The Strength of the Association Between Financial Development and Logistics Performance*

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ABSTRACT

Academic studies assume a positive association between development of finance and logistics performance, however, few empirical studies examine the relevance and strength of this relationship. To cover this gap, this paper tests the association between development of finance and logistics performance incorporating the countries' governance quality and global competitiveness variables into the model. We use the PLS-SEM method to concurrently examine whether the countries' good governance and financial sophistication spur superior logistics performance, which stimulates better global competitiveness for the countries. The results strongly support the conceptual assumptions. Notably, one unit increase in development of finance leads 0,517 unit increase in logistics performance. It is also shown that logistics performance has the greatest direct impact on global competitiveness compared to governance quality and financial development.

Key Words: *Financial development, financial sophistication, logistics performance, good governance, competitiveness.*

JEL Classification: *G20, O47*

Finansal Gelişmişlik ve Lojistik Performans Arasındaki Bağlantının Boyutu

ÖZ

Teorik çalışmalar finansal gelişmişlik ve lojistik performans arasında pozitif bir ilişki olduğunu öne sürse de bu ilişkiyi ve ilişkinin boyutunu inceleyen ampirik çalışmalar oldukça sınırlıdır. Söz konusu boşluğu doldurmak maksadıyla, ülkelerin yönetim kalitesi ve küresel rekabet gücü değişkenleri de modele eklenerek finansal gelişmişlik ve lojistik performans arasındaki ilişki test edilmiştir. Böylece PLS-SEM yöntemiyle, ülkelerin yönetim kalitesinin ve finansal gelişmişliğin, yüksek lojistik performansa ve devamında daha iyi küresel rekabet gücüne neden olup olmadığı eş zamanlı olarak test edilmiştir. Sonuçlar teorik varsayımları güçlü bir şekilde desteklemektedir. Finansal gelişmedeki bir birimlik artışın lojistik performansda 0,517 birimlik bir artış sağladığı görülmüştür. Ayrıca analiz sonuçları lojistik performansının küresel rekabet gücü üzerinde, yönetim kalitesi ve finansal gelişmişlik değişkenlerine oranla daha büyük doğrudan etkiye sahip olduğunu göstermektedir.

Anahtar Kelimeler: *Finansal gelişmişlik, lojistik performans, yönetim kalitesi, rekabet gücü.*

JEL Sınıflandırması: *G20, O47*

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INTRODUCTION

The most important function of financial intermediaries is to promote the allocation and development of economic resources, not only across time or across borders but also in an ambiguous environment by reducing market imperfections (Merton, 1995: 23-24; Merton and Body, 1995: 3-6). Well-designed financial policies and institutions bolster effective financial intermediation, as well as enabling easy access to deep and broad capital markets and services (Reuttner and Glass, 2012: 15). Thereby, in financially developed markets, the financial institutions and markets are anticipated to have developments in the quality of (i) generating and processing information about existing investments and then allocating capital in line with the assessments, (ii) monitoring the firms and individuals and then applying corporate governance after capital allocation, (iii) promoting risk management, trading and diversification, (iv) mobilizing and pooling savings and (v) easing the exchange of financial instruments, goods and services, (Levine, 1997: 691; Levine, 2005: 869; WEF, 2012: 4), (vi) making payment (International Monetary Fund, 2005: 20-21). All these services provide significant value to entrepreneurs and industries.

Logistics is one of the industries that significantly benefit from financial intermediation. Flows of goods, services, and information activities benefit from a growing range of financial products and services such as letters of credit, purchase order financing, open account, invoice financing, freight financing, payables discounting, receivables financing, and asset-based lending (Silvestro and Lustrato, 2014: 299-301). Moreover, financial intermediaries provide assorted solutions for uncertainties and risks in the logistics industry. For instance, insurance companies offer coverage for damage, loss, collision, undelivered goods, flood, fire, strikes, terrorism, and civil unrest. Financial derivatives market also offers instruments like futures, forward freights agreements (FFA), and freights options to hedge against logistics uncertainties and risks (Kleindorfer and Visvikis, 2007: 6). In essence, financial institutions and markets facilitate trade, reduce uncertainties, and offer capital to the logistics industry.

Although a sound relationship between development of finance and logistics performance is assumed by academic studies, unfortunately, as far as we know, there is no academic study examining this relationship empirically. Therefore, contribution of this paper to the literature is to confirm this assumption with empirical results by investigating the association between the development of finance and the logistics performance of the countries, as well as the strength of this relationship.

However, regarding the nexus between development of finance and logistics performance, existing research stresses that good governance of states plays a significant role in the development of finance (Beck et al., 2006: 933-934; Cihak and Demirgüç-Kunt, 2013: 2-7) and logistics performance of the states (Koh et al., 2018: 3; Larson, 2021: 5). Good governance is a kind of starting point for development of finance and superior logistics performance. On the other side, economic growth or global competitiveness of the countries is the output of

development of finance (Levine, 2021: 24) and logistics performance (Saidi et al., 2020: 277). Therefore, to explore the complete association between development of finance and logistics performance, governance quality and global competitiveness of the countries are incorporated into the analysis.

