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GENERAL & APPLIED ECONOMICS | REVIEW ARTICLE

Financial development in South Africa: The role of natural resources, IT infrastructure, and government size

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economics & finance

Paul Adjei Kwakwa^{1,2\star}, Justice Boateng Dankwah^1, Emmanuel Adu Boahen^1 and Paul Hammond^1

Abstract: The purpose of this paper is to identify the driving elements of the South African financial sector. While South Africa's financial sector appears robust, there exists a dearth of empirical research investigating the determinants of its development. Thus, this work assesses how three critical factors: natural resource abundance (NR), IT infrastructure, and government expenditure levels affect financial development (FD) in South Africa using annual data from 1971 to 2020. Preliminary findings show that the series are integrated, and they are cointegrated. Results from regression analysis suggest that the abundance of NR does not significantly contribute to financial development in South Africa. Conversely, advanced IT infrastructure, larger government size, and openness to trade are associated with a more developed financial sector. The implications of these findings are essential for policymakers and stakeholders in understanding the factors that drive financial development in South Africa. The study recommends that, among others, innovative approaches are needed to channel gains from natural resources effectively into the financial sector.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: financial development; South Africa; natural resources rent; infrastructure; government size

1. Introduction

Financial development (FD) in every economy is necessary for the attainment of the desired level of economy's development (Giri et al., 2023). Since early 20th century, authors such as Schumpeter (1911) have argued that financial development makes businesses cheaply assess credit, which promotes productivity and growth. Financial development, according to Levine (1997), promotes economic growth as it, among other things, pools savings to enhance investment. It also pools risk and optimal allocation of risk and returns (Adu et al., 2013). FD leads to growth when, in addition to the above, it facilitates and encourages inflows of foreign capital and the optimization of the allocation of capital (Manigandan et al., 2023). Moreover, it helps to reduce poverty and inequality by enabling poor and vulnerable groups to access finance.

Further, it helps the poor and vulnerable manage risks by lessening their exposure to shocks (Xu et al., 2023), hence lowering poverty and inequality. Others have argued that financial





© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent. development supports research and development (Huang, 2010; Kapidani & Luci, 2019) which eventually promote economic growth. Consequently, it has been the quest for countries to see their financial sector develop to a higher level to obtain the benefit needed from it. Arguments are made to suggest possible drivers of financial development, and empirical works are also done to ascertain what determines countries' level of financial development (Anyangwe et al., 2022; Bekele, 2023; Takyi & Obeng, 2013; Tinta et al., 2022).

For many African countries, the financial sector has been fragile, with many banks collapsing and others found to be distressed. South Africa happens to be a country in the region that seems to have a robust financial sector (FSCA, 2022). he ratio of domestic credit to GDP in the country has been over 100% for many decades (World Bank, 2023). Some have acknowledged that South Africa's development status has been supported by the strong financial sector (Abiodun & Temidayo, 2022; Ataguba 2023; Asafo-Adjei et al., 2021; Sunde, 2012). It becomes necessary to determine what factors may have accounted for the country's strong financial sector, while others are lagging behind.

Empirical works have thus far revealed a number of factors, such as the inflation rate, trade openness, interest rate, and GDP (Asratie, 2021; Ashour et al., 2023; Nsiah & Tweneboah, 2023; Zhang & Liang, 2023), that influence financial development. The results have, however, been inconclusive since there are mixed outcomes that have been revealed. In addition, while there has been contention about the influence natural resources (NR) have on financial development (Badeeb et al., 2023; Dwumfour & Ntow-Gyamfi, 2018; Khan et al., 2020), not much is known about how NR influences South Africa's FD. Natural resource can hamper FD through the resource curse hypothesis (Elhannani et al., 2016; Shahbaz et al., 2018). Abundant natural resources, on the other hand, are good for economic growth, as their extraction and processing boost economic activity and the associated income. Through this, demand for financial services for investment purposes increases (Shahbaz et al., 2018). South Africa is blessed with a number of natural resources. Until recently, it had been the number one producer of gold in the world. The country's coal deposit has powered economic activities for many years. The country has in abundance a variety of mineral deposits. It is, however, unclear how the abundance of these natural resources has affected South Africa's financial development.

