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Article

Interplay between Finance and Institutions in the Development Process of the Industrial Sector: Evidence from South Africa

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Abstract: Despite the importance of the financial system and quality of institutions to the attainment of economic development goals, the mediating role of institutions in how finance influences the development of the industrial sector across countries has not been given adequate attention in the literature. Therefore, this study assessed the moderating role of institutions in the relationship between finance and industrial development of South Africa for the period 1984–2021. To evaluate the long-run relationship among the variables, the combined cointegration test of Bayer and Hanck was used, while fully modified least squares, dynamic least squares and canonical cointegrating regression were employed to estimate elasticity relationships. The findings of the study revealed that finance impacts industrial development positively in South Africa, but this positive impact is diminished by the quality of institutions in the country. Therefore, the financial system in South Africa needs to be rooted in a high-quality institutional structure for its beneficial impact on the industrial sector to be reinforced for sustainable development. Moreover, there is a need for more reforms in the financial system to promote efficiency that would translate growth in finance into more inclusive growth gains in the industrial sector.



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Keywords: finance; institutions; industrial sector; development; cointegration; South Africa

1. Introduction

The pivotal role of industrial development in the process of inclusive economic growth and development has long been recognized (Ejaz et al. 2016; McMillan et al. 2014; Soderbom and Teal 2003; UNIDO 2017; Maroof et al. 2018). It is necessary to have an economic structure that generates a variety of inclusive opportunities because economic growth in isolation cannot engender an economy that meets the needs of everyone. According to Maroof et al. (2018), industrial expansion makes the most difference in enhancing national output, lowering price levels, advancing technology, generating jobs, driving trade, agricultural development, mining, production and other economic activities. It is therefore not surprising that the United Nations lists inclusive and sustainable industrialization as an indispensable requirement for the attainment of sustainable development (UNIDO 2017).

The inclusiveness attribute of industrial growth is well discussed in the literature. For example, Ejaz et al. (2016) argued that the economic benefits of expansion in the industrial sector diffuse to the other sectors of the economy, as it leads to an increase in demand for agricultural products utilized as raw materials and boosts the services industry towards increased efficiency by providing cutting-edge technologies. Additionally, the need for structural change from the inadequate productivity agricultural sector to highly productive industrial sector has been described as an absolute necessity if the macroeconomic objective of increased aggregate productivity and national income is to be achieved (McMillan et al. 2014). Furthermore, Soderbom and Teal (2003) argues that appropriate industrial policy could reduce poverty and inequality through the creation of highly productive and high-paying employment opportunities. Therefore, no economy attains sustainable growth, full employment and enhanced export without building a strong industrial sector (Fontagne and Harrison 2017).

Over the last few decades, industrial development has been instrumental in changing the status of Asian economies like China, India, Indonesia and Malaysia from low-income to middle-income economies¹. In economies like China, Indonesia and Korea, [Kniivila \(2007\)](#) reports higher economic growth and general decline in poverty levels as gains of industrial development. Contrariwise, poor economic condition alongside underdeveloped industrial sectors characterized the least developed countries in the 1970s and 1980s, which resulted in economic crisis. The economic crisis necessitated the application of the International Monetary Fund (IMF)- and World Bank-designed economic restructuring programmes in the shape of Structural Adjustment Program (SAP) in the affected economies by late 1980s to early 1990s ([Rajan and Zingales 1998](#)). The main goal of the programmes was to open and develop the financial markets towards fostering industrial development, financial stability, export promotion, trade openness, novelty and competition ([Kabango and Paloni 2010](#)). Meanwhile, among the developing regions of the world, sub-Saharan Africa (SSA) is the least industrialized ([World Bank 2022](#)), and this has been attributed to several factors, crucial among which is the inadequate access to financial resources which is ideally influenced by the level of financial sector development.

Both the theoretical and empirical literature have discussed the crucial role of financial development (FD) in achieving sustainable economic growth and development ([Adusei 2019](#); [Olaniyi and Adedokun 2022](#); [Shi et al. 2019](#)). Indeed, the financial sector drives the real sector's activities through the provision and efficient allocation of required resources for the finance of investment and entrepreneurial ventures ([Giri and Bansod 2019](#); [Rahman et al. 2020](#)). As argued by [Da Rin and Hellmann \(2002\)](#), in developing countries where the financial system is less developed, banks are very instrumental in enhancing industrial expansion through the provision of capital. It has also been argued that financial development impacts the growth of the industrial sector through the channel of technological progress by promoting investment in otherwise hard-to-finance technologies. [Rajan and Zingales \(1998\)](#) reported that industries that depend on finance for technological progress develop faster in countries with more developed financial system, while [Tadesse \(2004\)](#) found that financial development boosts technological innovation so much so that it explains the cross-country differences in industry rates of technological innovation.

These results were corroborated in subsequent studies by [Ilyina and Samaniego \(2011\)](#) and [Ilyina and Samaniego \(2012\)](#) who argued that the accelerated reallocation of resources towards Research and Development (R&D)-induced technological progress is an important channel whereby financial development enhances industrial growth. However, empirically speaking, results from studies on the role of financial development on industrial growth in different countries have been mixed and inconclusive ([Prasad et al. 2005](#)). Studies such as [Ahad et al. \(2019\)](#) and [Ang and McKibbin \(2007\)](#) reported the positive effect of financial development on industrial expansion. However, [Ben Ben Mim et al. \(2022\)](#), [Singh \(1997\)](#) and [Udoh and Ogbuagu \(2012\)](#) stressed the negative impact of financial liberalization on industrial development in emerging economies. Yet, [He et al. \(2017\)](#) reported moderate effect of financial development on industrial specialization in China, while [Heeks \(1996\)](#) emphasized limited benefits of financial liberalization on the growth of the Software Industry in India. Moreover, [Azolibe \(2022\)](#) reported mixed effects of financial development on industrial growth for different country-income groups.

Meanwhile, the notion of governance and its contribution to the institutional effectiveness for industrial growth and policy has also come to the fore ([Chinn and Ito 2006](#)). According to [Galindo et al. \(2007\)](#), countries with strong institutional quality, more developed financial sector and stable macroeconomic policies, benefit more from financial openness. Moreover, it has been argued that a solid, effective institutional structure is necessary for allocating resources to activities that promote growth ([Acemoglu and Johnson 2005](#); [Acemoglu et al. 2005](#)). This argument corroborates the proposed concept of 'better finance, more growth', which suggests that for an economy to be adequately financed, there is need for efficient and effective institutions that would facilitate resource allocation to the real sector ([Adusei 2019](#); [Demetriades and Law 2006](#); [Law et al. 2018](#)). Moreover,

without good institutions, political meddling and corrupt practices in the financial system may result in funds being channelled to unproductive activities (Demetriades and Law 2006; Law et al. 2018), thereby inhibiting the growth of the industrial sector. This notion is supported in the empirical literature by the claim that the impact of financial liberalization varies between economies due to variations in institutional development, governance structures, legal and investment market environments, as well as diverse macroeconomic conditions and policies in use (Chinn and Ito 2006; Galindo et al. 2007; Goyal 2012).

