus between financial development, which is a key channel for economic growth, and technology, particularly in emerging economies, has received less attention. Nevertheless, evidence of a positive relationship between technology adoption and financial development is provided by Owusu-Agyei et al. (2022). Moreover, Stiglitz (2013) discusses how technology can reduce information asymmetries with positive implications for financial development. In fact, the financial sector has been continuously reshaped by technological innovations (financial technology or fintech). Feyen et al. (2021) argue that technology has not only reduced transaction costs but has also led to innovative business models. Furthermore, fintech has facilitated the provision of tailored financial services as well as increased speed and overall security of individual transactions by maximizing economies of scale.

There is increasing evidence on how fintech has contributed to increasing access to financial services and hence improving financial development. For example, Sy et al. (2019) provide evidence from Sub-Saharan African countries, Berkmen et al. (2020) from Latin America, and Loukoianova et al. (2021) from Pacific Island countries. Furthermore, Khera et al. (2023) argue that some of the key drivers of improved financial development are shown to be the quality of financial institutions, as well as the levels of education and technology.

In this respect, although the technology and its development process have been studied over the years, its link with education has only recently started to be explored, partly due to the limitations of educational data. While data regarding years of schooling is readily available, more granular historical datasets are scarce. In order to fully benefit from an advanced and technology-driven society, the existing literature argues that it is no longer enough to simply have the technological infrastructure and capabilities. Instead, citizens also need to be sufficiently educated and develop relevant skills. Donou-Adonsou (2019) draws a clear link between education and technology, arguing that education (or the lack thereof) can be a key reason why many developing countries fail to fully embrace technology. Furthermore, Jepsen and Drahokoupil (2021) provide evidence that Central and Eastern European countries are likely to be affected by technological changes to a greater extent when compared to more developed countries. This is because more than a third of the labor force in the region tends to perform routine tasks that are more likely to be automated in the near future and thus replaced. This further emphasizes the need for proper education to retrain the workforce and prepare it for the modern world.

Therefore, it can be observed that a relationship exists between technology, education, and financial development. For instance, Horobet et al. (2024) conducted a study examining the interactive relationship between technology, education, and financial development in Europe. To achieve this, data spanning the years 1996 to 2021 are utilized to highlight differences between developed and emerging economies in Europe. Additionally, a Bayesian VAR framework is employed, comprising variables related to education, technology, and financial development, along with several control variables to account for

differences between countries in terms of nominal GDP growth, unemployment rate, and trade openness. The findings clearly indicate a dynamic mutual dependency between financial development (including its two main components, financial institutions, and financial markets) and technology and education. Furthermore, it is observed that education is a leading variable in the relationship of financial development-education-technology, while financial development and technology are lagging variables.

As evident, most studies have predominantly focused on the role of economic growth or foreign direct investment as influential factors in financial development, either directly or indirectly emphasizing the role of education and technology in financial development. However, in the present research, in addition to considering the qualitative role of governance quality, the impact of government size, investment, education, and technology on financial development has been taken into account. This constitutes the most significant aspect of differentiation and innovation in the current study compared to previous research.

After reviewing the theoretical foundations and research background regarding the impact of good governance and government policies on financial development, the next section will introduce the research methodology and detail the statistical analysis of the relationships between the research variables.

3. Research Method

In order to investigate the impact of good governance on the development of financial markets considering the role of government and taxes, investment and technology, and education, following Bekana (2024) who showed that good governance can affect financial development; Kumar (2024) who showed that government policies and taxes can affect financial development; Majeed et al. (2023) who showed that investment can be related to financial development and Horobet et al. (2024) who proved the effect of education and technology on financial development, the following regression model is estimated:

$$FD_{it} = c0 + B1\ FD_{it}(-1) + B2\ GQ_{it} + B3\ GNB_{it} + B4\ GFC_{it} + B5\ FDI_{it} + B6\ MOB_{it} + B7\ SSE_{it} + B8\ GDP_{it} + B9\ INF_{it} + B10\ UPOP_{it} + B11\ TRD_{it} + e_{it}$$

As the variables are defined in Table 1:

Table 1- Definition of Research Variables

Variable	Symbols	Role	Definition	Data Collection Source
Financial Development	FD	Dependent	The ratio of domestic loans granted to the private sector to GDP.	World Bank (WDI) - World Development Indicators
Good Governance	GQ	Independent	Composition (1) Public opinion and responsiveness, (2) Political stability index, (3) Government efficiency and effectiveness index, (4) Quality of laws and regulations index, (5) Rule of law index, (6) Corruption control index.	World Bank (WGI) - Worldwide Governance Indicators
Government Budget Deficit	GNB	Independent	Difference between annual revenues and annual expenditures as a percentage of GDP.	World Bank (WDI) - World Development Indicators
Domestic Investment	GFC	Independent	Investment in fixed capital as a percentage of Gross Domestic Product (GDP).	World Bank (WDI) - World Development Indicators
Foreign Investment	FDI	Independent	Net inflow of foreign direct investment as a percentage of Gross Domestic Product (GDP).	World Bank (WDI) - World Development Indicators
Technology	MOB	Independent	Percentage of mobile phone ownership (per 100 people).	World Bank (WDI) - World Development Indicators
Education	SSE	Independent	Percentage of high school enrollment.	World Bank (WDI) - World Development Indicators
Economic Growth	GDP	Control	Annual growth rate of per capita Gross Domestic Product at constant 2015 prices.	World Bank (WDI) - World Development Indicators
Inflation Rate	INF	Control	Annual rate of the Consumer Price Index (CPI).	World Bank (WDI) - World Development Indicators
Urban Population	UPOP	Control	Urban population as a percentage of the total population.	World Bank (WDI) - World Development Indicators
Trade	TRD	Control	Ratio of total trade volume to GDP.	World Bank (WDI) - World Development Indicators

Source: Research Findings

The study encompasses a statistical sample of 30 selected countries that are members of the OECD, including Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States, Italy, Japan, New Zealand, Finland, Australia, the Czech Republic, Hungary, Mexico, South Korea, Poland, and Slovakia. The selection criteria for these countries are based on the availability of the required data. The research period spans from 2010 to 2022, and the data analysis employs the Generalized Method of Moments (GMM) for dynamic panel data. All analyses are conducted using EViews software version 13.

4. Data Analysis

4-1. Descriptive Statistics

Appropriate use of descriptive statistics allows for the precise characterization of a set of data. Descriptive statistics are always employed to determine and express the features of research data. The following section presents these statistics for the main variables used in the study.