The other variables that have not been given much empirical attention are government size and IT infrastructure development. Infrastructure has the potential to support financial development by ensuring certain amenities for smooth operation of firms in the industry are met (Abeka et al., 2021). Technological advancement, especially IT, has led to increased efficiency among users. This has led to huge investment by countries to benefit from such technologies (Irfan & Ahmad, 2022). Being a leading IT country on the continent, South Africa saw internet users jump from 24% in 2010 to 72% in 2021 (World Bank, 2023). Investment in the country's IT infrastructure increased from R 23 trillion in 2015 to R 46 trillion in 2018 (Independent Communications Authority of South Africa, 2020). Yet, the effect of this level of IT development on the country's FD remains unknown.

Government size or expenditure may positively or negatively affect financial development. A large government size may require more government expenses. In that case, the government may resort to borrowing from domestic market. This may cripple domestic businesses, leading to a reduction in demand for financial services by these firms. Contrarily, government size can support financial development when it boosts activities of local firms to demand for financial support (Acemoglu & Johnson, 2005; Boschini et al., 2013). After apartheid, South Africa's democracy has seen government expenditure increase from US\$ 37.1 billion in 1990 to US\$ 69 billion in 2020 (World Bank 2023). How this affects FD in the country is yet to be explored.

Authorities in South Africa are poised for a robust financial sector (FS) to achieve its medium to long term economic goals (Republic of South Africa, 2023). It is therefore imperative to have a recent analysis of the drivers of financial development in the country to offer useful insight to

shape policy formulation. Such analysis needs to pay attention to significant variables that have been neglected in the literature. Based on the aforementioned, the following are the research questions for this study:

- (a) What effect do natural resources affect South Africa's FD?
- (b) What effect does the size of government have on FD in South Africa?
- (c) What effect has IT infrastructure got on FD in South Africa?

This paper offers three contributions to the scholarship: 1) while researchers have shown interest in the subject matter for African countries (Assefa 2014; Asratie, 2021; Ehigiamusoe et al., 2019; Takyi & Obeng, 2013), the evidence regarding the nexus between NR and FD is still scarce for South Africa. This study offers evidence from one of the NR rich countries in Africa. As an economic giant in Africa, the evidence can provide useful lessons to other countries in Africa. 2) the study empirically assesses the effect that telephone infrastructure and government size (which has been ignored) have on financial development. 3) previous studies have usually used one or two proxies for financial development, and this paper uses six different proxies for analysis. Such analysis is needed because the mixed outcomes reported in the previous studies may be a result of the differences in the proxies used for financial development. Moreover, utilizing various indicators of financial development is essential to inform policymakers of the specific measures which can be taken to improve specific aspects of the financial sector.

2. Review of literature and hypothesis development

Infrastructure, governance size, and natural resources have been considered in the literature as important variables that affect a country's financial development. As such, the literature review in this paper provides explanations to how natural resources, governance size, and infrastructure shape the financial development of a country. Our extensive search in the literature shows very few related studies in South Africa. Those studies have been more concerned with the linkages between FD and growth (Abro et al., 2023; Adekunle et al., 2023; Assefa & Mollick, 2017; Rafindadi & Ozturk, 2017; Salahuddin & Gow, 2016; Tadadjeu et al., 2023). This article therefore contributes to existing literature by suggesting new empirical evidence on how natural resources, governance size, and infrastructure are able to shape FD in South Africa.

The remaining literature consists of three sections. The first section examines the contribution of NR to FD, the second section examines the role of governance in shaping FD, and the third section examines how the infrastructure of a country influences FD.

2.1. Natural resources and financial development

While natural resources are major revenue source for governments in Africa, researchers have been concerned with ways that they could serve as a curse. To this end, the association between NR and growth (Kwakwa et al., 2022); the nexus between natural resources and political stability (Ferreira et al., 2023; Slesman et al., 2023) and the carbon emission effect of natural resources (Hussain et al., 2022; Xu et al., 2022) have been assessed in and outside Africa. The influence of NR on FD is also gaining popularity in Africa and elsewhere (Ekoula et al., 2023'Redmond & Nasir, 2020).

Several studies have proposed various mechanisms by which NR can hamper FD of a nation. First, some studies have argued that the discovery of NR is most likely to draw productive factors from the manufacturing sector, and this may lead to a reduction in manufactured products which would consequently cause a rise in commodity prices from the manufacturing sector of the economy (Gylfason et al., 1999; Krugman, 1987). Second, other studies have also argued that natural resource discoveries often create inflation, which causes an appreciation of that country's currency and thereby makes manufactured products from that country uncompetitive in the international market, which would invariably affect the country's international trade (Auty, 1993; Sachs & Warner, 1995).