In this study, to examine the associations between the variables, PLS-SEM method is used. The dataset consists of data from 101 countries for year 2012. We find a significantly positive association between variables, most importantly, development of finance significantly boosts logistics performance of the states. Notably, one unit increase in the development of finance spurs logistics performance a 0,517 unit. However, well-functioning financial intermediaries and superior logistics performance entail good governance of states. Thus, policy-makers around the globe should figure out the chain linkage among good governance, financial development, logistics performance, and global competitiveness of the countries. Thus, the countries can introduce specific incentives to strengthen good governance and then their financial systems, to obtain superior logistics performance and in turn, better global competitiveness.

This paper is organized as follows: the following section reviews the literature to provide theoretical background and develops the research hypotheses. The third section introduces the research methodology and data sources. Then the analysis results are presented in the fourth section. The fifth section covers the conclusion.

I.THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Good governance refers to the process of authorizing, monitoring, and replacing governments; the capacity of the lawmakers to generate and execute sound regulations and policies; respect of government and citizens to the rules and regulations (Worldbank, 2022). The performance of financial institutions and markets severely depends on good governance. Thus, the financial development of the countries is closely associated with political stability, regulatory policies, accountability and voice in the political system, the government bureaucracy's effectiveness, rule of law, and the commitment of the government officials to fight against corruption (Beck et al., 2006: 933-934).

The relationship between good governance and financial development is well-documented. For instance, Haber (1991: 559-561; 1996: 2-12) discovers the impact of regulatory policies of government on the size of financial markets. Levine (1997: 690) put forward that economic growth and financial development depend on the countries' political institutions and legal system. Likewise, Outreville (1999: 12) points out the reverse relation between political instability and development of finance. Cumming et al. (2010: 71) mention that better laws, the rule of law, risk of expropriation, fighting with corruption, risk of contract repudiation, and shareholder rights are essential for financial screening and origination of financial services. Recently, Malik et al. (2021: 377), find significant results about the relationship between governance quality and financial stability, and financial inclusion in the Asian region. Ahad and İmran (2021) stress the significant and

positive impact of governance quality to determine financial institutions in Pakistan. Therefore, we state that governance quality has a significant impact on financial development of the countries; as well, it is a prerequisite for financial development. Thereby, we propose:

Hypothesis 1 : Good governance is positively related to development of finance.

Good governance of the countries also has a vital role in their superior logistics performance (Koh et al., 2018: 3; Larson, 2021: 5). Good governance is not only a prerequisite for the development of finance but also for superior logistics performance. Well-functioning financial intermediaries and superior logistics performance flourish in counties that possess political stability, accountable business environment, high-level regulatory quality, and control of corruption.

Inefficient enforcement of rules or contracts, inefficient custom systems, procedural red tape, delays at border or port crossings, loss or theft in transit and restrictive protocols on the movement of cargo harshly impede countries' logistics operations and trade competitiveness (Hausman et al., 2005: 2). Thereby, Uyar et al. (2021: 37) refer that the public governance quality of the countries is considerably linked with logistics performance. Thus, we propose:

Hypothesis 2 : Good governance is positively related to logistics performance.

The contribution of well-functioning financial institutions and markets is critical for the logistics industry for seamless back-and-forth flow and storage of goods, services, and information (Ellram, 1991: 14-15; Bowersox and Closs, 1996; Mentzer et al., 2004: 607; Fugate et al., 2010: 43-44; Gupta and Dutta, 2011: 48; Hofmann and Johnson, 2016: 3; Song et. al., 2018: 70). Financial institutions and markets contribute to logistics businesses with services such as working capital, transportation financing, or fixed asset need for infrastructure. The logistics industry is a capital-heavy industry that requires larger ships, trucks, aircraft, warehouses (Bidgoli, 2010: 69), railroads, and many more infrastructure or facilities. Thereby, banks, equity markets, debt capital markets (Drobetz et al., 2013: 49-52), insurance companies, pension funds, private equity funds, sovereign wealth funds, or other government-backed funds (PriceWaterhouseCoopers, 2013) help the logistics industry with the acquisition, maintenance, sustainment or renovation of this equipment or infrastructures.

Moreover, financial institutions and markets contribute logistics industry by providing insurance coverage for many types of risks and uncertainties such as interest risk, credit risk, or currency risks (Manuj and Mentzer, 2008: 192; Govindan and Chaudhuri, 2015: 178-180). Moreover, in addition to financial or market risks, financial intermediaries also provide insurance for the physical movement of goods or services in case of loss, theft, damage or undelivered (Cavinato, 2004: 383; Schramm, 2012; Choi et al., 2016: 2; Zhen et al., 2016: 51-52; Fan and Stevenson, 2018: 205-206). Financial intermediaries also develop various types of financial derivatives products such as options, swaps, forwards and futures to handle the risk the logistics industry experiences (Kavussanos and

Visvikis, 2006; Kleindorfer and Visvikis, 2007: 6; Hertwig and Rau, 2010; Alizadeh et al., 2015: 57).

