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MACROECONOMIC DETERMINANTS OF MIGRATION: AN EMPIRICAL ANALYSIS FOR TURKIYE

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Abstract. International migration is an increasingly widespread phenomenon of our age with macroeconomic determinants. There are many economic and non-economic forces behind the decision to migrate. This study estimates the impact of macroeconomic determinants on international migration to Turkiye. Turkiye's annual data for 1990-2023 were used in the econometric analysis. The economic determinants used in this study are total tax burden, social assistance, GDP per capita, economic freedom index, unemployment, and health expenditures. Time series regression models were used in the analyses specific to Turkiye. Johansen cointegration tests were conducted to analyze the existence of a long run relationship between the variables. In addition, dynamic least squares (DOLS) and fully adjusted least squares (FMOLS) estimation methods were used to determine long run coefficients. The findings obtained from the Johansen cointegration analysis confirmed a long run cointegration relationship between the variables. FMOLS consequences indicate that real gross domestic product per capita, economic freedom index, tax burden, social assistance, and unemployment rate have a robust and significant effect on international migration to Turkiye in the long run. The DOLS analysis results also show that health expenditures have a positive impact on international migration. The results of this study can be used to develop migration projections and create migration policies that can lead to better economic and social integration among immigrants.

Keywords: migration, macroeconomics indicators, tax, social assistance, cointegration tests.

JEL Classification: F22, C01, H00, H23

1. Introduction

The phenomenon of migration is often explained as a permanent or semi-permanent change of residence. International migration is moving to a different state, country, or continent. The basis of the phenomenon of migration is that people living in any part of the world move to other places to make a living. Migration is a complex phenomenon that includes economic and demographic components. As a result of the increasing connectivity between countries and continents, migration has become an ongoing political and economic problem worldwide. There are many economic and social reasons behind the decision to migrate. Migrants may leave their home countries due to deteriorating economic conditions or political unrest. Conversely, migrants are often attracted to places with high wages, good health care, strong education systems, or cultural proximity. Individuals weigh the net benefits of migration against the costs when making decisions. By better understanding which forces (e.g. demographic characteristics, migrant networks, and economic conditions) affect particular migrant flows, policymakers can determine fiscal and economic policies to target (or reduce) certain types of migrants.

Factors related to the region, financial, economic, and social conditions related to the place to be migrated, obstacles that may occur in the process, and personal factors are considered to be the elements that affect the idea of migration and the migration process. Individuals may be motivated to leave their home country and move to another country to start a new life to obtain a higher standard of living, a better chance of finding a job, or a more comfortable security network. Other factors such as public facilities that increase the quality of life (e.g. social aids, health services), a democratic political system, providing higher income, and access to a better education and security system may also play a role in this mobility (Chen and Fang, 2013; Stark, 1990). To reduce the economic impact of the increasing number of immigrants in host countries, their social and economic integration is of great importance. As can be seen, immigrants, determinants of migration, and location elements are intertwined. When the effects of migration

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policies are evaluated, it is important to understand the basic determinants of migration patterns. When looking at the empirical research methodology of this subject, it is seen that different economic models are used to produce mixed results. It would be more accurate to determine migration policy by considering the various mechanisms that direct migrant flows. Discussions on the issue of migration have generally been shaped by the perception of whether migration is beneficial to the economic performance of the host country and/or the effects of migration on the labor market (unemployment and wages) (Gianluca, 2010).

What are the main trends and push/pull forces of international migration recently? Are borders "largely out of control" or are states generally effective in regulating migration and implementing fiscal policies? Questions such as these have preoccupied researchers. These questions give rise to current debates on migration. In this context, the macroeconomic determinants of migration and the effectiveness of migration policies have become quite controversial. Due to the chaotic situation caused by events such as civil war, political anxiety, diseases, and economic crisis(es) experienced especially in the Middle East and different parts of the world, international migration has recently become "forced migration" and the magnitude of migration has increased significantly (Meçik and Koyuncu, 2020). This study aims to investigate the macroeconomic determinants of international migration to Turkiye. In other words, what financial and economic reasons do migrants who migrate to Turkiye base their migration movement on? This question is sought to be answered. Based on this, the number of international migrations to Turkiye, taxes, transfer expenditures, national income per capita, unemployment rate, economic freedom index, and health expenditures were investigated and examined in the study. In the limited number of previous studies on migration to Turkiye, demographic, social, and economic consequences/relationships of migration were discussed. Still, they often focused on short run effects and specific immigrant groups. It is evaluated that the long run relationships between the variables were sought in the analysis and the push-pull factors in migration to Turkiye were discussed using different econometric techniques, which would increase the original value of the study and contribute to the existing literature.