However, trade is a critical component in FD, and therefore, the shrinking of trade due to natural resource abundance may negatively impact on the development of the financial sector of an economy (Aluko & Ajayi, 2018; Ashraf, 2018; Zhang et al., 2015). The third possible mechanism that has been suggested in the literature is that the abundance of NR discourages human capital investment (Gylfason, 2001; Gylfason & Zoega, 2006). It is established in the literature that well-educated individuals in the population are more sophisticated in terms of financial market participation and inclusion. Rent-seeking and corruption have also been identified as features of resource-rich economies. For example, Dong et al. (2019) reported a linkage between corruption and the distribution of mining royalties, and Leite and Weidmann (1999) corroborate Dong et al. (2019) by suggesting that corruption is more pronounced in developing economies which lack strong institutions and therefore rent-seeking activities are easier. In summary, an abundance of NR tends to undermine FD through rent-seeking and corruption, distorting international trade in manufactured products, worsening contract enforcement, and reducing incentives to educate.

An enquiry by Dwumfour and Ntow-Gyamfi (2018) disclosed that banks in countries with rich natural resources are often hesitant to lend to the private sector because of weak contract enforcement that exists in such economies, which weakens the financial sector development of such economies. Employing ARDL bounds testing methodology on the Pakistan dataset, evidence from Asif et al. (2020) is that the relationship between natural resource rent and FD is negative. Similarly, Sun et al. (2020) and Khan et al. (2020) studied how the abundance of natural resources shapes the development of the financial sector of emerging economies, and both studies concluded that the surge in rent-seeking activities due to abundance of natural resources often disturbs a county's financial development. Investigating the natural resource curse hypothesis of 68 resource-dependent economies, the evidence found by Mlachila and Ouedraogo (2019) strongly supports the natural resource curse hypothesis in the financial sector of those selected economies. Hooshmand et al. (2013) investigated the role of oil rents on the development of the financial sector for 27 oil-rich countries from 2002 to 2010, and they found a negative relationship between oil rent and financial sector development of those selected countries. Similar to the above studies, several other studies have found evidence to support the natural resource curse hypothesis in the development of the financial sector of a country (inter alia, Beck, 2011; Bhattacharyya & Hodler, 2014; Guan et al., 2020; Gylfason & Zoega, 2006; Nawaz et al., 2019); Gylfason (2001); Torvik (2002); Auty (1993). In China Khan et al. (2020) found NR is detrimental to FD. Badeeb et al. (2023) found for OECD nations that both natural resources and their squared duration have a detrimental impact on financial development. Nevertheless, the impact of the square term had a comparatively diminished magnitude. The study conducted by Hussain et al. (2020) centred its attention on the BRIC economies in order to evaluate the resource curse theory. The analysis of data spanning from 1992 to 2016 indicates energy prices reduces FD. According to a recent study conducted by Hussain et al. (2023), within high-income economies, the presence of natural resources has a detrimental impact on the progress of their financial sector.

Despite the numerous studies showing that NR reduces FD, there exist studies that have identified a positive correlation between the two. For example, an investigation conducted by Shahbaz et al. (2018) affirmed posotive effect of NR on FD for the USA; Hussain et al. (2020) established positive effect for BRICS nations; Moradbeigi and Law (2017) confirmed a postive effect for developing countries; Rustamov and Adaoglu (2018) confirmed same for Russia; and Zaidi et al. (2019) confirmed for OECD nations a positive effect. In all, the existing literature indicates that the validity of the natural resource curse concept is contingent upon the specific country setting.

It is against this consideration that we state our first research hypothesis as:

Hypothesis 1: There is a positive relationship between a country's natural resource abundance and financial development.

2.2. Government size and financial development

Current research has redirected its focus towards examining the impact of governance structure a nation's financial industry. Several scholarly studies have posited the notion that the presence of abundant natural resources inside a specific country hinders the development of effective political and economic institutions within such country (Bhattacharyya, 2013; Bhattacharyya & Hodler, 2010; Jensen & Wantchekon, 2004; Leite & Weidmann, 1999; Ross, 2001; Sachs & Warner, 1995). The existing body of literature has firmly established that in order for a nation to achieve robust development in its financial sector, governance plays an important role (Acemoglu & Johnson, 2005; Beck et al., 2003). Thus, many empirical findings suggest that should government activities or spending promote quality institution FD increases (Acemoglu & Johnson, 2005; Bhattacharyya & Hodler, 2014; Boschini et al., 2013; Law & Azman-Saini, 2012; Mehlum et al., 2006; Nawaz & Khawaja, 2020).

