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Economic measurement of the impact of trade openness policy on Turkey's economic growth for the period (1990-2022)

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Abstract

The research aims to demonstrate the importance of trade openness policy on economic growth and to measure and analyze the impact of trade openness on Turkey's economic growth for the period 1990-2022. Using the (ARDL) model, based on the hypothesis that there is a significant positive impact of the trade openness variable on Turkey's economic growth, where growth is represented by GDP per capita, while exports of goods and services, in addition to imports as a percentage of GDP, represent trade openness. The importance of this research stems from the significance of trade openness in modern economies since the last decade of the last century and its impact on the economic growth of various countries, including Turkey, the subject of the study. The study concluded with a number of results and recommendations, the most notable of which was proving that the variable of trade openness has a positive and significant impact on economic growth in Turkey in both the short and long term during the study period. The study also recommended enhancing and encouraging growth and its sources, exploiting its advantages by diversifying and increasing the industrial base, and supporting high-value and export-oriented sectors to create a trade surplus and boost local trade.

Keywords: Trade liberalization, economic growth, Turkish economy

Introduction

Opinions have differed on whether adopting open trade policies benefits countries by boosting their economic growth or harms them. Over the past three decades, there has been a radical change in thinking about trade transactions in light of successive financial crises, resulting in a new perspective that involved liberating institutions from state intervention and allowing global market forces to take over, aiming to end macroeconomic disturbances, reduce debt, promote growth, and alleviate poverty. The issue of improving economic growth is considered one of the important and vital matters for all countries in the world in light of globalization. The interest in this topic arises because most countries have taken measures that contribute to integrating their economies into the global economy and transitioning from isolation to openness amid the accelerating rates of global trade growth compared to national income growth rates. Moreover, integration into the global economy opens new horizons and provides significant opportunities for development and growth. At the same time, it creates major challenges that must be faced and addressed, as countries compete with each other to gain markets for their goods and services worldwide, while also striving to equip their economic institutions with the ability to face foreign products. It also seeks to compete in providing an attractive environment for foreign direct investments, and the opportunities these investments are expected to bring for enhancing economic growth. Some studies indicate that open economies achieve better developmental outcomes and growth rates compared to those that use protectionist systems. Economic openness in general and trade liberalization in particular have emerged as defining features of the global economy during the period of globalization. In this context, the Turkish economy has undergone significant changes since the 1980s of the last century, characterized by a shift towards international markets. Policies that encourage exports and other measures that promote economic openness have become central to Turkey's economic framework, leading to increased trade openness. From here, this study attempts to evaluate the relationship

between the policy of trade openness and the economic growth that Turkey has witnessed over the past decades.

The importance of the research

The research derives its importance from demonstrating the role of trade liberalization policy and its impact on economic growth in Turkey. And its aim to present a standard empirical study to enhance previous studies on the subject through the use of contemporary standard methodologies using a model. (ARDL).

Search problem

Even with the Turkish economy achieving many clear accomplishments and making significant progress, there are still more measures that need to be taken, particularly in the areas of trade openness policy and technical improvement, to bridge the growth gap. One of the most important sources for understanding that gap and the key component for reducing and narrowing its boundaries is research into trade openness policies and their connection to economic growth.

Research hypothesis

The research is based on the hypothesis that there is a positive and significant relationship between the variable of trade openness and economic growth in Turkey over the period. (2022-1990).

The aim of the research

The research aims to demonstrate the importance of trade liberalization policy in economic growth. In addition to measuring the impact of the trade openness variable on economic growth in Turkey during the period (2022-1990)

Research methodology

It includes the research method and its structure.

- A. **Research Method:** To achieve the study's objective and evaluate its hypothesis, the theoretical analysis method of the study variables and quantitative measurement were relied upon to determine the impact of the trade openness policy on Turkey's economic growth for the period (1990-2022), based on data and statistics taken from official global reports.
- B. **Structure of the research:** The study included three sections, the first of which was dedicated to studying the theoretical framework of trade openness, while the second examined the theoretical framework of economic growth. The third section was devoted to measuring the impact of the trade openness variable on Turkey's economic growth

The first topic

The theoretical framework for trade openness

Trade openness is a crucial tool for improving the distribution of manufacturing components across various economic sectors, which enhances output and efficiency. Since trade can lead to a decrease in real production costs, the literature on economic development claims that economic openness enables the achievement of economies of scale in production. (Nada and Mahmoud, 2019, 140)^[1].

