

Financial Development-International Trade Nexus in Ghana: The Role of Sectoral Effects

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Abstract: *This study investigates the role of sectoral effects in the financial development-international trade nexus using time series data from Ghana for the period 1960 to 2017. Our evidence from the autoregressive distributed lag (ARDL) estimates indicates that while the effect of sectoral value additions on trade is conditional on the proxy of financial development, financial development significantly promotes trade in both the long- and short-run, regardless of the proxy. Moreover, even after accounting for sectoral value additions, finance positively affected international trade. On the moderation front, we observe that increased agricultural value additions mitigate the beneficial impact of financial development on international trade, whereas increased service value additions magnify the beneficial effects. Thus, to boost international trade in Ghana, policymakers should prioritise fostering complementarity between the industrial, agricultural, service, manufacturing, and financial sectors.*

Keywords: International trade; financial development; Ghana; sectoral value additions; ARDL

JEL Classification: F13, F14, G21

Introduction

International trade (TOP) is critical to a country's development. Global trade allows the free flow of products, services, and factors of production across boundaries by eliminating trade barriers (UNCTAD, 2014). Academics and practitioners have at-

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tempted to identify the critical factors that influence financial development (FD) and economic growth (EG). Among other factors, TOP fosters FD and growth by enhancing competitiveness, knowledge transfer, and technological spillovers (Arif et al., 2022; Ibrahim & Sare, 2018; Prempeh, Kyeremeh, et al., 2023). As a result, numerous countries including Ghana, have implemented policies to increase cross-border trade.

Indeed, for a developing country like Ghana, the cost of TOP is relatively high. While research indicates that increasing trade flows may help reduce this cost, identifying specific policies and programs to reduce these costs remains a significant challenge. However, current proposals for domestic FD may be a critical channel for lowering trade costs and refocusing countries' attention on products and services where they have a comparative and competitive advantage (Porter, 1990). Nevertheless, despite the theoretical support for the FD-TOP nexus, empirical evidence on FD's specific impact on TOP remains inconclusive. For instance, some studies indicate that a well-developed financial system enables industries to rely on external financing to substantially increase export earnings (Beck, 2002; Manova, 2013; Svaleryd & Vlachos, 2002). Additionally, some studies conclude that underdevelopment of the financial sector results in financial frictions that affect a country's export orientation (Gross & Verani, 2012; Kohn et al., 2016). Hence, an underdeveloped financial sector hinders TOP.

As a matter of fact, various cross-border trade structures are associated with a country's level of FD. Trading in foreign countries entails a plethora of upfront investments, including market research, distribution networks, and product differentiation (Baldwin & Krugman, 1989). Besides that, entering a foreign market necessitates an efficient financial intermediary to ensure that all available resources facilitate TOP. However, when small local businesses with financial constraints lack access to external financing, they are unable to make such investments to promote TOP. Moreover, TOP can be harmed by high variable costs associated with transportation, tariffs, and insurance. Under these circumstances, an underdeveloped financial sector aggravates the financial constraints of businesses incapable of funding the initial investments related to TOP. Thus, access to finance improves businesses' prospects for international trade by enabling them to meet international marketing and branding obligations, high export costs, and higher quality standard requirements of foreign markets (Abor et al., 2014). Hence, an underdeveloped financial sector hinders TOP. Indeed, various structures of cross-border trade are associated with the level of domestic FD.

While some studies (Bilas, Bošnjak, et al., 2017; Caporale et al., 2022; Yakubu et al., 2018) contend that FD benefits TOP, this current study suggests that the influence of FD on TOP is conditional on whether a country's domestic financial sector effectively channels capital toward or away from activities that produce its competitive advantage. The theoretical literature on the FD-TOP nexus remains divergent. For example, a rise in TOP results in international competition, promoting productivity and growth as competition boosts efficiency. According to Kletzer and Bardhan

(1987), nations with a considerably higher level of FD enjoy a competitive edge in businesses and industries that strongly depend on foreign financing. To buttress this, Beck (2002) argues that a well-developed financial infrastructure allows countries to specialise and reap the benefits of economies of scale. External financing provides a comparative advantage in industries with high economies of scale. Nonetheless, increasing TOP may harm small businesses unprepared for competition and may require state protection.

There are several studies on how TOP affects economic growth (Belloumi & Alshehry, 2020; Biemudo et al., 2022; Silberberger & Königer, 2016; Tah et al., 2021; Zahonogo, 2017). Besides TOP's influence on EG, theoretical literature indicates that FD is critical for EG (Nguyen et al., 2022; Prempeh, Frimpong, et al., 2023; Shahbaz et al., 2022). However, literature on the FD-TOP nexus is still emerging (Caporale et al., 2022; Gächter & Gkrintzalis, 2017; Gokmenoglu & Amin, 2015; Wajda-Lichy & Kawa, 2018; Yakubu et al., 2018). However, studies on the FD-TOP link focus primarily on the direction of effects. According to some studies (Law & Demetriades, 2006; Rajan & Zingales, 2003), countries that open their doors to foreign trade and capital flows profit more from TOP because it promotes innovation and eliminates the entrenched interests of incumbents.

Indeed, the literature on FD's influence on TOP via its impact on various sectors of the economy is scant. Kumi *et al.* (2017) suggest that while foreign aid positively affects sectoral growth, aid volatility negatively affects sectoral value additions, with the effect being more pronounced in non-tradable sectors and having no effect on agriculture in Sub-Saharan Africa (SSA). Furthermore, Ibrahim and Alagidede (2018) discovered that although TOP and FD are essential contributors to EG, the extent to which FD impacts growth is contingent on the growth rates of both the financial and real sectors. More recently, Opoku *et al.* (2019) discovered that although FDI promotes EG unconditionally, its EG-promoting impact diminishes as sectoral effects are considered. Additionally, they established that FDI has a significant pass-through effect only in the agricultural and service sectors.

Despite these studies, the authors do not demonstrate how the FD affects TOP via the different sectors of the economy, notably agricultural, industrial, service and manufacturing. Additionally, Kumi *et al.* (2017), Ibrahim and Alagidede (2018), and Opoku *et al.* (2019) examine sectoral additions and their impact on EG. However, these studies did not conduct empirical research to determine whether domestic FD interacted with sectoral value additions to boost or dampen trade significantly. As a result, this study seeks to close these gaps by identifying the specific sectoral channels via which Ghana's FD affects TOP.