Table 2 - Descriptive Statistics for Main Research Variables

Variables	Mean	Median	Max	Min	Standard Deviation	Kurtosis	Skewness	number
GDP	0.37	0.33	0.86	-0.06	0.20	0.54	2.25	390
GQ	-0.21	-0.25	1.82	-2.13	0.79	0.10	3.04	390
GFC	0.51	0.48	0.97	0.04	0.23	-0.13	2.17	390
MOB	0.65	0.52	0.85	0.34	0.43	3.97	9.36	390
TRD	0.33	0.17	0.51	0.12	0.72	7.79	8.03	390
GNB	0.14	0.13	0.42	0.05	0.39	3.14	2.46	390
FD	0.40	0.40	0.89	0.02	0.18	0.51	3.47	390
FDI	0.25	0.18	0.52	-0.13	0.25	5.24	3.01	390
SSE	0.24	0.22	0.50	0.14	0.15	0.63	3.16	390
UPOP	0.66	0.61	0.84	0.33	0.43	-0.18	2.14	390
INF	11.45	4.87	70.35	-18.11	44.72	12.61	6.21	390

Source: Research Findings

The main central indicator is the mean, representing the point of balance and center of gravity of the distribution. It is a good indicator for demonstrating the centrality of data. For the variable Consumer Price Index (INF), the mean is 11.45. Another central indicator is the median, which reflects the society's status. It indicates that half of the data is below this value, and the other half is above it. The proximity of the mean and median suggests the normality of this variable, with a median of 4.87 for the Consumer Price Index variable.
In general, measures of dispersion are indicators used to determine the spread or variability of data relative to their mean. One of the most important measures of dispersion is the standard deviation, which is 44.72 for the Consumer Price Index variable. The kurtosis value indicates the level of potential asymmetry in the distribution, and for the Consumer Price Index variable, it is 12.61. Skewness also reflects the deviation from a normal distribution, and for the Consumer Price Index variable, this statistic is 6.21. The number of observations is 390 for all variables. The interpretation of data for other variables is similar to the Consumer Price Index variable mentioned above.
In the following section, the steps related to the statistical analysis of research data will be presented.

4-2. Examination of Variable Stationarity

Before estimating the model, it is necessary to test the stationarity of all variables used in the estimations, as the invalidity of variables can lead to the problem of spurious regression. In this study, the Levine's test has been utilized to test the validity of variables. The results of this validity test are presented in Table 3.

Table 3- Stationarity analysis of variables

Variables	t-statistic	p-value	Result
GDP	-14.07	0.0000	I(0)
GQ	- 9.80	0.0000	I(0)
GFC	-1.44	0.0439	I(0)
MOB	-5.45	0.0000	I(0)
TRD	-10.13	0.0000	I(0)
GNB	-8.29	0.0000	I(0)
FD	-26.36	0.0000	I(0)
FDI	-10.73	0.0000	I(0)
SSE	-5.92	0.0000	I(0)
UPOP	-8.04	0.0000	
INF	-10.18	0.0000	

Source: Research Findings

The unit root test is one of the most common tests used today for checking stationarity, and the stationarity results, using the Levine's Lin-Chu method, indicate the stationarity of all research variables at the level. In the following, the estimation of the research model will be addressed.

4-3. Estimation of the Research Model

Given that the research data includes selected OECD member countries and spans the period from 2010 to 2022, a pooled or panel data approach is employed to ensure logical results. For hypothesis testing and model estimation, an initial F-Limer test is conducted to choose between panel data or pooled data methods.

Table 4 - Results of the F-Limer Test

Test Statistic	Significance	Result
50.2	0001.0	Panel Data

Source: Research Findings

As Table 4 indicates, the statistically significant value of the F-Limer test is less than the 0.05 significance level, demonstrating the superiority of using the panel data method over the pooled data method. If, based on the results of the F-Limer test for each hypothesis, the use of the panel data method is confirmed, to determine which method (fixed effects or random effects) is more appropriate for estimation (detecting the fixed or random nature of cross-sectional unit differences), a Hausman test is employed, and the results are presented in Table 5.

Table 5 - Results of the Hausman Test

Chi-square Statistic	Degrees of freedom	Significance	Result
7.24	11	0.0024	Fixed effects

Source: Research Findings

As Table 5 shows, if the significance level of the chi-square statistic is greater than the 0.05 error level, it indicates the preference for using the panel data random effects method versus fixed effects. And if it is smaller, fixed effects are used. Based on the probability of the Hausman statistic, the fixed effects method is selected. Next, based on the F-Limer and Hausman tests, the research model will be estimated using the dynamic panel (GMM) method.

Table 6 - Results of Regression Analysis for the Research Model

Variables	Coefficient	Standard Deviation	Test Statistic	P-Value
c	0.556360	0.079565	6.992552	0.0000
FD(-1)	0.059685	0.108255	2.551336	0.0346
GQ	-0.048775	0.062132	-3.785029	0.0004
GNB	0.069155	0.061946	2.116379	0.0427
GFC	0.149679	0.099652	2.928575	0.0316
FDI	0.313732	0.064381	3.407545	0.0006
MOB	0.222162	0.072059	3.083056	0.0047
SSE	0.034297	0.027111	4.265060	0.0000
GDP	-0.143112	0.066034	-2.652883	0.0452
INF	0.035830	0.040998	3.873940	0.0002
UPOP	0.032017	0.042661	2.750496	0.0335
TRD	0.556360	0.079565	6.992552	0.0000
J-statistic = 21.23		Prob(J-statistic) = 0.26		

Source: Research Findings

In summary, the results of the research model estimation indicate that:

- The variable of financial development with a lag (ln FD(-1)) has positive effects on the dependent variable (financial development), so that with a one percent increase in the financial development variable with a lag, the financial development index will increase by 0.55 percent. It is also observed that this effect is statistically significant at the 1 percent level of significance.
- The variable of good governance (GQ) has positive effects on the dependent variable (financial development), such that with a one percent increase in the good governance variable, the financial development index will increase by 0.05 percent. It is also observed that this effect is statistically significant at the 5 percent level of significance.
- Additionally, it is observed that the government budget deficit variable (GNB) has negative effects on the dependent variable (financial development), so that with a one percent increase in the government budget deficit variable, the financial development index will decrease by 0.04 percent. Furthermore, it is noted that this effect is statistically significant at the 1 percent level of significance.
- The variables of foreign direct investment and domestic investment (FDI and GFC, respectively) have positive effects on the dependent variable (financial development). Specifically, with a one percent increase in these mentioned variables, the financial development index will increase by 0.14 percent and 0.06 percent, respectively. It is also observed that these effects are statistically significant at the 5 percent level of significance.
- Additionally, it is observed that the variables of education and technology (SSE and MOB, respectively) have positive effects on the dependent variable (financial development). Specifically, with a one percent increase in these mentioned variables, the financial development index will increase by 0.22 percent and 0.31 percent, respectively. It is also noted that these effects are statistically significant at the 1 percent level of significance.
- Finally, it is observed that the variables of economic growth, urbanization rate, and trade have positive and significant effects on financial development. Conversely, the inflation rate variable has a negative and significant impact on financial development.