The remainder of this study is organized as follows. In section 2, a brief theoretical information about migration is provided; in section 3, the literature review is discussed, in section 4, the details of the dataset and method are given, empirical results are presented and in section 5, the study is concluded.

2. Theoretical Framework

Migration has long been a significant force worldwide. In this context, many theoretical models have been developed to explain why international migration begins, and although each ultimately tries to explain the same thing, they initially refer to different concepts, propositions, and concrete information. Of these; *Ravenstein's Migration Theory* is based on generalizations focusing on individual rational choices that affect people's mobility from one place to another. Ravenstein focused on the push and pull factors of migration, individual characteristics of migrants, occupational fields, distance, and the feedback effect of any migration pattern using census data from England and Wales (Borjas, 1989; Haug, 2008). *In the Neo-Classical migration theory*, the economy focuses on differences in wage and employment status between countries and migration costs; migration movement is generally seen as an individual decision for income maximization. According to this theory, international migration, like domestic migration, occurs due to geographical differences in labor supply and demand. International migration of workers is caused by differences in wage rates between countries. The elimination of wage differentials would end the oscillation of labor, and in the absence of such differentials, migration would not occur. Central governments control migration flows by regulating or influencing labor markets in sending and/or receiving countries (Faist, 2000). In contrast, *the new economics of migration theory* addresses not only labor markets but also conditions in various markets. This approach views migration as a household decision to minimize risks to family income or overcome capital constraints in family production activities (Hagen-Zanker, 2008; Karemera, 2000). The basic insight of this new theory is that migration decisions are not made by isolated individual actors but usually by larger units of related individuals, such as families or households, in which people act together not only to maximize expected income but also to minimize risks and to relax constraints associated with various market failures, except in the labor market. However, in this approach, economic policies implemented by governments are also effective (Taylor, 1987; Kritz, et al., 2012).

Dual labor market theory and world systems theory often ignore such micro-level decision processes and instead focus on forces operating at much higher levels of aggregation. While the former attribute migration to the structural needs of modern industrialized economies, the latter sees migration as a natural consequence of economic globalization and market integration across national borders (Massey et al., 1993). *In network theory*, migration

networks are defined as interpersonal ties that link migrants, former migrants, and non-migrants across regions of origin and destination through kinship, friendship, and common community origins. *In migration systems theory*, multiple countries establish a migration system and chain of relationships through the reciprocal exchange of migrants. This chain of relationships can be established between two nearby countries or between countries and regions far apart (Castles and Miller, 1998; Çağlayan, 2006). *In push-pull theory*, migration motivations are summarized by considering how the relationship between two points (origin and destination) is affected by push and pull factors. Push factors are located at the origin and trigger migration; these include lack of economic opportunities, religious or political unrest, hazardous environmental conditions, etc. Pull factors are located at the destination and include the availability of jobs, religious or political freedom, and perception of a relatively benign environment. Pushes and pulls are complementary. That is, migration can only occur if the reason for migration (push) is satisfied by a corresponding pull at an accessible destination. In the context of labor migration, push factors are generally characterized by the lack of job opportunities in sending regions or countries, and pull factors are economic opportunities offered in receiving regions or countries. In this context, push factors are conditions that push people to leave their home country, while pull factors are conditions that encourage people to enter the destination country. In migration, there are also geographical movements such as involuntary migration due to natural disasters, war, or migration for marriage (Lee, 1966; Rani, 2018; Bijak, 2006; Simpson, 2017).