The remainder of the paper is structured as follows: the next section expands on the literature review. The third section outlines the data sources and estimation techniques that were utilised in this study. The fourth section contains the results and discussions, followed by the conclusion in the fifth section.

Literature Review

Earlier empirical studies have extensively explored the TOP-EG nexus (Abendin & Duan, 2021; Kim et al., 2016; Osei-Assibey & Dikgang, 2020; Tah et al., 2021; Zahonogo, 2017), yet the findings from literature are mixed and conflicting across methodologies, sampled nation(s) and period under study. For example, some studies observed a significant positive association between TOP and EG (Biemudo et al., 2022; Keho, 2017; Musila & Yiheyis, 2015; Osei-Assibey & Dikgang, 2020; Tah et al., 2021). Conversely, others also established a deleterious effect of TOP on EG (Belloumi & Alshehry, 2020; Lawal et al., 2016; Polat et al., 2014). Ulaşan (2015) discovered that lowering trade barriers does not influence EG. Fenira (2015) established a tenuous connection between TOP and EG. This occurred due to the deterioration of external balance brought about by the phenomenon called 'preferences erosion'. Rassekh (2007) concludes that lower-income nations benefit from TOP more than higher-income nations. Kim and Lin (2009) identified a point at which increased TOP promotes EG and a point at which it becomes detrimental to EG. The implication is that increased TOP and integration may make economies more divergent. Kim *et al.* (2011) discovered that TOP is associated with inequitable development. Advancements in TOP generally benefit the growth of high-income countries. However, for low-income households, TOP appears to have a significant and negative effect on real income.

Apart from FD, TOP has developed into a critical component of EG, attracting the attention of numerous researchers. Thus, several attempts have been made to empirically examine the relationship between FD and TOP from economies of scale perspective, and findings indicate that FD affects TOP (Belazreg & Mtar, 2020; Caporale et al., 2022). A well-developed financial sector may channel additional savings to the private sector, allowing businesses to access external financing and overcome liquidity constraints. According to Kletzer and Bardhan (1987), countries with a developed financial sector have a competitive advantage in industries that depend on foreign finance. To buttress this, Manova (2013) asserts that more developed financial markets assist industries that rely heavily on external financing in increasing exports. Omran and Bolbol (2003) also argued that FD enables foreign firms to borrow more money to expand their innovative activities in the domestic economy. Using a panel of 65 countries from 1966 to 1995, Beck (2002) applies a theoretical model developed by Kletzer and Bardhan (1987) to examine the relationship between FD and TOP. After adjusting for country-specific effects and reverse causality, the results indicate that FD promotes TOP. Surprisingly, the conclusions hold across countries and panel estimations. Beck (2003) established that economies with advanced financial systems have larger export shares and trade balances in sectors that employ more external finance. Similar conclusions were reached by studies like (Hur et al., 2006; Sghaier, 2020; Susanto et al., 2011), who concluded that FD promotes TOP. Some studies also

established a differential effect of FD on TOP (Bilas, Bosnjak, et al., 2017; Kim et al., 2010b; Leibovici, 2018; Yakubu et al., 2018). However, the findings of (Kim et al., 2010a) suggest complementarity between FD and TOP in the long-run and substitutionary between the two variables in the short-run.

Apart from these well-established studies of FD's unconditional effect, what is the indirect effect of FD at sectoral levels? There is a dearth of literature on transmission channels, though a few notable examples exist. In the literature on foreign direct investment (FDI), Opoku *et al.* (2019) investigated the link between FDI, EG and sectoral effects in Africa from 1960–2014, focusing on 38 African countries. The GMM estimates indicate that FDI promotes overall EG positively and unconditionally; however, its growth-promoting effect is fictitious when the sectoral conditional impact is considered. Additionally, FDI has a significant pass-through effect on the agricultural and service sectors while having a negligible effect on the manufacturing sector. Kumi *et al.* (2017) analysed the connection between aid, aid volatility, and sectoral growth in SSA from 1983 to 2014 and the role of FD in these relationships. Their analysis yields three significant findings. While FD significantly boosts value additions in the service, manufacturing and agricultural industries, it has a negligible effect on the agricultural industry. Also, while aid boosts sectoral growth, volatility in aid dampens sectoral growth, disproportionately affecting non-tradable sectors and having no discernible influence on agriculture. Finally, the detrimental effect of volatility in aid on sectoral value additions in SSA is mitigated by an advanced financial system that has a sizable impact on the tradable sector. Alagidede *et al.* (2020) discovered that financial integration and TOP significantly boost the agricultural and manufacturing industries. However, only financial integration substantially impacts industrial sector development while having little impact on service sector development. They concluded that trade and financial integration are mutually reinforcing and do not work in isolation to effect change in SSA.

Indeed, as demonstrated above, studies investigating the influence of FD on TOP through the lens of its effect on several segments of the economy are scarce. According to Ibrahim and Alagidede (2018), EG is inhibited when FD is not accompanied by increased growth in real sectors as measured by industrial sector value additions. Despite these studies, little is known about the effects of FD on TOP through the economy's different sectors, particularly manufacturing, industry, services, and agriculture. While some scholars have examined the relationship between EG and sectoral additions (Ahumada et al., 2022; Opoku et al., 2019; Samuel et al., 2021; Susanto et al., 2011; Ustarz & Fanta, 2021), they have failed to assess if sectoral value additions promoted or dampened TOP empirically. To address this gap, Sare *et al.* (2019) examine the role of sectoral value addition in mediating the relationship between FD and TOP, using a panel of 46 African countries from 1980–2016. They concluded that whereas the impact of sectoral value addition on TOP depends on the measure of TOP, FD has no influence on TOP in the short- and long-run regardless of the mea-

sure of FD. However, after accounting for transmission channels, they discovered a negative long-run substitutionary between TOP and FD independent of the measure of TOP and FD. Furthermore, they demonstrated via mediation analysis that greater sectoral value additions ameliorate the deleterious impact of FD on TOP, with the service sector having a huge impact. The findings, however, are not country-specific. As a result, previous literature findings are not instructive, leaving policymakers with an ambiguous interpretation to the point that growing TOP through increased sectoral value additions and the FD is a primary objective of several African countries, most notably Ghana, the FD-sectoral development-TOP requires more investigation and comprehension. This study, therefore, using current data, seeks to identify the exact sectoral transmission mechanism through which the advancement of Ghana's FD affects TOP. Using an autoregressive distributed lag (ARDL) model, it also examines this association's short- and long-run effects. From a policy standpoint, if FD is a primary driver of nations' competitive and comparative advantages, restructuring the financial sector might have ramifications for each industry and ultimately, TOP.