The key objective of this study is to examine the mediating role of institutions in the relationship between financial sector development and industrial growth in South Africa. The focus on South Africa for this study is appropriate and important. This is because the pace of financial sector development in the country appears to be captivating, as it has consistently maintained an upward trend for decades (see Figure 1). The financial market in the country is the most developed and sophisticated in SSA (Adusei 2019; Odhiambo 2014; Phiri 2015; Sunde 2012). It is also rated among the top 10 in the world (Adusei 2019), while the World Economic Forum global competitiveness survey of 140 countries across the globe for 2015/2016 ranks it 8th (Adusei 2019). Despite these outstanding attributes of South Africa's financial sector, the industrial sector output appears to be slowing down and fluctuating since 2008 (see Figure 2). Furthermore, the contribution of the country's industrial sector to GDP and employment has been on a steady decline since the 1980s (Figure 3). For example, while the financial sector has grown from constituting 11% of the economy in 1990 to 21% in 2020 (SARB 2021), the industrial sector regressed from forming 34.4% of the economy in 1990 to 24.5% in 2021 (Figure 3). The statistics are even worse for the manufacturing sector, which is a key pillar of industry. Its value added to the economy declined from 23% in 1991 to 11.7% in 2021 (Figure 3). Moreover, employment in the industrial sector has also fallen from 28.6% in 1991 to 22.3% in 2019 (Figure 3).

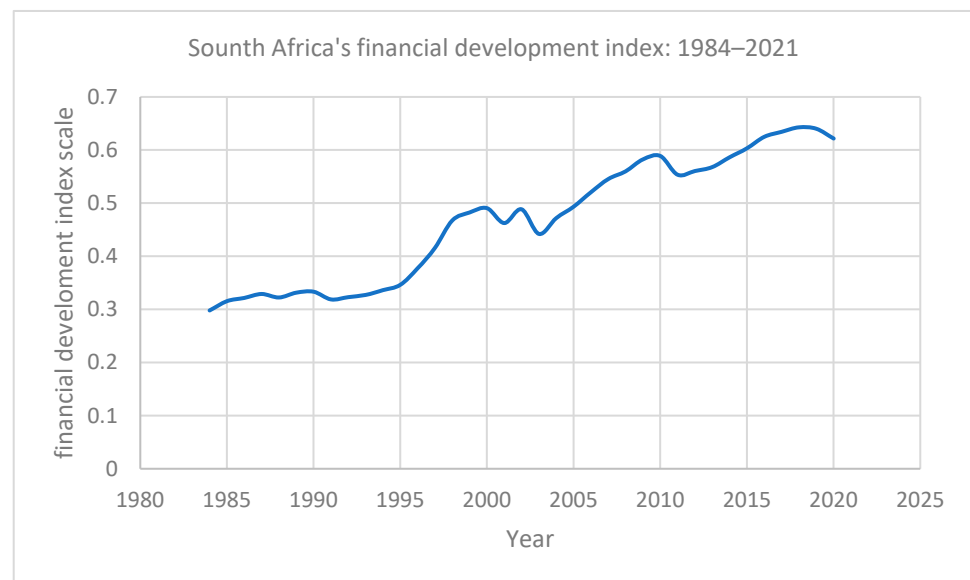


Figure 1. Trend of financial development index for South Africa.

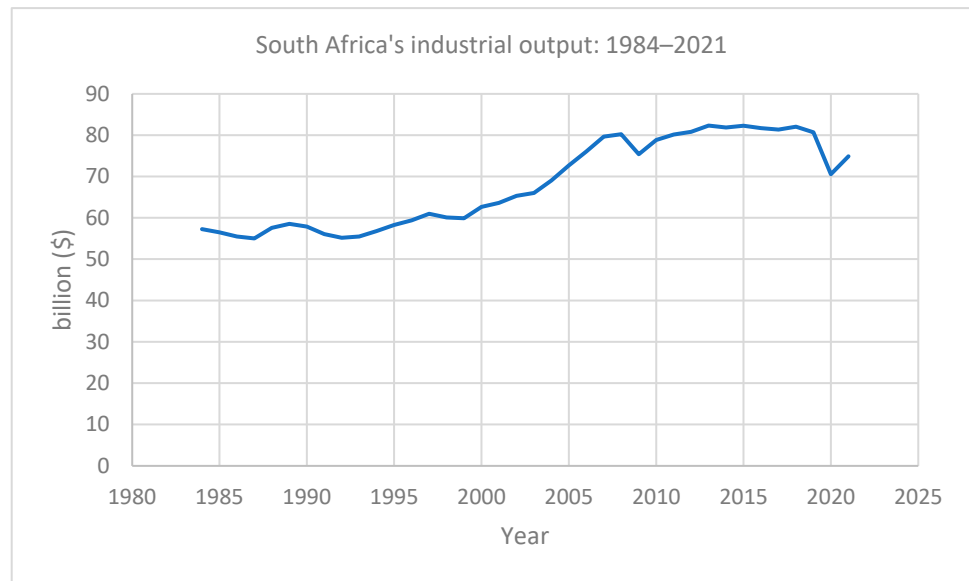


Figure 2. Trend of industrial output for South Africa.

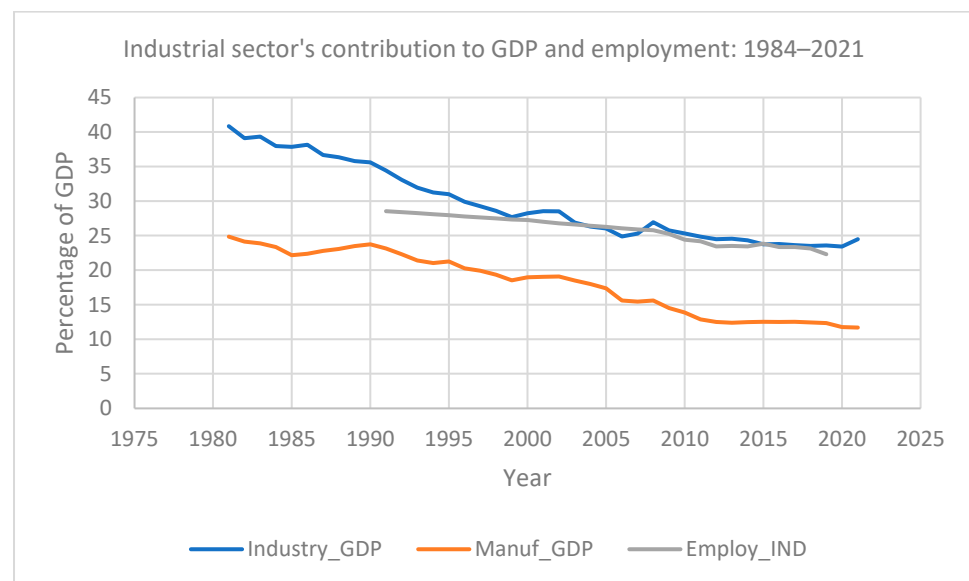


Figure 3. Industrial sector's contribution to GDP and employment.