3. Literature

The topic of migration and its macroeconomic determinants has recently received considerable attention in the theoretical and empirical literature. For example, Withers and Pope (1985) examined Australian data for the period 1861 to 1991 using causality testing. The authors found that government policy changes and unemployment caused migration. Marr and Siklos (1994) investigated the relationship between migration and unemployment in Canada using annual data for the period 1926-1992 and showed an inverse relationship between migration and unemployment rates. Dolado et al. (1994) found empirical evidence that migration to OECD economies had an enhancing effect on growth during the period 1960-1985. Jennissen (2003), while investigating the economic determinants of net migration in Western Europe between 1960 and 1998, found that GDP per capita, unemployment, and average education level were positively correlated, while unemployment had a negative effect on individual country net migration. Angrist and Kugler (2003), in their study using panel data technique for 18 European countries during the period 1983-1999, found that immigrants had a negative effect on labor market employment. Mwajuba (2005), in his study investigating the reasons for the migration of Nigerians, found that 80% of the total pull factors were economic and 18% were educational. Mendoza (2006) examined the macroeconomic determinants of the increase in the number of Mexicans migrating to the USA using regional-level data and found that GDP per capita has a negative effect, while unemployment rates and permanent immigrant stocks have a positive effect on immigration growth rates using least squares regression. Morley (2006) investigated the causal relationship between immigration and economic growth per capita in Australia, Canada, and the USA during the period 1990-2002. The study using the ARDL approach found evidence of long run causality running from GDP per capita to immigration. Ghatak and Moore (2007) used Granger causality techniques on panel data from thirteen EU countries to examine the relationship between immigration and the European Union labor market. The study concluded that immigration has a significant negative effect on unemployment rates in the destination countries. Joan (2007) examined the effect of immigration on GDP per capita growth in 24 OECD countries during the period 1960-2005. Empirical evidence suggests that immigration has a negative impact on GDP per capita growth. Ahmed et al., (2008) investigated the macroeconomic determinants of international migration in Pakistan using time series data for the period 1973-2005 using inflation rate, real remittances, real wage rate, and unemployment rate as explanatory variables and found that all variables except real wage rate have positive relationship with migrant workers. Mariya and Tritah, (2009) investigated the effects of migration on income and productivity in host countries using panel data technique for 20 OECD countries during the period 1960-2005. Econometric findings showed that migrants have a positive effect on income and labor productivity in host countries. Jean and Jimenez (2011) evaluated migration and unemployment in 18 OECD countries during the period 1984-2003 and found that migration has no permanent effect on unemployment. Ortega and Peri (2012) stated that migration to 15 OECD countries due to the pull effect did not affect per capita income during the period 1980-2005. Chletsos and Roupakias (2012) applied cointegration analysis and Granger causality tests to determine the direction of causality between migration in Greece and two macroeconomic variables. The econometric results provide empirical evidence that GDP and unemployment growth rate Granger-cause migration. Ullah (2012) used a panel data model for 23 countries receiving immigration