First: The concept of trade openness

The idea of free trade emerged with the advent of classical thought in the field of international trade, as this thought advocated for exchange free from government intervention. Opinions have varied regarding the establishment of a

comprehensive concept of trade openness, as well as the extent to which countries following this approach benefit. There are conflicting views between supporters and opponents of the idea of trade openness. Recently, some economic opinions have increasingly leaned towards adopting a policy of trade openness, and this policy has garnered significant attention from contemporary economic thinkers. Although proponents of trade liberalization claim that trade liberalization and economic growth are positively correlated, as demonstrated by some studies, others argue that trade openness and economic growth are negatively correlated, depending on the economic structure of each country. (Khaled and Hejira, 2017, 33)^[11]. The trade openness index varies from one country to another depending on the economy of that country. Some countries have unilateral exports, such as oil-rich countries, which heavily rely on their oil exports. Consequently, the trade openness of these countries is high due to the lack of export diversification and the significant increase in imports of manufactured goods from other countries to meet local needs. On the other hand, countries with diversified exports, such as industrial countries, generally do not have a high trade openness index because their revenue sources from industry and services are varied. Most of their industries are local and meet local demand. Trade openness benefits developed countries in exporting their goods to developing countries that have adopted a trade openness policy. The policy of trade openness can refer to phenomena of economic integration between countries, which through it affects the liberalization of trade from all restrictions and helps in the flow of foreign capital and investments, as well as the development of technology. The degree of trade openness for each country is measured by the contribution of total exports of goods and services and imports of goods and services divided by the gross domestic product (7-2006:6, Wilsor)^[19]. And trade openness, as defined by the International Monetary Fund, is the liberalization of the external sector, which includes the balance of capital and current trade transactions. This requires allowing the free movement of capital, goods, and services into and out of the country without any restrictions or barriers, such as administrative and technical obstacles, quantitative restrictions, or tariffs. An economy of any country that relies on trade openness can be defined as one that interacts with the economies of the outside world and adapts to global economic changes, which continuously develops itself (Al-Khatib, 2024, 780)^[12].

Secondly: Forms of trade openness

Commercial openness does not exist at the level of all countries in the world, but rather on the basis of individual countries. Countries adopt policies to liberalize their trade by removing restrictions imposed on the movement of capital, goods, and services, whether through import or export operations. There are several forms of commercial openness that can be summarized as follows:

1. **Complete trade liberalization:** It means freeing trade from all restrictions on the movement of goods, services, and factors of production, especially the complete freedom for the flow of capital and foreign direct investments.
2. **Partial trade openness:** This form of economic openness relies on bilateral agreements between the two countries, as customs barriers and restrictions are not

completely removed but are reduced through the implementation of an import substitution policy and the encouragement of exports (Al-Khatib, 2024, 780)^[12].

3. **Multiple Trade Openness:** This type of trade openness includes international organizations that remove all barriers to foreign trade. Some countries open up to each other because they adhere to permanent trade principles or agreements, or they open their trade relations based on commercial transactions and foreign trade with member countries of the same organization.
4. **Trade openness on a preferential basis:** The policy of openness means the freedom for the flow of foreign investments and the freedom for the flow of goods and services, especially if a country is given preference at the expense of other countries, in addition to the elimination of all customs and non-customs restrictions and barriers on foreign trade (Al-Khatib, 2024, 781)^[12].

Thirdly. Objectives of trade liberalization

There are many goals of trade openness, and each country seeks to achieve a set of these goals through a trade openness policy. Among these goals are the removal of customs restrictions on its foreign trade, which leads to an increase in international trade, improving living standards in countries around the world, especially developing countries, optimal exploitation of economic resources, and stimulating global demand. Additionally, increased trade generates financial surpluses for countries exporting various goods and services, as well as allowing developing countries to share in growth by acquiring advanced technology and keeping pace with global developments (Issa and Ismail, 2018, 249)^[10].

Fourth: Key indicators of trade openness

Trade openness is an important indicator of the contribution of foreign trade to the formation of GDP, meaning it shows the extent to which economic activity depends on the prevailing conditions in import and export markets. There are several important indicators of trade openness, which are: (Murad, 2013, 64).

1. **Imports divided by Gross Domestic Product:** It is the ratio of total imports of goods and services to Gross Domestic Product multiplied by 100.
2. **Trade exchange:** It can be expressed as the ratio of the export price index to the import price index multiplied by 100.
3. **Total foreign trade divided by GDP:** We adopted this indicator in our study, which expresses the ratio of total exports plus total imports of goods and services to the GDP of the country multiplied by 100 .