Data and Model Specification

Annual time-series data from 1960 to 2017 are used in this study. The data for this study were derived entirely from World Bank databases, specifically the World Development Indicators (WDI) and the Financial Development and Structure Dataset. International trade was proxied by trade (TOP). At the same time, financial development is measured using domestic credit to the private sector (DCPS), domestic credit to the private sector by banks (DCPBS), deposit money (BM), bank to deposit money bank and central bank assets (DMA), liquid liabilities (LL), and deposit money bank assets (DMB). Manufacturing value-added (MAN), agriculture value-added (AGRI), service value-added (SER), and industry value-added (IND) were used to measure sectoral value additions. Except for the Financial Development Index (PCI), constructed using Principal Component Analysis (PCA), all variables are expressed as a percentage of GDP.

The primary objective of this research is to determine how FD affects TOP in Ghana, an emerging economy. Additionally, we examined how FD affects TOP in Ghana via sectoral additions. To explore the effect of sectoral value additions and FD on TOP, we create a model in which TOP is a function of FD and sectoral value additions as illustrated in equation (1):

$$TOP_t = f(FD_t, SVA_t, \varepsilon_t) \quad (1)$$

Where TOP_t is a measure of international trade; FD_t represents financial development; SVA_t is a proxy for sectoral value additions in the industrial, agricultural,

service and manufacturing sectors, denoted by $AGRI_t$, IND_t , MAN_t and SER_t , respectively; t is the time index; and ε is the error term, which captures the effect of other variables not included in the TOP equation. We impose the following Cobb-Douglas production function on equation (1):

$$TOP_t = f(FD_t^\alpha, SVA_t^\partial, \mu_t^\varepsilon) \quad (2)$$

The study obtains equation (3) by explicitly writing equation (2) and inserting a constant.

$$TOP_t = FD_t^\alpha + SVA_t^\partial + \mu_t^\varepsilon \quad (3)$$

To reduce multicollinearity and to make the equation linear (Ibrahim & Musah, 2014; Sare et al., 2019), we take the natural log of equation (3):

$$\ln TOP_t = \alpha \ln FD_t + \partial \ln SVA_t + \varepsilon_t \ln \mu_t \quad (4)$$

From equation (4), $\varepsilon_t \ln \mu_t = 1$. Hence, equation (4) is transformed into equation (5):

$$\ln TOP_t = \alpha \ln FD_t + \partial \ln SVA_t + \varepsilon_t \quad (5)$$

The coefficients in equation (5) can be interpreted as elasticities since the variables are in log form. Since we imposed the Cobb-Douglas production function, $\alpha + \partial = 1$. Given that the study mostly relied on sectoral value additions, we model equation (6) as :

$$\ln TOP_t = \alpha \ln FD_t + \partial_1 \ln AGRI_t + \partial_2 \ln MAN_t + \partial_3 \ln SER_t + \partial_4 \ln IND_t + \varepsilon_t \quad (6)$$

From equation (6), $\alpha + \partial_1 + \partial_2 + \partial_3 + \partial_4 = 1$ where α measures the contribution of FD to TOP, ∂_1 , ∂_2 , ∂_3 and ∂_4 respectively measures the contribution of AGRI, MAN, SER and IND to TOP. Following Pesaran and Shin (1999, 2002), we introduce a constant term (ϕ) in equation (6) as shown in equation (7):

$$\ln TOP_t = \phi + \alpha \ln FD_t + \partial_1 \ln AGRI_t + \partial_2 \ln MAN_t + \partial_3 \ln SER_t + \partial_4 \ln IND_t + \varepsilon_t \quad (7)$$

$t = 1, 2, \dots, T = 57$; where ϕ represents the constant term.

To investigate the transmission channels of the FD-TOP nexus, we introduce the interactive term of FD_t and SVA_t into equation (7). To be precise, we construct the following equation, in which the indirect influence of FD on TOP is measured as ρ :

$$\ln TOP_t = \phi + \alpha \ln AGRI_t + \partial_3 \ln SER_t + \partial_4 \ln IND_t + \rho (\ln FD_t \times \ln SVA_t) + \varepsilon_t \quad (8)$$

Where denotes all the proxies of sectoral value addition while α , ∂_1 , ∂_2 , ∂_3 and ∂_4 are the parameters for FD, AGRI, MAN, SER and IND, respectively. Finally, the study expresses equation (8) using an ARDL framework to allow the outcome variable (international trade) to respond to changes in regressors. To be more specific, the ARDL modelling methodology suggested by Pesaran and Shin (1999, 2002) is used in this work, as described in equation (9):

$$\begin{aligned} \Delta \ln TOP_t = & \rho + \sum_{i=1}^n \beta_i \Delta \ln FD_{t-i} \\ & + \sum_{i=0}^p \sum_{q=1}^k \gamma_{qi} \Delta X_{qt-i} + \ln TOP_{t-1} \\ & + \sum_{q=1}^k X_{qt-1} + \ln TOP_{t-1} + \varepsilon_t \end{aligned} \quad (9)$$

X denotes the regressors, including FD_t , $AGRI_t$, MAN_t , SER_t , IND_t and the multiplicative interactive term of FD_t and SVA_t .

Undoubtedly, the ARDL model described above produces consistent results when the lag orders p and q are appropriately chosen. When the long-run results are the primary concern, the ARDL model's lag structure must be selected using an appropriate information criterion. When investigating short-run effects, as in this paper, it is proposed that a standard lag structure be utilised for all estimations. As a result, we equate both p and q to 1 in this study for a more concise explanation.

Results and Discussions

Analyses of the principal components, descriptive statistics, and correlations

To determine the resiliency of the estimates, an Index was constructed from the six alternative measures of FD using Principal Component Analysis (PCA). The results of the PCA are reported in Table 1. PCA is the process by which many correlated variables are transformed into fewer uncorrelated variables. Therefore, the first principal component (PC1) with a value above 1 was picked to represent the index. This accounts for approximately 82.4% of the variance in the initial six-variables data.