from Bangladesh between 1995 and 2009 and concluded that cultural, socio-demographic, and economic factors have a positive effect on the decision to migrate to other destinations. Cooray (2012) included remittances in a growth model with other variables and examined the impact of remittances on economic growth in South Asia using panel data over the period 1970-2008. The study suggested that remittances have a significant positive impact on economic growth. Damette and Fromentin (2013) examined the impact of changes in immigration levels on unemployment in 14 OECD countries. The authors used data for the period 1960-2003 and a three-variable vector error correction model (VECM). The findings of their research show that an increase in the number of immigrants is likely to increase wages in the destination countries in both the short and long run. Moreover, there is no evidence that migration has a negative effect on unemployment. Boubtane et al., (2013) empirically examined the interaction between migration and the economic conditions of the host country. The researchers used the panel VAR technique using annual data from 22 OECD countries for the period 1987-2009. According to the findings, migration movements have a positive effect on GDP per capita, while it has a negative effect on unemployment. Ager and Brückner (2013) investigated the effects of mass migration to the USA between 1870 and 1920 and argued that cultural fragmentation in the USA states increased per capita production, while cultural polarization had the opposite effect. Strielkowski and Troshchenkov (2013) analyzed the effects of migration on unemployment rates in Denmark. The analysis used cross-sectional data for the period 2007-08-09 and concluded that non-Western international migration had no significant effect on unemployment rates. Bashier and Siam (2014) econometrically examined the effects of migrant workers on economic growth in Jordan for the period 1980-2012. According to the study, migrant workers had a positive effect on economic growth. Chamunorwa and Mlambo (2014) investigated the effects of migrant labor on unemployment in South Africa for the period 1980-2010. In the study conducted using the Least Squares (OLS) method, the results showed a positive relationship between migration and unemployment in South Africa. Asad et al., (2016) also found a long run relationship between economic growth, labor migration, and unemployment in Pakistan using time series data for the period 1975-2010. D'Albis et al. (2016) used monthly data for France for the period 1994-2008 using the SVAR technique and concluded that migration significantly responds to the macroeconomic outlook of France and also increases the GDP per capita.

Latif (2015) found that immigration had a significant positive effect on the unemployment rate in Canada during the period 1983-2010 using panel econometric techniques and that unidirectional short run causality runs from immigration to the unemployment rate. Georgiana Noja and Son (2016) conducted an analysis of 8 European countries for the period 2000-2014. According to the results, international migration has a negative effect on employment rates in the short run. Bove and Elia (2017) argued that immigration has a significant positive effect on real GDP per capita in their study for 1960-2010, specifically for developed countries. Lewis and Swannell (2018) found that GDP growth was the most important macroeconomic determinant of immigration to 160 countries during the period 1990-2013. Furlanetto and Robstad (2019) obtained empirical findings in their studies conducted with the SVAR method on Norwegian data in 1990-2014 that an external migration shock reduces unemployment. Altunç et al., (2017) investigated the relationship between GDP, inflation, unemployment variables, and external migration for Turkiye in 1985-2015. The Granger causality test result shows a bidirectional causality between external migration and GDP. In addition, unidirectional causality findings were obtained from growth to inflation, from inflation to unemployment, and from unemployment to growth. Dökmen and Tosuner (2019) discussed the effects of internal migration on public expenditures and taxes in the context of the Turkiye example in their study. According to the results of the dynamic panel data analysis, no statistically significant relationship was established between public expenditures and internal migration; a negative relationship was found between tax revenues and internal migration. In their study, Nurdoğan and Şahin (2019) examined the relationship between the number of foreigners living in Turkiye and unemployment in 1995-2019 using time series analysis. As a result of the empirical analysis, it was determined that the number of foreigners in Turkiye was the cause of unemployment. Engin and Konuk (2020) investigated the impact of international migration on unemployment and economic growth in Turkiye during the period 1995-2019. The results of the Johansen cointegration analysis show that there is a long run relationship between the variables. It was found that the increase in the migration rate positively affects both unemployment and economic growth. Esposito (2020) examined the impact of migration on local unemployment in the short and long run in a sample of 15 EU countries during the period 1997-2016 and found that migration reduces unemployment rates both in the long run and in the short run. Öztürk and Özdil (2020) analyzed the annual data set in 19 OECD countries during the period 1990-2016 using the panel ARDL technique. The long run results show that migration flows contribute to the economic growth of host countries. The short run results show that migration flows have a negative effect on growth. Aslan and Altinöz (2020) investigated

the correlation between the immigrant population and the unemployment rate in the USA during the period 1980-2013. Using the ARDL methodology, estimations reveal that immigration in the USA has a long run positive effect on the unemployment rate. Guzi et al. (2021) investigated the link between immigration, economic growth, and inequality in 25 EU countries during the period 2003-2017. The findings from the dynamic linear panel model reveal that immigration plays an important role in reducing income inequality in the 25 EU countries examined during the specified period. Gundogmuş and Bayır (2021) conducted an empirical study on the impact of international migration on unemployment rates in 27 European countries. The empirical analysis using panel regression for the period 2000-2017 reveals that international migration does not have a statistically significant impact on unemployment. Dritsaki and Dritsaki (2024) examined the impact of migration on economic development and unemployment in 27 EU countries from 1990 to 2020 using a PVAR model. The findings of the study show that there is a significant positive correlation between GDP per capita unemployment rate and net migration rate to EU countries.