4-4. Goodness of Fit Test

The main condition for using the Generalized Method of Moments (GMM) is that the number of cross-sections (N) should be greater than the time period length (T). In the current study, the number of cross-sections (30) exceeds the number of specified years (13), satisfying this condition for the model. Two other conditions relate to the fundamental assumptions of compatibility for GMM estimators. Firstly, the set of instrumental variables must be valid, meaning they should not be correlated with error terms. This assumption has been tested using the Sargan-Hansen test. As observed, eleven instrumental variables have been employed in the current study, and the Sargan-Hansen test statistic, along with its associated J statistic, which follows a distribution with degrees of freedom equal to the number of over-identifying restrictions, rejects the null hypothesis of instrument correlation at a 99% confidence level. Consequently, this indicates the validity of the instrumental variables used and supports the reliability of the results for model interpretation (Sargan J statistic = 21.23 with a probability of 0.2675).

Second, the absence of second-order autocorrelation (AR2) in the residuals should be confirmed. As per the information provided in the table below, this assumption has also been tested using the Arellano-Bond serial correlation test and has been confirmed at the 99 percent confidence level.

Table 7- AR autocorrelation test of the model

AR Order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-0.8136	-12.2463	6.1438	0.0000
AR(2)	0.52360	6.0233	8.3252	0.4523

Source: Research Findings

Therefore, it can be stated that the order of self-correlation in the first-order difference of sentences' disruptions is of the first order. Consequently, the model estimated with the first-order gapped difference is deemed suitable and does not exhibit explicit bias.

5. Discussion and Conclusion

The aim of this research was to contribute to the literature on the link between good governance and financial sector development, considering the role of other variables such as government, investment, technology, and education. Therefore, in this study, a composite index of good governance was utilized, which comprises six indicators of good governance. Quantitative regressions and the Generalized Method of Moments (GMM) estimation method were employed for modeling the relationships under investigation. The sample for the study included selected OECD member countries during the years 2010 to 2022. The main findings indicate that the quality of governance institutions is associated with the level of financial sector development. An increase in the good governance index leads to an improvement in the level of financial development in the examined countries. Consistent with previous empirical findings, such as Anayiotos and Toroyan (2019) and Kaouthar and Mondher (2024), this article contributes to understanding the role of good governance in financial sector development, utilizing different governance concepts for selected OECD member countries. These empirical findings enhance the literature that has identified good governance as explaining cross-country differences in financial sector development. The findings suggest that countries with weak management relative to those with better-governed organizational infrastructures perform poorly in terms of financial sector development. For instance, in countries where regulatory quality and legal governance are weak, the motivation for saving and investment is likely to be low due to the lack of confidence and trust in governmental institutions. This is because, for example, low regulatory quality leads to increased investment risk and weak trust in institutions. As a result, it weakens the motivation for private investment. Similarly, the lack of proper legal governance indicates a lack of support for private property rights, acting as a deterrent for savings and investment. The effectiveness of government and control of corruption is also a crucial element in explaining cross-country variations in financial development. Government effectiveness requires reducing the costs of doing business, thereby strengthening investment efforts. Effective regulatory quality is essential for facilitating necessary competition, improving the motivation for saving and investment. Additionally, governments can influence access to essential resources for investment. However, excessively restrictive regulations imposed on economic factors may have a counterproductive effect on investment promotion. The prevalence of corruption increases the cost of investment, thereby weakening the motivation for private investment. Therefore, effective governance control through strengthening legal and institutional frameworks, implementing principles, and empowering regulatory bodies plays a crucial role in accelerating financial development in the examined countries. This conclusion aligns with the findings of Alvina (2022), Dogan et al. (2023), and Law and Azman-Saini (2022).

Additionally, it was observed that government and austerity budget policies had a negative impact on financial development. In this context, it is argued that policies such as high inflationary taxes, high required reserve ratios, directed or subsidized credit, collusion contracts between state-owned enterprises and banks, credit rationing, and deposit and loan interest rate ceilings may be among the constraints imposed by governments that can lead to "financial repression" and limit the level of financial development. This conclusion is consistent with the findings of studies conducted by Khan and Senhadji (2017), Favra (2019), Creane et al. (2024), and Kumar (2024). Other findings indicate that domestic investment and foreign direct investment variables lead to the enhancement of financial development in the examined countries. In this regard, it is argued that the expansion of investment inflows increases the total accessible money for the domestic economy and facilitates financial intermediation through money markets. The banking industry can promote trade with foreign investors. Secondly, a well-

functioning money market can attract shareholders who perceive such a financial market as a symbol of a stable economy, transparency by governmental authorities, and a business-friendly environment. A well-developed stock market increases accessible investment capital for registered companies, ultimately reducing capital expenditures and making the country more attractive for subsequent and new investments, leading to financial development. This conclusion aligns with the findings of studies conducted by Soumaré et al. (2018) and Majeed et al. (2023).

Finally, it was also observed that an increase in the level of education and technology leads to an improvement in the level of financial development in the selected countries under study. In this regard, it is argued that technology has not only reduced transaction costs but has also led to the creation of innovative business models. Additionally, fintech, by maximizing efficiency at scale, has enhanced the ability to provide customized financial services and has also increased the speed and overall security of individual transactions, contributing to financial development. Moreover, for full benefit from an advanced and technologically advanced society, the literature argues that it is not enough to merely have technological infrastructure and capabilities. Citizens must also acquire a good level of education and develop relevant skills. This conclusion is consistent with the findings of studies conducted by Owusu-Agyei et al. (2022) and Horobet et al. (2024).

In conclusion, given that good governance, investment, education, and technology have had a positive impact on financial development in the examined countries, it is recommended that countries strive to enhance the components of good governance, such as transparency and accountability, political stability, government efficiency and effectiveness, improvement of the quality of laws and regulations, and anti-corruption policies, in order to create a conducive environment for further financial development. Additionally, efforts should be made to enhance the level of education in the country and strengthen existing technologies to not only attract new investment resources but also create a foundation for improving the level of financial development in their countries. Finally, it is also recommended to control the negative consequences of government austerity budget policies on the level of financial development through government policy control.