Table 1: Principal Component Analysis

Eigenvalues: (Sum = 6, Average = 1)						
Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion	
1	4.946	4.367	0.824	4.946	0.824	
2	0.579	0.275	0.097	5.525	0.921	
3	0.304	0.180	0.051	5.829	0.972	
4	0.124	0.078	0.021	5.953	0.992	
5	0.047	0.046	0.008	6.000	1.000	
6	0.000		0	6	1	
Eigenvectors (loadings):						
Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
BM	0.372	-0.483	0.752	0.235	-0.086	-0.006
DCPBS	0.423	-0.305	-0.434	0.161	0.146	0.702
DCPS	0.424	-0.296	-0.429	0.133	0.155	-0.712
DMA	0.370	0.691	0.059	0.612	-0.091	-0.008
DMB	0.435	0.110	-0.076	-0.490	-0.743	0.006
LL	0.420	0.311	0.230	-0.535	0.622	0.018

The descriptive statistics, which have been grouped into three thematic areas which capture TOP, FD and sectoral value additions, are presented in Table 2. We notice that international trade proxied by trade openness (TOP) records a mean of 68.46% with a standard deviation 23.87. This demonstrates Ghana's relative market integration with global markets. The seven FD indicators DCPS, DCPBS, DMA, LL, DMB, BM and PC1 recorded means of 10.02%, 9.78%, 46.04%, 16.98%, 12.95%, 23.55% and 0.33, respectively, which affirms the relatively lower financial sector development in Ghana. Concentrating on the four sectors, the service sector's average mean value addition is slightly higher than the others, with the manufacturing sector attaining the lowest value. The high sectoral value addition of the service sector contradicts the widely held belief that Ghana is predominantly agrarian. The findings show that the most dominant sector in Ghana is the service sector, consistent with the (UNCTAD, 2015) report. This does not augur well for a country whose main agenda is to industrialise. It also buttresses several previous studies which opine that African countries, for that matter, Ghana, have progressively replaced their industrialisation potentials with services (Sare et al., 2019).

Table 2: Descriptive statistics

Descriptive	Trade		Financial Development							Sectoral Value Additions				
	TOP	DCPS	DCPBS	DMA	LL	DMB	BM	PCI	AGRI	SER	IND	MAN		
Mean	68.458	10.017	9.783	46.038	16.982	12.952	23.545	0.331	35.168	35.605	22.823	9.147		
Std. Dev.	23.872	4.926	4.715	22.696	8.285	9.172	6.384	2.555	9.614	7.425	5.629	1.539		
CV	0.349	0.492	0.482	0.493	0.488	0.708	0.271	7.719	0.273	0.209	0.247	0.168		
Maximum	116.048	15.882	15.827	78.891	32.057	27.663	34.108	3.174	50.601	48.181	34.860	11.745		
Minimum	18.815	2.209	2.209	17.694	6.339	2.424	11.813	-4.436	19.696	26.246	10.582	5.661		
Skewness	-0.056	-0.258	-0.272	0.240	0.464	0.186	-0.251	-0.407	-0.123	0.455	0.176	-0.425		
Kurtosis	2.428	1.404	1.428	1.296	1.820	1.504	1.990	1.638	1.982	1.766	2.657	2.876		
Jarque-Bera	0.481	3.985	3.923	4.441	3.192	3.366	1.801	3.569	1.555	3.334	0.342	1.043		
Probability	0.786	0.136	0.141	0.109	0.203	0.186	0.406	0.168	0.460	0.189	0.843	0.594		
Percentiles														
25%	45.994	4.942	4.942	25.105	9.954	3.289	19.835	-1.780	28.039	28.815	17.375	8.655		
50%	69.436	12.017	11.874	39.553	14.511	14.046	23.967	1.320	35.898	34.080	24.501	9.079		
75%	85.402	14.516	14.385	69.679	26.311	22.672	28.247	2.775	44.779	42.739	25.404	9.882		

Note: CV denotes coefficient of variation; St. dev represents standard deviation.

Table 2: Correlation Analysis

	TOP	DCPS	DCPBS	DMA	LL	DMB	BM	PCI	AGRI	SER	IND	MAN
TOP	1.000											
DCPS	0.734 ^b	1.000										
DCPBS	0.746 ^a	0.998	1.000									
DMA	0.400 ^b	0.849 ^a	0.834 ^a	1.000								
LL	0.452 ^a	0.878 ^a	0.855 ^a	0.923 ^a	1.000							
DMB	0.528 ^a	0.935 ^a	0.918 ^a	0.910 ^a	0.970 ^a	1.000						
BM	0.904 ^a	0.860 ^a	0.869 ^a	0.638 ^a	0.652 ^a	0.700 ^a	1.000					
PCI	0.732 ^a	0.982 ^a	0.977 ^a	0.884 ^a	0.906 ^a	0.937 ^a	0.876 ^a	1.000				
AGRI	-0.503 ^a	-0.840 ^a	-0.818 ^a	-0.853 ^a	-0.947 ^a	-0.921 ^a	-0.645 ^a	-0.888 ^a	1.000			
SER	-0.104	0.468 ^a	0.451 ^a	0.733 ^a	0.635 ^a	0.621 ^a	0.152	0.475 ^a	-0.525 ^a	1.000		
IND	0.586 ^a	0.584 ^a	0.564 ^a	0.448 ^a	0.641 ^a	0.604 ^a	0.550 ^a	0.642 ^a	-0.754 ^a	-0.097	1.000	
MAN	-0.272	-0.225	-0.240	-0.190	-0.071	-0.085	-0.346 ^b	-0.190	0.015	-0.283	0.3296 ^c	1.000

Note: a, b, and c denote the level of statistical significance at 1, 5, and 10%, respectively.

We estimate the coefficient of variation as the ratio of the standard deviation (SD) to the mean to compare the inter-volatility of the series. Where a lower (higher) CV indicates decreased (increased) volatility. Based on the CV values, we hypothesise that the FD index (PCI) is the most volatile of all variables, followed by deposit money bank assets and the manufacturing sector. By sector, the agricultural sector was determined to be the most volatile. According to anecdotal evidence, the agricultural sector's high volatility was anticipated due to the sector's intrinsic nature, where production is highly dependent on unpredictable weather and other spatial challenges such as perennial diseases and pests. Skewness values greater than zero indicate that DMA, LL, DMB, SER, and IND are skewed to the right, whereas negative values indicate TOP, DCPS, DCPBS, BM, PCI, AGRI, and MAN are skewed to the left.

When we look at the correlation coefficients in Table 3, we see that all FD indicators positively correlate with TOP. However, except for DMA, LL and DMB, all the FD and TOP have a strong relationship. Interestingly, all sectoral value additions are negatively correlated with TOP except for the industry sector. Additionally, the indicators are strongly correlated. The evidence is unsurprising in the light of the relationship between FD measures. As expected, PCI has a strong correlation with all other indicators of FD. The evidence indicates that AGRI has a negative relationship with IND and the SER. On the other hand, the correlation between IND and AGRI is relatively stronger than between AGRI and SER. Additionally, it is worth noting that the IND classification of sectoral value additions includes the MAN.

