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Original Research

Investigating the Impact of Financial Development Indicators and Economic and International Trade Performance on the Stock and Financial Markets

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ABSTRACT

One of the goals of researchers and policymakers is to find measures to achieve economic growth. Financial development is one of the policies that many economists recommend in order to achieve economic growth and development. From this perspective, financial development is an engine for economic growth, and policymakers should focus on creating and expanding financial institutions and markets. The present study examines the impact of financial development and economic performance indicators including economic growth and international trade in developing and developed countries in the long run from 2001 to 2018. Data collection has been done by two methods, library, and field, to complete the literature and research background, refer to libraries and researches, and for financial and economic data, including financial development indicators in two sections: Bank- Index and Capital Markets Stock-Index, as well as figures for Gross Domestic Product (GDP) and international trade from the World Development Index (WDI) databases, are used. Developed countries, due to their technology and power in production, can carry out their industrial production and export to developing countries. However, developing countries do not see long-term equilibrium relationships for economic growth and international trade.

1 Introduction

Financial development is one of the keys to achieving long-term economic growth. At the same time, financial development can have asymmetric effects on growth. Financial development can act as a vital springboard to prevent a sudden contraction of the economy, but it does not play such a role in economic expansion [1-5]. The recent financial crisis reflects the fact that the financial sector can also act as a shock transmitter to the economy rather than a shock absorber and repellent. The development of the financial sector will lead to stronger economic growth through more efficient allocation of resources and financing of innovative activities. At the same time, the financial sector can reduce the risk to a greater extent in the

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event of a negative shock. In times of negative shocks, the financial sector operates through different channels than when conditions are favorable. This difference is especially evident in countries with lower levels of development [6-9].

Under favorable conditions, companies are more common in countries with lower levels of development. Under favorable conditions, companies in emerging and developing countries typically finance their activities through sources other than the formal banking sector and mostly through trade credits and accumulated revenues. In these circumstances, informal financing does not seem to be a significant constraint on the expansion of companies. However, such methods of financing (especially) business credit increase the risk of chain effects by shocking private companies and accelerating it to the rest of the system [10-15]. The development of financial markets through the two channels of level effect and efficiency effect will increase economic growth by increasing investment. The level effect shows that the development of the financial sector directs resources from inefficient projects to productive investments. Transparency in financial market regulations such as compliance with accounting standards and reporting systems, investor confidence is very important. The efficiency effect shows that with the development of financial markets, diversity and liquidity increase, and resources are directed to high-yield projects. These two effects increase investment and economic growth. On the other hand, the stock market is always attractive as an additional external source of financing for firms. Stock market development increases the amount of funding available for investment projects. The stock market leads to increased investment and economic growth due to the financing of investment projects as well as increasing investor confidence. Increasing stock market activity increases risk diversity for both consumers and producers, which is an important component of wealth creation in an economy [16-22]. An increase in wealth also provides reassurance for economic activity and ultimately increases economic growth. Financial markets also operate to facilitate the absorption of funds and credits by savers and owners of money and capital and to direct these savings to applicants for these funds. Trade facilitation as well as the distribution of risk management can affect economic growth. Schumpeter's analysis of the subject of financial development began in 1911 [23], later by McKinnon and Shaw in 1923, by Stiglitz in 1921, and by Schnabbach in 2004 in its classical form, without analyzing the cause and effect between financial depth and economic growth [13].

Assari Arani et al. [1] also study the impact of financial development on poverty and inequality in OPEC member countries using the dynamic panel and generalized torque method and conclude that financial development through economic growth contributes significantly to poverty and poverty reduction. There is equality in these countries. Finally, Agah et al. [2] investigate the effect of financial development on poverty reduction in Iran with the help of two indicators of financial development (financial depth) and the ratio of banking system facilities to the non-governmental sector divided by GDP and concludes that Both indicators of financial development have had a non-linear and threshold effect on absolute poverty in Iran. In a way that makes the absolute poverty situation in the society worse before a certain threshold, the expansion of financial development has a positive and significant effect on reducing poverty. The limit of this financial deepening threshold is estimated between 0.62 and 0.27, respectively. And have concluded that in Iran, the effects of improvement and expansion of financial markets on economic growth can be observed. The monetary market is higher in developed countries and the financial structure of developed countries is different from developing countries, and this is due to the high degree of information symmetry and recent development in countries, but in developing countries, the money market in Compared to the financial market is more powerful [12].