However, it is possible that large government size may cause the government to spend more. In the process, the government may borrow from the local market, which may cripple local businesses, and the financial sector may suffer (Kapaya, 2023). Many works obtained found government spending crowds out the private sector (Bikefe et al., 2022; Mwakalila, 2020; Naceur et al., 2014). The high borrowing may increase government debt beyond a sustainable manner, which could deter direct foreign investment (Othman et al., 2018). In cases where government is able to manage its debt well, it sends positive signal to players in the financial sector thereby boosting FD (Kapaya, 2023). Studies including İlgün (2016) and Pedersoli and Presbitero (2023) obtained a positive effect of government spending on FD. Thus, it hypothesized that:

Hypothesis 2: Governance size has a positive effect on financial development.

2.3. Infrastructure and financial development

There have been several studies on the effect of infrastructure on FD (Abeka et al., 2021; Barro, 1990; Fan & Chan-Kang, 2008; Kumar, 2002; Landau, 2013; Mahmoudzadeh et al., 2013; Mohmand et al., 2017; Tariq et al., 2019). Some studies have argued that investment in physical infrastructure may lead to FD (Abeka et al., 2021; Barro, 1990; Donou-Adonsou et al., 2016; Taria et al., 2019). Verma et al. (2023) have informed that digital technology has been instrumental in transforming the global financial sector. Specifically, they contest that ICT development results in an efficient financial sector. Further, Raifu et al. (2023) contest that the financial sector benefits from ICT by reducing information asymmetry through its facilitation of energy storage and sharing. In addition to offering cost reduction and information sharing, Shahbaz et al. (2023) indicate that ICT offers stronger auditing advantage to financial institutions and the ability to design right product at the right time to enhance their operations. Irfan and Ahmad (2022) have indicated growth in mobile technology has the potential to expand business activities, which of course include the financial sector. Others have claimed that an increase in government infrastructural expenditure could slow down the economy coming from the prospect of a drop in private sector investment (Landau, 2013; Mahmoudzadeh et al., 2013). In their study, Mohanty and Bhanumurthy (2019) obtained significant impact of infrastructure on both economic and FD. The study conducted by Pradhan et al. (2014) revealed infrastructure development improves FD. Abeka et al. (2021) found that an improvement in the infrastructure of the telecommunication industry would enhance FD in Sub-Sahara Africa. They therefore argued that policies that would boost telecommunication infrastructure would enhance financial sector development and that the gains in the financial sector can effectively be directed into economic development. Anyangwe et al. (2022) concluded that there is a positive effect of mobile banking on Ghana's financial sector. Also, Raifu et al. (2023) found that financial sector development in Africa measured by financial depth and accessibility is positively affected by ICT. Regulatory authority was noted to further enhance the positive effect of ICT on the development of the financial sector. Wu and Wang (2023) have also reported that ICT promotes

financial development in urban towns. However, for Turkey, Shahbaz et al. (2023) reported ICT reduces FD.

From the ongoing discussion concerning whether expenditure on IT infrastructure may improve FD or not, we formulate our last hypothesis as follows:

Hypothesis 3: Improvement in infrastructural development has a strong relationship with financial development.

3. Methodology

3.1. Empirical specification

The study is aimed at analysing the role of NR, IT infrastructure, and government size on FD in South Africa. Based on the objective and literature review (Asif et al., 2020; Adabor, 2023; Nurmakhanova et al., 2023), financial development for South Africa can be modelled by controlling for the effect of trade openness (Ibrahim & Sare, 2018; Menyah et al., 2014) as follows:

$$FD = f(NR, IT, GS, TO)$$
(1)

where *NR*, *IT*, *GS* and *TO* are natural resources, IT infrastructure, government size, and trade openness, respectively. Specifying equation 1 into Cobb-Douglas function and linearized by taking the natural logarithm of all variables to obtain:

$$lnFDt = +\varphi \ln NRt + \sigma \ln ITt + \delta \ln GSt + \phi \ln TOt + \nu_t$$
(2)

where *ln* is the natural logarithm notation and σ , γ , ϕ , β , ϕ , μ , and α are parameters to be estimated.