Meanwhile, the International Country Risk Guide (ICRG) data from the Political Risk Service (PRS) group have shown that since the advent of democracy in the 1990s, South Africa's institutional attributes have been regressing. From an institutional quality index² score of 6.7 in 1994, the country's score stood at 4.3 in 2020 (Figure 4). This is a perturbing situation because the potential benefits of the giant strides recorded in the financial sector to the industrial sector could be frittered away, as weak institutions may create loopholes and lapses that tend to direct resources away from the industrial sector to unproductive activities. It therefore raises the question of whether the regressing quality of institutions has any impact on the link between financial development and industrial growth in South Africa. Despite the peculiar and curious attributes of the financial system and industrial sector in South Africa, this subject has not been explored in the literature, which is why this study represents a departure from the existing literature on the determinants of industrial development.

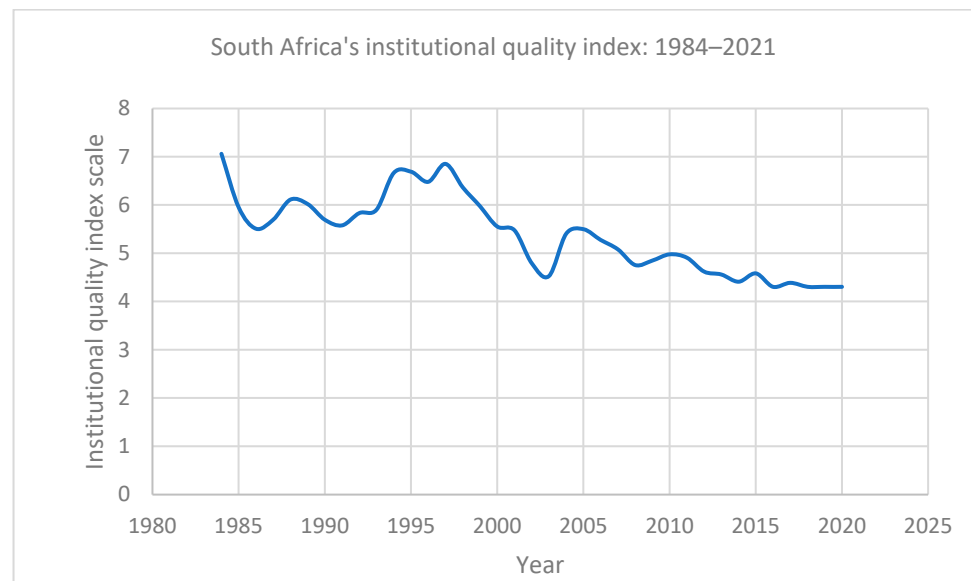


Figure 4. Trend of institutional quality index for South Africa.

This study contributes to the literature in a few ways. First, it provides an insight into the nature of influence of the financial sector development on the industrial sector in the case of South Africa. It also explores the role of institutions in the linkage between finance and industrial development. Most of the existing studies are not country-specific, despite notable disparities in the levels of financial and institutional developments, alongside industrial progress across countries. The specific case of South Africa even presents a situation of contrasting trend in the development and output of the three sectors. Therefore, South Africa deserves a study of its own, especially as it has been argued that the impact of finance on growth cannot be generalized for many countries because the effectiveness of an economic policy is country-specific and depends on the quality of supporting institutions (Adusei 2019; Kutan et al. 2017). Furthermore, most existing studies measured financial development by variables like monetary aggregate, credit to the private sector and stock market capitalization, which do not reflect the multidimensionality of the financial sector. This study contributes by using the recently developed FD index of the IMF (2019). This series overcomes the drawback of the other measures, as it is an aggregation of 20 financial market and financial institution indicators, thereby covering all aspects of the financial system.

The remaining segments of this study focus on the following: Section 2 contains a review of both theoretical and empirical literature. Section 3 deals with the methodology, while Section 4 discusses the results of the tests and regressions. Section 5 concludes the study.

2. Literature Review

Theoretically and empirically, the conventionalists tend to see finance as a significant growth and development engine (Bagehot 1873; Galindo et al. 2007; King and Levine 1993; Levine 1999, 2005; Levine et al. 2000; Pagano 1993; Schumpeter 1912). This perspective is supported by more recent empirical studies which argued that FD has the capability to boost the real sector's capacity to produce and spur growth, through resource mobilization and allocation, in order to finance profitable investments (Ehigiamusoe et al. 2019; Rewilak 2017). Regarding a specific sector of the economy—the industrial sector, economists have long stressed the catalytic role that finance plays in bringing about fundamental transformation (Cameron 1963; Gerschenkron 1962). In this context, Schumpeter (1912) argued that banks provided capital as a way of promoting the industrial revolution which increasingly demanded funds. Empirically, Rajan and Zingales (1998) investigated whether FD promotes industrial expansion by reducing borrowing costs. They conducted this research by way of

comparing the expansion of industries that rely heavily of external financing with those that do not. Their research outcome implies a positive and monotonic impact of FD on industrialization, as it demonstrates that the latter tend to expand disproportionately more speedily than the former in regions with higher levels of FD.

In another study by [Haraguchi et al. \(2019\)](#), determinants of successful industrialization in developing countries were explored. The methodology involved identifying two different groups of small economies that have sustainably implemented specific industrial policies for the periods 1970–1990 and 1991–2014. The research outcome revealed that several elements which include financial sector development, capital openness, factor endowments, investment promotion and the existing condition, drive successful industrialization. Furthermore, [Ahad et al. \(2019\)](#) evaluated the role of FD in the industrial growth process of Pakistan by using the [Bayer and Hanck \(2013\)](#) cointegration and vector error-correction model for 1972–2014. The estimates of their analysis established that FD and savings enhanced the growth of the industrial sector, and that a bidirectional causal relationship exists between FD and industrial production. This result is supported by that of [Tadesse \(2004\)](#) in a study of the linkage between FD and the industrial sectors of 38 countries for the years 1980–1995. The estimates of the maximum likelihood analysis suggested that FD impacts the technological progress and total factor productivity (TFP) of the industries. It was also found that there is a positive link between access to credit by the manufacturing sector and the sector's growth.

Besides, by estimating a TFP model for 130,840 Chinese firms for the years 2001–2007, [Chen and Guariglia \(2013\)](#) assessed the link between FD and industrial productivity. It was found that industrial productivity was limited by the availability of finance. This finding is supported similar studies for China by [He et al. \(2017\)](#) and [Lee et al. \(2015\)](#). While the former focused on the industrial regions of China from 1998 to 2010 and employed robust standard errors method, the latter used disaggregated data of the economy spanning 2003–2010 and the conventional panel estimation technique. Both studies found that FD exerts a positive impact on the Chinese industrial sector. Moreover, [He et al. \(2017\)](#) added that greater growth was found in the industrial regions with developed financial system, compared to others. Additionally, [He et al. \(2017\)](#) explored whether FD could influence industrial specialization in an emerging economy. The data consisted of 28 industries in 30 regions of China, spanning 1998–2010 and the method of instrumental variable was utilized. The research outcome revealed that availability of alternative financing framework and foreign direct investment (FDI) are crucial to increased industrial specialization across the Chinese regions.