4. Econometric Model, Dataset, Methodology and Findings

This study empirically examines the macroeconomic determinants of the 'pull' factors of international migration to Turkiye. Annual time series data for Turkiye covering 1990-2023 were used to estimate the relationships. The selection of the review period was determined by the availability of data. The sample period was limited to 1990-2023 due to the lack of pre-1990 data on the economic freedom index. Details of all variables included in the analysis are provided in Table 1.

Table 1
Explanations of variables

Variable Symbols	Description of the Variable
Mig	International migration to Turkiye (total number of foreign immigrants)
Tax	Total tax burden (total tax revenues/GDP) (%)
Trans	Social assistance/GDP (%)
Gdppc	National income per capita (National income per capita series is real and taken from Turkiye Statistical Institute, TUİK, $)
Ecofree	Economic freedom index
Unp	Unemployment rate (%)
Hexp	Health expenditures/GDP (%)

In the study, the relationship between a set of macroeconomic variables that attract foreign immigrants to the country (Table 1) and international migration to Turkiye was analyzed using the following model. Following the theoretical framework and the majority of empirical studies conducted on the subject, the model took into account the following macroeconomic variables;

$$Mig_t=\beta_0+\beta_1 Tax_t+\beta_2 Trans_t+\beta_3 Gdppc_t+ \\ +\beta_4 Ecofree_t+\beta_5 Unp_t+\beta_6 Hexp_t+u_t \quad (1)$$

To obtain a sound estimate, total tax burden (*Tax*), social assistance (*Trans*), per capita national income (*Gdppc*), economic freedom index (*Ecofree*), unemployment rate (*Unp*), and health expenditures (*Hexp*) are used as control variables; it is evaluated that these have a significant and noteworthy effect on migration (*Mig*). In this study, international migration to Turkiye from the variables used is compiled from the World Bank's (2023) World Development Indicators database, per capita national income and unemployment rate are compiled from the Turkiye Statistical Institute, total tax burden and social assistance and health expenditure series are compiled from the Central Bank of the Republic of Turkiye. In addition, the data source for the economic freedom index is the Fraser Institute. In addition, u_t is the error term of the estimated model.

Three important econometric steps were used in this study. First, the stationarity analysis of the data used in the study was performed by applying the Phillips-Perron (PP) unit root test developed by Phillips-Perron (1988) which suggests that the error terms have weak dependence and heterogeneity, in addition to the Augmented Dickey-Fuller (ADF) unit root test proposed by Dickey and Fuller (1979, 1981). Secondly, the Johansen (1988; 1995) cointegration test was used to determine the existence of a long run relationship between the variables. This technique checked whether there was a long run relationship between all the variables. Finally, the cointegration equation estimates were performed by applying the DOLS and FMOLS approaches proposed by Pedroni (2000; 2001). These techniques aim to estimate the long run relationship between the variables and to calculate the final unbiased coefficients. The DOLS technique solves the endogeneity problem and eliminates the serial correlation found in the Ordinary Least Squares (OLS) method. While DOLS and FMOLS eliminate the small sample bias, the application of the FMOLS approach essentially requires that all variables have the same cointegration order and that the regressors do not appear to be cointegrated. The FMOLS method provides unbiased and consistent parameter estimates by correcting problems such as autocorrelation and heteroscedasticity that frequently occur in long run econometric models (Brooks, 2019).

In the study, descriptive statistics of the variables were included before the time series analysis was performed. The descriptive statistics of the variables are shown in Table 2.

