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Factors affecting the foreign direct investment decision in Turkey during the period (1995-2019)

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ملخص

الهدف من هذه الورقة البحثية هو تحليل العلاقة بين مجموعة من العوامل تمثلت في: صافي تدفقات الاستثمار الأجنبي المباشر ، القوى العاملة، عدد الباحثين في البحث والتطوير و الآلات ومعدات النقل، التي تؤثر على قرار المستثمر الأجنبي عند اختياره لموقع المشروع الاستثماري في تركيا خلال الفترة (1995-2019)، وذلك باستخدام نموذج الانحدار الخطي المتعدد.

أظهرت النتائج أن هناك تأثير جد إيجابي لعامل الآلات ومعدات النقل على قرار الاستثمار الأجنبي المباشر في تركيا ، بينما هناك تأثير ضعيف لعدد الباحثين (لكل مليون شخص)، وتأثير جد ضعيف بالنسبة للقوى العاملة على الاستثمار الأجنبي المباشر في تركيا خلال فترة الدراسة.

الكلمات المفتاحية: الاستثمار الأجنبي المباشر؛ قرار الموقع ، نموذج الانحدار الخطي المتعدد.

تصنيف JEL: F21، F23.

Abstract:

The objective of this research paper is to analyze the impact of factors (net foreign direct investment flows, number of researchers in research and development, number of workers, machinery and transportation equipment) on choosing the location of the investment project and the investor's decision in Turkey during the period (1995-2019) by using multiple linear regression models

The results revealed that there is a significant and positive effect of the added value of the Engines and Transport on the level of FDI in Turkey, whereas, there is a negligible effect of the number of Scientist (per million persons) and number of workers on the FDI.

Keywords: *Foreign direct investment; decision location; multiple linear regression model.*

Jel Classification Codes : *F21; F23.*

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I. Introduction

Selecting and determining the location of an investment project is one of the most important and difficult decisions facing the investing companies, on which the success or failure of the project depends, and this is due to the size of the financial investments invested in the mentioned projects. This decision is objective and accurate, especially if there are alternatives that can be compared through based on a detailed and complete study that includes all aspects of the site, as the comparison between these sites is done according to objective considerations and thus choosing the site that meets the required conditions.

There are many factors influenced by the choice of the site, which must be taken seriously, classified into tangible factors such as cost factors, machinery and equipment, human resources, and intangible such as environmental factors, political ... etc., and each factor has an importance that distinguishes it from other factors.

These factors differ from one area to another, depending on the project to be completed, so we will address through this research paper to identify the influence of a group of factors on the decision to select the location of the investment project in Turkey.

The aim of this research paper is to analyze the relationship between factors (the net flows of the FDI, the labor forces, the number of researchers in Research & Development, Machinery and transport equipment) influencing the selection of the investment project site and the investor's decision by highlighting:

- Presenting concepts about foreign direct investment, and the foreign direct investment site decision.
- Analytical study of a factors that affect the decision to choose a site in Turkey during the period of time extending from 1995 to 2019.

II. Previous studies

There are many studies that have discussed the issue of the foreign investment site decision, and each study has an important scientific addition despite the differences in its results. (Donald J, 1977) has studied the implications of face-to-face commercial transactions within the agglomeration economies, by developing a model for the decision to locate the company, and this model assumes that transactions can only occur face to face, and thus require travel by people with High skills, and intermediate and final products may also need to be transferred, so when choosing a site, each company will focus on travel costs between one site and all other sites. As for (Dunning, 1980), he identified the main features of the selective theory of international production and sought to assess the importance of the variables related to ownership and

location by explaining the industrial pattern and geographical distribution of the sales of 14 companies belonging to the United States specialized in the manufacturing industry in seven countries for the year 1970, Where the independent variables were divided into three categories:

- The ownership variables suggested by the industrial organization theory;
- Country-specific variables based on trade and location theory;
- General performance indicators.

While (Krugman, 1991) used a simple model, showing how a country can internally differentiate between an industrial location and a geographical setting, he found that in order to achieve economies of scale, while reducing transportation costs, manufacturing companies like to locate in the region where the demand is greatest; But the location of the demand itself depends on the distribution to the sector of the manufacturer.

In a study by (Wheeler & Mody, 1992) in which they addressed manufacturing investments by US multinationals in the 1980s, their results indicated that agglomeration economies were indeed the dominant influence on investors, and that short-term incentives had a clear effect on site selection.

While both (Cheng & Kwan, 2000) estimated the effects of the determinants of foreign direct investment (FDI) for a sample of 29 Chinese regions from 1985 to 1995, and found that the large regional market, good infrastructure, preferential policy and education have a positive effect, While the cost of wages has a negative impact on foreign direct investment.