3.2. Data and estimation approach

Data for the study came from the World Development Indicators of the World Bank (2023). Selected time frame for the investigation spanned from 1971 to 2021. The analysis is contingent upon the accessibility of data pertaining to all relevant variables. Natural resources were measured in terms of total resource rent (% of GDP); Government size was evaluated based on total government expenditure. IT infrastructure was quantified by considering the number of mobile phone subscriptions. Lastly, trade openness was measured by examining commerce as a percentage of GDP. In accordance with prior research conducted by Adu et al. (2013), Mohieldin et al. (2019), and Adedoyin et al. (2023), this paper included six indicators for the purpose of assessing financial progress. The indicators under consideration are domestic credit to the private sector (FDPC), domestic credit to the private sector by banks (FDBK), broad money (FDBM), foreign direct investment net inflows as a percentage of GDP (FFDI), and domestic credit provided by the financial sector (FDFS). Additionally, a financial development index, FINDEX has been constructed using the principal component analysis method. The index was constructed incorporating the five indicators of FD. Table 1 presents the descriptive statistics of the variables.

Studies that rely on time series data would lead to misleading results when the data contain unit roots. It becomes necessary to ensure that they become stationary by removing the unit roots to obtain accurate results. Consequently, a unit root test is conducted using Augmented Dickey-Fuller and the Zivot-Andrews tests. While they are both appropriate for small data, the latter is useful even when there are structural breaks. They both have the null hypothesis of no stationarity. If at levels they are not stationary, the difference term is taken to ensure stationarity.

Table 1. Descri	ptive statistics								
	LFDBK	LFDBM	LFDFS	LFDPC	LFFDI	LGOV	LNATU	LTELE	LTO
Mean	3.999609	4.018185	4.783650	4.560533	20.51267	24.43580	1.483041	14.95994	3.868173
Median	4.048514	3.959320	4.911803	4.688818	20.81837	24.42023	1.439073	15.21820	3.888520
Maximum	4.253936	4.312111	5.144125	4.958795	23.01428	24.97662	2.484193	15.51896	4.189269
Minimum	3.739745	3.726092	4.269330	3.987541	15.02686	23.53800	0.763934	13.72777	3.535768
Std. Dev.	0.161397	0.171813	0.299523	0.330271	1.994576	0.428015	0.420930	0.579644	0.150404

The subsequent step involves evaluating the cointegration connection between the variables. The confirmation of cointegration signifies the existence of a persistent relationship between the variables over an extended period of time. This research employs the Fully Modified Ordinary Least Squares (FMOLS) method to ascertain the enduring impacts of trade liberalisation, FD, abundance of natural resources, size of government, and IT infrastructure. The research additionally utilises the DOLS cointegration methods to reaffirm the long-term findings obtained from the FMOLS.

4. Results and analysis

4.1. Unit root and cointegration results

The fallouts from the unit root analysis are reported in Table 2. From these tests, all the series are found to be free from unit root at the first difference. In other words, at levels, the variables were not stationary, meaning that they all contained unit root. However, at first difference, they are all found to be free from unit root. This result offers enough reason that the series is suitable for further exploration. Evidence from the ARDL cointegration test is that the series is cointegrated (Table 3). This is because the **F statistic values** for all indicators for financial development (FD) are more than the critical values at the lower and upper bounds. This is an indication of a long-run relationship between FD variables and the independent variables. It therefore brings to the fore that in the long run, the level of FD in South Africa can be attributed to trade openness, natural resources, government size, and IT infrastructure.

4.2. Regression results

This section provides an examination of the FD effect of natural resources, telephone infrastructure, and government size. The research utilises the FMOLS and DOLS methodologies in order to calculate the regression coefficients. Their results are shown in Tables 4 and 5 respectively. A look at the results shows that both estimates reveal similar outcomes regarding the effect of natural resources, government expenditure, telephone infrastructure, and trade openness on various measures of the financial development indicator.

The verdicts presented in Table 4 reveal a statistically relevant association between natural resources and financial development indicators in a negative direction for the majority of the FD variables, where an increase of natural resource by 1% would result in a decrease of financial development ranging from 0.1% to 1.0%. This finding suggests that overreliance on natural resources may impede financial development in South Africa.