The second topic

The theoretical framework for economic growth

Economic growth is one of the most important goals that all countries in the world strive to achieve at the highest levels, as it constitutes one of the main factors determining social progress, a prerequisite for achieving economic development, and is also considered a measure of the wealth enjoyed by various countries around the world.

First: The concept of economic growth

Most economists disagree on providing a clear and complete definition of economic growth, as many definitions of growth have been proposed. Perhaps the idea that growth is

a quantitative variable reflecting changes in the productive capacity of the state and the extent to which these capacities are utilized is the most well-known among these concepts. The production of more goods and services to meet the needs of society increases as the degree of utilization of these capacities rises. Economic growth is considered one of the most important goals that countries strive to achieve, as economic development cannot be realized without achieving increasing and sustainable economic growth rates. This is because growth represents the tangible result of the economic and non-economic efforts made by society, and it is one of the essential conditions for improving the standard of living of community members. Economic growth is defined as the increase in the value of goods and services produced by the local economy, or an increase in gross domestic product (GDP) or gross national income (GNI), which leads to an increase in per capita real income or gross national product (GNP). According to this definition, the concept of economic growth is the same as the concept of economic welfare. And the growth of gross national income that increases the individual's share of real income is known as economic growth. (Nada and Mahmoud, 2019, 143)^[14]. The economist Michael Todaro describes growth as an increase in the state's ability to provide a diverse mix of economic goods and services to its residents, and this growing increase in productive capacity is based on technological advancement and institutional adjustments. He defined it (Al-Bayati) as the continuous increase in the real per capita share of GDP over one year, and per capita GDP is considered one of the most commonly used and accurate indicators when measuring the level of economic progress of any country. Economic growth can also be broadly and comprehensively defined as the increase in GDP of the products and services desired by the community's residents over a specific period, often one year, which raises the real average income per person (Swanenberg, 2008, 84)^[17].

Secondly: The importance of economic growth.

The importance of economic growth is reflected in the results it achieves and the significant roles it plays in the local economy, as it leads to the improvement of the living standards of all members of society and enhances their well-being. Thus, the importance of economic growth stems from the continuous increase in the quantities of goods and services available to the citizens of the state, as well as the improvement of their well-being through enhancing product quality and raising workers' wages, which paves the way for eradicating poverty and improving the provision of health and educational services for the population (Draj, 2010, 55). Which in turn seeks to achieve a cumulative increase in per capita real GDP over time, while ensuring an increase in both the quality and quantity of goods and services available to individuals. Additionally, it aims for a continuous increase in national output by developing productive projects, which in turn lead to increased production, and thus a sustainable increase in national output. It is also used as a quantitative variable to measure the relative change in the size of the national output. Economic growth leads to an improvement in the standard of living for individuals due to the increased satisfaction of human needs, especially the basic ones. Additionally, the rise in real incomes for individuals contributes to increased consumption, which in turn leads to increased production, and consequently,

economic growth. This increase includes both the quantity and quality of social services provided to individuals, such as education and health, and alleviates the burden on scarce economic resources, which creates an increase in local production, helping to address economic problems.

Third: Types of Economic Growth

1. **Natural growth:** It is growth that occurs spontaneously, without resorting to a systematic and scientific process, due to the inherent forces in the local economy. Natural growth: It is growth that occurs on its own, without resorting to a systematic and scientific planning process, due to the inherent forces in the local economy. And although it sometimes experiences fluctuations that occur periodically and briefly, this type of growth is stable, moderate, and sequential. Since the Industrial Revolution, the majority of developed capitalist countries have sought this type of growth.
2. **Transient growth:** This type of growth lacks stability and continuity, arising in response to external factors, and it quickly disappears with the removal of the stimulating causes. Transient growth: It is a type of growth that lacks stability and continuity, arising in response to external factors, and this growth quickly disappears with the cessation of the stimulating causes. But since this type of growth often occurs as a reaction to changes in foreign trade, it reflects the general situation faced by emerging countries. And this circumstance does not significantly affect overall development, and it may continue or proceed at the same speed it reached at the beginning of its emergence (Al-Khatib and Al-Shammari, 2024, 377) ^[12].
3. **Planned growth:** It is the growth that occurs as a result of a comprehensive planning process for the available resources of the community and its needs. The strength and effectiveness of this type of growth are closely linked to the planners' ability to accurately predict the future through economic studies and the realism of the specified plans. It is worth noting that the study of economic planning methods is considered a relatively modern scientific approach, as planning has become a widely practiced activity by many countries in drawing up their development plans. Planned growth: It is the growth that occurs as a result of a comprehensive planning process of the available community resources and its needs. The strength and effectiveness of this type of growth are closely linked to the planners' ability to accurately predict the future through economic studies and the realism of the specified plans. It is worth noting that the study of economic planning methods is considered a relatively modern scientific approach, as planning has become a widely practiced activity by many countries in drawing their development plans. (Dagher, 2020, 147) ^[6].
4. **Intensive Growth:** This type of growth is characterized by economic growth and income growth exceeding population growth, leading to an increase in per capita income from extensive growth to intensive growth, representing a turning point for society. Intensive growth: This type of growth is characterized by economic growth and income growth exceeding population growth, leading to an increase in per capita income from extensive to intensive growth,