On the other hand, the study conducted by (Miroslav N, 2003) indicated that market size, accumulated knowledge, innovation, presence of advanced clients, and low transportation costs play an important role in improving the advantages of certain sites, as global competitiveness often depends on knowledge and skills. Local capabilities are highly concentrated, which can be found through the geographic focus of a group of companies. Each of (Macarthy & Atthirawong, 2003) extracted a comprehensive set of factors that may affect the decisions of the international site, which were represented in the most important five main factors that strongly affect it, which are: costs, infrastructure, business characteristics, government and political factors, and economic factors. Ten main sub-factors have also been identified, which are: the quality of human resources, availability of transportation, quality of transportation, availability of human resources, quality of facilities, rates of wages, motivation of workers, communication systems, government stability, industrial relations laws, in addition to the presence of sub-factors that include patent protection, availability of management resources, specific skills, system costs, and integration, these

factors that have been identified have implications for management practice, and on policy-making by governments and other agencies, and on Academic research in international operations.

(Head & Mayer, 2004) listed the options for the locations of Japanese multinational companies in the European Union, as it was found that market potential is the most important determinant compared to labor costs or taxes, and in this regard, the results of the study (Buch, Jörn, Alexander, Farid, James R., & Karen-Helene, 2005) showed that the main objective of the presence of German companies abroad is the important markets, at the macro level, where they found that in a market size greater than 1%, 1% more activity is related to German companies in this Site. (Beata Smarzynska & Spatareanu, 2005) noted to the impact of labor market flexibility on foreign direct investment flows in 19 Western and Eastern European countries. The analysis in this study was based on the data of new investment companies that occurred during the period 1998-2001, and it was found that increased flexibility in the labor market in the host country in terms of absolute value, or in relation to the labor market in the country of origin of the investor, is associated with larger inflows of foreign direct investment.

In another study by (Alejandro N & Ernesto M, 2006), they dealt with the effectiveness of direct government effects in selecting the site, as they relied on the analysis on data on 100 companies, taken from the largest 1000 companies in the Philippines. They concluded that of the thirty-four factors generally believed to influence the siting decision, only four are important, which can be divided into: transportation, energy, information and communication, and the material requirements of the factory. And it applies to some extent equally, to local and foreign companies, which means that there is not much difference in their domestic behavior, nor generally direct government interventions can be considered decisive in site selection.

Both (Tarun, Ambalika, & Tripti, 2009) relied in their study on developing a framework for companies located within the special economic zones in India, and evaluating the impact of the site on the competitiveness of the company, by identifying the basic and subsidiary variables that affect the competitiveness of the company's site, and that lead to the superior performance of the company,the results indicated that the site's competitiveness has a major influence on the strategic decision of industries. Also (Zbigniew & Katarzyna, 2015) explained the possibilities and advantages of the site for cities, as well as other factors that affect direct investments, by displaying the sites of individual Polish cities, as it appeared that the headquarters is affected by many factors, including competitiveness, which is improving By continuous research, in addition to

searching for new directions to develop effective regional units, especially in the circumstances of globalization.

The study of (Belkhodja, Muhammad, & Egide, 2016) dealt with the factors that determine investors 'choice of economic zones in China on the one hand, and other cities on the other hand. This study showed that choosing a location for foreign direct investment is sensitive in various economic regions in China, as well as in the country of origin of foreign direct investment, based on a data set consisting of 1218 observations, and the researchers concluded that the protection of intellectual rights, economics of agglomeration, investments in education, And the gross domestic product, all affect the choice of location for foreign direct investment in China.

However, these options differ according to the origin of foreign direct investment, and also (Daniel, Agnieszka, & Boleslaw, 2016) tried to determine the most important factors for selecting the site for foreign and domestic investors using statistical methods for data for the provinces of Lower Silesia, Opole and Silesia for the period from 2000 to 2009. The results showed the different factors for determining the location of hotels financed by national and foreign capital. In the case of hotels of national capital origin, they include planning investment incentives and administrative investment incentives, intensifying competition, providing tourism services in gastronomy, arts and entertainment, as well as the availability of investment properties. Whereas in the case of hotels with foreign and mixed capital, it appeared that the degree of internationalization of the economy and urbanization are important factors, of statistical significance, that affect the determination of the location of the investment, On the other hand, the researcher (Min, 2017) argued about the importance of the site strategy, as it is an important and successful condition for the investment of multinational companies in China, and she used the site performance model for multinational companies, which was tested, based on a sample of 216 joint projects of multinational auto companies in China. It found the relationship between locator and multinational performance to be important and positive, and supported by the performance of the local partner.