The financial intermediaries are able to monitor the borrowers to deter them from taking self-interest actions (Diamond, 1984: 393). That is, financial service providers can consistently supervise the overall flow of goods, services, and information activities between financed enterprises and their customers through an e-platform which helps them to curb borrowers' moral hazard (Song et. al., 2018: 70) which results in better logistics performance.

Moreover, financial flows are not only strongly linked to flows of goods, services, and information within and between companies (Martin and Hofmann, 2017: 42), but also they run parallel to logistics operations (Silvestro and Lustrato, 2014: 299-301). Therefore, we propose:

Hypothesis 3 : Development of finance is positively related to logistics performance.

Good governance has a significant impact on financial development and logistics performance. However, good governance has a direct impact on the global competitiveness of countries. Acemoğlu and Robinson (2012) state that political power, democratic development, and economic incentive severely affect the countries' development paths. It is widely recognized that nations, possessing sound democratic institutions, well-functioning government organizations and free economic circulation, can achieve higher global competitiveness (Brunet, 2012: 62). Therefore, we propose:

Hypothesis 4: Good governance is positively related to global competitiveness of the countries.

Global competitiveness is a broader term, that aims to move the focus beyond economic growth (Schwab and Zahidi, 2020: 8). Thus, global competitiveness incorporates a wide-ranging focus such as education, goods market efficiency, labor market efficiency, technology readiness, market size, business sophistication and innovation as well as economic growth. In finance and economic literature, the relationship between development of finance and economic growth is well-documented (Goldsmith, 1969: 114-116; King and Levine, 1993: 717-718; Levine, 1997: 690-691; 2005: 869; Levine and Zervos, 1998: 537-540; Beck et al., 2000: 262-264). The causality runs from development of finance to economic growth (Rajan and Zingales, 1998: 560). Likewise, a significantly positive relationship between financial development and higher education (Outreville, 1999: 15), health, education and gender equality (Claessens and Feijen, 2007), and technological innovation (Levine, 2005: 871) is addressed. It is also pointed out that financial development spurs job creation (Acemoglu, 2001: 665; Gatti and Vaubourg, 2009: 5). Thus, we propose:

Hypothesis 5: Development of finance is positively related to the global competitiveness of the countries.

Superior logistics performance indicates facilitated movement of goods, services, or related information, as well as punctual, traceable, safe, and cost-efficient delivery when trading. Thus, superior logistics performance enables a

competitive business environment in countries in general (Martia et al., 2014: 2982). Therefore, a positive linkage between logistic performance and economic growth (Fawcett et al., 2011: 116; Katrakylidis and Madas, 2019) and overall global competitiveness (Fawcett and Waller, 2013: 184; Chen and Novy, 2011: 208-210; Kabak et. al., 2020: 238-240) is addressed by academic studies. Thereby as a last hypothesis, we propose:

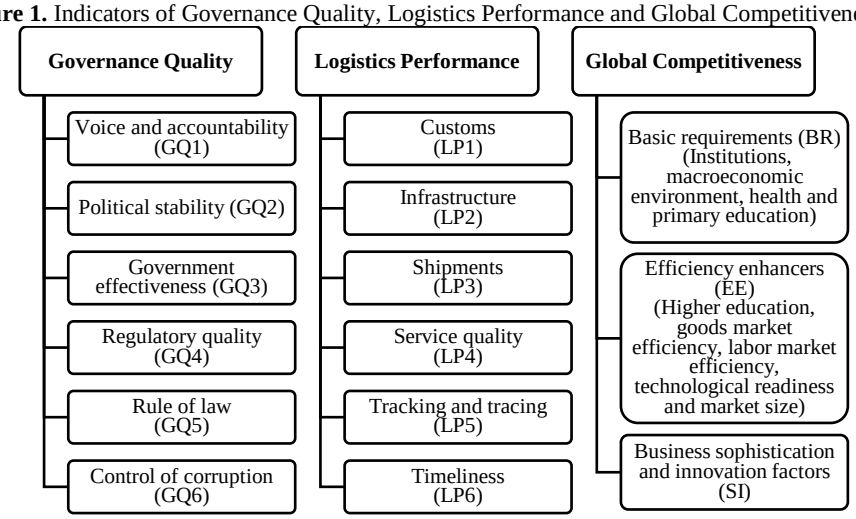
Hypothesis 6 : Logistics performance is positively linked to global competitiveness of the countries.

II. METHODOLOGY AND DATA

Partial Least Squares Structural Equation Modeling (PLS-SEM) is used as a method of econometric analysis to concurrently analyze the linkage among good governance, development of finance, logistics performance, and global competitiveness of the countries. PLS-SEM is an appropriate econometric analysis tool when the sample size is small, as in this study, and it doesn't require any distribution assumption, also it is highly robust as missing values are less than % 5 (Hair et.al, 2022: 19). Moreover, PLS-SEM can easily handle reflective and formative measurement models. It can therefore be applied in a wide variety of research studies. According to Hair et. al. (2021: 11), PLS-SEM provides high efficiency in parameter estimation, which is shown in its greater statistical power in comparison to that of CB-SEM. Greater statistical power refers that PLS-SEM is more likely to extract a specific relationship significant when it is actually present in the population. Hair et. al. (2017: 13) also argue that PLS-SEM is especially superior to multiple regression in estimation of indirect effects among the constructs.