Furthermore, the importance of FD in the industrialization process has been stressed from the viewpoint of its role in enhancing technological progress. By investigating a large sample of countries over the 1980's, [Rajan and Zingales \(1998\)](#) demonstrated that industrial sectors that require external finance develop disproportionately faster in economies that have more developed financial systems. This finding was supported by [Tadesse \(2004\)](#) who examined a panel data of 10 industries across 38 countries. Estimates from the study revealed a positive relationship between FD and industries' realized technological progress. Furthermore, by examining the technological attributes shared by industries that record relatively faster growth in more developed financial markets, [Ilyina and Samaniego \(2011\)](#) investigated 28 manufacturing industries, using U.S. data for the period 1970–1999. Their results showed that fast-growing industries in more developed financial markets are characterised by greater R&D intensity. In a follow-up study, [Ilyina and Samaniego \(2012\)](#) showed that the accelerated reallocation of resources towards technologically driven industries constitutes a new channel whereby FD enhances industrial expansion, in line with [Rajan and Zingales \(1998\)](#).

The conventional positivism regarding the role of FD in the economic growth process has been questioned by several researchers, especially as an after-effect of the several financial crises suffered by the global economy. This dissent to the popular optimism argument could be historically traced to Thomas [Veblen \(1923\)](#) who, based on the experiences of the

US and Western Europe in the 19th century, argued that the notion of FD propelling real investment and employment, was merely a myth propagated by political economists. Veblen was extremely appalled by the development of financial markets and the growth in credit that developed Western countries were going through in the second part of the 19th century, such that he attributed the escalating income inequality, poor rate of economic growth, and growing fragility in these economies to this phase of FD (Argitis 2016; Davanzati and Pacella 2014).

The scathing criticisms by Veblen has reverberated through contemporary research, which have given credence to his argument in different forms. There is a tolerant version which consists of studies that showed passive or weak influence of FD on growth (Gantman and Dabós 2012; Narayan and Narayan 2013; Williams 2018). On the extreme side of the results spectrum are those that indicated the adverse impacts of FD (Adusei 2012; Ehigiamusoe and Lean 2019; Gazdar and Cherif 2015; Loayza and Ranciere 2006). Corroborating the Veblen's argument, some studies in this spectrum have claimed that the escalated economic fragility being experienced across the world in the aftermath of the global financial crisis is associated with FD (Kaminsky and Reinhart 1999; Stiglitz 2010). In the specific case of the industrial sector, studies such as Ben Ben Mim et al. (2022) in a panel study of 46 economies, and Udoh and Ogbuagu (2012) in the case of Nigeria, have found that improvement in the financial sector development inhibits the growth of the industrial sector.

Besides the contradictory and ambiguous research findings of studies on the FD-growth nexus, recent studies have stressed the mediating role of institutions in determining the performance of FD in the economic growth process. Several studies have argued that the nature of the influence that FD wields on economic growth is contingent on the quality of institutions in the country (Demetriades and Law 2006; Gazdar and Cherif 2015; Law et al. 2018; Olaniyi and Adedokun 2022). They argued that high-quality institutions galvanize the financial system towards efficient allocation of resources to growth-stimulating investment, while poor-quality institutions give room for chicanery, opportunistic and rent-seeking tendencies that engender political meddling and corruption which drain away the growth-enhancing prospects of FD. Based on this argument, the role that institutions play in how FD affects growth has been extensively studied by researchers.

In this context, Demetriades and Law (2006) analysed panel data of 78 countries spanning 1978–2000, using the mean group (MG) and pooled mean group (PMG) methods. The results of the study suggested that institutions galvanized FD to exert a strong beneficial impact on economic growth. This result is corroborated by another study by Yahyaoui and Rahmani (2009) who investigated 22 developing economies for the years 1990–2006. They found that the beneficial impact of FD on economic growth is higher when a strong institutional structure supports the financial system. In a similar manner, Gazdar and Cherif (2015) used the generalized method of moment (GMM) to estimate panel data spanning 1984–2007 for 18 Middle East and North African (MENA) countries. The research outcome demonstrated that institutional quality abated the detrimental effects of FD on economic growth. Moreover, the study revealed that there is a threshold of institutional quality above which the countries must operate for FD to enhance economic growth. The study concluded that the quality of institutions in MENA was generally below the threshold, which was responsible for weak institutions-induced negative impact of FD on economic growth in the region. Their results were supported by another study of 21 MENA economies by Kutun et al. (2017) who found that the quality of institutions and FD are complementary in the economic growth process.

Besides, by adopting the same methodology with Demetriades and Law (2006), Balach and Law (2015) investigated 4 South Asian countries for the years 1984–2008. The estimates of their regressions indicated that FD impacts the economy better when the financial system is supported by high-quality institutional structure. Furthermore, Olaniyi and Adedokun (2022) explored the mediating role of institutions in the relationship between finance and growth in South Africa by estimating the autoregressive distributed lag (ARDL)

model based on time-series data spanning 1986–2015. Their study revealed that FD and institutional quality complementarily promote economic growth in the long run, though they found that institutional quality diminished the growth-enhancing prospects of FD in the short run. Additionally, the study revealed a threshold of institutional quality beyond which finance would enhance growth.

On the other hand, there are empirical results to the effect that institutions diminish the growth-enhancing effect of FD. [Ahlin and Pang \(2008\)](#) investigated the panel data of 45 economies spanning 1960–2000, using the system GMM estimator. In the study, the mediating role of corruption control (proxy for institutional quality) in the relationship between FD and growth. The estimates from the study revealed that corruption control are substitutes, indicating that corruption control drains away the beneficial impact of FD on economic growth. A similar research outcome came out from the study by [Berhane \(2018\)](#), who examined 40 African economies from 1980 to 2014, based on the PMG technique. The study found that institutions impacted the FD-growth nexus negatively. Similarly, [Williams \(2017\)](#) demonstrated that democracy and political institutions failed to support FD towards boosting growth. The results of the system GMM for panel data of 78 developing countries indicated that democracy and institutions lessen FD's capacity to boost growth.

Moreover, the study by [Olaniyi and Oladeji \(2020\)](#) found contrasting results in the short and long run. Their study was conducted for Kenya over the period 1986–2015 and they applied the fully modified ordinary least square (FMOLS) and the ARDL. Their results demonstrated that institutions complemented the growth-enhancing attribute of FD in the short run, but in the long run, institutions drained away the growth benefits of FD. In addition to the contrasting and mixed mediating impact of institutions, there are results from studies like [Rachdi and Mensi \(2012\)](#) and [Effiong \(2015\)](#) which suggested that institutions have no significant effect on the FD-economic growth nexus. While both studies employed the system GMM method, the former was conducted in the context of 13 MENA countries for the period 1990–2008 and the latter, in the context of 21 SSA countries from 1986 to 2010. The studies found that institutions do not influence the way FD impacts economic growth.

Meanwhile, these studies primarily examined the mediating role of institutions in the FD-economic growth nexus, while the same subject in the context of industrial development remains rather unexplored. This study intends to fill this gap in the literature by investigating the mediating role of institutions in the relationship between finance and industrial sector development in South Africa. Moreover, most of the extant studies on the subject were conducted based on panel data. However, considering the peculiar attributes of the financial system and industrial development of South Africa, cross-country and panel studies might not appropriately accommodate the peculiarities and issues in the country that could be crucial for inferring appropriate policy implications.