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Appendices:
Descriptive Statistics:

	GDP	GQ	GFC	MOB	TRD	GNB	FD	FDI	SSE	UPOP	INF
Mean	0.372643	-0.20973	0.510104	0.648181	0.332783	0.140061	0.400952	0.251767	0.244101	0.664629	11.45385
Median	0.331855	-0.2533	0.482094	0.517448	0.169907	0.126464	0.39508	0.181037	0.21935	0.614031	4.869397
Maximum	0.864291	1.824099	0.965743	0.851567	0.508156	0.421374	0.886476	0.519895	0.495584	0.844575	70.34604
Minimum	-0.0589	-2.13368	0.038684	0.344332	0.117792	0.052453	0.017169	-0.13101	0.142025	0.32525	-18.1086
Std. Dev.	0.196175	0.793101	0.22735	0.426485	0.719225	0.389342	0.179364	0.246626	0.148532	0.426233	44.71736
Skewness	0.537084	0.09509	-0.13408	3.971762	7.792906	3.144004	0.514225	5.242421	0.627498	-0.17746	12.61362
Kurtosis	2.252813	3.037757	2.171712	9.363295	8.026179	2.461427	3.472013	3.01253	3.156999	2.144729	6.207766
Jarque-Bera	23.61305	0.518488	10.45362	4563.069	89481.08	5245.845	17.66032	13124.96	22.06199	11.82571	471695.7
Probability	0.000007	0.771635	0.005371	0	0	0	0.000146	0	0.000016	0.002704	0
Sum	123.3449	-69.4193	168.8444	247648	110.1511	278.0601	132.7152	1.71E+10	80.79746	253.0923	3791.225
Sum Sq. Dev.	12.69997	207.5731	17.05701	1.69E+09	170.7039	50.02379	10.61662	2.01E+19	7.280417	59.95264	659882

bservations	390	390	390	390	390	390	390	390	390	390	390

Stationarity Test:

GDP

Null Hypothesis: Unit root (common unit root process)
Series: GDP
Date: 02/06/24 Time: 22:48
Sample: 2010 2022
Exogenous variables: Individual effects
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-14.0769	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on GDP

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.55143	0.0170	0.0186	0	0	2.0	12
2	-1.21408	0.0171	0.0165	0	0	1.0	12
3	-1.22978	0.0208	0.0184	0	0	1.0	12
4	-0.61643	0.0171	0.0124	0	0	6.0	12
5	-0.85089	0.2073	0.0366	0	0	11.0	12
6	-1.20214	0.0434	0.0096	0	0	11.0	12
7	-1.09075	0.0139	0.0045	0	0	11.0	12
8	-0.84268	0.0470	0.0086	0	0	11.0	12
9	-0.98364	0.0286	0.0102	0	0	5.0	12
10	-0.84397	0.0508	0.0247	0	0	5.0	12
11	-1.33652	0.0393	0.0114	0	0	8.0	12
12	-0.72265	0.0496	0.0341	0	0	3.0	12
13	-1.04191	0.0407	0.0081	0	0	11.0	12
14	-1.10519	0.0133	0.0088	0	0	9.0	12
15	-1.45768	0.0158	0.0649	0	0	0.0	12
16	-0.52913	0.0230	0.0205	0	0	2.0	12
17	-1.09467	0.0266	0.0298	0	0	2.0	12
18	-1.20214	0.0434	0.0096	0	0	11.0	12
19	-1.09075	0.0139	0.0045	0	0	11.0	12
20	-0.84268	0.0470	0.0086	0	0	11.0	12
21	-1.13987	0.0315	0.0083	0	0	9.0	12
22	-0.84397	0.0508	0.0247	0	0	5.0	12
23	-1.33652	0.0393	0.0114	0	0	8.0	12
24	-0.87792	0.0422	0.0126	0	0	6.0	12
25	-1.04191	0.0407	0.0081	0	0	11.0	12
26	-1.10519	0.0133	0.0088	0	0	9.0	12
27	-1.45768	0.0158	0.0649	0	0	0.0	12
28	-0.52913	0.0230	0.0205	0	0	2.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-1.05712	-19.947	1.043	-0.554	0.919	336

GQ

Null Hypothesis: Unit root (common unit root process)
Series: GQ
Date: 02/06/24 Time: 22:48
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-9.80088	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on GQ

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.39891	0.0013	0.0007	0	0	6.0	12
2	-0.51446	0.0019	0.0007	0	0	5.0	12
3	-0.50195	0.1533	0.0732	0	0	5.0	12
4	-0.49836	0.0003	0.0006	0	0	1.0	12
5	-0.83001	0.0002	0.0002	0	0	2.0	12
6	-0.47256	0.0018	0.0002	0	0	8.0	12
7	-0.66600	0.0006	0.0001	0	0	11.0	12
8	-0.47029	0.0012	0.0003	0	0	11.0	12
9	-1.03254	0.0008	0.0003	0	0	11.0	12
10	-0.94310	0.0027	0.0092	0	0	0.0	12
11	-0.99606	0.0031	0.0007	0	0	8.0	12
12	-0.19546	0.0003	0.0003	0	0	3.0	12
13	-0.25674	0.0003	3.E-05	0	0	10.0	12
14	-1.20030	0.0003	8.E-05	0	0	7.0	12
15	-1.13868	0.0004	0.0002	0	0	11.0	12
16	-0.65129	0.0016	0.0022	0	0	1.0	12
17	-0.51002	0.0037	0.0006	0	0	11.0	12
18	-0.94620	0.0015	0.0007	0	0	1.0	12
19	-0.85149	0.0006	0.0034	0	0	0.0	12
20	-0.54425	0.0005	0.0010	0	0	0.0	12
21	-0.62153	0.0022	0.0033	0	0	2.0	12
22	-0.54032	0.0054	0.0094	0	0	1.0	12
23	-0.66419	0.0042	0.0007	0	0	9.0	12
24	-1.05992	0.0010	0.0002	0	0	11.0	12
25	-0.80775	0.0009	0.0001	0	0	11.0	12
26	-0.35148	0.0004	7.E-05	0	0	7.0	12
27	-0.67700	0.0005	0.0018	0	0	0.0	12
28	-0.88248	0.0010	0.0002	0	0	11.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.64754	-16.642	1.070	-0.703	1.003	336

GFC

Null Hypothesis: Unit root (common unit root process)
Series: GFC
Date: 02/06/24 Time: 22:49
Sample: 2010 2022
Exogenous variables: Individual effects
User-specified lags: 0

Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-1.44753	0.0739

** Probabilities are computed assuming asympotic normality

Intermediate results on GFC

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.05178	0.0012	0.0012	0	0	1.0	12
2	-0.30113	0.0009	0.0004	0	0	4.0	12
3	-0.40086	0.0008	0.0010	0	0	0.0	12
4	-0.45657	0.0044	0.0056	0	0	0.0	12
5	-0.34011	0.0019	0.0021	0	0	2.0	12
6	-0.39246	0.0147	0.0192	0	0	0.0	12
7	-0.39246	0.0147	0.0192	0	0	0.0	12
8	-0.52092	0.0180	0.0228	0	0	1.0	12
9	-0.30639	0.0013	0.0019	0	0	1.0	12
10	-0.57441	0.0038	0.0031	0	0	3.0	12
11	-0.38183	0.0012	0.0009	0	0	3.0	12
12	-0.36773	0.0010	0.0012	0	0	0.0	12
13	-0.34633	0.0025	0.0033	0	0	0.0	12
14	-0.39250	0.0024	0.0027	0	0	2.0	12
15	-0.42890	0.0176	0.0229	0	0	0.0	12
16	-0.46635	0.0149	0.0170	0	0	2.0	12
17	-0.58600	0.0064	0.0076	0	0	0.0	12
18	-0.62393	0.0024	0.0028	0	0	2.0	12
19	-0.42018	0.0007	0.0010	0	0	0.0	12
20	-0.42109	0.0037	0.0048	0	0	0.0	12
21	-0.48453	0.0034	0.0043	0	0	1.0	12
22	-0.17519	0.0031	0.0038	0	0	1.0	12
23	-0.52092	0.0180	0.0228	0	0	1.0	12
24	-0.38035	0.0022	0.0031	0	0	1.0	12
25	-0.33514	0.0010	0.0011	0	0	0.0	12
26	-1.47348	0.0107	0.0156	0	0	1.0	12
27	-0.42018	0.0007	0.0010	0	0	0.0	12
28	-0.34115	0.0025	0.0032	0	0	0.0	12
29	Dropped from Test						
30	Dropped from Test						

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.34471	-8.833	1.024	-0.554	0.919	336

MOB

Null Hypothesis: Unit root (common unit root process)
Series: MOB
Date: 02/06/24 Time: 22:49
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-5.45471	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on MOB

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.89664	1.4769	0.2430	0	0	11.0	12
2	-0.56432	0.7573	1.2830	0	0	1.0	12
3	-1.17075	1.0174	0.2925	0	0	6.0	12
4	-0.77126	2.2140	1.1645	0	0	6.0	12
5	-0.24147	0.1451	0.0910	0	0	1.0	12
6	-0.04547	0.0088	0.0089	0	0	0.0	12
7	-0.25038	0.0745	0.0213	0	0	6.0	12
8	-0.69302	564.21	95.314	0	0	11.0	12
9	-1.05991	2.5320	3.3483	0	0	2.0	12
10	-0.40161	1.1498	0.1860	0	0	8.0	12
11	-0.55187	170.86	19.213	0	0	11.0	12
12	-0.73463	89.235	15.367	0	0	11.0	12
13	-0.42457	3.7928	1.2016	0	0	5.0	12
14	-0.98649	0.0007	0.0033	0	0	2.0	12
15	-0.10908	125384	134188	0	0	2.0	12
16	-0.44536	715.52	98.145	0	0	11.0	12
17	-0.35658	627.77	70.301	0	0	11.0	12
18	-0.60494	3.6102	3.8692	0	0	1.0	12
19	-0.72334	0.0174	0.0258	0	0	1.0	12
20	-0.92291	95956.	106484	0	0	2.0	12
21	-0.50873	0.0398	0.0763	0	0	1.0	12
22	-0.36029	0.0014	0.0014	0	0	2.0	12
23	-0.84598	117.56	20.018	0	0	11.0	12
24	-0.36884	1029.7	171.12	0	0	9.0	12
25	-0.69302	564.21	95.314	0	0	11.0	12
26	-0.29744	1.1386	1.0371	0	0	2.0	12
27	-0.79876	48.627	36.871	0	0	1.0	12
28	-0.76961	2.5696	1.2790	0	0	4.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.47269	-11.579	1.111	-0.703	1.003	336

TRD

Null Hypothesis: Unit root (common unit root process)
Series: TRD
Date: 02/06/24 Time: 22:49
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-10.1300	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on TRD

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.51707	0.0006	0.0009	0	0	2.0	12

2	-1.13611	0.0047	0.0008	0	0	11.0	12
3	-0.20036	2.E-05	6.E-06	0	0	3.0	12
4	-0.66918	4.E-05	1.E-05	0	0	11.0	12
5	-0.87537	7.E-05	5.E-05	0	0	3.0	12
6	-0.98391	1.E-05	2.E-05	0	0	2.0	12
7	-1.01192	0.0001	2.E-05	0	0	11.0	12
8	-0.40822	0.0002	2.E-05	0	0	11.0	12
9	-0.67942	2.E-05	7.E-05	0	0	1.0	12
10	-0.72292	0.0003	0.0003	0	0	4.0	12
11	-0.34623	0.0007	0.0001	0	0	11.0	12
12	-1.03918	9.E-06	2.E-06	0	0	9.0	12
13	-0.82268	4.E-06	6.E-06	0	0	9.0	12
14	-1.02366	1.E-05	6.E-05	0	0	3.0	12
15	-0.41582	3.6233	1.7412	0	0	5.0	12
16	-0.36376	1.E-05	3.E-05	0	0	1.0	12
17	-0.82700	0.0011	0.0002	0	0	11.0	12
18	-1.58867	3.E-05	1.E-05	0	0	11.0	12
19	-0.44671	5.E-05	3.E-05	0	0	4.0	12
20	-0.64453	0.0001	2.E-05	0	0	6.0	12
21	-0.40176	0.0001	0.0002	0	0	1.0	12
22	-0.50806	0.0077	0.0141	0	0	1.0	12
23	-0.86697	3.E-05	8.E-06	0	0	11.0	12
24	-0.51176	6.E-07	5.E-07	0	0	4.0	12
25	-1.07436	8.E-05	2.E-05	0	0	7.0	12
26	-0.35793	3.E-07	3.E-08	0	0	10.0	12
27	-0.70123	8.E-06	1.E-06	0	0	11.0	12
28	-0.93834	5.E-05	1.E-05	0	0	10.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.66064	-16.633	1.101	-0.703	1.003	336