A total of 101 countries' data is used for year 2012. Due to larger data availability, year 2012 is selected, as the number of data is significantly reduced in case of selection of data in other years. Therefore, it is possible to avoid missing data of less than % 5 for variables.

Figure 1. Indicators of Governance Quality, Logistics Performance and Global Competitiveness



State governance quality and logistics performance data come from the World Bank's databank. Global competitiveness data is obtained from World Economic Forum's databank. These three variables are used in a reflective measurement model rather than a formative measurement model in PLS-SEM as the indicators for these variables are highly interrelated with each other. Figure 1 reflects the indicators of governance quality, logistics performance and global competitiveness indicators.

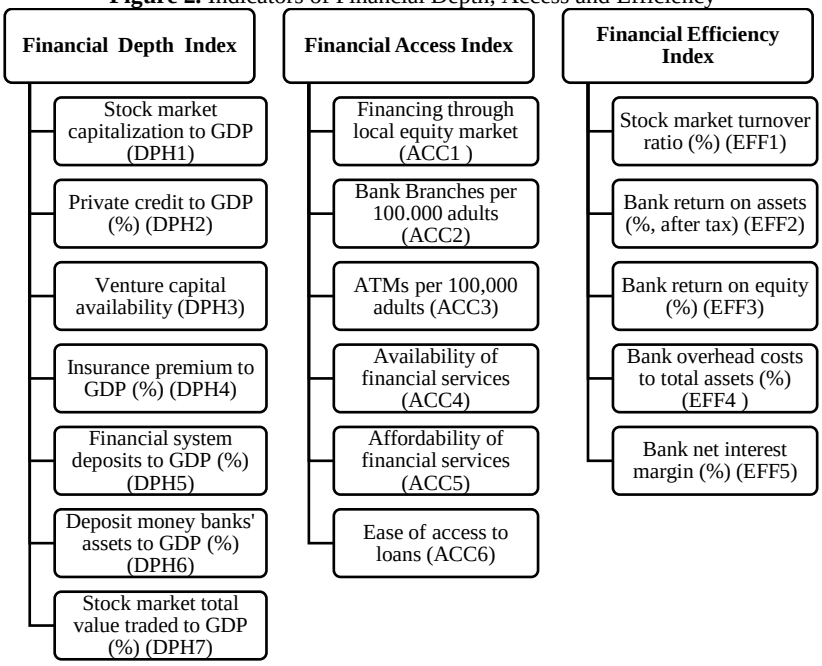
It is worth mentioning that logistics performance indicators come from the World Bank's Logistics Performance Index which (LPI) is provided in its "Connecting to Compete: Trade Logistics in the Global Economy 2012" report. As seen on Figure 1, LPI consists of six indicators as customs, infrastructure, shipments, service quality, tracking and tracing, and timeliness. LPI has been published in the years 2007, 2010, 2012, 2014, 2016, and 2018. It is purpose is to measure the ground efficiency of trade supply chains and logistics performance. To establish LPI, a global survey covering the logistics professionals is executed. The logistics professionals are asked to fill out a standardized questionnaire to evaluate logistics performance such as availability and quality of infrastructure, ease of shipments, logistics service quality and the ability to track cargo- in eight of their main overseas markets. As a result, LPI enables to compare the countries' logistics performance in terms of quality, cost, administrative efforts, infrastructure, and lead times (Arvis and Shepherd, 2012).

Financial depth, access and efficiency are well-known financial development characteristics (Sahay et. al., 2015: 34 ; Svirydzenka, K. 2016: 5). These variables are added into the PLS-SEM as formative measurement model as they represent different characteristics of financial development and they are mostly not interrelated with each other.

Finance industry consists of many institutions and markets such as banks, debt markets, stock markets, insurance companies, venture capital, etc. Thus, to include all finance industry, we develop three indices to represent financial depth, access and efficiency as offered by Cihak et al. (2012: 1-5) and Sahay et al. (2015: 34).

The financial depth index consists of seven variables. Venture capital availability data are obtained from WEF Database and the rest of them are obtained from WorldBank Financial Development database. Variables representing stock markets, banks, insurance companies and venture capital are added to the index. However, the data representing debt markets couldn't be added to do missing data more than % 50. Financial access index dataset related to banks is obtained from WorldBank Financial Development database which are measurable, and the others are obtained from the WEF database and retrieved from the perception of survey participants. Financial efficiency index dataset consists of five measurable variables and they are obtained from the WorldBank database. Thus Figure 2 shows the indicators of the financial depth, access and efficiency indices.

Figure 2. Indicators of Financial Depth, Access and Efficiency



During index construction, after winsorizing the extremely best and worst scores, we normalized the indicators between 0 and 1. Then we use principal component analysis (PCA) to obtain index construction weights as offered by Nardo et al. (2005: 56). The first step in the PCA is to examine whether data are likely to produce components well based on correlation and partial correlation. Thus, we test sampling adequacy using Kaiser Meyer Olkin (KMO) statistics. Then we use Bartlett's Test of Sphericity to examine the null hypothesis that the individual indicators in a correlation matrix are uncorrelated. Table 1 shows that overall KMO test results are higher than 0,50 and Barlett's Test of Sphericity results are statistically significant. They refer that there is significant correlation among the indicators and PCA can be used.