In general, there are four approaches and perspectives on the relationship between economic growth and financial development. The first view is supply-oriented, according to which, financial development has a

positive effect on economic growth. This view was first proposed by Schumpeter [23] and later endorsed by Roubini and Sala-y-Martin [17] in 1992, King and Levin [11], and Rousseau and Vachel [18]. Schumpeter argues that the financial sector, as a source of funds for productive investment, accelerates economic growth. In modern societies, due to the specialization of affairs and the division of labor, the savings process is separated. In these institutions, by reducing information asymmetry for lenders and lenders, they allocate funds to the most material sectors and, thus, increase efficiency and economic well-being. Saint-Pauls [22] shows that more efficient financial markets improve the quality of investment and accelerate economic growth. According to [22] a financially intermediary economy can reduce its inefficient savings and prevent the misallocation of investment funds. In this context, financial intermediaries shift savings in favor of capital accumulation and, therefore, accelerate economic growth. Specifically, the stock market causes individuals to reduce risk through diversification in the portfolio, in which case, the share of resources allocated to firms and, consequently, economic growth increases.

The second view, the demand-driven view, was first proposed by Robinson. In this view, the development of the financial sector serves the real sector of the economy and investment. He believes that economic growth and changing the real sector of the economy will increase the need for the financial sector. Of course, the supply-oriented view does not reject this approach but argues that the effect of financial development on stronger economic growth has the opposite effect [23-30]. Friedman and Schwartz [6] have provided evidence for this view. The third view is an intermediate view, according to which there is a two-way relationship between financial development and economic growth. Greenwood, and Smith [7] provide evidence for this view. Finally, according to the fourth view, there is no relationship between financial development and economic growth. Lucas believes that the relationship between financial development and economic growth has been exaggerated. Robinson [19] have found evidence to support this view. The general purpose of this study is to help better understand the indicators of financial development and indicators of economic growth and international trade in developing and developed countries, and the specific purpose of this study is as follows.

1- Studying and explaining the model between financial development and economic performance in developing and developed countries (using VAR self-regression vector model and Granger causality test) to find the supply relationship or demand follow-up in these countries and compare the two groups of countries together.

2- Designing and explaining the structural model of financial development factors and economic performance including economic growth and international trade in developing and developed countries and comparing them with each other.

2 Proposed Methodology

According to our study, the obtained research hypotheses are stated as follows:

1- Between indicators of financial development and indicators of economic growth and international trade in developing countries, there is a type of supply-side management relationship or demand tracking.

2. There is a relationship between supply indicators of financial development and indicators of economic growth and international trade in developed countries.

3- There is a different amount and intensity of influence between the indicators of financial development economic growth and international trade in each other in developing and developed countries.

4- The human development index has an effect on long-term equilibrium relations in developed and developing countries.

Table 1: Dependent variables and independent variables and how to calculate them

	Variables	Description
Dependent Variables	GDP	Gross domestic product i in year t
	InTrade	International trade volume; Which is equal to the net amount of exports in country i in year t. The net amount of exports is calculated as follows: NX = EX-IM Where: NX: Net Exports; EX: export amount; IM: amount of imports;
Independent Variables	MD	The ratio of banks' monetary deposit assets to the country's GDP in year t; Which is equal to the amount of assets held by banks's monetary deposits divided by gross domestic product.
	FD	Ratio of financial system deposits to GDP in year i; Which is equal to the deposits of the financial system of banks divided by GDP.
	Debt	Ratio of cash debt to gross domestic product of country i in year t; Which is equal to the cash debts of banks divided by GDP.
	Credit	Ratio of private credits of banks' monetary deposits to GDP in year i; Which is equal to the private sector credits of banks' monetary deposits divided by GDP
	PM	Net profit margin of banks in country i in year t; Which is calculated as the difference between interest received on facilities and interest paid on bank deposits as follows: Interest paid on deposits - interest on granting facilities = bank interest rate margin
	FO	The ratio of the concentration of banks in country i in year t; Which is calculated by Herfindahl-Hirschman index (H) as the sum of squares of each bank's percentage of the banking network.
	ROE	Return on equity of banks in country i in year t, which is calculated as the net distribution of dividends on equity.
	CR	Cost-to-income ratio of banks in country i in year t; Which is equal to the bank expenses divided by the bank income.
	BI	Banking stability index or bankruptcy risk (Z-score) in country i in year t; Which is calculated as follows: [ROA+(Equity/Assets)]/ROA Std.Dev
	IN	Ratio of stock market investment to GDP in country i in year t; Which is equal to the amount of investment in the stock market divided by GDP.
	Trade	The ratio of the total value of stock market transactions to GDP in country i in year t; Which is equal to the value of stock market transactions divided by GDP.
	Comp	Number of companies admitted per one million people in country i in year t.
	Turnover	The ratio of stock market transactions in country i in year t; Which is calculated from the division of the total transactions made into the value of shares of domestic companies listed on the stock exchange
Control Variables	FDI	Degree of trade freedom or openness of the economy in country i in year t; In this research, foreign direct investment has been used for this index.
	INF	Inflation rate in country i in year t
	G	Ratio of government consumption expenditures to GDP in country i in year t; Which is equal to government spending divided by GDP.