representing a complete turning point for society.

Fourth: The economic growth indicator

One of the most important indicators of economic growth is the per capita GDP because it reflects the general level of well-being of individuals in society. The well-being of individuals can be expressed through the per capita GDP, which is defined as the GDP divided by the total population. GDP represents the total value of goods and services produced within one year, including the total gross value added achieved in economic activities within the country's territorial boundaries, contributed by both national and non-national factors of production (Mostafa, 2011, 156) ^[13]. Per capita GDP is also an important measure of economic growth, and it is one of the good and important metrics. This measure reflects the strength of domestic demand for goods and services and the level of consumption. It is also an important factor in measuring the wages received by individuals. The economic growth index indicates the continuous increase in per capita GDP over time, as this increase leads to an improvement in individual living standards, provided that there is no inflation or imbalance in the balance of payments, as well as ensuring the fair distribution of the wealth owned by the state (Al-Sheibi, 2008, 25) ^[5].

Fifth: The relationship between economic growth and trade openness

Most economic theories and schools emphasize the importance of international trade in promoting economic growth. In modern economic literature, the relationship between economic growth and trade openness gains special importance. There are many viewpoints on how trade openness is related to economic growth or vice versa. Here is what justifies their viewpoints: Since it involves the movement of goods and services in and out of the country, as well as the links it establishes at the macroeconomic level, trade openness is theoretically viewed as one of the important and primary channels between local and international economies (Al-Sawahi, 2014, 173). Dennis Robertson was the first to point out that foreign trade, especially exports, is the engine of economic growth, in an article he published in 1940. In the second half of the nineteenth century, Nurks came to prove that the increase in the export of goods is the driving force behind growth in raw material-producing countries. In 1971, contributions from Balassa and some economists who studied the relationship between foreign trade and economic growth emerged, showing that foreign trade is closely linked to GDP, and that countries experiencing high and rapid growth tend to export more goods, and that an increase in exports leads to rapid economic growth (Al-Sawahi, 2006, 38). Practically, many findings from applied studies have confirmed that trade openness is a crucial factor, an important element, and a major driver of economic growth. Many analyses have been conducted in an attempt to uncover the impact of various factors on growth rates and to determine the causal relationship between them. These studies concluded that there is strong evidence indicating a close correlation between trade openness and an increase in the speed of economic growth (International Monetary Fund, 2006, 2) ^[9].

The third topic

The economic measurement of the impact of trade openness on economic growth in Turkey

Economic measurement is one of the branches of economic analysis that focuses on the numerical estimation of correlations between economic variables in order to test hypotheses, make estimations, and then predict economic events. And since the majority of economists are interested in the measurement process, which involves using statistical and mathematical methods to analyze economic data in order to provide numerical content for economic theories to verify their validity, economic measurement covers a wide range of economic concepts. This subject is divided into the following categories:

First: The description of the study variables using a model (ARDL)

To determine the nature of the relationship between the trade openness index and economic growth, annual data was used to provide better results. After obtaining the data from the official World Bank website, the number of observations

became 33.

As for the variables included in the study, they are as follows:

1. The dependent variable: It represents economic growth, where economic growth is expressed as (GDP per capita) and is denoted by (GDP).
2. The independent variable: trade openness, denoted by (Trade), indicating trade openness and representing trade (% of GDP) expressed as (exports + imports)/GDP.