The unit root tests are summarised in Table 4. Using the DF-GLS and Philip-Perron test statistics, the estimation indicates that the series comprises the $I(1)$ and $I(0)$ series. The mixed stationarity of the tests supports using the ARDL model, which simultaneously accommodates both $I(0)$ and $I(1)$ variables. The stationarity test's findings have both statistical and economic implications. The economic implication is that shocks to a unit root series will have an infinite effect. This indicates that mean reversion is absent. The statistical importance is that unless the series are cointegrated, and the predictor variables are purely exogenous, series with unit root might result in erroneous estimates (Adu et al., 2013; Kapaya, 2020). Meeting the rigorous exogeneity criterion, on the other hand, is usually challenging. As a result, an estimator that considers both exogeneity and endogeneity was applied, further validating the ARDL technique usage. However, this is not to suggest that stringent exogeneity is required.

Table 3: Test of Stationarity

DF-GLS test				Phillips-Perron test			
Variable	Level	First difference	Decision	Variable	Level	First difference	Decision
TOP	-1.323	-6.630 ^a	I(1)	TOP	-1.275	-7.063 ^a	I(1)
DCPS	-0.925	-7.912 ^a	I(1)	DCPS	-1.032	-8.479 ^a	I(1)
DCPBS	-1.049	-7.841 ^a	I(1)	DCPBS	-1.159	-8.418 ^a	I(1)
DMA	-0.880	-4.487 ^a	I(1)	DMA	-2.144	-5.976 ^a	I(1)
LL	-0.464	-6.206 ^a	I(1)	LL	-0.637	-6.087 ^a	I(1)
DMB	-0.642	-3.097 ^b	I(1)	DMB	-0.252	-4.318 ^a	I(1)
BM	-1.741 ^c	-7.762 ^a	I(0)	BM	-1.971	-7.693 ^a	I(1)
PCI	-0.510	-2.013 ^b	I(1)	PCI	-0.729	-6.669 ^a	I(1)
AGRI	-0.957	-5.905 ^a	I(1)	AGRI	-1.299	-9.740 ^a	I(1)
SER	-1.544	-5.081 ^a	I(1)	IND	-1.502	-5.619 ^a	I(1)
IND	-1.646 ^c	-5.325 ^a	I(0)	SER	-1.382	-5.018 ^a	I(1)
MAN	-3.227 ^a	-6.172 ^a	I(0)	MAN	-2.817	-6.586 ^a	I(1)

Note: a, b and c denote statistical significance levels at 1, 5 and 10%, respectively

Estimation of Long and Short Run Relationships between Finance, Sectoral Value Additions, and Trade

This section discusses the ARDL short-run and ECT for cointegration results. Table 5 contains six regression models that have been estimated and reported. The findings corroborate the existence of cointegration as indicated by the ECTs. Furthermore, the ECT suggests that indicators of FD and TOP restore to equilibrium, as demonstrated by the negative and significant sign. The ECT for the estimated models ranges from -0.58 and -0.73. The economic implication is that convergence speed is moderate to rapid correction toward the equilibrium relationship between FD and TOP at a rate of between 58 and 73% per year relative to the previous year to achieve a steady state.

Additionally, evidence indicates that regardless of the measure, FD promotes TOP at 10% and 1%, respectively. These findings support a short-run positive causal relationship between FD and TOP. At 1%, PCI indicates a positive causal link between TOP and FD. The magnitude, on the other hand is small, implying an elastic impact on TOP. Thus, FD, as measured by PCI, positively affects TOP in the short-run. Regarding sectoral value additions, AGRI is a critical sector of the economy and positively impacts TOP, albeit negligible. Notwithstanding the positive coefficients, IND does not significantly promote TOP. Intriguingly, both MAN and SER have a significant short-run dampening effect on TOP.

Table 6 summarises the results of the ARDL long-run and bound tests for cointegration. Each indicator of FD was analysed in conjunction with indicators of sectoral value addition. According to the results of the bound tests, all estimated models gave

evidence of cointegration, as the F -statistics were higher than the upper bound of the critical values at 1%. As a result, the null hypothesis of no cointegration was repudiated in all models. Additionally, all FD indicators demonstrate robust and positive long-run associations with TOP significant at 1%. This implies that FD promotes TOP in Ghana to a considerable extent, consistent with the findings of Caporale et al. (2022) but not with Sare *et al.* (2019).

Regarding sectoral value additions, AGRI and IND have a negligible impact on TOP. Regardless, if the impact were significant, it would have been beneficial. This result is consistent with the estimates for the short-run. Given the negative and significant coefficients of SER, there is evidence of a long-run inverse relationship between SER and TOP. Increases in SER reduce TOP by 0.42 % to 0.63 %. A closer examination of the results reveals that when AGRI is excluded from the model, the negative impact of SER is severe. Additionally, the results indicate that advancement in the MAN impedes TOP as evidenced by the significant negative coefficients. TOP is inhibited by a percentage increase in MAN, with coefficients ranging from 0.49% to 0.52%. The degree of the detrimental impact, on the other hand, is consistently greater in the short-run than in the long-run.

We may infer from the findings that the FD boosts trade in the short- and long-term. This impact is conditioned on the FD indicator utilised in the TOP equation. Previous estimates, however, failed to account for the transmission channels via which diverse sectors of the economy might moderate the FD-TOP link. The following section, therefore, investigates the role of sectoral improvements in the association between FD and TOP.