The results of the report (Konstantinos, David, & Isabel, 2017) showed that there is a relationship between the quality of the various economic structures of the host country and the inflows of foreign direct investment. These results are strong according to the economic specifications, and they are confirmed when the sample is limited to the eurozone countries only, and on the other hand. On the other hand (J. Francois, 2018) touched upon the preferred sites of foreign companies affiliated with the largest financial groups, which are headquartered in emerging countries, and identified some of the advantages of the location for

these host countries, and adopted in the analysis of the internationalization process for these groups on the list of financial groups Major classified by total assets. The factors affecting the selection of these sites were classified by the multinational companies, which are: resources, market research, efficiency search variables, and cultural variables, The results indicated that companies prefer to invest in foreign sites where no focus is placed on cultural dimensions, and that other factors, such as the role of efficiency, political risk, and government effectiveness in host countries have a strong influence on the determinants of the internationalization process.

The study (Chol, 2020) also dealt with the determinants of the locations of the inflow of foreign direct investment in Sudan during the period 1980-2018 (market size, infrastructure, inflation, debt, false investment incentive, and openness of trade conditions). The results revealed that there is a short-term causal relationship between the independent variables and foreign direct investment, and that the gross domestic product, external debt, investment incentives, and inflation are important determinants of foreign direct investment flows to Sudan.

(Al Qur'an, 2020) explored the factors contributing to the selection of foreign markets by Arab international companies, where the researcher adopted the multiple case study method, and seven decisions regarding the selection of the international market (IMS) were analyzed, by relying on personal interviews, archival data, and field notes as secondary data sources, showing the existence of four critical factors that contribute to the selection of international markets by Arab companies, meaning the international business experience of the selected management team, identification of potential international markets, internal and external consultation with international business experts and the appointment of a manager who is worthy Confident and internationally experienced.

Overall, relying on previous studies of this topic highlights the large gaps in the study of investment decisions, most notably the absence of any major attempt to integrate all the variable factors into a comprehensive model for measuring the required impacts.

III. The theoretical framework of the study

III.1 Foreign direct investment site

Relative to Camangi, the site (location) is a system of local technological external factors, meaning a set of tangible and intangible factors, and it is also a system of economic and social relations, which contribute to the formation of social capital within a specific geographical area, as it is a local governance that brings together society and a group of actors From the private sector and the

local public administration system (Camagni, 2002, p. 554).

It could also be:

- Administrative region *(*area),
- A limited area in which a certain population lives, or it can be a country, or an area that defines any social space that a population appropriates, regardless of its size (Noureddine, 2010, p. 16).

III.2 Foreign direct investment location decision

The decision to establish a direct investment site decision FDI company in a specific location is closely linked to aspects to aspects related to the strategy of multinational companies, including internationalization and entry decisions, so it is important to understand how this strategy helps decision-making related to the location of the FDI (Fiona, 2012, p. 16). Often companies choose a single site from among the alternatives that exist, because it contains opportunities and a set of special features, which are assumed to influence future profit, and the site selection is where companies expect to increase their profits in the future, and therefore, this decision should not be taken randomly (Falck, 2014, p. 290).

The location decision can be defined as a commitment to work, and according to Brunet and others, the site decision is the act of selecting by the company for a geographical location to conduct its activity (Bertrand, 2004, p. 19)**.**

III.3 Critical factors in international location decisions

To determine the factors that may affect the decisions of the international site, we will rely on the results of the study (MacCarthy, 2003) Delphi, which employed an international team of experts, to investigate the factors that affect international positioning decisions, as follows:

Table (01): Major criteria and sub-factors affecting international location decisions

Major factors	Sub-factors
Costs	Fixed costs; transportation costs; wage rates and trends in wages; energy costs; other manufacturing costs; land cost; construction/leasing costs and other factors (e.g. R&D costs, transaction and management costs etc.
Labor characteristics	Quality of labor force; availability of labor force; unemployment rate; labor unions; attitudes towards work and labor turnover; motivation of workers and work force management
Infrastructure	Existence of modes of transportation (airports, railroads, roads and sea ports); quality and reliability of modes of transportation; quality and reliability of utilities (e.g. water supply, waste treatment, power supply, etc.) and telecommunication systems