2.1 Research Methodology

This research is based on the objectives of research in the category of applied research and based on the type of study of variables of causal type and in terms of method of data collection and research design is quasi-experimental and using post-event approach (through past information). Data collection has been done by two methods, library, and field, to complete the literature and research background, refer to libraries and researches, and for financial and economic data, including financial development indicators in two sections: Bank- The Stock-Index and Capital Markets Indices, as well as GDP (GDP) and international trade figures, use the WDI (Global Development Index) databases to analyze data and extract descriptive

and inferential statistics from Eviews software was used. The relevant tests are performed to test the hypotheses, and finally, the multiple regression method of cross-sectional data and time series is used to determine the relationship between independent and dependent variables. The temporal realm of research from 2001 to 2018 is the spatial realm of research in developed and developing countries.

2.2 Research Models and Variables

In this research, two models have been estimated. These two models are as follows:

$$GDP_{it}= \beta_0 + \beta_1 MD_{it} + \beta_2 FD_{it} + \beta_3 debt_{it} + \beta_4 Credit_{it} + \beta_5 PM_{it} + \beta_6 FO_{it} + \beta_7 ROE_{it} + \beta_8 CR_{it} + \beta_9 BI_{it} + \beta_{10} IN_{it} + \beta_{11} Trade_{it} + \beta_{12} Comp_{it} + \beta_{13} Turnover_{it} + \beta_{14} FDI_{it} + \beta_{15} INF_{it} + \beta_{16} G_{it} + \varepsilon_{it} \quad (1)$$

$$InTrade_{it}= \beta_0 + \beta_1 MD_{it} + \beta_2 FD_{it} + \beta_3 debt_{it} + \beta_4 Credit_{it} + \beta_5 PM_{it} + \beta_6 FO_{it} + \beta_7 ROE_{it} + \beta_8 CR_{it} + \beta_9 BI_{it} + \beta_{10} IN_{it} + \beta_{11} Trade_{it} + \beta_{12} Comp_{it} + \beta_{13} Turnover_{it} + \beta_{14} FDI_{it} + \beta_{15} INF_{it} + \beta_{16} G_{it} + \varepsilon_{it} \quad (2)$$

3 Data Analysis

In this section, statistical analyzes have been performed for 46 developed countries in the period 2018-2001. These analyzes include descriptive statistics for variables and inferential statistics (combined data method). In the inferential statistics section, unit root test to check the reliability of variables, basic regression hypothesis tests including Jarkbra test, Pagan Godfrey test and appropriate model selection tests in the combined data method including F-Leamar test and Hausman test and in Finally, regression model estimates are performed.

3.1 Descriptive Statistics

Table 2: Descriptive Statistics of Research Variables

Variable	Mean	Median	Max	Min	Std. Dev	Skewness coefficient	Kurtosis ratio
GDP	1230000000000	331000000000	16900000000000	3170000000	2500000000000	4/404	24/166
InTrade	43600000000	240405/1	1310000000000	-309000000	169000000000	4/623	55/112
MD	0/053	0/038	272/0	0/0102	0/042	1/918	7/281
FD	0/056	0/043	0/285	0/0132	0/044	1/607	5/96
Debt	0/405	0/377	0/827	0/029	0/194	0/328	2/017
Credit	0/404	0/372	0/820	0/095	0/188	0/391	1/993
PM	0/408	0/380	0/899	0/092	0/180	0/348	2/019
FO	0/629	0/656	0/888	0/103	0/160	-0/755	3/321
ROE	0/680	0/650	0/925	0/012	0/155	-0/868	3/676
CR	1/703	0/538	77/04	-0/152	5/485	9/363	505/11
BI	22/724	8/192	14598/99	0/499	699/22	11/453	422/55
IN	0/296	0/278	0/672	0/080	0/116	0/631	2/866
Trade	0/353	0/319	0/734	0/077	0/166	0/489	2/182
Comp	11/181	11/00	999/00	1/20	65/202	2/496	9/427
Turnover	0/631	0/658	0/827	0/259	0/156	0/730	3/149
OPEN	0/024	0/0781	0/392	0/00089	0/175	-8/192	77/96
INF	2/481	2/015	24/809	-55/958	3/493	1/00096	99/792
G	33/11	33/569	77/789	22/148	22/029	1/280	7/983

Source: Researcher's findings

Table 2 shows the descriptive statistics for the variables, which show the descriptive parameters for each variable separately. These parameters include central indices such as mean, median, maximum, minimum, as well as scatter indices such as standard deviation, skewness coefficient, and Kurtosis coefficient. The most important central indicator is the mean, which represents the equilibrium point, and is a good indicator to show the centrality of data in each variable.