Table 1. KMO and Barlett's Test of Sphericity.

Statistics Name	Financial Depth	Financial Access	Financial Efficiency
KMO	0,808	0,772	0,684
Barlett's Test of Sphericity Significance	0,000	0,000	0,000

The next step is to determine weights for the indices for financial depth, access and efficiency indicators. As offered by OECD (2008: 89), we obtain weights by getting the square of component loadings represents the proportion of the total unit variance of the indicator which is explained by the associated principal component. They are normalized squared factor loadings, e.g. 0,248=(0,8942^2)/3,2247 which is the portion of the variance of the first principal component explained by the variable DPH2 (Private credit to GDP, %). Thereby,

the following Table 2's right side provides the weights used to construct indices for financial depth, access and efficiency.

Table 2. Factor loading and Weights of the Indicators Based on PCA.

	Component		**Squared Component (Scaled to Unity Sum)**	
	1	2	1	2
DPH1	0,341	**0,842**		**0,310**
DPH2	**0,894**	0,321	**0,248**	
DPH3	0,120	**0,825**		**0,297**
DPH4	**0,729**	0,401	**0,165**	
DPH5	**0,835**	0,243	**0,216**	
DPH6	**0,939**	0,188	**0,273**	
DPH7	0,429	**0,736**		**0,237**
Eigenvalue after rotation *	**3,225**	**2,289**		
ACC1	**0,885**	-0,095	**0,236**	
ACC2	-0,061	**0,860**		**0,472**
ACC3	0,162	**0,857**		**0,468**
ACC4	**0,905**	0,269	**0,247**	
ACC5	**0,948**	0,112	**0,270**	
ACC6	**0,890**	-0,020	**0,238**	
Eigenvalue after rotation *	**3,32**	**1,567**		
EFF1	**0,573**		**0,114**	
EFF2	**-0,792**		**0,218**	
EFF3	**-0,757**		**0,199**	
EFF4	**0,740**		**0,190**	
EFF5	**0,898**		**0,280**	
Eigenvalue	**2,882**			

* Rotation Method: Varimax with Kaiser Normalization.

III. ANALYSIS AND RESULTS

At first, we set up a model to simultaneously examine the impact of good governance on the development of finance (hypothesis 1), logistics performance (hypothesis 2), and competitiveness (hypothesis 4); the impact of development of finance on logistics performance (hypothesis 3) and competitiveness (hypothesis 5), and finally impact of logistics performance on competitiveness (hypothesis 6).

The analysis sequence is as, first, reflective measurement models (good governance, logistics performance and competitiveness) and then formative measurement model, development of finance constructs are examined and then the overall model is assessed. The algorithm of the model converges in the 7th iteration; thus, we can follow the next steps.

A. Reflective Measurement Models

We begin the assessment of the reflective measurement models with internal consistency reliability. It is applied to examine how the indicators in a construct are associated with each other (Hair, et.al., 2021: 77) Internal consistency reliability scores in Table 3 indicate that Cronbach's Alpha and Composite

Reliability values are higher than the critical value of 0,70 for each construct. It reflects that each construct meets internal consistency requirements.

In the reflective measure, the indicators in the same construct are expected to be highly correlated to each other. For instance, in the governance quality construct, six indicators should be interrelated with each other. Thus, to measure the constructs' reliability two convergent validity tests are applied. First, we apply Outer Loading tests, according to this test if the score of the Outer Loading test is below 0,70, it is needed to be removed from the model. Table 3 also shows that the score of all indicators in Outer Loadings are above 0,70, so all indicators are kept in the constructs. The second test is Average Variance Extracted (AVE). In this test, the scores above 0,50 reflect that the construct statistically explains the variance of its indicators and convergent validity of the construct is well established. AVE values of GQ (0,87), LP (0,93) and GC (0,89) are well above the required minimum level of 0,50. Thereby, we comment that the model meets the requirements of convergent validity tests.

Table 3. Internal Consistency Reliability and Convergent Validity Tests Results.

Construct	Indicators	Internal Consistency Reliability		Convergent Validity	
		Cronbach's Alpha	Composite Reliability	Outer Loadings	AVE
				> 0,70	> 0,50
GQ	GQ - 1	0,98	0,98	0,85	0,87
	GQ - 2			0,85	
	GQ - 3			0,97	
	GQ - 4			0,96	
	GQ - 5			0,98	
	GQ - 6			0,97	
LP	LP - 1	0,97	0,99	0,96	0,93
	LP - 2			0,98	
	LP - 3			0,98	
	LP - 4			0,94	
	LP - 5			0,95	
	LP - 6			0,97	
GC	BR	0,94	0,96	0,90	0,89
	EE			0,97	
	SI			0,96	

Finally, discriminant validity of the reflective constructs is examined with three different types of tests, cross-loadings, Fornell-Larcker Criterion, and Heterotrait – Monotrait (HTMT) Ratio. These tests are useful to examine to which extent a construct is different from the other (Hair et al., 2009). Table 4 shows that all constructs meet the requirements of discriminant validity tests. Even though HTMT Ratio for logistics performance and governance quality is larger than the threshold score of 0,90, the bootstrap confidence intervals indicate that HTMT Ratios are significantly different from 1. Thereby we comment that each construct is unique and represent its underlying argument.