Proximity to suppliers	Quality of suppliers; alternative suppliers; competition for suppliers; nature of supply process (reliability of the system) and speed and responsiveness of suppliers
Proximity to markets/customers	Proximity to demand; size of market that can be served/potential customer expenditure; responsiveness and delivery time to markets; population trends and nature and variance of demand
Proximity to parent company's facilities	Close to parent company
Proximity to competition	Location of competitors Quality of life
Quality of life	Quality of environment; community attitudes towards business and industry; climate, schools, churches, hospitals, recreational opportunities (for staff and children); education system; crime rate and standard of living
Legal and regulatory framework	Compensation laws; insurance laws; environmental regulations; industrial relations laws; legal system; bureaucratic red tape; requirements for setting up local corporations; regulations concerning joint ventures and mergers and regulations on transfer of earnings out of country rate
Economic factors	Tax structure and tax incentives; financial incentives; custom duties; tariffs; inflation; strength of currency against US dollar; business climate; country's debt; interest rates/exchange controls and GDP/GNP growth, income per capita
Government and political factors	Record of government stability; government structure; consistency of government policy; and attitude of government to inward investment
Social and cultural factors	Different norms and customs; culture; language and customer characteristics
Characteristics of a specific location	Availability of space for future expansion; attitude of local community to a location; physical conditions (e.g. weather, close to other businesses, parking, appearance, accessibility by customers etc.); proximity to raw materials/resources; quality of raw materials/resources and location of suppliers

Source: (MacCarthy, 2003, p. 797)

III.4 Foreign investments in Turkey

With its strategic location, modern logistic infrastructure, broad production potential, etc., Turkey is a center of attraction for international investors looking to capitalize on the country's access to a giant market of 1.3 billion people and US$26 trillion worth of trade volume within a four-hour flight radius. The Strategy's main target is to increase Turkey's foreign direct investment ("FDI") performance both in terms of quantity (targeting 1.5% of the global FDI market as of 2023) and quality, and in particular to increase knowledge-intensive, high-value-added investments that also create high-quality employment (Ural & Sila, 2021).

IV. The Empirical Study

IV.1 Methodology

Before the study and presentation of the results, we will present the variables, the model used in the study, and the statistical data source.

- ***Variables:***

The dependent variable:

- FDI: the net flows of the FDI

The independent variables:

- workers: the labor forces (number of workers in all sectors);
- Scientists: the number of researchers in Research & Development;
- Engines: Machinery and transport equipment (% of value added in manufacturing).

Hence, the relationship between the dependent variables and independent variable is:

FDI= f(Engines, workers, Scientists).

- ***Model***

To measure the impact between the factors affecting the foreign direct investment site selection decisions and foreign direct investment, the multiple regression model was estimated.

$$FDI_t = c_0 + c_1 Engines_t + c_2 Workers_t + c_3 Scientists_t + \varepsilon_t \quad t: 1995, \dots, 201$$

- ***Data***

We obtained statistical data related to the study variables from the World Bank database, by relying on international development indicators.

IV.2 Results and discussion

IV.2.1 Data Description

Table (02): Summary Statistics of the study variables

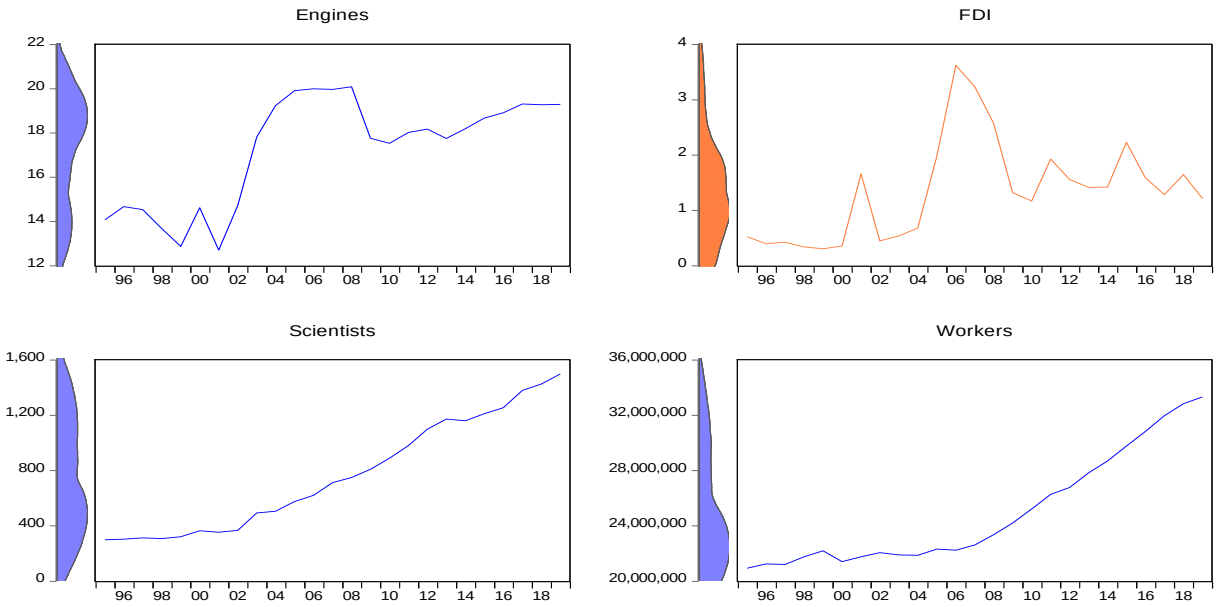
	Engines	Fdi	Scientists	Workers
Mean	17.27375	1.355526	767.2683	24988403
Median	18.02597	1.322249	713.8048	22626118
Maximum	20.08896	3.623502	1499.291	33318941
Minimum	12.70686	0.305399	300.125	20943301
Std. Dev.	2.454266	0.90234	409.0465	4084996
Skewness	-0.605105	0.824812	0.347605	0.837993
Kurtosis	1.880296	3.188858	1.688035	2.250092