The mean and median values indicate the centrality of the data in each variable. As can be seen, in some variables such as GDP, InTrade and BI, the values of these two indicators are very different from each other, which indicates the existence of skewed observations in the data. The presence of outliers in the maximum and minimum values and the standard deviation of these variables are also known. The maximum and minimum values in these variables are far from each other and also their standard deviation is high. The values of skewness and elongation coefficient indicate the normality of the data distribution, which according to the results, the data distribution is not normal.

3.1.1 Analysis and Tests

Single Root Test

The unit root test is one of the most common tests used today to diagnose the stasis of a time series process. The basis of the unit root test is based on the logic that when there is a first-order regression in a self-process, then the series is unknown. In order to perform the unit root test, the M, boys and Shin tests were used. The null hypothesis of this test is the existence of a single root or variable instability. If the probability level of the test statistic is less than 0.05, the null hypothesis is rejected and the variable is sTable; And if the probability level of the test is greater than 0.05, the null hypothesis is rejected and the variable is unsTable. The results of the unit root test are shown in Table 3.

Table 3: Results of Unit Root Test of Variables

Variable	t Statistic	Probability level	Unit root test result
GDP	2/222	0/00	STable with the trend
InTrade	0/555	0/22	STable difference
MD	150/08	0/00	STable
FD	33/545	0/00	STable
Debt	-55/505	0/00	STable
Credit	55/220	0/00	STable
PM	77/999	0/00	STable
FO	88/422	0/00	STable
ROE	-77/777	0/00	STable
CR	8/333	0/00	STable
BI	7/555	0/00	STable
IN	16/101	0/00	STable
Trade	55/333	0/00	STable
Comp	-3/688	0/00	STable with the trend
Turnover	16/333	0/00	sTable
OPEN	8/777	0/00	sTable
INF	9/884	0/00	sTable
G	-2/222	0/00	sTable

As can be seen, all variables except the InTrade variable at the 1% probability level do not have a single root and are therefore sTable. But since the InTrade variable is a sTable difference, so there is no need to use the difference of this variable in the model, the unit root test is performed on the estimation error

component in the second model. If the error component is sTable, the model can be estimated with confidence and without worrying about the existence of false regression (Suri, 2016). The results are as follows:

Table 4: The Result of the Unit Root Test of the Error Component

Variable	t Statistic	Probability level	Unit root test result
Error component (second model)	33/334	0/00	sTable

As can be seen, the estimation error component is sTable at the 1% probability level. Therefore, the model can be estimated with confidence.

F Leamar test:

The F-Leamar test is used to examine the model in terms of data integration (pooling data) or panel data. The null hypothesis of this test is the integration of data (data money) and the opposite hypothesis is that the data is tabular (data panel). Table 5 shows the results of the F-Leamar test for both models.

Table 5: Limer F Test

Model	F Leamar Statistic	Probability	Result
Dependent variable GDP	1/030	0/01	Panel data
Dependent variable InTrade	4/111	0/00	Panel data

Source: Researcher Findings

As can be seen in the Table, the probability level in both models is less than 0.05 and the model is a data panel. Therefore, Hausman test is used to select one of the two methods of fixed effects and random effects.

Hausman test:

Hausman test is used to select one of the two methods of fixed effects and random effects in the panel data model (data panel). The null hypothesis of this test is random effects and the opposite hypothesis is fixed effects. Table 6 shows the results of the Hausman test.

Table 6: Hausmann Test

Model	Hausman Statistic	Probability	Result
Dependent variable GDP	55/555	0/00	Fixed effects
Dependent variable InTrade	159/566	0/00	Fixed effects

Source: Researcher's findings

As can be seen, in both models the probability level is less than 0.05. Therefore, the fixed effects method is chosen for these models.

Jark-Bra Test:

Jark test is used to check the normality of error components in the model. In general, if the Jark statistic is greater than 5.66, the normality is rejected, in which case the probability value given below the JB statistic will be less than 0.05. Therefore, it can be said that the null hypothesis of this test is the normality of the error components and the opposite hypothesis is the non-normality of the error components. The test results for both models are shown in Table 7.

Table 7: Results of Jark-Bra Test

Model	Jark-Bra Statistic	Probability	Result
Dependent variable GDP	3/777	0/14	Normal
Dependent variable InTrade	2/336	0/33	Normal

Source: Researcher's findings

As can be seen, the level of probability of the brook statistic in both models is greater than 0.05; Therefore, the normality of the error components is accepted.