Table 2
Descriptive statistics of variables

Descriptive statistics	*Ecofree*	*Gdppc*	*Hexp*	*Mig*	*Tax*	*Trans*	*Unp*
Mean	6.055294	99333.37	2.750882	371.8646	17.55588	1.309706	9.702941
Median	6.100000	96870.50	2.450000	306.7495	17.40000	1.180000	9.900000
Maximum	7.020000	210596.0	4.100000	923.6510	23.10000	2.210000	13.70000
Minimum	4.860000	50.23400	1.800000	113.6210	13.30000	0.510000	6.300000
Standard deviation	0.685774	60384.33	0.716914	199.9779	2.129332	0.483419	2.005520
Jarque-Bera(prob.)	2.419790 (0.29)	0.595320 (0.74)	3.527336 (0.17)	8.182234 (0.01)	3.585399 (0.16)	1.730551 (0.42)	0.861007 (0.65)

According to the introductory statistics in Table 2, the standard deviation value is greater in GDP per capita (*Gdppc*). The period average of the unemployment rate is 9.7%. The average value of migration in Turkiye is approximately 371,864. In addition, in the Jarque-Bera test, it was seen that the series has a normal distribution since the p values for all variables except *Mig* are greater than the critical value (0.05).

In the analysis, the series were first tested for stationarity. In time series analysis, to obtain empirically significant relationships between variables, the series should not contain a unit root, meaning they should be stationary. Generally, time series contain non-stationary behavior (stochastic trend) (Kwiatkowski et al., 1992). In the case of using non-stationary time series, spurious regression problems or invalid statistical inferences may be encountered. In such cases, the findings obtained from the regression analysis may not reflect the real relationship (Gujarati, 1995; Shrestha and Bhatta, 2018). Therefore, the stationarity of the series used in this study was tested using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, and the results are shown in Table 3.

According to the results of both ADF and PP unit root tests (Table 3), it was concluded that all variables *Ecofree*, *Gdppc*, *Hexp*, *Mig*, *Tax*, *Trans*, and *Unp* contained unit roots at the level and became stationary when their first differences were taken. As a result of the unit root tests, it was found that the degrees of integration of the variables were the same, meaning they were stationary at the same level. The existence of a long run relationship between the variables was examined with cointegration tests. Cointegration is the statistical presentation of the long run relationship between the variables. The existence of cointegration between the variables means that there is a long run relationship. In this part of the study, Johansen's approach (1988, 1995) was used to examine whether there was a long run relationship between the variables. Before performing the Johansen cointegration test, the optimal lag length should be determined. Therefore, a VAR model in unrestricted reduced form is estimated for each model to determine the optimal lag length between the variables. As a result, the most appropriate lag length for the Johansen cointegration test for each model was selected as 1 according to AIC (Akaike Information Criterion) through unrestricted VAR estimation. After determining the appropriate lag

Table 3
Unit root test results for variables

	ADF test			PP test		
Variables	No Constant-No Trend	Constant	Constant-Trend	No Constant-No Trend	Constant	Constant-Trend
Ecofree	0.578	-1.831	0.626	0.689	-1.824	-0.606
ΔEcofree	-7.246*	-7.284*	-8.423*	-7.073*	-7.095*	-8.501*
Gdppc	2.556	-0.197	-2.264	2.557	0.084	-2.264
ΔGdppc	-4.458*	-5.776*	-5.684*	-4.484*	-6.118*	-6.001*
Hexp	-0.479	-1.337	-2.401	-0.468	-1.300	-2.394
ΔHexp	-6.312*	-6.229*	-6.113*	-6.336*	-6.252*	-6.133*
Mig	-0.742	-1.175	-1.27	-1.085	-1.238	-1.391
ΔMig	-8.297*	-8.165*	-8.050*	-8.405*	-8.277*	-8.154*
Tax	-0.420	-1.606	-2.405	-0.420	-1.623	-2.487
ΔTax	-6.219*	-6.154*	-6.232*	-6.216*	-6.152*	-6.219*
Trans	-0.826	-1.813	-1.862	-0.827	-1.895	-1.862
ΔTrans	-5.283*	-5.204*	-5.150*	-5.273*	-5.186*	-5.165*
Unp	-0.145	-1.788	-3.019	-0.115	-1.950	-2.351
ΔUnp	-4.560*	-4.485*	-4.443*	-4.489*	-4.385*	-4.326*

*Note: *, ** and *** indicate statistical significance at the 1%, 5% and 10% levels, respectively.*

length, the Johansen cointegration method was used to determine the existence and number of cointegrations in the model. Table 4 shows the Johansen cointegration test results based on maximum eigenvalue and trace statistics for the lag length 1.