Table 4. Discriminant Validity Test Results.

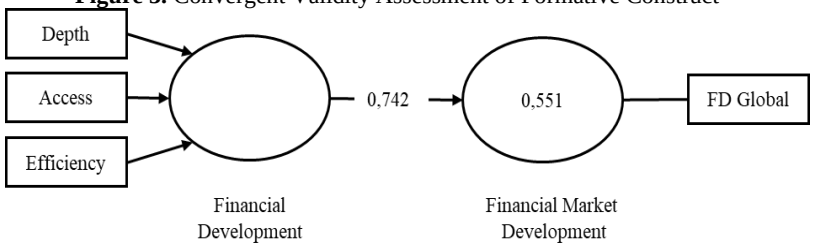
Construct	Indicators	Discriminant Validity									
		Cross - Loadings			Fornell - Larcker Criterion			HTMT			
		GQ	LP	GC	GQ	LP	GC	GQ	LP	GC	Does HTMT confidence interval include 1 ?
GQ	GQ1	**0,85**	0,60	0,55	**0,93**					0,87	**No**
	GQ2	**0,85**	0,59	0,63							
	GQ3	**0,97**	0,86	0,89							
	GQ4	**0,96**	0,77	0,82							
	GQ5	**0,98**	0,81	0,86							
	GQ6	**0,97**	0,82	0,86							
LP	LP1	0,85	**0,96**	0,87	0,81	**0,96**		0,81		0,92	**No**
	LP2	0,80	**0,98**	0,88							
	LP3	0,79	**0,98**	0,86							
	LP4	0,73	**0,94**	0,83							
	LP5	0,71	**0,95**	0,80							
	LP6	0,78	**0,97**	0,87							
GC	BR	0,75	0,71	**0,90**	0,84	0,89	**0,94**				**No**
	EE	0,82	0,90	**0,97**							
	SI	0,81	0,88	**0,96**							

B. Formative Measurement Model

Financial depth, financial access, and financial efficiency are the most referred characteristics of development of finance (Cihak et al., 2012: 1-5; Sahay et al., 2015: 34; Svirydzenka, 2016: 5). But these variables are not positively and highly correlated. Thus, we established financial development construct as a formative measurement model. Thereby, financial development construct is evaluated based on (i) convergent validity, (ii) collinearity between indicators, and (iii) significance and relevance of outer weights.

Formative measurement model's convergent validity is assessed by the correlation of the construct with an alternative measure of the same concept (Hair et. al., 2019: 15). Chin (1998) cites this approach as redundancy analysis, in which determination coefficient, R^2, is larger than 0,50 and path coefficient is larger than 0,70 then we can conclude that the formative measurement model meets convergent validity. Thereby, we set up a reflective measurement model by using World Economic Forum's Global Competitiveness Report Financial Market Development year 2012 dataset in which financial markets are ranked in terms of their efficiency, confidence and trustworthiness. Then we compare it with the formative measurement model which includes indices of financial depth, access and efficiency. Figure 3 points to the formative construct providing acceptable convergent validity as determination coefficient, 0,551, is larger than the benchmark of 0,5 and likewise, the path coefficient, 0742, is also larger than the benchmark of 0,7.

Figure 3. Convergent Validity Assessment of Formative Construct



The second step is to assess collinearity of indicators by evaluating the formative indicators' variance inflation factor (VIF) values. In the formative construct, the indicators measure different dimensions of the variable, thus we expect smaller collinearity (VIF values smaller than 5) with the indicators. Table 5 reflects that VIF scores are smaller than 3, hence collinearity is not a problem for financial development construct and then we can pass to the final assessment step, the assessment of indicator weights' statistical significance and relevance.

The indicator outer weights' statistical significance and relevance are assessed after running bootstrapping. Table 5 gives statistical information, thus t-statistics for the outer weights are above the critical value of 1,96 and therefore we state that outer weights are significant at the % 5 level.

In conclusion, reflective and formative measurement model assessments are satisfactory, thus we can continue to evaluate structural model results.