3. Methodology

3.1. Description of Data

This study examines the mediating role of institutions in the relationship between FD and industrial growth in South Africa by analysing annual time-series data spanning 1984 to 2021. The dependent variable is industry value added (IND), which refers to the net output of the industrial sector, and it was obtained from the World Bank's ([World Bank 2022](#)) World Development Indicators (WDI). FD was measured by financial development index recently introduced by [IMF \(2019\)](#). The decision to use this index, rather than the traditional measures, is based on its all-inclusive attribute, as it captures 20 elements of both financial institutions and financial market. Therefore, it encapsulates the multifaceted nature of the financial system, which is not comprehensively captured by the popular measures such as monetary aggregates, private sector credit and stock market capitalization. The index ranges from 0 to 1, such that the closer to 1 a score is, the higher the level of FD and vice versa.

To measure the quality of institutions (INSQ), a composite index of International Country Risk Guide (ICRG) INSQ variables, sourced from the Political Risk Services (PRS) Group, was constructed. Many studies have utilized the ICRG INSQ dataset to measure the quality of institutions (examples include [Gazdar and Cherif 2015](#); [Hassan et al. 2019](#); [Law et al. 2018](#); [Olaniyi and Oladeji 2020](#)). Moreover, it has been adjudged the most widely used measure of INSQ ([Williams and Siddique 2008](#)). We derived the composite INSQ by computing the average of the following three INSQ elements: corruption (range: 0–6), law and order (range: 0–6), and government stability (range: 0–12). The choice of these three indicators is predicated on their coverage of key institutional issues that influence a country’s industrial performance ([Bai et al. 2004](#); [Levchenko 2007](#)). Moreover, these three ICRG measures are property rights institutional variables, which refer to institutional factors that determine the extent to which the government, politicians and powerful elites are constrained in their relationship with the rest of the society ([Acemoglu and Johnson 2005](#)). In a study of the relative importance of property rights institutions and contracting rights institutions to various economic outcomes, [Acemoglu and Johnson \(2005\)](#) showed robust evidence that property rights matter for financial development, long-run economic growth and investment, whereas contracting rights institutions have limited impacts on financial development. Therefore, these variables were selected because they are more fundamental to the performance of the financial system than others with contracting rights institutional attributes.

To ensure uniformity and comparability among the indicators, each of the three elements of the index is standardised to range between 0 and 10, in line with extant studies (see [Gazdar and Cherif 2015](#); [Hassan et al. 2019](#); [Law et al. 2018](#); [Olaniyi and Adedokun, 2022](#)). Within this range, the higher the score, the better the level of INSQ and vice versa. The control variables comprise the determinants of industrial development. Trade openness (TR) was measured by the addition of import and export, and it was obtained from WDI. FDI was measured by stock of inward FDI provided by [UNCTAD \(2022\)](#).

A synopsis of the attributes of each variable employed is presented in Table 1. The mean of IND, FDI and TR are \$68.13, \$71.98 billion and \$128.69 billion, respectively. Each of these mean values outstrip its respective median, which implies that the distribution of each of the four series is skewed to the right. On the other hand, the distribution of FD and INSQ are skewed to the left, because their respective mean values of 0.47 and 5.39 are lower than their median values. The highest IND of \$82.37 billion was attained in 2013, while the lowest of \$55.05 billion was attained in 1987. FD was at its lowest level of 0.29 in 1984, while the highest FD level of 0.64 was attained in 2019. The INSQ data shows though the mean INSQ over the study period is 5.39, the best INSQ score of 7.06/10 was recorded in 1984, while the worst score of 4.30/10 was obtained in 2021. This indicates that INSQ of South Africa has consistently deteriorated over the last four decades.

Table 1. Descriptive statistics of variables.

	IND	FD	INSQ	FDI	TR
Mean	68.12602	0.468228	5.385332	71978.07	128.6966
Median	65.67021	0.482313	5.474537	51771.87	120.2984
Maximum	82.36578	0.642649	7.060185	179564.8	200.0041
Minimum	55.04710	0.297837	4.303079	7747.726	57.12777
Std. Dev.	10.53556	0.117683	0.809971	61504.15	50.43079
Skewness	0.151959	−0.055544	0.307617	0.308005	−0.017974
Kurtosis	1.332423	1.526297	2.044113	1.417641	1.489099
Jarque-Bera	4.549203	3.367215	1.992193	4.445129	3.616512
Probability	0.102838	0.185703	0.369318	0.108331	0.163940
Sum	2588.789	17.32442	199.2573	2663189	4890.470
Sum sq. Dev.	4106.930	0.498575	23.61790	1.36 × 10 ¹¹	94100.78
Observations	38	38	38	38	38

The Jaque-Bera statistics suggests that all the variables are normally distributed, considering that their respective probability values exceed 0.05. Moreover, the standard deviation of each of the variables is very low when compared to the mean value. This suggests that each of the series is adequately represented by the mean, thus, underscoring the normality attribute of the data. It further indicates that the series are stable, less volatile and not abnormally outspread. Finally, the kurtosis value for each of the variables is less than 3. This is indicative of the platykurtic attribute of the variables, which implies that there is less tendency for outliers.

3.2. Model Specification

To examine how institutions influence the role of FD in industrial growth process, this study follows extant literature such as [Gazdar and Cherif \(2015\)](#), [Law et al. \(2018\)](#) and [Olaniyi and Adedokun \(2022\)](#), and thus, specify the baseline model as follows:

$$IND_t = \beta_0 + \beta_1 FD_t + \beta_2 INSQ_t + \beta_3 (FD_t * INSQ_t) + \beta_4 X_{it} + \varepsilon_t \tag{1}$$

where *IND* is industrial sector development; *FD* is financial development; *INSQ* is institutional quality; *X* is a set of control variables, comprising FDI and trade openness; ε and *t* are error term and time index, respectively.

The inclusion of the interaction term of FD and INSQ in Equation (1) enables the evaluation of the mediating influence of INSQ on the impact of FD on IND ([Gazdar and Cherif 2015](#); [Hassan et al. 2019](#); [Law et al. 2018](#); [Olaniyi and Adedokun 2022](#)). Within this specification, we can obtain the marginal impact of FD on the industrial sector by partially differentiating Equation (1) with respect to FD as follows:

$$\frac{\partial IND_t}{\partial FD_t} = \beta_1 + \beta_3 INSQ_t \tag{2}$$

Based on Equation (2), the mediating effect of INSQ on the finance-industrial sector nexus is dependent on the coefficients of β_1 and β_3 , which can assume any of the following four possibilities ([Gazdar and Cherif 2015](#); [Hassan et al. 2019](#); [Olaniyi and Adedokun 2022](#)):

- (a) If $\beta_1 > 0$ and $\beta_3 > 0$, it indicates that FD contributes positively to the growth of the industrial sector and its interaction with INSQ reinforces the positive effect
- (b) If $\beta_1 > 0$ and $\beta_3 < 0$, it means that FD contributes positively to the growth of the industrial sector and its interaction with INSQ drains away the positive impact
- (c) If $\beta_1 < 0$ and $\beta_3 > 0$, it shows that FD stymies the growth of the industrial sector and its interaction with INSQ mitigates the negative effect
- (d) If $\beta_1 < 0$ and $\beta_3 < 0$, it implies that FD negatively impacts the industrial sector and its interaction with INSQ aggravates the negative impact

In estimating the model, all the variables were converted into their logarithmic forms in order to engender elasticity relationships and prevent possible heteroscedasticity.