The study variables can be expressed by the following functions:

A. The trade openness function and its impact on economic growth.

$$GDP = f(\text{Trade}) \dots(1)$$

B. Error correction equation.

$$\Delta GDP = c + \lambda GDP_{t-1} + \beta_1 \text{Trade}_{t-1} + \sum_{i=1}^n a_1 \Delta GDP_{t-i} + \sum_{i=0}^m a_2 \Delta \text{Trade}_{t-i} + \mu_t$$

Research sample: The research sample consists of time series as shown in the table. (1)

Table 1: Study Variables for Duration (2022-1990)

Trade openness	Per capita GDP	Years	Trade openness	Per capita GDP	Years
48.337	8004	2006	16.145	2773	1990
55.227	9711	2007	15.827	2730	1991
65.438	10844	2008	16.531	2826	1992
53.631	9013	2009	18.115	3149	1993
59.072	10623	2010	17.398	2241	1994
65.466	11301	2011	22.151	2855	1995
65.004	11713	2012	24.670	3010	1996
64.801	12578	2013	26.718	3099	1997
61.962	12165	2014	27.864	4433	1998
51.089	11050	2015	24.954	4058	1999
47.064	10970	2016	28.074	4278	2000
49.893	10696	2017	25.797	3100	2001
49.319	9569	2018	27.766	3641	2002
48.233	9215	2019	33.118	4705	2003
43.510	8639	2020	41.407	6032	2004
51.493	9743	2021	44.460	7369	2005
61.647	10675	2022	48.337	8004	2006

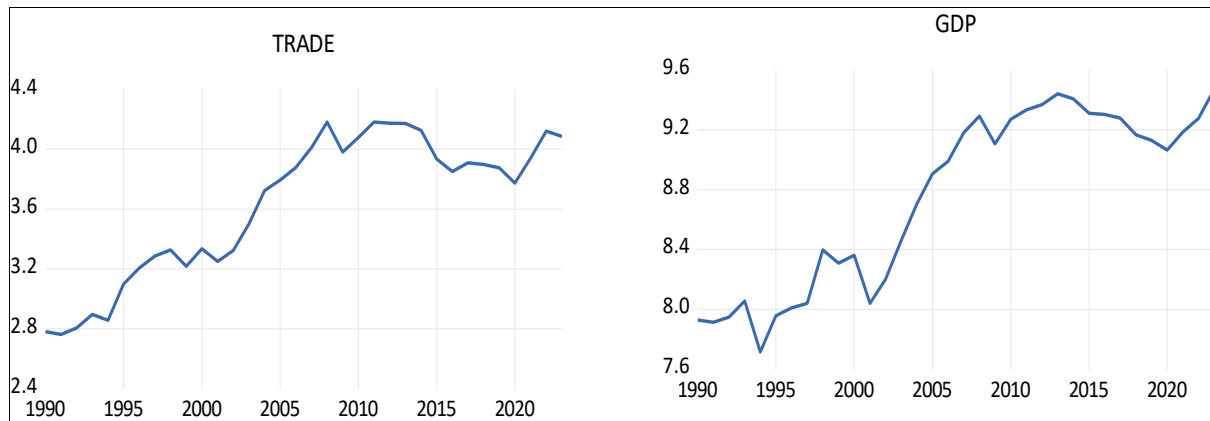
Source: The table is based on the researcher's work, relying on the following source. World Bank, Open Data. <https://data.albankaldawli.org.-l>

Secondly: Model Tests (ARDL)

1. Stability test of variables using the Phillips-Perron test (PP)

Plotting a time series against time is essential to determine its type and nature before subjecting it to any tests. The time series plot serves as a preliminary predictor of the expected

characteristics of the time series. For example, the time series is not stationary if this graph has a general trend (either upward or downward), which means that its average fluctuates over time. We can see that the time series has a general trend from Figure (1) below.



Source: The researcher's preparation, made with statistical software (12.EViews)

Fig 1: The time series graph of the study variables

After conducting the stability test for the study variables using the Phillips-Perron (PP) test, the results shown in Table (2) below indicated that the time series were not stable at the level. However, after calculating the first difference between them, the time series became stationary

at the (1%) level, whether with or without a constant or trend. This indicates that the data is free from spurious regression and unit roots, and thus will be integrated of order I(1).