Table 4: Outcomes of Short-run Analysis

Model	1	2	3	4	5	6
Model Selection	(1, 0, 0, 0, 0, 1)	(1, 0, 0, 0, 1)	(1, 1, 0, 0, 0, 1)	(1, 1, 0, 0, 1)	(1, 1, 0, 0, 0, 1)	(1, 1, 0, 0, 1)
D(PC1)	0.07 ^a (0.02)	0.06 ^a (0.02)				
D(lnCPS)			0.16 ^c (0.08)	0.14 ^c (0.079)		
D(lnCPBS)					0.15 ^c (0.08)	0.14 ^c (0.08)
D(lnAGRI)	0.24(0.29)		0.22(0.26)		0.21(0.26)	
D(lnIND)	0.36(0.29)	0.14(0.12)	0.37(0.27)	0.15(0.11)	0.38(0.28)	0.17(0.11)
D(lnSER)	-0.42 ^c (0.24)	-0.59 ^a (0.12)	-0.46 ^c (0.23)	-0.63 ^a (0.12)	-0.45 ^c (0.23)	-0.61 ^a (0.12)
D(lnMAN)	-0.70 ^a (0.13)	-0.69 ^a (0.13)	-0.71 ^a (0.12)	-0.71 ^a (0.12)	-0.71 ^a (0.12)	-0.70 ^a (0.12)
ECT ₁	-0.63 ^a (0.08)	-0.58 ^a	-0.73 ^a (0.09)	-0.68(0.08)	-0.73 ^a (0.10)	-0.69 ^a (0.08)
R-Squared	0.83	0.83	0.86	0.85	0.86	0.85
Adj R-Squared	0.82	0.81	0.84	0.84	0.84	0.84
S.E. of Regression	0.08	0.08	0.07	0.07	0.07	0.07
F-statistic	75.53 ^a	73.18 ^a	60.65 ^a	58.58 ^a	60.01 ^a	58.28 ^a
Durbin Watson stat	1.83	1.85	1.95	1.98	1.92	1.95

Note: a, b and c are statistically significant at 1, 5 and 10%, respectively. Values in (#) denote standard errors

Table 6: Outcomes of Long-run analyses

Model	1	2	3	4	5	6
Model Selection	(1, 0, 0, 0, 0, 1)	(1, 0, 0, 0, 1)	(1, 1, 0, 0, 0, 1)	(1, 1, 0, 0, 1)	(1, 1, 0, 0, 0, 1)	(1, 1, 0, 0, 1)
PC1	0.11 ^a (0.02)	0.10 ^a (0.02)				
<i>ln</i> DCPS			0.47 ^a (0.07)	0.45 ^a (0.07)		
<i>ln</i> DCPBS					0.46 ^a (0.07)	0.45 ^a (0.07)
<i>ln</i> AGRI	0.39(0.43)		0.31(0.33)		0.28(0.33)	
<i>ln</i> IND	0.58(0.43)	0.24(0.21)	0.50(0.35)	0.22(0.16)	0.52(0.35)	0.26(0.15)
<i>ln</i> SER	-0.66(0.42)	-0.10(0.19)	-0.64 ^c (0.34)	-0.92 ^a (0.14)	-0.62 ^c (0.34)	-0.89 ^a (0.13)
<i>ln</i> MAN	-0.52 ^a (0.18)	-0.52 ^a (0.19)	-0.50 ^a (0.14)	-0.49 ^a (0.15)	-0.50 ^a (0.14)	-0.49 ^a (0.15)
C	4.52(0.18)	6.17 ^a (1.09)	3.93(3.29)	6.92 ^a (0.73)	3.90(3.29)	6.69 ^a (0.71)
F(t) bounds tests						
F-statistic	20.98 ^a	25.33 ^a	18.90 ^a	22.7 ^a	18.71 ^a	22.6 ^a
Diagnostics						
<i>Serial Correlation LM Test</i>	1.23[0.31]	1.29[0.29]	2.32[0.12]	2.13[0.14]	2.17[0.14]	1.99[0.16]
<i>Heteroskedasticity Test</i>	0.40[0.89]	0.42[0.86]	0.82[0.59]	0.78[0.61]	0.81[0.60]	0.77[0.62]
<i>Ramsey RESET Test</i>	0.08[0.78]	0.14[0.71]	0.32[0.76]	0.30[0.77]	0.42[0.68]	0.38[0.71]
<i>Normality Test</i>	0.20 [0.91]	1.36[0.51]	2.93[0.23]	4.07[0.13]	2.82[0.24]	3.90[0.14]
CUSUM	Stable	Stable	Stable	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable	Stable	Stable	Stable

Note: a, b, and c denote significance at 1, 5 and 10%, respectively; Values in (#) denote standard errors and [#] denotes p-values

Finance, sectoral value additions, transmission channels, and trade

Concerning the impact of FD on TOP, the findings in Table 7 indicate that the short-run effects of FD on TOP are mixed. FD promotes TOP when AGRI and SER are included in the model. FD, on the other hand, impedes TOP by including IND. For example, in Model 1, when FD is measured using the PC1, a percentage increase in FD results in an increase of 0.93% in TOP. However, when IND is included in Model 2, a percentage increase in FD measured by PC1 reduces TOP by 0.34%. As can be seen, when DCPS and DCPBS are used as indicators of FD, the detrimental effect is significant. Thus, the impact of FD on TOP is inconclusive in the short-run. Regardless, FD promotes TOP in the long-run. For example, in column 1, a percentage increase in PC1 increases TOP by 0.92% in the long-run. When DCPS and DCPS are used to measure FD, the positive effect of FD on TOP becomes insignificant once IND is considered. This evidence suggests that FD's exact influence on TOP depends on the period, measure of FD, and the control variable used. This is in sync with Kim *et al.* (2010b) and Sare *et al.* (2019). Nonetheless, based on the sample,

there is enough evidence to demonstrate that expanding Ghana's banking sector boosts TOP.

Concerning the sectoral effect on TOP, the analysis reveals that in the short- and long-run, AGRI has no discernible effect on TOP when PC1 is used as the measure of FD, regardless of the model specification. However, when DCPS and DCPS are used as indicators of FD, AGRI promotes TOP positively and significantly when IND is excluded from the model. For instance, in column 3, a percentage increase in AGRI results in a 1.33% increase in TOP at the 5% significant level. On the other hand, the SER has a deleterious impact on TOP in the long- and short-run, significant at the 1% level. The adverse effect of SER is between 0.78 and 1.49% in the short run and between 1.26 and 2.15% in the long-run. Additionally, the study included the IND in the model. The findings indicate that the IND inhibits TOP in both the long- and short-run, but the long-run coefficients are negligible.

Apart from the direct influence of FD on TOP, we examined the channels via which FD influences TOP by including a multiplicative interactive term of FD measures and the value additions of various economic sectors in our TOP equation. This research aimed to determine empirically whether growth in different sectors of the economy interacts with FD to affect TOP. The study hypothesises that sectoral value addition has a beneficial effect on TOP by influencing FD. Four possible outcomes can be generated from the estimation of equation (8). First, if both μ and $\phi < 0$, FD does not promote TOP and magnifies the adverse influence. Second, if both μ and $\phi > 0$, FD spurs TOP and amplifies the positive impact. Third, if $\mu < 0$ and $\phi > 0$, then FD does not promote TOP, and sectoral growth inhibits the deleterious sectoral effect. Lastly, if $\mu > 0$ and $\phi < 0$, then FD supports TOP, and sectoral value addition inhibits the positive impact on TOP.