3.3. Methods

3.3.1. Unit Root Test

To avoid the problem of spurious regression and ensure the application of the right estimation approach, it necessary to assess the unit root attribute of the series. Many extant studies do this by using the traditional Augmented-Dickey-Fuller (ADF) and Phillips-Perron (PP) stationarity tests. However, it has been shown that these tests have low power in the case of series with structural break. This implies that when structural break is present in the series, the results from ADF and PP tests are likely to be unreliable. As a country, South Africa has undergone some political development and industrial policy-induced structural changes over the study period, and this could lead to structural break in the series under consideration. Therefore, to avoid bias and inefficiency in the unit root test results, we employed the [Zivot and Andrews \(1992\)](#) (ZA) unit root test, which produces

robust estimates and accounts for structural break in series. The test equation for ZA test is as follows:

$$\Delta x_t = \rho + \rho x_{t-1} + \sigma t + \delta DU_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \tag{3}$$

$$\Delta x_t = \rho + \rho x_{t-1} + \sigma t + \pi DT_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \tag{4}$$

$$\Delta x_t = \gamma + \gamma x_{t-1} + \gamma t + \vartheta DU_t + \vartheta DT_t + \sum_{j=1}^k d_j \Delta x_{t-j} + \mu_t \tag{5}$$

where DU_t denote the dummy variable, which shows that a shift arises at a point, while DT_t represents the trend in shift. Thus,

$$DU_t = \begin{cases} 1 \dots \text{if } t > TB \\ 0 \dots \text{if } t < TB \end{cases} \text{ and } DT_t = \begin{cases} t - TB \dots \text{if } t > TB \\ 0 \dots \dots \dots \text{if } t < TB \end{cases} \tag{6}$$

3.3.2. Cointegration Methods

It is pertinent to evaluate the presence of long-run relationship among the variables once all the variables are integrated of order 1. For this purpose, the Bayer and Hanck (2013) (BH) combined test for cointegration was adopted. This method was adopted because it is more advanced than the conventional cointegration tests. The BH combined test avoids the drawbacks of the traditional methods by removing extraneous multiple test methods and efficiently integrating various cointegration tests which consist of Banerjee et al. (1998), Boswijk (1995), Engle and Granger (1987) and Johansen (1991) tests. The Fisher’s formula is utilized to construct the equation for the BH test in order to underpin it, and it is expressed as follows:

$$EG - JOH = -2[\ln(P_{EG}) + \ln(P_{JOH})] \tag{7}$$

$$EG - JOH - BO - BDM = -2[\ln(P_{EG}) + \ln(P_{JOH}) + \ln(P_{BO}) + \ln(P_{BDM})] \tag{8}$$

where P_{EG} , P_{JOH} , P_{BO} and P_{BDM} denote the test probabilities of Engle and Granger (1987), Johansen (1991), Boswijk (1995) and Banerjee et al. (1998), respectively.

As a next step, this study employed the FMOLS method proposed by Phillips and Hansen (1990) to evaluate the impact of the regressors on the industrial sector development. To test the robustness of estimates, both CCR (canonical cointegrating regression), developed by Park (1992) and DOLS (dynamic ordinary least squares) of Saikkonen (1992) were also employed. The nature of the model being estimated raises the possibility of omitted variable bias and this could lead to the endogeneity issue (Brückner 2013). In particular, the omission of other variables which are possible determinants of industrial growth could cause the bias. Moreover, the explanatory variables have the tendency to suffer from the problem of endogeneity, which could engender simultaneity in the model. Therefore, the application of FMOLS and DOLS for estimation is appropriate because both techniques can effectively overcome the problem of endogeneity and serial correlation by accommodating nuisance parameters (Adusei 2012; Phillips and Hansen 1990; Yildirim and Orman 2018). Additionally, the DOLS method involves the use of leads and lags through which it gets around issues associated with simultaneity and small sample biases. The CCR also operates in the same manner as the FMOLS, the only difference is that while the former focusses on transmuting only the data, the latter focusses on transmuting both data and parameters (Wu et al. 2018).

To capture causal relationships among the variables, the study employed the Toda and Yamamoto (1995) test. This test is suitable no matter the integration properties of the series because it utilizes a modified Wald test which enables it to get around the problems associated with power and size, which characterise the traditional tests (Rahman et al. 2015). The test for causality between the variables in the model is crucial for this study because it

could give insight that would help policymakers in formulating policies towards boosting the growth of the industrial sector in South Africa. This is because it could enhance the understanding of how these variables interact with each other to influence the industrial sector.

4. Results and Discussion

We begin by determining the stationarity attributes of the variables through the application of ZA unit root test, which accounts for single structural break. The tests were conducted on each variable, first with only intercept and then, with both intercept and trend. The results, which are presented in Table 2, indicate that in both cases of tests with only intercept and tests with intercept and trend, all the variables contain unit root at level. However, upon first difference, they all became stationary. This suggests that all the variables in the model are integrated of order 1.

Table 2. Zivot–Andrews unit root test results.

Variable	Intercept	Break Year	Intercept and Trend	Break Year
lnIND	−5.391	1998	−5.872	1996
lnFD	−4.029	1997	−4.237	1997
lnINSQ	−3.999	1992	−4.755	1999
ln(FD*INSQ)	−4.183	1994	−4.151	1996
lnFDI	−3.997	2004	−4.265	2009
lnTR	−4.117	2003	−4.875	2000
ΔlnIND	−7.152 ***	2002	−6.921 ***	2005
ΔlnFD	−5.061 **	1996	−5.939 ***	1992
ΔlnINSQ	−6.245 ***	1998	−6.025 **	1998
Δln(FD*INSQ)	−5.401 ***	1999	−5.570 **	1999
ΔlnFDI	−4.265 **	2009	−8.228 ***	2011
ΔlnTR	−6.814 ***	2011	−7.502 ***	2008

Note: *** and ** represent 1% and 5% levels of significance, respectively.

The confirmation of stationarity for all the variables at first difference necessitates the need to investigate the long-run relationship among the variables. Accordingly, the BH combined cointegration test was employed to examine cointegration relationship and the results are presented in Table 3. It is obvious from the estimates that the computed EG-JOH and EG-JOH-BO-BDM F-statistics of 13.172 and 26.495, respectively, are both greater than their respective critical values of 10.419 and 19.888 at 5% level of significance. This suggests that the null hypothesis of no cointegration among the variables in the model is rejected in favour of the existence of cointegration among them. The existence of cointegration among the variables implies that the variables would eventually converge to long-run equilibrium after any short-run deviation from the path to equilibrium.

Table 3. Bayer-Hanck cointegration test results.