Pagan Godfrey test:

Pagan Godfrey test is used to examine the homogeneity of variance of error components. The null hypothesis of this test is the homogeneity variance homogeneity and the opposite hypothesis is the error component variance heterogeneity. If the probability level of the test is higher than 0.05, the null hypothesis is accepted. The results of Pagan Godfrey test for both models are shown in Table 8.

Table 8: Pagan Godfrey Test

Model	Pagan Godfrey Statistic	Probability	Result
Dependent variable GDP	21220/30	0/00	Variance inequality
Dependent variable InTrade	3447/808	0/00	Variance inequality

Source: Researcher's findings

As can be seen in both models, the probability level of Pagan Godfrey statistic is less than 0.05 and this model has variance inequality. Therefore, to solve this problem, the GLS method is used to estimate the models.

3.2 Estimation of the First Model (GDP Dependent Variable)

According to the tests performed, the first model (GDP dependent variable) was estimated as data panel, fixed effects and GLS. Table 9 shows the model estimation results.

Table 9: Estimation Results of the First Model (GDP dependent variable)

Variable	Coefficient	Std. Dev	statistic t	Probability level
Width of origin	7/555	1/099	6/88	0/00
GDP(-1)	0/111	0/0418	77/48	0/00
MD	-0/055	0/033	-3/20	0/00
FD	0/000	0/088	2/14	0/03
Debt	0/0083	0/0085	0/88	0/22
Credit	0/024	0/0081	2/96	0/00
PM	-0/0096	0/0080	-1/20	0/33
FO	-0/055	0/0071	-2/14	0/03
ROE	0/0209	0/0076	2/22	0/00
CR	-0/00032	0/00017	-1/88	0/66
BI	-0/0030	0/00071	-4/88	0/00
IN	-0/055	0/0095	-2/65	0/00
Trade	0/0033	0/0021	1/56	0/10
Comp	0/00023	0/00019	1/11	0/22
Turnover	-0/0034	0/0038	-0/88	0/77
OPEN	-0/0114	0/0469	-0/24	0/80
INF	-0/0021	0/0011	-1/22	0/05
G	-0/0096	0/0013	-7/33	0/00

Source: Researcher's findings

The value of the coefficient of determination or R2 is 0.89, which shows the good fit in the estimation. In fact, 89% of the independent variables were able to explain the dependent variable. The value of the Watson camera is 1.90, which indicates a lack of autocorrelation between the error components. Also, the F statistic is equal to 56/2015, which is also significant. Therefore, the whole regression model is statistically significant. The coefficients of the variables debt, PM, Comp, Turnover, Open are not significant at the level of probability of 1, 5 or 10%. Therefore, these variables are excluded from the analysis.
The estimated model is written as follows:

$$GDP = 7.53 + 0.731GDP(-1) – 0.075MD + 0.06FD + 0.024Credit – 0.0153FO + 0.0209ROE – 0.00032CR -0.0030BI – 0.025IN + 0.0033Trade – 0.0021INF – 0.0096G \quad (3)$$

The coefficient of variable GDP (-1) is 0.731 which is a positive number; Therefore, intermittent GDP (period t-1) has a positive and relatively high effect on GDP in period t.

Panel Integration Test:

In this section, the panel co-integration test is used to examine the long-run equilibrium relationships in more detail. For this purpose, Pateroni and Kao tests have been used.13 Hypothesis Zero All statistics of this test indicate non-coherence and the opposite hypothesis refers to coherence between model variables. The results of the Pedron test are shown in the Table below.

Table 10: Padron test results in developed countries

statistic	Value	Probability level
Panel v-Statistic	-1/67	0/55
Panel rho-Statistic	1/69	0/55
Panel PP-Statistic	-5/61	0/00
Panel ADF-Statistic	-2/63	0/00
Group rho-Statistic	2/55	0/99
Group PP-Statistic	-22/88	0/00
Group ADF-Statistic	-2/90	0/00

Source: Researcher's findings

Based on the results presented in the Table above, the latent correlation between the variables in the two statistics of PP and ADF panel and the two statistics of PP and ADF group is accepted at the level of 1% probability. To confirm the results of the Padron test based on latent coherence between variables, Kao coherence test was also used. This test is performed using ADF unit root test statistics. The null hypothesis of this test is the absence of co-integration and the opposite hypothesis is the existence of co-integration between the model variables. The results of the Kao co-accumulation test are shown in the Table below.

Table 11: Kao Test Results in Developed Countries

statistic	Value	Probability level
ADF test t statistics	-2/456	0/00

Source: Researcher's findings

According to the results written in the Table above, based on the Kao test, the null hypothesis that there is no latent co-integration between the variables at the 1% level is rejected.