The short-run effects in Table 7 indicate that except for the AGRI, where the interactive term was negative and statistically significant at the conventional level when FD is proxied by PC1, FD has a positive direct effect and a negative (and significant) interactive term in the AGRI (column 1). This suggests that while FD promotes TOP, development in the AGRI dampens the beneficial influence on TOP although the linear effect of PC1 is exceedingly higher. The direct effect results in column 2 indicate that while PC1 decreases TOP in the short-run when FD is combined with IND, it significantly promotes TOP. The implication is that while FD impedes TOP, IND mitigates the adverse effect. A possible explanation for the industrial sector's dampening effect is the demand-following hypothesis, which postulates that growth in the real sector of the economy stimulates demand for financial services, resulting in FD and, thus, a unidirectional causality running from FD to the real sector (Odhiambo, 2004; Yakubu et al., 2018).

DCPS and DCPBS promote TOP and a positive (significant) interactive terms of finance in the service sector (columns 3 and 5). The findings imply that expansion of the service sector amplifies the beneficial effect on trade. On the other hand, regard-

less of the model specification, the long-run direct effect of all finance measures on international trade is positive. However, in the industrial sector, the interactive term of FD becomes negative, albeit insignificantly. However, growth in AGRI significantly dampens the beneficial influence of FD on TOP, whereas growth in the SER magnifies the beneficial impact of FD on TOP. While FD facilitates TOP, the SER invariably uses financial resources made available by the domestic financial sector, increasing the real sector of the economy and, thus, the need for these financial resources. As a result, the financial system improves, as proposed by Levine (1997). In the long-run, these indirect impacts combine to boost exports due to increased value additions enabled partly by the financial environment.

Additionally, the models' error correction terms were estimated. All error correction terms generated by the ARDL bounds testing approach were negative and significant at the 1% level consistent with theory. The implication is that there is a mean-reverting process at work and that following a shock, the system's disequilibrium tends to be corrected toward the long-run path.

Table 5: Outcomes of Short-run analyses

Model	1	2	3	4	5	6
Model Selection	(1, 1, 0, 0, 1, 0)	(1, 1, 0, 0, 0, 1)	(1, 1, 0, 0, 0, 0)	(1, 1, 0, 1, 0, 1)	(1, 1, 0, 0, 0, 0)	(1, 1, 0, 1, 0, 1)
D(PC1)	0.93 ^b (0.45)	-0.34 ^c (0.19)				
D(lnCPS)			0.59 ^a (0.08)	-1.60 ^c (0.83)		
D(lnCPBS)					0.58 ^a (0.09)	-1.74 ^b (0.84)
D(lnAGRI)	0.38(0.23)	-0.24(0.37)	1.33 ^b (0.53)	-0.57(0.40)	1.14 ^b (0.51)	-0.58(0.40)
D(lnSER)	-0.78 ^a (0.20)	-1.04 ^a (0.31)	-1.49 ^a (0.37)	-1.26 ^a (0.38)	-1.37 ^a (0.37)	-1.24 ^a (0.37)
D(lnIND)		-0.50(0.36)		-1.99 ^b (-0.85)		-2.05 ^b (0.85)
D(lnMAN)						
ECT	-0.61 ^a (0.10)	-0.72 ^a (0.12)	-0.69 ^a (0.14)	-0.69 ^a (0.13)	-0.69 ^a (0.14)	-0.69 ^a (0.13)
<i>Transmission channel:</i>						
FIN * AGRI	-0.31 ^a (0.11)		-0.30 ^b (0.13)		-0.27 ^c (0.13)	
FIN * SER	0.09(0.07)		0.18 ^a (0.06)		0.15 ^b (0.07)	
FIN * IND		0.15 ^b (0.06)		0.61 ^b (0.28)		0.66 ^b (0.28)
R-Squared	0.74	0.77	0.73	0.76	0.72	0.76
Adj R-Squared	0.71	0.74	0.72	0.722	0.70	0.72
S.E. of Regression	0.10	0.09	0.09	0.10	0.10	0.10
F-statistic	28.03 ^a	32.68 ^a	42.92 ^a	22.46 ^a	39.46 ^a	22.46 ^a
Durbin Watson stat	1.89	2.09	2.11	2.12	2.06	2.10

Note: a, b and c are statistically significant at 1, 5 and 10%, respectively. Values in (#) denote standard error.

Table 6: Long-run and bound tests analysis

Model	1	2	3	4	5	6
Model Selection	(1, 1, 0, 0, 1, 0)	(1, 1, 0, 0, 0, 1)	(1, 1, 0, 0, 0, 0)	(1, 1, 0, 1, 0, 1)	(1, 1, 0, 0, 0, 0)	(1, 1, 0, 1, 0, 1)
PC1	0.92 ^a (0.13)	0.34 ^b (0.13)				
<i>ln</i> DCPS			1.30 ^a (0.44)	0.64(0.62)		
<i>ln</i> DCPBS					1.26 ^b (0.46)	0.51(0.65)
<i>ln</i> AGRI	0.62(0.38)	-0.33(0.53)	1.91 ^a (0.61)	-0.82(0.63)	1.66 ^b (0.61)	-0.84(0.63)
<i>ln</i> SER	-1.26 ^a (0.33)	-1.44 ^a (0.51)	-2.15 ^a (0.56)	-1.81 ^a (0.63)	-1.99 ^a (0.57)	-1.79 ^a (0.63)
<i>ln</i> IND		-0.69(0.55)		-1.21(0.84)		-1.28(0.86)
C	6.36 ^a (1.19)	12.6 ^b (62)	2.67(2.67)	16.01 ^b (6.72)	3.12(2.76)	16.25 ^b (6.79)
<i>Transmissions:</i>						
FIN * AGRI	-0.06(0.121)		-0.43 ^b (0.16)		-0.40 ^b (0.16)	
FIN * SER	0.14(0.12)		0.26 ^b (0.10)		0.23 ^b (0.11)	
FIN * IND		-0.06(0.05)		-0.01(0.21)		0.03(0.22)
F(t) bounds tests						
F-statistic	9.44 ^a	9.91 ^a	8.33 ^a	7.41 ^a	7.96 ^a	7.4 ^a
<i>Diagnostics</i>						
<i>Serial Correlation LM Test</i>	1.12[0.34]	1.83[0.18]	0.30[0.59]	0.21[0.65]	0.14[0.71]	0.17[0.68]
<i>Heteroskedasticity Test</i>	0.20[0.99]	0.74[0.65]	0.12[0.88]	0.52[0.56]	0.41[0.89]	1.89[0.10]
<i>Ramsey RESET Test</i>	0.046[0.96]	0.34[0.74]	0.32[0.75]	0.27[0.61]	0.25[0.80]	0.22[0.64]
<i>Normality Test</i>	1.82[0.400]	3.78[0.34]	0.71[0.70]	1.04[0.59]	0.77[0.68]	1.07[0.59]
CUSUM	Stable	Stable	Stable	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable	Stable	Stable	Stable