Model	F-Statistic	F-Statistic	Cointegration
lnIND = f(lnFD, lnINSQ, ln[FD*INSQ], lnFDI, lnTR)	EG-JOH	EG-JOH-BO-BDM	Yes
	14.916 **	24.374 **	
	Critical value 10.419	Critical value 19.888	

Note: ** indicates 5% level of significance.

Table 4 provides the estimates of the regressions conducted to explore the elasticity relationships among the variables. For robustness of analysis, the FMOLS regression was conducted alongside DOLS and CCR. As shown in the table, the results of the three methods are congruent with one another, with only few exceptions. The results indicate that the coefficient of FD is significant and positive at 1% and 5% significance levels across

the three models. Specifically, the FMOLS estimate suggests that a 1% increase in FD is associated with a 0.26% rise in the value added to the industrial sector. This result implies that in the long run, FD tends to promote industrial expansion in South Africa, thereby indicating that FD is a key driver of industrial development in the country. This research outcome also suggests that the country’s fast growing financial sector enables favourable conditions for the productive use of resources efficiently, leading to the funding of innovative and entrepreneurial projects (Pan and Yang 2019) which tend to spur the growth of the industrial sector. This finding is consistent with the position of seminal studies such as Cameron (1963), Gerschenkron (1962) and Schumpeter (1912) that FD provides the required dynamism and stimulus for investments, which in turn engenders fundamental positive transformation of the industrial sector. Moreover, considering the increased dependence on technology in industrialization in modern times, this finding supports the argument in the literature that financial development influences industrial expansion through the reallocation of finance towards technological innovation and R&D (Ilyina and Samaniego 2011; Ilyina and Samaniego 2012; Rajan and Zingales 1998; Tadesse 2004).

Table 4. Regression results.

Variable	FMOLS	DOLS	CCR
lnFD	0.258 *** [0.000]	0.470 ** [0.016]	0.291 ** [0.000]
lnINSQ	0.037 ** [0.024]	0.125 * [0.071]	0.056 ** [0.012]
ln(FD*INSQ)	−0.182 *** [0.003]	−0.182 ** [0.039]	−0.095 *** [0.007]
lnFDI	0.014 * [0.085]	1.304 [0.162]	−1.492 (0.185)
lnTR	0.163 ** [0.036]	0.196 *** [0.000]	0.084 ** [0.020]
Constant	1.229 *** [0.000]	1.827 *** [0.000]	1.613 *** [0.000]
R2	0.951	0.965	0.957
Adjusted R2	0.922	0.939	0.931

Note: ***, ** and * indicate significance at 1%, 5% and 10%, respectively; Values in brackets represent *p*-values.

This finding is not surprising considering the high pace of development of the South African financial sector and the fact that it is the best in SSA and one of the highly ranked globally. Therefore, it is evident from this result that the fast pace of growth of South Africa’s financial system tends to promote credit channelization to the industrial sector by supporting the economy’s growth-spurring activities (Chipaumire and Ngirande 2014). Furthermore, this finding appears to support the principle of “more finance, more growth”, as argued in baseline studies such as Beck et al. (2000), King and Levine (1993), Pagano (1993) and Schumpeter (1912), which stresses the finance-led growth hypothesis within the framework of the endogenous growth model that FD inspires and enables long-run growth. Consequently, this finding implies that the South African industrial sector is generally more likely to expand as the financial sector develops and it is consistent with extant studies such as Ahad et al. (2019), Haraguchi et al. (2019) and Kothakapa et al. (2021) which found that FD has a strong positive impact on the development of the industrial sector.

Similarly, every coefficient of institutional quality index (INSQ) in the various regressions suggest a significant positive impact on industrial development at 5% and 10% levels. This suggests the important role that institutions play in the growth process of the industrial sector of South Africa. This finding implies that the institutional structure in the country facilitates the growth of industrialization. The inference from this research outcome is that the South African long-run industrial growth prospects are highly likely to be activated if strong institutions are created and maintained. Therefore, it supports the widely held argument that institutions play a significant role in promoting long-run growth. This finding corroborates previous studies such as Aminu et al. (2019) and Chinn and Ito (2006) which suggest that institutions can promote or diminish the prospect of the industrial sector in an economy.

After establishing the effect of institutions and FD on the South African industrial sector, the separate effect of interaction term between the two variables is now examined

to determine whether institutions enhance the growth effect of FD in the industrial sector. Across the three models, the coefficient of the interaction between FD and institutions (FD*INSQ) is negative and significant at the 1% and 5% levels. This demonstrates that the two drivers of industrialization interact to produce a significant impact on South Africa's industrial development prospects, but the impact is ultimately negative. This result indicates that FD and institutions do not complement each other in the development process of the industrial sector. This suggests that the positive impact of FD on industrial development is not accounted for by the positive effect of institutions, while the beneficial impact of institutions on the industrial sector is not engendered by the positive impact of FD. Put differently, FD and institutions do not support each other in their interaction to enhance the growth potential of the industrial sector, rather, their interaction leaks out the industrial growth-enhancing efforts of each variable.

Specifically, the negative coefficient of the interaction term suggests that the institutional structure in South Africa does not support the financial sector to enhance the productivity of the industrial sector, it rather drains away the beneficial impact of FD on industrial development. The finding also implies that instead of finance and institutional factors complementing each other in the development process of industrialization, they are substitutes to each other in the process, and it is consistent with that of [Ahlin and Pang \(2008\)](#), [Berhane \(2018\)](#) and [Olaniyi and Oladeji \(2020\)](#) which found that the interaction of finance and institutions inhibit growth and that both FD and institutional factors are substitutes in the process of economic growth. More specifically, this result agrees with the study by [Aminu et al. \(2019\)](#) in the case of Nigeria, which found that FD promotes manufacturing output and that the beneficial impact of FD is moderated downwards by institutional factors which comprise bureaucratic quality, democratic accountability and corruption control. However, the result contradicts the result in several studies that institutions enhance the financial system to increase growth and that both FD and institutional factors are complements in the economic growth process ([Demetriades and Law 2006](#); [Gazdar and Cherif 2015](#); [Law et al. 2018](#); [Olaniyi and Adedokun 2022](#)).

This research outcome suggests that the institutional framework in South Africa is not properly set up to reinforce the regulatory system of the financial sector towards supporting the development of the industrial sector. It suggests the possibility of the institutional environment being characterised by policy uncertainty, dereliction and lapses which encourage corruption and vices that redirect finances from the industrial sector to unnecessary and unproductive endeavours. It also suggests the likelihood that the institutions are unable to control and prevent political meddling and corrupt activities in the South African financial system, which could encourage the diversion of funds to unproductive activities and so hinder the growth impact of FD on the industrial sector. For example, [Kisten \(2020\)](#) demonstrated that policy uncertainty in South Africa has continued to increase over the years and has resulted in steady decline in industrial production. Moreover, the quality of the institutions in the country may be below the minimum level that is needed for it to stimulate FD towards enhancing industrial development. This is consistent with the position in several studies that the ability of FD to enhance growth is contingent on the attainment of a certain level of INSQ ([Chinn and Ito 2006](#); [Gazdar and Cherif 2015](#); [Law et al. 2018](#); [Olaniyi and Adedokun 2022](#)). Considering the steady decline in the INSQ index of South Africa over the decades, there is a possibility that this level is yet to be attained. This implies the need for a review of the institutional structure in South Africa, with a view to refocusing it towards stimulating the highly growing financial system of the country to the path of industrial development.