3.3 Estimation of the Second Model (InTrade Dependent Variable)

According to the tests, the second model (InTrade dependent variable) was estimated as data panel, fixed effects and GLS. Table 12 shows the estimation results of the second model.

Table 12: Estimation Results of the Second Model (InTrade Dependent Variable)

Variable	Coefficient	Std. Dev	statistic t	Probability level
Width of origin	99/55	1/333	55/88	0/00
InTrade(-1)	0/999	0/669	1/11	0/09
MD	0/110	0/045	2/45	0/01
FD	0/011	0/0204	1/045	0/30
Debt	-0/011	0/055	-0/88	0/77
Credit	-0/033	0/033	-2/43	0/01
PM	-0/0407	0/099	-2/10	0/04
FO	-0/054	0/099	-1/55	0/66
ROE	-0/0055	0/0808	-0/11	0/00
CR	-0/0554	0/033	-0/45	0/65
BI	-0/0545	0/0088	-1/64	0/10
IN	-0/044	0/033	-1/33	0/07
Trade	-0/664	0/626	-2/46	0/01
Comp	0/077	0/088	0/63	0/22
Turnover	-0/041	0/099	-1/36	0/77
OPEN	0/011	0/055	1/40	0/16
INF	-0/0101	0/636	-0/77	0/88
G	0/999	0/202	3/88	0/00

Source: Researcher's Findings

The value of the coefficient of determination or R2 is 0.89, which shows a good fit in the estimation. In fact, 89% of the independent variables were able to explain the dependent variable. The value of the Watson camera is 1.60, which indicates a lack of autocorrelation between the error components. Also, the statistic F is equal to 934/1836, which is also significant. Therefore, the whole regression model is statistically significant. The coefficients of the variables FD, Debt, ROE, CR, Comp, Turnover, Open, and INF are not significant at the probability level of 1, 5, or 10%. Therefore, these variables are excluded from the analysis. The estimated model is written as follows:

$$\text{InTrade} = 19.95 + 0.119\text{InTrade}(-1) + 0.110\text{MD} - 0.033\text{Credit} - 0.0407\text{PM} - 0.054\text{FO} - 0.014\text{BI} - 0.044\text{IN} - 0.064\text{Trade} + 0.389\text{G} \quad (4)$$

The coefficient of the InTrade variable (-1) is 0.119, which is a positive number; Therefore, the volume of intermittent international trade (period t-1) has a positive and moderate effect on the volume of international trade in period t.

Panel Integration Test

The results of the Pedron test are shown in the Table below.

Table 13: Paternity Test Results in Developing Countries

statistic	Value	Probability level
Panel v-Statistic	-1/55	0/96
Panel rho-Statistic	1/88	0/88
Panel PP-Statistic	-1/44	0/55
Panel ADF-Statistic	-1/22	0/88
Group rho-Statistic	1/55	0/96
Group PP-Statistic	-1/45	0/86
Group ADF-Statistic	-1/11	0/99

Source: Researcher's findings

Based on the results presented in the Table above, the latent correlation between the variables based on panel and group statistics is rejected. Therefore, there is no long-run equilibrium relationship between the variables. To confirm the results of the Padron test based on latent coherence between variables, Kao coherence test was also used. The results of the Kao co-integration test are shown in the Table below.

Table 14: Kao Test Results in Developing Countries

Statistics	Value	probability level
ADF test t statistics	0/22	0/99

Source: Researcher's findings

According to the results written in the Table above, based on the Kao test, the null hypothesis that there is no latent covariance between the variables is accepted at the 1% level. In general, based on Padron and Kao tests, the existence of long-term relationships between model variables is ruled out.

4 Discussion and Conclusion

As the results showed, there are long-term equilibrium relationships for developed countries, but no long-term relationships for developing countries. This could be because all developed countries have high economic growth and per capita incomes; And development indicators such as the Human Development Index are high in these countries; Therefore, developed countries have long-term equilibrium relations for these countries due to their regular trend for economic growth and development. However, in developing countries, due to irregular economic growth and severe exchange rate fluctuations, as well as low per capita income and human development index, economic growth and international trade do not follow a regular trend in the long run; Therefore, there are no long-term relationships for developing countries. Developed countries have also been able to increase their international trade volume by joining the World Trade Organization (WTO), and this order in the growth process has led to a long-term equilibrium relationship. But developed countries like Iran are either not in the WTO or their presence in the WTO has not had a significant effect on their trade. Developed countries with lower birth rates and lower mortality rates than developing countries have been able to increase human development indicators; In developed countries such as Norway, Australia, the Netherlands, the United States, Germany, Canada, etc., the human development index is above 0.9.