Jarque-Bera	2.831609	2.871802	2.296427	3.511763
Probability	0.24273	0.237901	0.317203	0.172755

Source: Output of Eviews program (V12)

Table 2 summarizes the descriptive statistics of the variables under study, where we focused on the mean, maximum, minimum, standard deviation and the form indicators (skweness and kurtosis). Starting with the foreign direct investment (FDI) which is measured in this study by the percent of the real GDP of Turkey, the average value over the period (1995 to 2019) is 1.35% and the maximum value is 3.62 % that was recorded in 2006 and the min value was 0.3 % in 1999. In term of variation, the standard deviation of the FDI was 0.902 % that showed a high dispersion of the FDI in Turkey over this period. For the Engines, that captures the percent of the added values in the sector of Industry in Turkey, the mean value is 17.27% and the range of values is 12.70 (as min) to 20.08 (as max), we found a small variation over the study period of this variable; a thing that was confirmed by the estimate of the standard-deviation (2.45). Concerning the number of Scientists (per million persons), the average is 767 per 106 persons, but the recent number in 2019 was 1499 scientists per 106 persons, the same pattern can be noted for the number of workers. According to the form of the data distribution for the set of variables, we can accept the hypothesis of normal distribution of the four time series as the p. values of the Jarque & Berra test are all greater than the level of 0.05, see the last line in Table2.

Figure (01): Plots of the study variables over the period (1995-2019)



Source: Output of Eviews program (V12)

At first comment the four time series exhibited a non-stationary process over the study period, we see that the foreign direct investment (as a percent of the whole GDP of Turkey) followed a an alternate trajectories of variations from increasing to decreasing in a short period of time, we noted that the highest amounts of the FDI in Turkey were in the five years 2004 to 2009. In the case of the number of scientists (per million persons) and the number of workers they showed the same pattern of increase over the period (1995 to 2019), in contrast, the Engines (which represents the added value of the Engines and Transport equipments in the sector of Industry) has two different regimes of evolution, the first one was in the sub-period (1999 to 2002). For the modeling purpose, we need to check out the stationary of the time series under study, consequently, to test the hypothesis of stationary the Augmented Dicky-Fuller test was applied and results are depicted in next section.

IV.2.2 The study of Stationary Time series

Table (03): Dicky-Fuller Unit-Root test

	Level			First (Trend) Difference		
Series	**None**	**Intercept**	**Intercept & Trend**	**None**	**Intercept**	**Intercept & Trend**
ENGINES	0.8657	0.5759	0.7678	0.0042	0.0002	0.0213
FDI	0.2949	0.2331	0.5043	0.0023	0.0001	0.0113
SCIENTISTS	1.0000	0.9997	0.3123	0.0044	0.3046	0.0032
WORKERS	0.9921	1.0000	0.9740	0.7844	0.6362	0.0176

Source: Output of Eviews (V12) program.

The results of the unit root testing have been summarized in Table 3. As we can see, the four time series are not stationary at level (for the three models of the ADF test), this is clearly showed by the p. values of the tests that are all greater than the level of 0.05. After that the first differentiation was applied to the whole time series, and we applied second time the ADF test to check if the transformed time series became stationary, the results showed that all of them are stationary, as the p. values of the ADF test were all below the level of 0.05.