Table 2. Results of unit root test							
	ADF test	t-statistic	ZA test t-statistic (break year)				
Variable	At levels	At first difference	At levels	At first difference			
LTELE	0.657	-4.397***	1.329(2013)	-5.780***(2002)			
LGOV	-2.618	-5.043***	-3.116(1981)	-7.460***(2000)			
LNATU	-3.440	-8.704***	-3.627(1990)	-9.565***(2000)			
LTO	-1.978	-6.457***	-3.546(1982)	-6.411***(1995)			
LFDBK	-1.192	-7.769***	-3.615(1994)	-5.363*** (2002)			
LFDBM	0.046	-5.275***	-3.210(2001)	-6.405***(2009)			
LFDFS	-0.625	-8.428***	-2.339(1991)	-9.902***(2008)			
LFDPC	-2.660	-6.056***	-2.340(1991)	-5.405***(1985)			
LFFDI	-2.507	-8.528***	-3.850(1999)	-6.876***(1993)			
FINDEX	-1.252	-6.525***	-2.772(1998)	-4.889***(1984)			

*** denotes significance at 1% level

Table 3. Cointegration results						
Critical values	Lower bound	Upper bound				
10%	2.45	3.52				
5%	2.86	4.01				
1%	3.74	5.06				
Model	f-statistic	Cointegration status				
With LFDFS as dependent variable	3.87	Confirmed				
With LFDBK as dependent variable	9.58	Confirmed				
With LFDPC as dependent variable	7.81	Confirmed				
With LFFDI as dependent variable	4.77	Confirmed				
With FINDEX as dependent variable	5.81	Confirmed				
With LFDBM as dependent variable	6.95	Confirmed				

Table 4. Regression results from FMOLS							
	LFFDI	LFDBK	LFDBM	LFDFS	LFDPC	FINDEX	
Variables	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	
Natural	-0.819	-0.100***	-0.072	-0.222***	-0.240***	-1.039***	
resources	(0.427)	(0.034)	(0.040)	(0.041)	(0.042)	(0.319)	
Government	0.463	0.148	0.238**	0.266***	0.385***	2.053***	
expenditure	(0.936)	(0.079)	(0.093)	(0.093)	(0.098)	(0.697)	
Telephone	1.195	0.136**	-0.080	0.271***	0.266***	1.238***	
infrastructure	(0.599)	(0.051)	(0.060)	(0.060)	(0.063)	(0.444)	
Trade	7.354***	0.279**	0.658***	0.443***	0.242	5.169***	
openness	(1.464)	(0.123)	(0.139)	(0.147)	(0.151)	(1.124)	
С	-35.939***	-2.614**	-3.044**	-7.177***	-9.445***	-87.217***	
	(13.277)	(1.101)	(1.315)	(1.295)	(1.360)	(9.876)	

*** = one percent significant level

** = five percent significant level.

Coeff. = coefficient; SE= standard error

Table 5. DOLS results							
	LFFDI	LFDBK	LFDBM	LFDFS	LFDPC	FINDEX	
Variables	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	
Natural	-0.858	-0.103***	-0.075	-0.227***	-0.245***	-1.135***	
resources	(0.457)	(0.034)	(0.040)	(0.045)	(0.047)	(0.380)	
Government	0.785	0.174**	0.291***	0.317***	0.389***	2.167***	
expenditure	(0.857)	(0.072)	(0.088)	(0.009)	(0.101)	(0.709)	
Telephone	0.889	0.114**	-0.120**	0.222***	0.251***	1.006**	
infrastructure	(0.542)	(0.047)	(0.056)	(0.063)	(0.066)	(0.441)	
Trade	7.054***	0.264	0.574***	0.438**	0.278	5.086***	
openness	(1.556)	(0.131)	(0.148)	(0.017)	(0.184)	(1.377)	
С	-37.985***	-2.853***	-3.422***	-7.670***	-9.443***	-86.010***	
	(12.512)	(1.042)	(1.255)	(1.397)	(1.464)	(10.195)	

*** = one percent significant level

** = five percent significant level.

Coeff. = coefficient; SE= standard error.