The results in Table 4 show that the H_0 hypothesis, which suggests no cointegration between the variables at the 5% significance level in both the maximum eigenvalue (max) and trace test statistics for the model, is rejected. Therefore, there is at least one cointegration between the variables in both tests. As seen in Table 4, the cointegration tests provide evidence a long run relationship between the series in the model. In particular, the trace test statistics show two cointegration equations between the series in the model at the 5% level. Thus, it is observed that there is a long run relationship between the total tax burden, social assistance, per capita national income, economic freedom index, unemployment rate, health expenditures, and international migration to Turkiye in the sample period in Turkiye.

After determining the existence of a long run relationship between the variables, cointegration parameters for the model were estimated. In this study, the coefficients of the cointegration vector were examined with fully adjusted OLS (FMOLS) and dynamic OLS (DOLS) estimation methods. Table 5 shows the DOLS and FMOLS estimation results.

Table 4
Johansen cointegration test results

Trace Test				
Null (Ho) Hypothesis	Alternative Hypothesis	Test Statistics	0.05 Critical Value	Probability Value
r=0	r>0	**159.8738**	**125.6154**	0.0001
r≤1	r>1	**99.90274**	**95.75366**	0.0251
r≤2	r>2	62.72765	69.81889	0.1613
r≤3	r>3	36.25374	47.85613	0.3838
r≤4	r>4	20.79135	29.79707	0.3708
r≤5	r>5	9.376161	15.49471	0.3317
r≤6	r>6	1.991117	3.841465	0.1582
Maximum Eigenvalue Test				
Null (Ho) Hypothesis	Alternative Hypothesis	Test Statistics	0.05 Critical Value	Probability Value
r=0	r=0	**59.97109**	**46.23142**	0.0010
r=1	r=1	37.17508	40.07757	0.1024
r=2	r=2	26.47391	33.87687	0.2926
r=3	r=3	15.46239	27.58434	0.7109
r=4	r=4	11.41519	21.13162	0.6059
r=5	r=5	7.385044	14.26460	0.4446
r=6	r=6	1.991117	3.841465	0.1582

Table 5
Results of long run coefficient estimates for FMOLS and DOLS models

FMOLS				
Variables	Coefficient	Standard Errors	t-statistic	probability
Hexp	44.64317	52.25855	0.854275	0.4008
Gdppc	0.001855	0.000470	3.947216	0.0005*
Ecofree	-183.1807	64.47217	-2.841237	0.0086***
Tax	40.54177	13.90897	2.914794	0.0072***
Trans	-164.6312	56.43002	-2.917441	0.0072***
Unp	47.43805	14.07955	3.369288	0.0024**
C	230.7900	456.7076	0.505334	0.6176
R^2: 0.443283				
DOLS				
Variables	Coefficient	Standard Errors	t-statistic	probability
Hexp	390.4905	126.4837	3.087280	0.0215**
Gdppc	0.001503	0.001378	1.090831	0.3172
Ecofree	160.0790	130.3721	1.227862	0.2655
Tax	-51.20929	26.58147	-1.926504	0.1023
Trans	-114.3666	173.3083	-0.659903	0.5338
Unp	30.91425	26.48701	1.167148	0.2874
C	-1040.922	933.7214	-1.114810	0.3076
R^2: 0.971172				