IV.2.3 Estimation Results

After the study of stationary, the following multiple regression model has been estimated via the EVIEWS (V12) program,

$$FDI_t = c_0 + c_1 Engines_t + c_2 Workers_t + c_3 Scientists_t + \varepsilon_t \quad t: 1995, \dots, 2019$$

Where:

- FDI: is the net flows of the FDI (measured by the percentage of the GDP);
- Workers: is the labor forces (number of workers in all sectors);
- Engines: represents the added value of the Engines and Transport; equipments in the sector of Industry;
- Scientists: is the number of Scientists (per million persons);
- ε_t: is the errors term.

Table (04): Estimation of multiple regression model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENGINES	0.239239	0.053760	4.450116	0.0002
SCIENTISTS	0.001371	0.000486	2.820211	0.0100
WORKERS	-1.53E-07	4.44E-08	-3.449918	0.0023
R-squared	0.525974	Mean dependent var		1.355526
Adjusted R-squared	0.482880	S.D. dependent var		0.902340
S.E. of regression	0.648882	Akaike info criterion		2.085034
Sum squared resid	9.263046	Schwarz criterion		2.231299

Source: Output of Eviews (V12) program

The estimate of the regression model is summarized in Table 4, where we included three variables in aim to estimate and analyze their effects on the level of the foreign direct investment in Turkey over the period (1995-2019). The first estimated model included all the three explanatory variables and the constant term, but the results were not suitable, see Table (A) in Appendix, as a statistical solution, we drop out the intercept form the model and the results were better than the first model, see Table (B) in Appendix.

As a technical analysis, the three explanatory variables (the number of Workers, number of Scientists and the Engines) explain together 52.59% of the variation in the FDI variable; this percent is the determination coefficient (R-squared in Table3). Furthermore, the p-values of t-Students of the three parameters are smaller than the significance level of 0.05, beside that the detailed

estimate of the three parameters is showed in Table 4 that contain the point estimate and the 90%, 95% and 99% Confidence Intervals (CI).

Table (05): Estimate of the three parametres

		90% CI		95% CI		99% CI	
Variable	Coeffici	Low	High	Low	High	Low	High
ENGINES	0.239239	0.146925	0.331552	0.127747	0.350730	0.087702	0.390775
SCIENTISTS	0.001371	0.000536	0.002205	0.000363	0.002379	7.07E-07	0.002741
WORKERS	-1.53E-07	-2.30E-07	-7.70E-08	-2.46E-07	-6.12E-08	-2.79E-07	-2.81E-08

Source: Output of Eviews (V12) program

In terms of the economic analysis of the estimate results, we found a positive effect of the added value of the Engines and Transport on the level of the Foreign Direct Investment (FDI), each increase of the Engines by 1% could generate an increase in the FDI by 0.239% (ceteris paribus). For the rest variables, we found a weak positive effect of the number of scientist on the FDI over the study period, the corresponding coefficient is 0.0013; that means an increase by 1 scientist (per million persons) could generate an increase of the FDI by 0.0013. The variable of the number of workers has a very small effect (a negligible) on the level of FDI, that means the workers is not a real attractor of the FDI in the case of Turkey over the study period.

IV.2.4 Analysis of the Goodness of Fit

We reply here that the process of analyzing the goodness of fit of a statistical model is to summarize (via a set of statistical tests) the discrepancy between observed values and the values expected under the model in question. In the context of this study, we test the correlation of residuals, the assumption of Heteroskedasticity, the multicollinearity and the model stability including the estimate coefficients.

Table (06): Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.510804	Prob. F(2,20)	0.1065
Obs*R-squared	5.017271	Prob. Chi-Square(2)	0.0814

Source: Output of Eviews (V12) program.

According to the LM test, the p. value of the Fisher test is 0.1065 and it's greater than 0.05, so we accept the null hypothesis of no serial correlation at up to 2 lags.

Table (07): The ARCH test of Heteroskedasticity

F-statistic	0.079411	Prob. F(1,22)	0.7807
Obs*R-squared	0.086319	Prob. Chi-Square(1)	0.7689

Source: Output of Eviews (V12) program**.**

To check the homogeneity of variance of the errors terms, the ARCH test was applied, and the results of the test indicated that the p-value of the Fihser test is 0.7807 and it's greater than 0.05, so we accept the hypothesis of the Homoscedasticity in the residuals variances, see the full test results in Table (C) in Appendix**.**

Table (08):Variance Inflation Factor

Variable	Coefficient Variance	Uncentered VIF
ENGINES	0.00289	52.1961
SCIENTISTS	0.00001	10.5086
WORKERS	0.00002	75.1133