Note: The CUSUM and CUSUMSQ model stability test graphs are included as an appendix because of space constraints. a, b, and c denote significance at 1, 5 and 10%, respectively; Values in (#) denote standard errors and [#] indicate p-values

Conclusion

This paper explores the impact of financial development and sectoral value additions on international trade in Ghana in the short- and long-run. The analyses were based on six financial development indicators aggregated to create an index. The results demonstrated that the indicator of financial development mattered regarding its impact on international trade. This evidence helps to explain why the existing literature contains contradictory findings. The evidence suggests that financial development mainly promotes international trade. However, the adverse effects were unsurprising in an environment previously state-dominated and centralised exclusively to service the state before being liberalised. To be precise, a dearth of empirical evidence on how financial development influences growth may be the reason for poor investment

decisions and resource distribution in Sub-Saharan Africa and Ghana. Thus, not only the quantum but policies on deposit mobilisation, financial sector reforms, quality of bank regulations and supervision, liberalisation of the financial sector, interest rate levels and effective mechanisms for allocating credit must be implemented and prioritised to attain an optimum level of savings mobilisation and channelling of resources towards productive investments.

The findings have important policy ramifications and critical recommendations have been made. Ghana has undergone significant economic reforms since the mid-1980s, liberalising the financial sector and promoting integration with the rest of the world market. The study spanned the decades from 1960 to 2017. According to the findings, financial development primarily supports international trade in the short- and long-term. Regarding sectoral value additions, the data indicate that their effects on trade are ambiguous in the short and long run. Additionally, there is evidence that growth in the service or manufacturing sectors' value additions dampens international trade in the long- and short-run. While the industry had a significant positive impact on international trade, the coefficients of the positive effects were insignificant at the conventional level. After incorporating interactive effects into the model, the effect of financial development on international trade was mixed in the short-run (i.e., both negative and positive). However, the long-term effect was positive regardless of the financial development proxy or model used. The results indicate that increases in agricultural value addition dampen the beneficial effect of finance on trade in the short and long run on the transmission channels. Growth in the service sector amplifies the short- and long-run benefits of financial development. Finally, increased industry value addition significantly mitigates the negative effect of financial development on international trade in the short-run. However, the effect is just transient.

Theoretically, there are numerous channels through which financial development can influence international trade. External finance-dependent sectors thrive in economies with a higher level of financial development. Consequently, countries with underdeveloped financial systems have a lower export share in industries that rely more on external financing. As a result, the degree to which financial development affects the international trade regimes of different economies (Sghaier, 2020). For instance, Beck (2002) argues that nations with an advanced financial sector have a comparative advantage in industrialisation because fixed-cost financing is relatively less expensive in such economies. Additionally, financial development mitigates the distorting effects of financial frictions, affecting productivity and shifting the economic structures toward capital-intensive sectors (Buera et al., 2011). Since international trade increases a country's exposure to global market fluctuations, a well-developed financial system safeguards against external risks and facilitates trade (Kim et al., 2010a). On the other hand, increased international trade may stimulate demand for additional financial products designed to mitigate the risks associated with international trade.

As a result, financial institutions will evolve to offer insurance and risk management products. As a result, financial development and international trade may have a long-run complementarity effect. The study confirmed this through the evidence provided regarding sectoral value additions. In Ghana, there is evidence of a long-term positive correlation between financial development and international trade.

Indeed, international trade can be facilitated by providing firms with the appropriate and optimal level of financing. This will increase access to finance, and firms will be able to cover fixed entry costs, thereby growing incumbent firms' export levels. This would result in an increase in bilateral trade on an aggregated basis. However, due to Ghana's underdeveloped financial system, financial intermediation is hampered, resulting in higher transaction costs, which inhibit trade, mainly when trading parties cannot provide the necessary financing. Ghana enjoys a comparative advantage in agriculture due to its abundant factor endowments, high productivity, and cost differentials resulting from dynamic economies of scale (Sare et al., 2019). However, the main obstacles are spatial and the sector's risky nature (Meyer, 2011).

Financial intermediaries are unwilling to lend to the agricultural sector compared to other real sectors of the economy due to risk-averse commercial and financial organisations, resulting in low credit availability to assist agrarian output. As a result, the agriculture sector's demand for finance and enhanced financial intermediation is inadequate to improve the finance-trade link. Hence, the interaction between finance and the agricultural sector dampens the positive effect of financial development on international trade. Nevertheless, financial intermediaries classify the industrial and service sectors as relatively safer because they are not subject to the agricultural sector's spatial constraints. Therefore, growth in these areas and demand for enhanced financial intermediation are projected to boost long-term financial development according to the demand-following hypothesis. The evidence from the estimates suggests that industrial value additions mitigate the short-term harmful effect of financial development on international trade.

By contrast, service sector value additions amplify the short- and long-run benefits of financial development on international trade. This conclusion is not farfetched. According to the GSS (2019) report, the service sector contributed 59.5% to its non-oil GDP, while the agricultural and industrial sectors contributed 19.4% and 21.1%. Given the service sector's substantial contribution, the financial sector will likely support service sector activities (such as energy, transportation, and telecommunications, among others) via better financial services. Thus, the fact that the service sector contributes the most to trade and gross domestic product, combined with improved finance, will further enhance finance's beneficial effect on international trade. To boost international trade in Ghana, policymakers should prioritise fostering complementarity between the industrial, agricultural, service, manufacturing, and financial sectors.

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Conflicts of interest/Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Availability of data and material

Data will be made available on request.

Code Availability

The computer program results are shared through the tables in the manuscript.

Authors' Contributions

Kwadwo Boateng Prempeh: Conceptualization, data curation, formal analysis, investigation, methodology, resources, software, validation, writing – original draft.

Joseph Magnus Frimpong: Supervision, writing – review and editing.

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