The analysis also indicates that government expenditure positively impacts all indicators of FD except for foreign direct investment inflows, which largely confirms our hypothesis. This result implies that the South African government has played an active role in promoting financial development through its spending policies. It is noted that when government expense increases by 1% financial development increases by 0.23–2.05%. It is an indication of the need to have government expenditure considered an important factor in financial development initiatives.

Moreover, the results from the regression analysis indicate that the presence of telephone infrastructure increases LFDBK and LFDPS indicators of FD and no significant effect on the others. The results of this study indicate that telephone infrastructure plays a crucial role in enabling private individuals and enterprises to obtain credit. The results of the study also demonstrate that the degree of trade openness favours various indicators of FD such that a one percent rise in trade openness will result in a corresponding increase in South Africa's financial development, estimated to range between 0.72% and 7.3%. This result suggests that increasing trade openness is an effective strategy for promoting financial development in South Africa. This implies that a more open trade policy may promote FD in the country.

5. Discussion

The findings of the research demonstrate a statistically significant adverse impact of natural resources on multiple indicators of FD. This suggests that the presence of abundant resources such as gold and diamonds in South Africa may have impeded the country's FD. The results of the study are in opposition to the concept that the presence of abundant natural resources in a country leads to enhanced financial development. The aforementioned findings are consistent with the resource curse hypothesis, a theory that suggests countries endowed with abundant natural resources frequently have economic difficulties, including issues related to governance, corruption, and political stability (Asif et al., 2020; Auty, 1993; Gylfason, 2001; Torvik, 2002). There are multiple elements that can contribute to the adverse effect. Firstly, dependence on natural resources might have led to little economic diversification, rendering it vulnerable to external shocks. For instance, Morema and Bonga-Bonga (2020) have confirmed that oil and gold price fluctuations harm the stock market in South Africa. Secondly, the natural resources can foster rent-seeking behavior with corruption, which impedes FD (Hooshmand et al., 2013; Mlachila & Ouedraogo, 2019). There are several reported cases of corrupt practices in South Africa's mining sector (Corruption Watch, 2023; Mining Review Africa, 2022) which might have adversely affected the financial sector. Lastly, the volatility of commodity prices can make it challenging for the country to plan and invest in long-term financial development initiatives (Gylfason et al., 1999; Krugman, 1987). Like many African countries, there is evidence that volatility in the prices of gold and oil, among others, has constrained government revenue (African Renewal, 2017). Such situations often lead to the government borrowing from the domestic market which may crowd out private sector. Through this, the financial sector may not grow as expected. The findings confirm the results reported by Badeeb et al. (2023) and Hussain et al. (2023).

Also, government expenditure, which serves as a measure of government size, positively correlates with financial development in South Africa. These results align with Costa and Santos (2013); Huang (2010); Rathinam and Raja (2010) and it may be due to the implementation of policies and regulations by the government to promote financial development. Also, the government might have handled its borrowing or debt in a sustainable manner to promote financial development. Government's establishment of regulatory frameworks that encourage investment and safeguard investors' rights (Republic of South Africa, 2023), might have stimulated financial development in the country. Investments made by governments in many productive areas have the potential to enhance the overall economic setting and foster FD.

The study yielded compelling evidence in support of the hypothesis that advancements in IT infrastructure are closely linked to financial development. Specifically, the study highlighted the significance of telephone infrastructure in fostering financial development within the context of

South Africa. These findings align with past papers (Abeka et al., 2021; Barro, 1990; Donou-Adonsou et al., 2016; Tarig et al., 2019). Investing in infrastructure is pivotal for growth by establishing the groundwork for various economic activities. For instance, enhancements in IT infrastructure can lower transportation costs, enhance the efficiency of goods and service delivery, and facilitate business operations and expansion. Again, investments in communication infrastructure can improve information accessibility and connectivity, thereby facilitating trade and investment. The results show that the pace of ICT infrastructure in the country (World Bank, 2023) has bolstered financial development. For the citizens, this might be the case since IT infrastructure might have facilitated easy access to financial services. For financial institutions, expanding IT infrastructure might have also facilitated transactions, expedited financial transfers, and reduced transaction costs (Raifu et al., 2023; Shahbaz et al., 2023; Verma et al., 2023) thereby improving financial sector. For instance, Ernst and Young (2023) has opined that South Africa's financial landscape in recent times has been shaped by modern technology which has raised the bar of the country's financial sector since among others within a few months new banks are launched and in a few days financial institutions launch new products. Ernst and Young (2023) further captured that digital assets will remain a key factor to shape the financial sector development in South Africa. Thus, the study provides robust evidence supporting the hypothesis that improvements in infrastructure development are strongly associated with financial development.