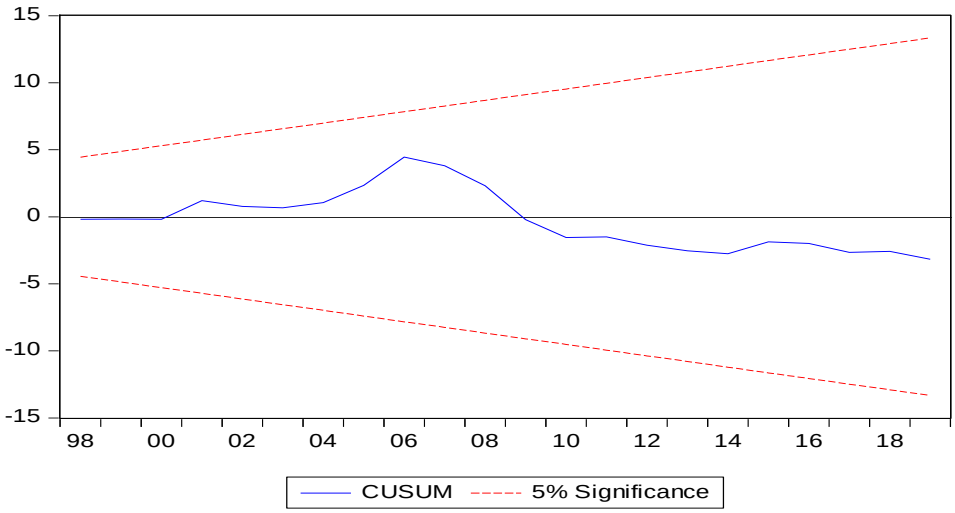
Source: Output of Eviews (V12) program.

Table 8 summarizes the estimate results of the Variance Inflation Factor (VIF) of the coefficients in the model, the VIFs indicate the degree that the variances in the regression estimates are increased due to multicollinearity. Consequently, results showed that all the VIF values are lower than 2.45, this indicate the absence of multicollinearity in the regression model.

IV.2.5 Stability of the model

To test the stability of the estimated model and the corresponding coefficients, the CUSUM tests have been applied; noted that the general idea of this test is to study the evolution over time of the normalized forecast error; and the CUSUM (Cumulative Sum) will therefore be based on the cumulative sum of the recursive residuals.

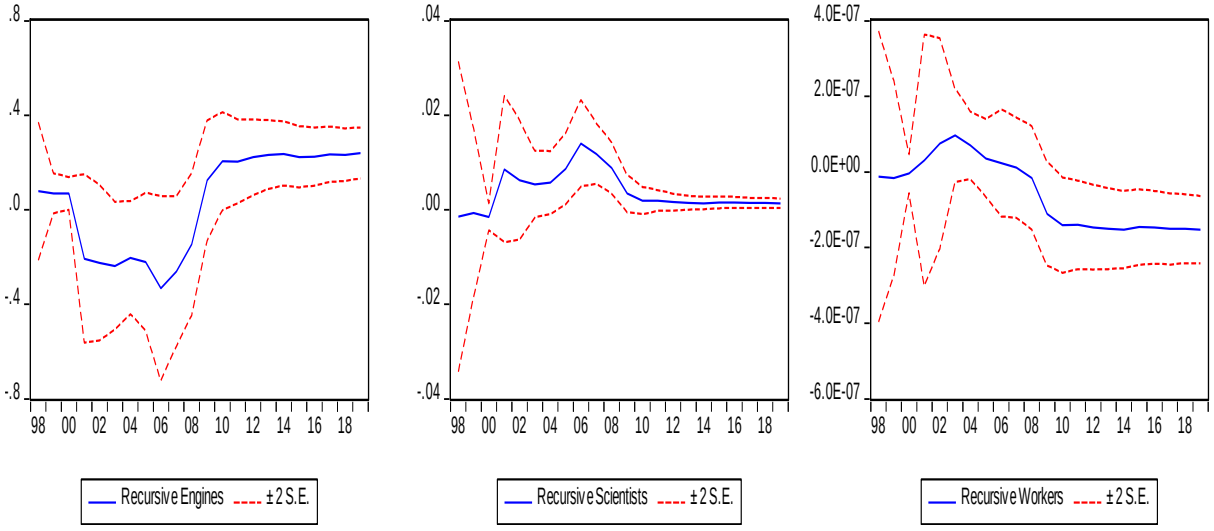
Figure (02): The CUSUM Stability test of the model



Source: Output of Eviews program (V12)

The plot of CUSUM statistics in Figure 2 showed that the values of the test remain in their interval; therefore, we generally reject the hypothesis of a structural change. Thus, we can conclude that the model of the current study is stable; this is validated also for the three coefficients of the explanatory variables, with a slight departure of the coefficient of the Engines variable, see Figure3.