Table 5. VIF Results, Significance and Relevance of Outer Weights

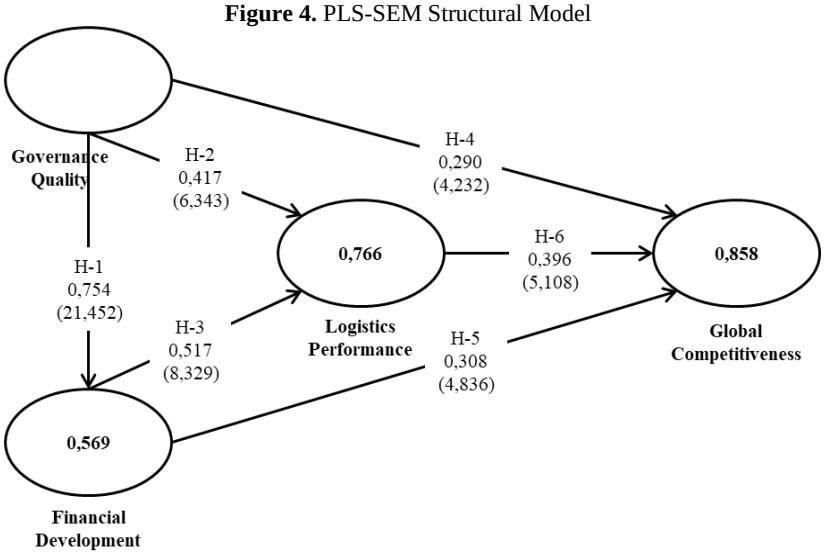
Indicators	VIF	Outer Weights	Standard Deviation	t -Value	P -Value	% 95 Confidence Interval	
						% 2,5	% 97,5
Depth	2,87	0,46	0,10	4,43	0,00	0,24	0,65
Access	2,46	0,49	0,10	5,10	0,00	0,31	0,69
Efficiency	1,54	0,17	0,07	2,51	0,02	0,04	0,30

C. Structural Model Assessment

Before assessing the predictive capabilities and the causality between the construct, we check the collinearity by calculating VIF values. They reflect collinearity is not a problem for the model as they are lower than the threshold of 5. So that we assess the structural model in the sequence as offered by Hair et. al., (2019: 17-20); (i) assessment of path coefficients, (ii) R^2, determination coefficient, (iii) f^2, effect size, (iv) Q^2, the predictive relevance, finally (v) q^2, effect size.

Figure 4 below, presents PLS-SEM structure of our model. Thus, the ovals represent the constructs, and the scores inside of them are the coefficient of determination. The direction of the arrows indicates the causality flows shown by academic studies. The first lines on the arrow line demonstrate the number of hypotheses, the second line shows the path coefficients, and the last lines in brackets exhibit their t-values.

Figure 4. PLS-SEM Structural Model



T-values in the brackets exhibit that all the path coefficients are statistically significant at a % 1 significance level as all of them are larger than the critical value of 2,57. In this instance, we find strong evidence for all hypotheses suggested in this paper.

In the PLS-SEM model, path coefficients are standardized beta coefficients in an OLS regression. They range from -1 to +1 in which a coefficient close to -1 indicates a strong reverse relationship between the constructs, and coefficients close to +1 represent a strong positive relationship. Thereby, the coefficients close to 0 indicate a weak relationship.

Figure 4 depicts a significantly positive association between governance quality, development of finance, logistics performance, and competitiveness constructs. It refers that one unit increase in good governance leads to a 0,754 unit increase in financial development, a 0,417 unit increase in logistics performance, and a 0,290 increase in competitiveness factors. It is noteworthy that the governance quality construct has the largest impact on the financial development compared to logistics performance and competitiveness factors. Thereby, we can state that the countries which are politically stable, absent of violence or terrorism; their citizens are able to participate in selection, monitoring, and replacing their government, as well as free media and freedom of expression; government institutions are the guarantor for freedoms of citizens; also it has an environment where creation and enforcement of law are well established as well as fighting against corruption is common sense, have a high probability to have more sophisticated financial system, higher logistics performance and better competitiveness.

Path coefficients from financial development to logistics performance and competitiveness show that one unit increase in finance development leads to a 0,517 unit increase in logistics performance and a 0,309 unit increase in

competitiveness factors when everything else remains constant. Thus, it is worth highlighting that development of finance has the largest direct impact on logistics performance compared to good governance. Hence we conclude that the countries which have sophisticated finance system with deep, easily accessible, and efficiently functioning, have a high probability to have superior logistics performance and better competitiveness factors.

Lastly, the path coefficient between logistics performance and competitiveness demonstrates that the global competitiveness increases a 0,396 unit in case of one unit increase in logistics performance. Thereby, logistics performance has the largest direct impact on competitiveness compared to good governance and financial development.

A construct intervening with other interconnected constructs is cited as a mediator variable or construct. If an exogenous construct affects a mediator construct, it will influence endogenous variables. For instance, in our model, financial development is a mediator variable as a change in good governance affects financial development which in turn influences logistics performance and competitiveness. Moreover, logistics performance is also a mediator construct as changes in good governance and financial development influence logistics performance which in turn affects competitiveness. The effect caused via the mediator construct is cited as an indirect effect. It is calculated by multiplying path coefficients. As the indirect effect of good governance on logistics performance is found by multiplying the path coefficient of governance quality - financial development (0,754) with the path coefficient of financial development-logistics performance (0,517), thus we find the indirect effect as 0,390. It refers that one unit increase in good governance leads to a 0,390 unit indirect increase in logistics performance via financial development. When we add direct impact to indirect impact, we find that the total effect of good governance on logistics performance is 0,807. Thereby Table 6 presents the indirect effects and total effects. It is not surprising that good governance has the largest total effect (0,842) on competitiveness factors.