But developing countries all have moderate or low human development indexes. Iran is also a developing country with an average human development index between 0.8 and 0.7. Another reason for the long-term equilibrium relationship for developed countries and the lack of a long-term equilibrium relationship for developing countries is the dependence of the economies of developed countries on the industrial sector, and the dependence of the economies of developing countries on the service sector. Developed countries

increase their technology by upgrading the industrial sector and leading to the transfer to the right of the production facilities curve in their country. Therefore, developed countries maintain a regular growing trend of economic development by increasing industrial production and exporting it to other countries. They also reach a high level of development index by increasing production. But developing countries have their products more in the production of raw materials and its export, which after the production of final goods in developed countries, buy it at several times the price of raw materials. Developed countries, due to their technology and production power, can carry out their industrial production and export to developing countries. Therefore, in view of the above, developing countries do not see long-term equilibrium relations for economic growth and international trade. According to the study, the practical suggestions can be stated as follows:

1- Since the degree of trade freedom in developed countries has a great impact on the volume of international trade; Therefore, developing countries should produce final goods and refrain from importing final goods and exporting raw materials.

2. The stock market in developing countries has more power than developed countries; Therefore, due to the strength of the stock market and the government in these countries, stock exchange companies are advised to place their goods in the direction of the country's exports in order to increase both exports and increase the country's GDP.

3- The import of technology in developing countries is very high, which has led to not so high economic growth in these countries. Therefore, it is necessary to produce the technology in the country and prevent its import as much as possible.

4. Economic development occurs when economic growth is stable and long-lasting. Therefore, in order to achieve economic development, it is necessary for developing countries to consider this issue.

5. One of the requirements of economic development is exports, which have been well implemented by developed countries. These countries should be role models for developing countries in terms of technology exports and final goods.

6- Since there are long-term relations for developed countries; But it does not exist for developing countries, so it is recommended that governments of developing countries, human development indicators and economic growth trends of developed countries for their country's economy as a model.

Suggestions for future research

Due to the breadth of this research in the study of countries, suggestions as a complement to the results of this research are presented as follows:

1- The impact of sustainability and environmental indicators on economic growth in developed and developing countries and their comparison

2- The impact of macroeconomic variables such as unemployment, real wages, etc. on GDP in developed and developing countries and their comparison

3- Providing optimal inflation in developed and underdeveloped countries using the DSGE model and comparing them.

References

[1] Assari, A., Financial Development and Economic Growth: A Comparison of OPEC and Non-Oil Developing Oil Countries Using the Generalized Torque (GMM) Method, *Journal of Economic Research*, 2015; 82: 141-146

[2] Agah, M., Malekpoor, H., Bagheri, A., Investigating the Effect of Financial Constraints and Different Levels of Agency Cost on Investment Efficiency, *Advances in Mathematical Finance and Applications*, 2017; 2(4): 31-47. doi: 10.22034/amfa.2017.536264

[3] Azadi, M., Izadikhah, M., Ramezani, F., Hussain, F.K., A mixed ideal and anti-ideal DEA model: an application to evaluate cloud service providers, IMA, *Journal of Management Mathematics*, 2020; 31(2): 233-256. doi: 10.1093/imaman/dpz012

[4] Bencivenga, V.R., Smith, B.D., Financial Intermediation and Endogenous Growth, *The Review of Economic Studies*, 1991; 58(2): 195-209. doi: 10.2307/2297964

[5] Dumitrescu, E. I., Hurlin, C., Testing for Granger noncausality in heterogeneous panels, *Economic Modelling*, 2012; 29(4): 1450–1460.

[6] Friedman, M., and Schwartz, A.J., A Monetary History of the United States, 1867–1960, *Princeton: Princeton University Press for NBER*, 1963.

[7] Greenwood, J., and Smith, B., Financial markets in development, and the development of financial markets, *Journal of Economic Dynamics and Control*, 1997; 21(1): 145-181. doi: 10.1016/0165-1889(95)00928-0

[8] Im, K.S., Pesaran, M., Shin, Y., Testing for unit roots in heterogeneous panels, *Journal of Econometrics*, 2003; 115(1): 53-74. doi: 10.1016/S0304-4076(03)00092-7

[9] Izadikhah, M., Financial Assessment of Banks and Financial Institutes in Stock Exchange by Means of an Enhanced Two stage DEA Model, *Advances in Mathematical Finance and Applications*, 2021; 6(2): 207-232. doi: 10.22034/amfa.2020.1910507.1491

[10] Jokar, H., Shamsaddini, K., Daneshi, V., Investigating the Effect of Investors' Behavior and Management on the Stock Returns: Evidence from Iran, *Advances in Mathematical Finance and Applications*, 2018; 3(3): 41-52. doi: 10.22034/amfa.2018.544948

[11] King, R.G., Levine, R., Finance and Growth: Schumpeter Might Be Right, *The Quarterly Journal of Economics*, 1993;108(3): 717-737. doi: 10.2307/2118406

[12] Lucas, R.E., On the mechanics of economic development, *Journal of Monetary Economics*, 1988; 23: 3-42.