Figure (03): The CUSUM stability test of the estimate coefficients



Source: Output of Eviews program (V12)

V. Conclusion

This study deals with estimating the factors affecting the foreign direct investment decision in Turkey during this period (1995-2019). We focused on the following factors :(the net flows of the FDI, the labor forces, the number of researchers in Research & Development, Machinery and transport equipment) for

that a multiple linear regression models have been estimated.

The results revealed that there is:

- a significant and positive effect of the added value of the Engines and Transport on the level of FDI in Turkey,
- whereas, there is a negligible effect of the number of Scientist (per million persons) on the FDI.
- the number of workers has a very small effect (a negligible) on the level of FDI, that means the workers is not a real attractor of the FDI in the case of Turkey over the study period

IV. Bibliographie

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Appendices

Table(A) Full estimation results including all explanatory variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.788999	4.153884	0.671420	0.5093
ENGINES	0.181451	0.101842	1.781685	0.0893
SCIENTISTS	0.002664	0.001989	1.339772	0.1946
WORKERS	-2.65E-07	1.72E-07	-1.540784	0.1383
R-squared	0.535936	Mean dependent var		1.355526
Adjusted R-squared	0.469641	S.D. dependent var		0.902340
S.E. of regression	0.657136	Akaike info criterion		2.143794
Sum squared resid	9.068376	Schwarz criterion		2.338815
Log likelihood	-22.79743	Hannan-Quinn criter.		2.197885
F-statistic	8.084119	Durbin-Watson stat		1.533505
Prob(F-statistic)	**0.000906**			

Table(B) Full estimation results of the optimal model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENGINES	**0.239239**	**0.053760**	**4.450116**	**0.0002**
SCIENTISTS	**0.001371**	**0.000486**	**2.820211**	**0.0100**
WORKERS	**-1.53E-07**	**4.44E-08**	**-3.449918**	**0.0023**
R-squared	**0.525974**	**Mean dependent var**		**1.355526**
Adjusted R-squared	**0.482880**	**S.D. dependent var**		**0.902340**
S.E. of regression	**0.648882**	**Akaike info criterion**		**2.085034**
Sum squared resid	**9.263046**	**Schwarz criterion**		**2.231299**
Log likelihood	**-23.06293**	**Hannan-Quinn criter.**		**2.125602**
Durbin-Watson stat	**1.535538**			

Table(C) : Full result of the ARCH test

Heteroskedasticity Test: ARCH				
F-statistic	0.079411	Prob. F(1,22)		0.7807
Obs*R-squared	0.086319	Prob. Chi-Square(1)		0.7689
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 10/23/21 Time: 15:23				
Sample (adjusted): 1996 2019				
Included observations: 24 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.363109	0.158071	2.297130	0.0315
RESID^2(-1)	0.059741	0.211998	0.281800	0.7807
R-squared	0.003597	Mean dependent var		0.385869
Adjusted R-squared	-0.041694	S.D. dependent var		0.652210
S.E. of regression	0.665668	Akaike info criterion		2.103604
Sum squared resid	9.748511	Schwarz criterion		2.201776
Log likelihood	-23.24325	Hannan-Quinn criter.		2.129649
F-statistic	0.079411	Durbin-Watson stat		2.037243
Prob(F-statistic)	0.780731			

Table (D) Full Results of the Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:				
Null hypothesis: No serial correlation at up to 2 lags				
F-statistic	2.510804	Prob. F(2,20)		0.1065
Obs*R-squared	5.017271	Prob. Chi-Square(2)		0.0814
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 10/23/21 Time: 15:24				
Sample: 1995 2019				
Included observations: 25				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENGINES	0.000349	0.050412	0.006918	0.9945
SCIENTISTS	2.40E-05	0.000457	0.052643	0.9585
WORKERS	-1.02E-09	4.17E-08	-0.024524	0.9807
RESID(-1)	0.321405	0.207113	1.551839	0.1364
RESID(-2)	-0.400405	0.207419	-1.930420	0.0679
R-squared	0.200674	Mean dependent var		0.002792
Adjusted R-squared	0.040809	S.D. dependent var		0.621250
S.E. of regression	0.608442	Akaike info criterion		2.021027
Sum squared resid	7.404037	Schwarz criterion		2.264802
Log likelihood	-20.26283	Hannan-Quinn criter.		2.088640
Durbin-Watson stat	2.289974			