GNB

Null Hypothesis: Unit root (common unit root process)
Series: GNB
Date: 02/06/24 Time: 22:50
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-8.29807	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on GNB

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.23121	0.0028	0.0034	0	0	1.0	12
2	-1.26910	0.0035	0.0007	0	0	11.0	12
3	-1.29440	0.0033	0.0008	0	0	8.0	12
4	-1.27451	0.0033	0.0008	0	0	8.0	12
5	-1.34418	6.E-05	3.E-05	0	0	11.0	12
6	-0.88127	0.0026	0.0006	0	0	11.0	12
7	-0.90010	0.0071	0.0020	0	0	7.0	12

8	-0.12244	0.0011	0.0012	0	0	1.0	12
9	-0.65204	0.0008	0.0006	0	0	2.0	12
10	0.77873	0.0110	0.0137	0	0	1.0	12
11	-0.67513	0.0065	0.0054	0	0	4.0	12
12	-0.65497	0.0008	0.0011	0	0	1.0	12
13	-0.17832	0.0001	1.E-05	0	0	11.0	12
14	-1.22222	0.0002	4.E-05	0	0	8.0	12
15	-1.09799	0.0004	0.0001	0	0	11.0	12
16	-1.09799	0.0004	0.0001	0	0	11.0	12
17	-1.08558	0.0005	0.0004	0	0	2.0	12
18	-0.84175	5.E-05	1.E-05	0	0	11.0	12
19	-0.52370	0.0009	0.0015	0	0	0.0	12
20	-1.14316	8.E-05	4.E-05	0	0	8.0	12
21	-1.02065	0.0176	0.0033	0	0	11.0	12
22	-0.83162	0.2916	0.2676	0	0	1.0	12
23	-0.77255	0.5312	0.0637	0	0	11.0	12
24	-0.83596	0.0614	0.0803	0	0	7.0	12
25	0.25578	0.0003	0.0004	0	0	0.0	12
26	-0.53469	0.0005	0.0002	0	0	8.0	12
27	-1.16844	0.0072	0.0012	0	0	10.0	12
28	-0.38856	0.0104	0.0016	0	0	9.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.72224	-14.815	1.130	-0.703	1.003	336

FD

Null Hypothesis: Unit root (common unit root process)
Series: FD
Date: 02/06/24 Time: 22:50
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-26.3699	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on FD

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.33348	0.0081	0.0083	0	0	2.0	12
2	-0.39037	4.E-05	5.E-05	0	0	1.0	12
3	-0.60152	0.0002	0.0002	0	0	1.0	12
4	-0.29839	0.0005	0.0004	0	0	4.0	12
5	-0.39464	0.0079	0.0010	0	0	11.0	12
6	-0.97241	0.0024	0.0004	0	0	11.0	12
7	-0.42969	0.0033	0.0003	0	0	11.0	12
8	-0.34584	0.0016	0.0017	0	0	2.0	12
9	-0.75116	0.0008	0.0005	0	0	3.0	12
10	-0.92591	0.0007	0.0070	0	0	1.0	12
11	-0.55982	0.0021	0.0012	0	0	4.0	12
12	-0.51427	0.0211	0.0066	0	0	6.0	12
13	-0.09031	0.0004	5.E-05	0	0	11.0	12
14	-0.51992	0.0023	0.0033	0	0	0.0	12

15	-0.77563	0.0008	0.0006	0	0	3.0	12
16	-0.42252	0.0029	0.0004	0	0	11.0	12
17	-0.61593	0.0136	0.0155	0	0	2.0	12
18	-0.69631	0.0002	0.0001	0	0	4.0	12
19	-0.70962	0.0006	0.0004	0	0	3.0	12
20	-0.99119	0.0002	0.0223	0	0	1.0	12
21	-0.65716	0.0311	0.0286	0	0	3.0	12
22	-0.52632	0.0043	0.0022	0	0	5.0	12
23	-0.96978	0.0012	0.0003	0	0	11.0	12
24	-1.33630	0.0016	0.0010	0	0	5.0	12
25	-0.62740	0.0002	0.0003	0	0	1.0	12
26	-0.49332	0.0146	0.0018	0	0	11.0	12
27	-0.58674	0.0137	0.0184	0	0	1.0	12
28	-0.32438	0.0087	0.0095	0	0	0.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.85941	-32.063	1.165	-0.703	1.003	336

FDI

Null Hypothesis: Unit root (common unit root process)
Series: FDI
Date: 02/06/24 Time: 22:50
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 336
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-10.7314	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on FDI

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.59691	0.0001	0.0002	0	0	1.0	12
2	-0.07099	0.0002	0.0002	0	0	1.0	12
3	-0.96090	0.0024	0.0007	0	0	7.0	12
4	-0.54748	5.E-08	7.E-08	0	0	2.0	12
5	-0.55027	5.E-08	7.E-08	0	0	2.0	12
6	-0.32717	6.E-05	0.0001	0	0	1.0	12
7	-0.30349	0.0002	0.0002	0	0	0.0	12
8	-0.49689	2.E-05	4.E-06	0	0	7.0	12
9	-0.58449	4.E-06	8.E-06	0	0	0.0	12
10	-0.56404	0.0002	0.0003	0	0	2.0	12
11	-0.63192	0.0021	0.0003	0	0	11.0	12
12	-1.05312	7.E-12	2.E-10	0	0	2.0	12
13	-0.65730	5.E-08	1.E-08	0	0	11.0	12
14	-0.48541	4.E-11	1.E-11	0	0	6.0	12
15	-0.47867	2.E-11	6.E-12	0	0	5.0	12
16	-0.49169	3.E-11	6.E-12	0	0	9.0	12
17	-0.49402	5.E-11	5.E-11	0	0	3.0	12
18	-0.89197	8.E-08	3.E-08	0	0	11.0	12
19	-0.73875	2.E-06	8.E-07	0	0	8.0	12
20	-0.88272	6.E-05	1.E-05	0	0	8.0	12

21	-0.89229	6.E-05	1.E-05	0	0	7.0	12
22	-0.53028	0.0003	0.0001	0	0	5.0	12
23	-0.53945	3.E-06	3.E-06	0	0	3.0	12
24	-0.39799	0.0006	0.0008	0	0	0.0	12
25	-0.57080	4.E+16	6.E+16	0	0	1.0	12
26	-0.75611	3.E+15	3.E+15	0	0	3.0	12
27	-0.69630	1.E-05	2.E-05	0	0	0.0	12
28	-0.09030	3.E-05	4.E-05	0	0	2.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.73634	-18.644	1.098	-0.703	1.003	336