Table 2: Stability test of the data using the Phillips-Perron test (PP)

Unit root test table (PP)			
		At Level	
		GDP	TRADE
With Constant	t-Statistic	-0.903300	-1.565700
	Prob.	0.774600	0.488400
		n0	n0
With Constant & Trend	t-Statistic	-1.780900	-1.285900
	Prob.	0.691100	0.874000
		n0	n0
Without Constant & Trend	t-Statistic	1.660300	1.680000
	Prob.	0.973900	0.975000
		n0	n0
		At First Difference	
		d(GDP)	d(TRADE)
With Constant	t-Statistic	-5.837600	-5.047400
	Prob.	0.000000	0.000300
		***	***
With Constant & Trend	t-Statistic	-5.761400	-5.223200
	Prob.	0.000200	0.000900
		***	***
Without Constant & Trend	t-Statistic	-5.413500	-4.585300
	Prob.	0.000000	0.000000
		***	***

Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant

Source: The researcher's preparation, made with statistical software (12.EViews)

2. Granger Causality Test for the relationship between trade openness and economic growth in the short term.

Table 3: Granger causality test (Granger Causality Test)

Pairwise Granger Causality Tests			
Sample: 1990 2023			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
TRADE does not Granger Cause GDP	33	9.150720	0.005100
GDP does not Granger Cause TRADE		2.096210	0.158000

Source: The researcher's preparation, made with statistical software (12.EViews)

By observing the F-test probability in Table (3), the results

showed a one-way causal relationship between (TRADE) and (GDP), as the statistical F-probability was (0.0051). Therefore, we reject the null hypothesis and accept the alternative hypothesis, which states that there is a one-way causal relationship between trade openness and economic growth, according to the Granger causality test. This means that changes in the trade openness index cause changes in the economic growth rate, while changes in economic growth do not cause changes in trade openness.

3. The initial test of the model (ARDL)

The Autoregressive Distributed Lag (ARDL) model for the trade openness function (TRADE) and its relationship with GDP in Turkey was estimated after proving the stability of the time series of the variables at the first difference.

Table 4: Preliminary Test of the Model (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.520237	0.134143	3.878225	0.000600
TRADE	0.919374	0.168367	5.460546	0.000000
TRADE(-1)	-0.576686	0.262308	-2.198503	0.036700
TRADE(-2)	0.293817	0.171199	1.716233	0.097600
C	1.905742	0.612530	3.111264	0.004400
R-squared	0.974228	Mean dependent var	8.801846	
Adjusted R-squared	0.970410	S.D. dependent var	0.569358	
S.E. of regression	0.097940	Akaike info criterion	-1.666324	
Sum squared resid	0.258990	Schwarz criterion	-1.437303	
Log likelihood	31.661180	Hannan-Quinn criter.	-1.590410	
F-statistic	255.160700	Durbin-Watson stat	1.722328	
Prob(F-statistic)	0.000000			

Source: The researcher's preparation, made with statistical software (12.EViews)

Table (4) shows that the adjusted R2 and R2 values are (0.97) and (0.97) respectively, indicating that the independent variable (trade openness) in the estimated model accounts for (97%) of the changes in the dependent variable (economic growth), and the remaining (3%) are random variables not considered by the model, reflecting the impact of random variables on the dependent variable. As

for the overall estimated model, it was significant, with the calculated (F) value equal to (255.1607) at a significance level of (0.0000), which is less than (0.01). This means that the estimated model is highly significant.

4. Bounds Test for the Model (ARDL)

Table 5: Results of the joint integration test between the study variables

F-Bounds Test	Null Hypothesis: No levels relationship			
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.137132	Asymptotic: n=1000		
k	1	10%	3.02	3.51
		5%	3.62	4.16
		2.50%	4.18	4.79
		1%	4.94	5.58
Actual Sample Size	32	Finite Sample: n=35		
		10%	3.223	3.757
		5%	3.957	4.53
		1%	5.763	6.48

Source: The researcher's preparation, made with statistical software (12.EViews)

From Table (5), which shows the results of the boundary test for the relationship between trade openness (TRADE) and economic growth (GDP), we notice that the calculated value (F-statistics) was (5.13), which exceeds the upper limit of the tabulated value (4.79) at the 2.5% significance level. Thus, the alternative hypothesis, which indicates the existence of a long-term cointegration relationship between trade openness and economic growth in Turkey, is accepted, and the null hypothesis is rejected.

5. Estimating error correction results and short- and long-term relationships according to the model

(ARDL)

The next phase involves verifying the short-term and long-term correlations between trade openness and economic growth after proving the existence of a long-term equilibrium relationship (cointegration). This will be done by estimating an error correction model, which is a crucial step in ARDL tests. This test relies on the error correction term (CoInt Eq (-1)) to clarify the correction relationship between the short and long term. If the error correction term is negative and statistically significant, this implicitly indicates the presence of a cointegrating relationship between the two variables, as shown in the table (6).