The FMOLS results show that FDI is positive and significant at the 10% level, which demonstrates that FDI somewhat boosts the industrial sector. This result echoes the stance in the literature that inward FDI bears positive impact on the growth of the domestic industrial sector by inducing economies of scale and competitiveness, which engenders the upgrade of the production process ([Kearns and Ruane 2001](#)). It has also been argued that FDI promotes industrialization through the transfer of technology, managerial talent

and financial capital, which would otherwise be unavailable or provided only at excessive costs (Akinlo 2003). However, this result should be taken with a pinch of salt because it is not robust, considering the insignificance of the regressor in DOLS and CCR. The coefficient of TR is positive and strongly significant at the 1% and 5% levels across the three models. This suggests that improvement in trade openness is associated with better growth of the industrial sector. Specifically, the FMOLS estimate implies that a 1% increase in TR improves the industrial sector by 0.16%. Trade openness can stimulate the growth of the industrial sector by driving healthy competition, thereby giving rise to efficiency among the local industries. As argued by Babatunde (2009), liberalization of international trade can motivate industries that deal in export products. This research outcome is consistent with the finding in extant studies that trade openness has a positive effect on industrial development (Azolibe 2022; Ejaz et al. 2016; Haraguchi et al. 2019).

The last part of the econometric analysis involves examining causality among the key variables through the Toda-Yamamoto (TY) causality test. Information regarding causality directions among the variables can assist policymakers in making policies towards developing the industrial sector. It could also provide insight into the role of FD, INSQ, FDI and TR in shaping the industrial sector of South Africa. As presented in Table 5, the results suggest that FD and IND have strong bidirectional causal relationship with each other. This finding supports Ahad et al. (2019) which reported bidirectional causality between FD and industrial production for Pakistan. Similarly, FD has a bidirectional causal link with INSQ. These results suggest feedback between both IND and INSQ on one hand, and FD on the other hand, thereby stressing the importance of FD in the linkage among the three variables. TR also has bidirectional causality with IND and FDI, in line with Mohsen et al. (2015), who found causal link between export and industrial output for Syria. Moreover, INSQ Granger causes IND and FDI, which underscores the crucial role of institutions in the development of the industrial sector. Finally, there is a unidirectional causality from FD to TR, implying that FD does not only Granger cause IND, but it also Granger causes other important drivers of IND.

Table 5. Toda-Yamamoto causality test results.

Variable	IND	FD	INSQ	FDI	TR
IND		7.531 *** [0.000]	2.118 [0.412]	1.910 [0.399]	8.530 ** [0.037]
FD	6.122 *** [0.000]		6.921 *** [0.003]	2.416 [0.181]	5.841 *** [0.000]
INSQ	7.418 *** [0.001]	4.916 * [0.051]		7.372 ** [0.019]	3.902 [0.615]
FDI	1.329 [0.624]	0.982 [0.317]	1.826 [1.903]		8.458 *** [0.000]
TR	5.724 ** [0.026]	2.551 [1.074]	0.541 [0.756]	5.738 *** [0.000]	

Note: ***, ** and * indicate 1%, 5% and 10% levels of significance, respectively; Values in brackets represent probability values.

5. Conclusions

The linkage between finance and industrial development has elicited unabating debate over the years, with several studies on the subject producing mixed and contrasting results. However, the mediating role of institutions in the finance-industrial development nexus has not been given adequate attention. Specifically, despite the impressive attributes of South Africa’s financial system and the curiously underwhelming state of the nation’s industrial sector, there has been no research efforts towards the intervening role of institutions in the FD-industrial sector nexus for the country. Therefore, this study set out to fill this gap by investigating how the institutional structure in South Africa influences the impact of finance on the development of the industrial sector. The highly efficient combined cointegration test of Bayer and Hanck (2013) was used to test for cointegration of the

variables comprising annual time-series data that spanned 1984 to 2021. Moreover, long-run elasticity relationships among the variables were determined by means of FMOLS, DOLS and CCR methods. In addition to the appropriateness of these methods for our case in which all variables were integrated of order 1, the methods also helped in controlling for possible omitted variable bias, serial correlation, simultaneity and endogeneity.

The research outcome revealed that finance exerts a strong positive impact on the growth of the industrial sector. This finding appears to suggest that the financial sector is very crucial in the development process of the industrial sector in South Africa. The results also established that the interaction between FD and institutions in the country has a separate negative effect on industrial development, and crucially, that it leaks out the positive impact of finance on the industrial sector. By implication, the result implies that both finance and institutions are substituting, instead of complementing each other in the development process of the industrial sector. This result suggests the likelihood that the institutions are rather weak and suffer from policy uncertainty, dereliction and lapses which encourage corruption and other vices that redirect finances from the industrial sector to unnecessary and unproductive activities, such that they undermine the positive efforts of financial system to enhance the development prospects of the industrial sector. Furthermore, while the impact of trade openness on industrial growth is found to be positive, the impact of FDI is weak and not robust.

Some key policy implications could be derived from these findings. First, considering the substituting relation between FD and INSQ, government should revamp and refocus the institutional and financial structures to foster an environment that is conducive to industrialization. There is need for more reforms in the financial sector to increase its efficiency towards achieving “better finance, more growth” (Adusei 2019; Law et al. 2018). Further to this, the financial sector in the country needs to be rooted in a strong institutional structure to enhance its beneficial impact on the industrial sector. Moreover, government should promote a financial system that provides finance that is oriented towards both forward and backward linkages among the local industries, which can engender positive spill-over impacts on the overall industrial sector. Moreover, all the institutions that are relevant to the industrial sector and the financial system, such as the Reserve Bank, Johannesburg Stock Exchange, Export Councils, Industry Associations, Joint Action Groups, Security and Exchange Commission, Ministry of Trade, Industry and Competition, should be organized to collaborate towards regular formulation and efficient implementation of policies that would enhance the development of the industrial sector.

This study has contributed to the discussion on the linkage between finance and industrial development in South Africa by examining the moderating role of institutions, which has been ignored by previous studies. However, there are limitations in this study which can be addressed in future research. First, other variables which drive industrial development can be included in future research. This does not diminish the quality and applicability of this study’s outcomes in any way because issues of omitted variable bias and endogeneity have already been addressed by the estimation techniques. Furthermore, considering this study focused only on South Africa, future research can complement it by carrying out a comparative analysis of top financially developing countries of the world. Lastly, future research can explore whether spatial interdependence or third-country effects influence the linkage between FD and industrial sector performance.

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Notes

- ¹ <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups> (accessed on 12 June 2022).
- ² To measure institutional quality, a composite index of International Country Risk Guide (ICRG) variables was constructed by computing the average of the following three variables: corruption (range: 0–6), law and order (range: 0–6), and government stability (range: 0–12). More details about the index can be found in Section 3.1.

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