SSE

Null Hypothesis: Unit root (common unit root process)
Series: SSE
Date: 02/06/24 Time: 22:51
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 299
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-5.92941	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on SSE

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.85097	0.0006	0.0006	0	0	1.0	12
2	-0.25383	0.0001	0.0001	0	0	2.0	12
3	-1.06896	0.0057	0.0014	0	0	11.0	12
4	-0.53175	0.0039	0.0016	0	0	4.0	12
5	-0.56243	0.0063	0.0010	0	0	9.0	12
6	-1.01563	0.0040	0.0025	0	0	3.0	12
7	-0.56858	0.0003	7.E-05	0	0	11.0	12
8	-0.64521	0.0053	0.0015	0	0	5.0	6
9	-0.65159	0.0027	0.0019	0	0	5.0	12
10	-0.75482	0.0005	0.0002	0	0	5.0	12
11	-0.71896	0.0300	0.0038	0	0	11.0	12
12	-1.42101	0.0023	0.0035	0	0	1.0	10
13	-0.70113	0.0009	0.0001	0	0	8.0	12
14	-1.40741	0.0033	0.0016	0	0	11.0	12
15	-0.61268	0.0027	0.0043	0	0	0.0	8
16	-0.47094	0.0012	0.0002	0	0	8.0	9
17	-1.57669	0.0003	0.0003	0	0	8.0	9
18	-1.27832	0.0020	0.0004	0	0	9.0	11
19	-0.24258	0.0046	0.0010	0	0	7.0	8
20	-0.35865	0.0046	0.0078	0	0	1.0	12
21	-0.52036	0.0248	0.0051	0	0	9.0	10
22	-3.02611	0.0040	0.0136	0	0	2.0	12
23	-0.29342	0.0042	0.0009	0	0	8.0	10
24	-0.59314	0.0087	0.0061	0	0	2.0	12
25	-0.83763	0.0067	0.0012	0	0	11.0	12
26	1.79116	0.0019	0.0019	0	0	2.0	8
27	-0.95934	0.0006	0.0002	0	0	7.0	8
28	-0.45351	0.0009	0.0017	0	0	0.0	10

29	Dropped from Test					
30	Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.71451	-12.483	1.146	-0.703	1.003	299

UPOP

Null Hypothesis: Unit root (common unit root process)
Series: UPOP
Date: 02/06/24 Time: 22:51
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 331
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-8.04965	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on UPOP

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.88140	0.0068	0.0017	0	0	9.0	12
2	-0.40993	0.0034	0.0045	0	0	1.0	12
3	-0.78395	0.0816	0.0095	0	0	11.0	12
4	-1.14382	0.0695	0.0262	0	0	5.0	12
5	-0.73301	0.0880	0.0161	0	0	11.0	12
6	-0.79812	0.0603	0.0091	0	0	11.0	12
7	-0.58115	0.0018	0.0002	0	0	11.0	12
8	-1.15890	0.0517	0.0101	0	0	11.0	12
9	-0.60999	0.0977	0.0192	0	0	10.0	12
10	-0.44613	0.0001	0.0001	0	0	2.0	12
11	-0.38462	0.0948	0.0117	0	0	11.0	12
12	-1.04252	0.0030	0.0006	0	0	11.0	12
13	-0.51258	0.0010	0.0002	0	0	11.0	12
14	-1.33909	0.0515	0.0459	0	0	7.0	12
15	-0.48522	0.0706	0.0585	0	0	3.0	12
16	-1.47018	0.0028	0.0018	0	0	5.0	9
17	-0.72664	0.0048	0.0052	0	0	2.0	12
18	-0.62575	0.0323	0.0085	0	0	7.0	12
19	0.21417	0.0363	0.0259	0	0	3.0	12
20	-0.60085	0.0036	0.0054	0	0	0.0	12
21	-0.74295	0.0880	0.0159	0	0	8.0	12
22	-0.61659	0.0502	0.0058	0	0	11.0	12
23	-0.53241	0.0016	0.0002	0	0	11.0	12
24	-0.43444	0.0022	0.0033	0	0	1.0	12
25	-0.49815	0.0244	0.0031	0	0	11.0	12
26	-1.03474	0.0039	0.0010	0	0	8.0	12
27	-0.45432	0.0338	0.0071	0	0	8.0	12
28	-0.71657	0.0140	0.0250	0	0	1.0	10
29	Dropped from Test						
30	Dropped from Test						

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.70476	-14.294	1.057	-0.703	1.003	331

INF

Null Hypothesis: Unit root (common unit root process)
Series: INF
Date: 02/06/24 Time: 22:51
Sample: 2010 2022
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 331
Cross-sections included: 28 (2 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-10.1890	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on INF

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.75354	54.611	14.109	0	0	11.0	12
2	-1.18267	0.6733	0.1958	0	0	6.0	12
3	1.25336	1521.7	1497.1	0	0	1.0	12
4	-0.37317	8.4707	3.4434	0	0	5.0	12
5	-1.30094	2.2325	1.3934	0	0	6.0	7
6	-1.39696	8.5651	1.8341	0	0	11.0	12
7	-1.44041	3.8595	1.6180	0	0	8.0	12
8	-0.98173	82813.	12449.	0	0	11.0	12
9	-0.98171	6.1452	1.2638	0	0	11.0	12
10	-0.49379	0.6515	0.8573	0	0	1.0	12
11	-1.13842	34366.	5619.7	0	0	11.0	12
12	-0.81105	448.94	63.114	0	0	11.0	12
13	-0.83148	5.8034	5.6566	0	0	3.0	12
14	-1.32637	5.7031	1.3260	0	0	8.0	12
15	-1.33632	5.1414	2.2447	0	0	6.0	12
16	-1.04545	36.810	5.9798	0	0	11.0	12
17	-0.83133	25.809	5.9879	0	0	6.0	12
18	-0.84628	32.006	16.457	0	0	4.0	12
19	-0.59154	4.3031	0.7281	0	0	11.0	12
20	-1.39298	0.4964	0.1669	0	0	6.0	12
21	-1.36281	6.5895	4.9400	0	0	3.0	12
22	-1.04792	138.09	39.783	0	0	11.0	12
23	-0.58928	8.7883	6.0381	0	0	2.0	12
24	-0.71482	2.0010	2.4662	0	0	1.0	12
25	-0.81170	126.89	16.833	0	0	11.0	12
26	-0.92025	14.119	2.8748	0	0	11.0	12
27	-0.88793	72.456	91.324	0	0	2.0	12
28	-1.14014	17.551	8.5474	0	0	4.0	12
29		Dropped from Test					
30		Dropped from Test					