*Note: *, ** and *** indicate 1%, 5% and 10% significance levels, respectively.*

Table 5 presents the estimate of the long run relationship between the variables considered in the study. According to the results in Table 5, the t-statistic values of the long run coefficients for all variables except the *Hexp* variable in FMOLS are statistically significant. The FMOLS estimates show a long run and positive relationship between *Gdppc*, *Tax*, and *Unp* and international migration to Turkiye. Accordingly, it is observed that a one-unit increase in *Gdppc*, *Tax*, and *Unp*, in the long run, has an increasing effect on international migration to Turkiye according to the FMOLS estimator. It can be said that the result regarding *Gdppc* meets the expectations. In other words, it can be stated that the national income per capita in Turkiye is an important macroeconomic variable that attracts international migration. It has been found that the national income per capita is one of the main determinants that pushes migrants away from their countries and directs them to "better off" places (Turkiye). Although the coefficient of the health expenditure variable is in line with expectations, it is not statistically significant. Again, the social assistance variable (*Trans*) and the economic freedom index variable (*Ecofree*) were statistically significant, but the signs of the coefficients were not as expected. In other words, the country's public social assistance system and economic freedoms are not an important center of attraction for foreign migrants. In the DOLS results, it is seen that the coefficient of health expenditures (*Hexp*) is in the expected direction and statistically significant. This situation reveals that health services are an important factor in international migration and that improvements in health services will contribute to international migration to Turkiye.

6. Conclusions

Migration theories have proposed several potential factors that may trigger and/or influence international migration. These include neoclassical migration theories, new migration theories, and the push and pull theory, which is one of the most popular theories to determine the causes of migration. However, apart from theoretical studies, it is observed that empirical macro-econometric modeling studies to test these migration theories are limited.

This study aims to empirically examine and evaluate the macroeconomic determinants of international migration to Turkiye. For this purpose, the relationship between international migration, total tax burden, social assistance, per capita national income, economic freedom index, unemployment rate, and health expenditures was examined using annual data for the period 1990-2023. In the study, the existence of a long run relationship between the variables was tested using cointegration analysis. Johansen cointegration tests were used to test the cointegration relationship and DOLS and FMOLS estimators were used to estimate the long run coefficients. According to the empirical findings, there is a long run, positive, and statistically significant relationship between per capita national income, health expenditures, and international migration to Turkiye. Therefore, an increase in per capita national income, one of the parameters of international migration, increases international migration by approximately 1%. Similarly, it was found that the increase in health expenditures, which was selected as a parameter of international migration, increased international migration. These results show that improvements in per capita national income and health expenditures have an increasing effect on international migration to Turkiye. The results obtained confirm the economic theories of migration. Per capita national income has emerged as an important determinant for Turkiye and has confirmed the neo-classical economic theory of migration, which states that earnings differences between countries represent one of the main factors in labor migration. Regarding the social dimension, it has not been confirmed that social assistance and the economic freedom index are important pull factors for international migration to Turkiye. When it comes to health expenditures (system), the factor has a significant pull positive effect on migration and this result supports Lee's (1966) push-pull theory. These results are also largely consistent with the empirical results reached by the studies conducted by Parkins (2010), Singh (2009), Jandos (2014), Dinbabo and Nyasulu (2015), Mayilvaganan (2019), Arif (2020), and Beerli et al. (2023) in the literature.

International migration is an increasingly complex process that depends on various demographic, economic, political, military, and environmental factors. International migration has a significant impact on Turkiye's economic and social dynamics. Turkiye has become a country that is attractive to migrants in groups due to its geopolitical location, economic opportunities, and regional conflicts. For all these reasons, determining and examining the factors that determine international migration is of great importance. As a developing country, understanding the interactions between the indicators discussed in the study constitutes a strategic priority for policymakers in Turkiye. The results of this study can be used to develop migration projections and also to develop migration policies that can lead to better economic and social integration of migrants. In addition, it is evaluated that finding common ground with source, transit, and destination countries (international cooperation), making the necessary legal reforms investigating the reasons for the migration of people from their source countries, and developing

projects to overcome these problems will be beneficial in strengthening and shaping Turkiye's migration policy. Additionally, future studies on migration should consider other important aspects at the macro level of migration, such as climate change, urbanization, political aspects, human rights, and education.

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