[13] McKinnon, R.I., Money and Capital in Economic Development, *Brookings Institution, Washington*, 1973.

[14] Khatai, M., The effect of rate fluctuations on economic growth according to the level of development of financial markets, *Iranian Economic Research*, 2008; 37: 1-20.

[15] Poordavoodi, A., Moazami Goudarzi, M.R., Haj Seyyed Javadi, H., Rahmani, A.M., Izadikhah, M., Toward a More Accurate Web Service Selection Using Modified Interval DEA Models with Undesirable Outputs, *Computer Modeling in Engineering & Sciences*, 2020; 123(2): 525-570. doi: 10.32604/cmes.2020.08854

[16] Parsa, B., Sarraf, F., Financial Statement Comparability and the Expected Crash Risk of Stock Prices, *Advances in Mathematical Finance and Applications*, 2018; 3(3):77-93. doi: 10.22034/amfa.2018.544951

[17] Roubini, N., and Sala-y-Martin, X., A growth model of inflation, tax evasion. and financial repression, *Working paper no. 4062 (NBER, Cambridge. MA) May*, 1992.

[18] Rousseau., and Wachtel, P., Equity markets and growth: Cross-country evidence on timing and outcomes, *1980-1995, Journal of Banking & Finance*, 2000; 24(12): 1933-1957

[19] Robinson, J., The Generalisation of the General Theory, in the Rate of Interest, and Other Essays, *2nd Edition, Macmillan, London*, 1952.

[20] Rezaei, N., Elmi, Z., Behavioral Finance Models and Behavioral Biases in Stock Price Forecasting, *Advances in Mathematical Finance and Applications*, 2018; 3(4): 67-82. doi: 10.22034/amfa.2019.576127.1118

[21] Roostaee, R., Izadikhah, M., Hosseinzadeh Lotfi, F., An interactive procedure to solve multi-objective decision-making problem: an improvment to STEM method, *Journal of Applied Mathematics*, 2012; 324712:1-18. doi: 10.1155/2012/324712

[22] Saint-Paul, G., Fiscal Policy in an Endogenous Growth Model, *The Quarterly Journal of Economics*, 1992; 107(4):1243-1259.

[23] Schumpeter, J.A., The Theory of Economic Development; an Inquiry into Profit, Capital, Credit, Interest, and the Business Cycle, *Harvard University Press, Cambridge*, 1911.

[24] Salehi, A., Mohammadi, S., Afshari, M., Impact of Institutional Ownership and Board Independence on the Relationship Between Excess Free Cash Flow and Earnings Management, *Advances in Mathematical Finance and Applications*, 2017; 2(3): 91-105. doi: 10.22034/amfa.2017.533104

[25] Tavana, M., Izadikhah, M., Farzipoor Saen, R., Zare, R., An integrated data envelopment analysis and life cycle assessment method for performance measurement in green construction management, *Environ Sci Pollut Res*, 2021; 28: 664–682. doi: 10.1007/s11356-020-10353-7

[26] Tsai, C., Feature selection in bankruptcy prediction, *Knowledge-Based Systems*, 2009; 2(22): 120-127. doi: 10.1016/j.knosys.2008.08.002.

[27] Teruel, P., Solano, J., Accruals quality and corporate cash holdings, *Accounting and Finance*, 2009; 49: 95–115. doi:10.1111/j.1467-629X.2008. 00276.x

[28] Zare, R., Izadikhah, M., Multi-criteria decision making methods for comparing three models of aluminum ingot production through life cycle assessment, *Applied Ecology and Environmental Research*, 2017; 15(3): 1697-1715. doi: 10.15666/aeer/1503_16971715

[29] Zheng, J., Wang, Y., Li, S., and Chen, H., The Stock Index Prediction Based on SVR Model with Bat Optimization Algorithm, *Algorithms*, 2021;14(10). doi: 10.3390/a14100299

[30] Zhang, D., Xiang, W., Cao, Q., Chen, S., Application of incremental support vector regression based on optimal training subset and improved particle swarm optimization algorithm in real-time sensor fault diagnosis, *Applied Intelligence*, 2021; 51(6): 3323-3338. doi: 10.1007/s10489-020-01916-9