Table 6: Error correction results and short- and long-term relationships according to the ARDL model in Turkey

Case 2: Restricted Constant and No Trend				
Sample: 1990 2023				
Included observations: 32				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.905742	0.612530	3.111264	0.00440
GDP(-1)*	-0.479763	0.134143	-3.576501	0.00130
TRADE(-1)	0.636505	0.165756	3.840003	0.00070
D(TRADE)	0.919374	0.168367	5.460546	0.00000
D(TRADE(-1))	-0.293817	0.171199	-1.716233	0.09760
CoIntEq(-1)*	-0.479763	0.117920	-4.068535	0.00040
*p-value incompatible with t-Bounds distribution				
Levels Equation				

Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRADE	1.326708	0.091988	14.422680	0.00000
C	3.972259	0.339628	11.695910	0.00000
EC = GDP - (1.3267*TRADE + 3.9723)				

Source: The researcher's preparation, made with statistical software (12.EViews)

From Table (6) above, we notice that the short-term parameter for the independent variable (trade openness) was significant at the (1%) level according to the probability (Prob) and reached (0.00000). We also observe that the relationship between the study variables in the short term is positive, meaning that an increase in the trade openness index by (1%) will lead to an increase in economic growth by (0.91%). This result is consistent with the study's hypothesis that trade openness is positively correlated with economic growth. We also note that the error correction term or speed of adjustment (CointEq(-1)) reached (-0.479), which is negative and at a significance level of (1%). This outcome satisfies the necessary and sufficient criterion for the independent and dependent variables to have a short-term relationship that eventually develops into a long-term one. A correction of 47% is made from the present period

for any shock or change in the independent variable that disrupted the equilibrium in the past. We find that trade openness and economic growth have a direct relationship over the long run, with a considerable influence at the 1% level. This means that an increase in the trade openness index by 1% over time leads to an increase in economic growth by 1.32%, which aligns with the study's hypothesis. 6- Autocorrelation and heteroscedasticity tests in the ARDL model

The Breusch-Godfrey LM serial correlation test and the ARCH heteroscedasticity test are used to examine the estimated models for the relationship between trade openness and economic growth to ensure they are free from the problem of autocorrelation (serial correlation between values) and heteroscedasticity at the 5% significance level.

Table 7: Autocorrelation and Heteroscedasticity Test

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.534312	Prob. F(2,25)	0.5926
Obs*R-squared	1.311768	Prob. Chi-Square(2)	0.5190
Heteroskedasticity Test: ARCH			
F-statistic	0.100787	Prob. F(1,29)	0.7532
Obs*R-squared	0.107364	Prob. Chi-Square(1)	0.7432

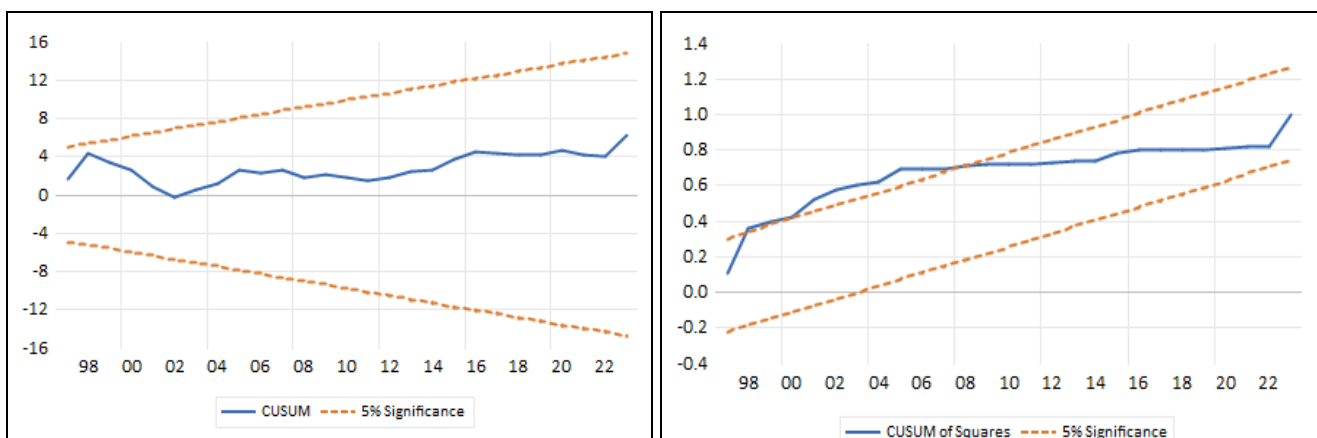
Source: The researcher's preparation, made with statistical software (12.EViews)

It is clear from the tables (7) above that the estimated (ARDL) models for the relationship between trade openness (TRADE) and economic growth (GDP) are free from the issues of autocorrelation and heteroscedasticity.