Trade openness has been shown to have a good impact on South Africa's financial development. This may be that exports and imports of goods and services by firms require that they do so through financial sector. With this, the accumulated funds help the financial sector to expand. Moreover, trade openness is often associated with foreign direct investments which propels FD (Svaleryd and Vlachos, 2002). Studies like Ibrahim and Sare (2018) and Menyah et al. (2014) obtained comparable results.

6. Conclusion and policy implications

This paper examined the financial development effect of natural resources, IT infrastructure, and government size in South Africa. Utilizing annual data spanning (1971 to 2021), the analysis revealed trade openness, telephone infrastructure, and government size play crucial roles in fostering financial development.

The study found that natural resources in South Africa reduce financial development emphasizing the importance of addressing the challenges posed by the "natural resource curse" to enhance financial sector growth. To achieve this, policymakers should prioritize curbing corruption associated with the extractive sector as well as promoting serene political atmosphere to promote investment in the country. Like many African countries, South Africa has its fair share of corruption, which may impede the benefits to be derived from the abundant natural resources. Although there are efforts made to address this canker, it appears more robust measures are needed to make it successful. One of such measures is to make it more costly to engage in corruption. Cases on political instability still characterise the South African economy. Finding a lasting solution to this menace may help the financial sector benefit from its natural resources. Furthermore, innovative approaches are needed to channel gains from natural resources effectively into the financial sector. For instance, promoting green bonds using natural resource rent can boost financial development. Tax incentives for foreign firms that reinvest their profits in the country and public-private partnerships in the extractive sector can also be helpful in the fight against the resource curse in South Africa.

Also, investments in infrastructure, particularly in the telecommunications sector will promote FD. Authorities should not renege on its commitment in this regard. It is important to extend such infrastructure to the rural areas where many of the unbanked are found. Moreover, policymakers should endeavour to see to it that internet is accessed at a relatively cheaper cost. This will help citizens to engage in online banking and also reduce the cost of doing business for financial institutions.

Government is urged to channel its expenditure in productive ventures. Areas such as health, education, road, and water among others can boost the human capital of the country to support the financial sector. Encouraging openness in trade through reduced tariffs and the removal of trade barriers can attract foreign investment and facilitate easier access to financial resources. Policymakers should consider implementing policies that enhance competition within the financial industry and maintain a stable regulatory environment to support financial sector development.

In summary, this research highlights the crucial significance of government policies and infrastructure development in fostering FD within the context of South Africa. The findings offer valuable insights for policymakers, urging them to focus on investments in IT infrastructure, trade openness, stable regulations, and sustainable management of natural resources to foster a thriving financial sector.

7. Limitations and avenues for future research

Like numerous previous investigations, the current study possesses specific constraints that warrant consideration when interpreting its findings. Nevertheless, it is crucial to underscore that these limitations do not compromise the validity of the study's discoveries. Instead, they present intriguing opportunities for further exploration. Firstly, the study's hypotheses were tested solely using data from South Africa, opening avenues for future research to validate and extend these findings in different contexts and countries. Conducting cross-country studies could shed light on the interplay and relationships identified in this research.

Secondly, there exists the potential for future research to delve deeper into the mechanisms underlying the observed connections. Exploring regional variations and conditions could lead to a more thorough comprehension of the factors influencing financial development. Thirdly, while this study focused on South Africa as a whole, further research could explore specific elements driving financial development in different regions or industries within the country. Analysing distinct sectors like banking, insurance, and capital markets may yield valuable insights.

Fourthly, it assumed a linear connection between independent variables and FD. Future investigations can investigate potential nonlinear effects to provide a deeper insight. Lastly, this current study concentrated on a limited number of variables. To enrich the understanding of financial development, future research can explore how institutional and cultural factors affect FD. In conclusion, while the present study has its limitations, they serve as stepping stones for future research endeavours. Addressing these areas of inquiry can enhance our comprehension of financial development dynamics and contribute to the advancement of theory in this field.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Declaration

We declare that no human participant was used for the study.

Data availability statement

Data can be obtained from World Bank (2023) World Development Indicators. https://databank.worldbank.org/ source/world-development-indicators#.

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