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.96494	-17.252	1.054	-0.703	1.003	331

F-Limer Test:

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.509716	(27,266)	0.0001
Cross-section Chi-square	69.214512	27	0.0000

Cross-section fixed effects test equation:
Dependent Variable: FD
Method: Panel Least Squares
Date: 02/06/24 Time: 23:05
Sample (adjusted): 2011 2022
Periods included: 12
Cross-sections included: 28
Total panel (unbalanced) observations: 305
White period (cross-section cluster) standard errors & covariance (d.f. corrected)
Standard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD(-1)	0.853351	0.047270	18.05253	0.0000
C	0.024041	0.026852	0.895316	0.3785
GQ	-0.006152	0.006837	-0.899776	0.3762
GNB	0.002284	0.016749	0.136379	0.8925
GFC	0.010855	0.028693	0.378326	0.7081
FDI	-5.52E-12	6.87E-12	-0.803680	0.4286
MOB	-4.27E-06	4.84E-06	-0.881800	0.3857
SSE	0.034186	0.070886	0.482260	0.6335
GDP	0.023116	0.028786	0.803000	0.4290
INF	-7.61E-05	9.87E-05	-0.771296	0.4472
UPOP	0.015558	0.014314	1.086862	0.2867
TRD	0.007295	0.006906	1.056360	0.3002

Root MSE	0.091688	R-squared	0.738237
Mean dependent var	0.401456	Adjusted R-squared	0.728410
S.D. dependent var	0.179504	S.E. of regression	0.093547
Akaike info criterion	-1.862152	Sum squared resid	2.564065
Schwarz criterion	-1.715779	Log likelihood	295.9782
Hannan-Quinn criter.	-1.803606	F-statistic	75.12129
Durbin-Watson stat	1.807335	Prob(F-statistic)	0.000000

Hausman Test:

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.245012	11	0.0024

* Cross-section test variance is invalid. Hausman statistic set to zero.
** WARNING: robust standard errors may not be consistent with assumptions of Hausman test variance calculation.
** WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.

FD(-1)	0.652283	0.853351	0.005148	0.0051
GQ	0.008793	-0.006152	0.000568	0.5307
GNB	-0.024475	0.002284	0.001559	0.4980
GFC	0.019351	0.010855	0.002669	0.8694
FDI	-0.000000	-0.000000	0.000000	0.7804
MOB	0.000009	-0.000004	0.000000	0.0866
SSE	0.277371	0.034186	0.020944	0.0929
GDP	0.017094	0.023116	0.000273	0.7155
INF	-0.000153	-0.000076	0.000000	0.2102
UPOP	-0.025761	0.015558	0.000928	0.1751
TRD	0.005786	0.007295	-0.000002	NA

Cross-section random effects test equation:
Dependent Variable: FD
Method: Panel Least Squares
Date: 02/06/24 Time: 23:06
Sample (adjusted): 2011 2022
Periods included: 12
Cross-sections included: 28
Total panel (unbalanced) observations: 305
White period (cross-section cluster) standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank
Standard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.092776	0.041992	2.209347	0.0358
FD(-1)	0.652283	0.085919	7.591852	0.0000
GQ	0.008793	0.024799	0.354586	0.7257
GNB	-0.024475	0.042894	-0.570600	0.5730
GFC	0.019351	0.059099	0.327434	0.7459
FDI	-1.59E-11	3.77E-11	-0.420638	0.6773
MOB	8.59E-06	8.93E-06	0.962033	0.3446
SSE	0.277371	0.161150	1.721198	0.0967
GDP	0.017094	0.033190	0.515048	0.6107
INF	-0.000153	0.000116	-1.316353	0.1991
UPOP	-0.025761	0.033665	-0.765209	0.4508
TRD	0.005786	0.006749	0.857318	0.3988

Effects Specification
Cross-section fixed (dummy variables)

Root MSE	0.081853	R-squared	0.791382
Mean dependent var	0.401456	Adjusted R-squared	0.761579
S.D. dependent var	0.179504	S.E. of regression	0.087649
Akaike info criterion	-1.912036	Sum squared resid	2.043494
Schwarz criterion	-1.436324	Log likelihood	330.5855
Hannan-Quinn criter.	-1.721761	F-statistic	26.55412
Durbin-Watson stat	1.739860	Prob(F-statistic)	0.000000

Model Estimation:

$FD_{it} = c0 + B1\ FD_{it}\ (-1) + B2\ GQ_{it} + B3\ GNB_{it} + B4\ GFC_{it} + B5\ FDI_{it} + B6\ MOB_{it} + B7\ SSE_{it} + B8\ GDP_{it} + B9\ INF_{it} + B10\ UPOP_{it} + B11\ TRD_{it} + e_{it}$

Dependent Variable: FD
Method: Panel Generalized Method of Moments
Transformation: First Differences
Date: 02/06/24 Time: 22:53
Sample (adjusted): 2012 2022
Periods included: 11
Cross-sections included: 28
Total panel (unbalanced) observations: 277
White period (period correlation) instrument weighting matrix
White period (cross-section cluster) standard errors & covariance (d.f. corrected)
Standard error and t-statistic probabilities adjusted for clustering
Instrument specification: @DYN(FD,-2) GQ GNB GFC FDI MOB SSE GDP INF UPOP TRD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD(-1)	0.556360	0.079565	6.992552	0.0000
GQ	0.059685	0.108255	2.551336	0.0346
GNB	-0.048775	0.062132	-3.785029	0.0004
GFC	0.069155	0.061946	2.116379	0.0427
FDI	0.149679	0.099652	2.928575	0.0316
MOB	0.313732	0.064381	3.407545	0.0006
SSE	0.222162	0.072059	3.083056	0.0047
GDP	0.034297	0.027111	4.265060	0.0000
INF	-0.143112	0.066034	-2.652883	0.0452
UPOP	0.035830	0.040998	3.873940	0.0002
TRD	0.032017	0.042661	2.750496	0.0335

Effects Specification
Cross-section fixed (first differences)

Root MSE	0.109387	Mean dependent var	0.000314
S.D. dependent var	0.094893	S.E. of regression	0.111625
Sum squared resid	3.314419	J-statistic	21.23852
Instrument rank	29	Prob(J-statistic)	0.267551

AR Test:

Arellano-Bond Serial Correlation Test
Equation: Untitled
Date: 02/06/24 Time: 23:00
Sample: 2010 2022
Included observations: 277

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-0.813692	-12.246354	6.143825	0.0000
AR(2)	0.523625	6.023376	8.325214	0.4523

*Standard errors could not be computed. Try different covariance matrix options