6. Test for the stability of the predicted models (CUSUM), (CUSUM Squares)

One of the critical tests to ensure that the data used in the study is free from structural changes is the stability test for the estimated (ARDL) model. This is done using two tests: the first is the cumulative sum of residuals (CUSUM), and

the second is the cumulative sum of squares of residuals (CUSUM of Squares). The presence of any structural changes in the data and the degree of stability and consistency of long-term parameters with short-term parameters are two critical issues clarified by these two tests, which are among the most important tests. The ARDL technique is usually followed when conducting such tests. If the graphs of the CUSUM SQ and CUSUM tests fall within the critical boundaries at the (5%) level, all estimated parameters are stable and there are no structural changes, as shown below in Figure (2):



Source: The researcher's preparation, made with statistical software (12.EViews)

Fig 2: Stability test of the estimated model

It is clear from Figure (2) and the CUSUM part that the cumulative sum of residuals lies within the critical value

limits at the (5%) level, indicating the stability of the estimated parameters in the short term. Meanwhile, the

CUSUM of Squares part shows that the cumulative sum of squared residuals has exceeded the critical value limits. The graph indicates that the cumulative sum of squared residuals deviated from the critical value limits in the year (1998). (2008). This indicates the presence of a structural break in the values and the instability of the estimated parameters in the long term.

Conclusion

1. The results of the (ARDL) test showed that the adjusted R-squared (Adj.R2) indicates that trade openness explains approximately (97%) of the changes in economic growth. Additionally, the overall probability of the model was (0.0000) according to the (F) test, which means that the model is significant and statistically valid, and can be relied upon in the future for planning purposes.
2. The results showed a long-term relationship (cointegration) between both trade openness and economic growth at a significance level of (2.5%) according to the bounds test.
3. The short-term results indicated a positive and significant relationship between trade openness and economic growth, and that an increase in the trade openness index by (1%) leads to an increase in economic growth by (0.91%). This result is consistent with the study's hypothesis that trade openness is positively related to economic growth.
4. The results showed that the value of the error correction coefficient was (-0.47), which is a negative value and statistically significant at the (1%) level. This indicates a direct and statistically significant relationship between trade openness and long-term economic growth, and that short-term deviations are corrected by (47%) towards the long-term equilibrium value in the same year.
5. The long-term results showed a clear correlation between trade openness and economic growth, with a significant impact at the (1%) level, meaning that an increase in the trade openness index by one unit in the long term leads to an increase in economic growth by (1.32%). This result is consistent with the study's hypothesis.
6. The long-term results indicated a direct relationship between trade openness and economic growth, with a significant impact at the (1%) level. This means that an increase in trade openness by (1%) leads to an increase in economic growth by (1.32%). This result is consistent with the study's hypothesis.
7. Autocorrelation and heteroscedasticity tests showed that the model does not suffer from autocorrelation and heteroscedasticity issues.
8. The stability tests (CUSUM) and (CUSUM of Squares) showed parameter stability in the short term but suffered from instability and inconsistency at the beginning of the study period in the long term .
9. The presence of a one-way causal relationship between trade openness and economic growth according to the test. (Granger).

Suggestions

1. Enhancing economic growth, especially through trade openness and reaping its benefits by encouraging high-value and export-oriented industries, diversifying and

growing the industrial base, and achieving trade surpluses capable of boosting regional trade and the trade balance.

2. Benefiting from trade openness by strengthening the connection between the Turkish economy and the global economy in order to rapidly transition from the group of middle-income countries to a new model of economic growth, growth driven by innovation and technological advancement after the end of the phase of growth driven by structural change.
3. Highlighting the elements of development success that have helped the Turkish economy achieve its goals, most notably economic stability, attracting foreign investment, economic reforms, wise and successful economic policies, and integrating them into current development plans.
4. A country should pay attention to the trade openness index, which is important for increasing exports by removing customs restrictions, creating new opportunities for economic institutions either directly or indirectly, linking global institutions with local institutions, and working on transferring modern and appropriate technology through trade openness, which in turn leads to increased economic growth.

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