Table 6. Mediating Effect with Indirect Effects and Total Effects

Direction of Mediation	Mediating Construct	Direct Effect	Indirect Effect	Total Effect
GQ → LP	FD	0,417	0,390	0,807
GQ → GC	FD, LP	0,290	0,551	0,842
FD → GC	LP	0,308	0,204	0,512

Coefficient of determination, R^2, indicated in the ovals in Figure 4, provides the model's explanatory power by giving variance explained in each endogenous construct by the exogenous constructs linked to it. Thereby there are three R^2 in the model. First, good governance explains % 56,9 of the variance of financial development, then good governance and financial development explain % 76,6 of the variance of logistics performance and lastly, good governance, financial development and logistics performance together explain % 85,5 of the

variance of competitiveness. In the next step, we use Cohen's f^2 (Cohen, 1988) test to find out how the removal of a selected exogenous construct affect R^2 of the endogenous construct (Hair et. al., 2019: 119). Cohen's f^2 scores larger than 0,02, 0,15 and 0,35 refers to the size of the explanatory power of the exogenous construct as small, medium and large effect, respectively. Hence, Table 7 shows that good governance has a medium effect (0,320) on R^2 of financial development and logistics performance. Not surprisingly, financial development has the largest effect (0,491) on R^2 of logistics performance and a medium effect (01,93) on R^2 of competitiveness. Lastly, logistics performance has also a medium effect (0,258) on R^2 of competitiveness.

Table 7. Metrics of the PLS-SEM Structural Model

Name of Variables	f^2		Q^2			q^2		
	L P	G C	SSO	SSE	Q^2 (=1-SSE/SSO)	F D	L P	G C
GQ	**0,320**	**0,194**	606	606	-		**0,240**	**0,089**
FD	**0,491**	**0,193**	303	183,16	**0,395**		**0,357**	**0,089**
LP		**0,258**	606	181,70	**0,700**	-0,002		**0,134**
GC			303	74,83	**0,753**			

The following step is to examine the path's predictive relevance by using Stone-Geisser's Q^2 (Stone, 1974; Geisser, 1975) as offered by Hair et.al. (2011: 25). Q^2 larger than zero reflects that the associated exogenous construct has predictive relevance for the endogenous construct. We execute the blindfolding procedure to get Q^2. Table 7 gives Q^2 scores, all of which are larger than zero, thus we state that all exogenous constructs have predictive relevance for the endogenous constructs. However, Q^2 does not provide which exogenous construct has the largest predictive relevance on the endogenous construct. Thus, we use q^2 to examine to which extent the exogenous constructs explain the Q^2 of the endogenous construct. Hair et al., (2016: 126) stress that q^2 scores of 0,02, 0,15 and 0,35 indicate that the exogenous construct has a small, medium and large predictive relevance for the linked endogenous construct, respectively. Table 7 also gives q^2 scores which reflect that good governance has a medium effect (0,240) on logistics performance's predictive relevance however, financial development has the largest effect (0,357) on it. In short, the statistics reflect that financial development has a superior impact on logistics performance.

CONCLUSION

Prior academic studies have assumed a positive association between financial development and logistics performance; however, the relevance and strength of this association are ignored by empirical studies. In this paper, we concurrently examine the association between development of finance and logistics performance incorporating good governance and global competitiveness into the

model. Thereby we assess the predictive capabilities and the causality between these variables and also the strength of the association.

We find a significantly positive association between all variables, as good governance is positively associated with financial development, logistics performance, and competitiveness; financial development is positively associated with logistics performance and competitiveness and lastly, logistics performance is positively associated with competitiveness.

One unit increase in financial development boosts a 0,517-unit increase in logistics performance. Furthermore, financial development has a superior direct effect on logistics performance compared to the direct effect of good governance. Likewise, logistics performance has a superior direct effect on competitiveness factors compared to the direct effect of good governance and financial development.

Furthermore, good governance has the largest total impact on logistics performance and competitiveness. Thereby policy-makers should be aware that political stability, absence of violence/terrorism, citizens' participation in selection, monitoring, and replacing governments, free media, freedom of expression, equal and fair application of law in government and society, determination to fight against corruption are essential for financial sophistication, superior logistics performance, and better global competitiveness.

Moreover, policymakers who want to improve their countries' logistics performance and competitiveness should first consider improving their financial systems. As deep, accessible and efficient financial systems provide various products and services to the logistics industry for the solution of its difficulties, risks and uncertainties.

It should be noted that the limitation of our study is that we used a data set for the year 2012 due to the availability of data. Further studies may use more extensive and multi-year data, when available, to capture the association between the variables.

Araştırma ve Yayın Etiği Beyanı

Makalenin tüm süreçlerinde Yönetim ve Ekonomi Dergisi'nin araştırma ve yayın etiği ilkelerine uygun olarak hareket edilmiştir.

Yazarların Makaleye Katkı Oranları

1. yazar %60 oranında, 2. yazar %40 oranında katkı sağlamıştır.

Çıkar Beyanı

Yazarın herhangi bir kişi ya da kuruluş ile çıkar çatışması yoktur.

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