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## Contents

**Analysing the Relationship Among Poverty, Income Inequality, and Environmental Pollution Based on Kuznets Curve Model: Evidence from Developed Countries**

Fuat LEBE, Yusuf Ekrem AKBAŞ ..... 627-640 *Article Type: Research Article*

**Central Bank Digital Currencies: Implications for the Turkish Lira**

Muhammet DURDU ..... 641-656 *Article Type: Research Article*

**Overview of Economic Relationships between Türkiye and Turkic Republics**

Merve Vural ALLAHAM, Cemal ZEHİR ..... 657-678 *Article Type: Research Article*

**How Does Organizational Justice Affect Job Satisfaction? The Mediating Role of Job Involvement**

Ozan BÜYÜKYILMAZ, Cihan KARA ..... 679-698 *Article Type: Research Article*

**Underemployment Experiences Among Youth with Higher Education Graduates: A Qualitative Research Study in Istanbul**

Halim BAŞ, Yürsa AK, Merve YOSUNKAYA ..... 699-718 *Article Type: Research Article*

**“(IL)Liberal Peace” As a Solution? Rethinking Pitfalls in Post-Gaddafi Libya’s Sociopolitical Transformation**

Hikmet MENGÜASLAN ..... 719-734 *Article Type: Research Article*

**Regulations on Covert Advertising: An Analysis of Advertising Board Decisions in Türkiye**

Güldane ZENGİN ..... 735-752 *Article Type: Research Article*

**Time-Varying Beta Estimation: A Comparison of DCC-GARCH and Rolling-Window Methods in Turkish Industry Portfolios**

Cihan ÇOBANOĞLU ..... 753-768 *Article Type: Research Article*

**A Global Bibliometric Perspective on Organizational Attractiveness: Patterns, Influences, and Future Directions**

Esra Sipahi DÖNGÜL, Şerife Uğuz ARSU ..... 769-796 *Article Type: Research Article*

**Understanding Suicide in Türkiye: The Role of Income, Unemployment, Consumer Loans, Cost of Living, and Health Expenditure**

Gökçen AYDINBAŞ, Merve ÜNLÜOĞLU ..... 797-816 *Article Type: Research Article*

# Understanding Suicide in Türkiye: The Role of Income, Unemployment, Consumer Loans, Cost of Living, and Health Expenditure

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## ABSTRACT

A healthy and fulfilling life is essential for individuals to engage effectively and productively within society. The absence of these conditions can increase vulnerability to mental health issues and, in severe cases, lead to suicidal behavior. Suicide is a complex and pressing social issue that reflects not only individual suffering but also broader socioeconomic challenges. Individuals experiencing economic hardship, social isolation, or unmet basic needs are at a heightened risk for suicide, highlighting the need for a comprehensive public health response. It is essential to understand the key contributing factors to develop effective prevention strategies and inform sound social policy. This study aims to investigate the relationship between suicide and various socio-economic factors — including income, unemployment, consumer loans, cost of living, and health expenditure — in Türkiye over the period 1993–2023, using the ARDL bounds testing approach. According to the cointegration test, it is inferred that there is a long-run relationship among the variables. Long-run coefficients show that increases in income and health expenditure reduce suicide cases, while increases in consumer loans increase suicide cases. The coefficient of the error correction term is negative and statistically significant as anticipated. In addition, the results were tested using the FMOLS method, and similar to the ARDL model, the negative relationship between income and the dependent variable and the positive relationship between consumer loans and the dependent variable were found. The causality relationship is investigated by the Toda-Yamamoto test. The findings obtained from this test show that GDP per capita and consumer loans are Granger causes of suicide.

**Keywords:** Suicide, Gross Domestic Product, Consumer Loans, Unemployment, ARDL Bounds Testing Approach.

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## INTRODUCTION

Throughout human history, it has been witnessed that some people may attempt suicide at a certain point in their life journey and that these attempts may even end in death from time to time. While suicide is fundamentally a personal act, it is profoundly influenced by societal factors and, in turn, has significant implications for societal well-being. Currently, it ranks as one of the leading causes of death, as noted in research (Machado et al., 2015). Given its serious nature as a social phenomenon that poses a threat to social stability, suicide has been the subject of extensive research across multiple disciplines, including medicine, psychology, sociology, anthropology, and economics.

According to estimates from the World Health Organization (WHO), approximately 800,000 individuals die by suicide each year globally, translating to one death every 40 seconds. In 2019, the recorded number of suicides was 703,000. Suicide represents 1.4% of all global deaths. It is important to note that over 77% of these cases occur in low- and middle-income countries,

and suicide is the fourth leading cause of death among individuals aged 15 to 29 (WHO, 2021). Furthermore, the WHO estimates that there are more than 20 suicide attempts for every completed suicide (Mathieu et al., 2022). The annual global prevalence of self-reported suicide attempts is approximately 3 per 1,000 adults (Nock et al., 2008; Borges et al., 2010).

As of 2019, the global average suicide rate stands at 9.0 per 100,000 individuals. Certain regions report higher rates, with Africa at 11.2, Europe at 10.5, and Southeast Asia at 10.2, all exceeding the world average (WHO, 2021). Within Europe, the countries with the highest suicide rates include France, Lithuania, Latvia, Slovenia, and Estonia (WHO, 2018).

Suicide rates exhibit significant variations due to a range of factors, including gender, socioeconomic status, occupation, age group, and geographical location. Notably, the incidence of suicide is higher among men compared to women. Research highlights unemployment as a crucial contributing factor, with an estimated 45,000 individuals annually taking their

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own lives due to joblessness (Nordt et al., 2015). Young people are particularly vulnerable to the effects of unemployment, resulting in elevated suicide rates within this demographic. Data obtained from the Turkish Statistical Institute (TURKSTAT) indicates that in 2023, a total of 4,061 individuals lost their lives to suicide in Türkiye. Among these cases, approximately 75% were men, while 25% were women. The primary reasons for suicide include unspecified causes (27.9%), other contributing factors (31.3%), and health-related issues (26.4%) (TURKSTAT, 2024). When examining suicide rates by province in Türkiye, it is observed that the highest rates occur in large and populous cities such as Istanbul, Izmir, and Ankara. However, when suicide rates are examined according to population, it is seen that provinces such as Tunceli, Ardahan, Burdur, Aydın and Edirne are more prominent (Socio-Political Field Research Centre, 2020).

In conclusion, suicide—regardless of whether it results in death or not—remains a significant public health issue affecting individuals, communities, and healthcare systems across the globe. Despite advancements in medical and psychological interventions, suicide continues to account for a substantial number of deaths worldwide. Importantly, it should be acknowledged that some individuals may experience ambivalence or a renewed desire to live following a suicide attempt. Research indicates that individuals who attempt suicide typically present to emergency departments within approximately three hours, making emergency services the first point of contact for medical intervention. At this critical stage—referred to as the early post-attempt period—individuals often require not only immediate medical care but also social and psychological support (Harmancı, 2015).

This study aims to analyze the economic and social factors determining suicide in Türkiye with data for the period 1993-2023. In this context, the effects of per capita income, unemployment rate, consumer loans, cost of living, and health expenditures on suicide are investigated and the long-run relationships between these variables are analyzed using the Autoregressive Distributed Lag (ARDL) bounds testing approach. The relationship between suicide and socioeconomic factors is shaped not only by short-term economic fluctuations but also by long-term trends that develop over time. To align with the primary objective of this study, it is essential to employ a method that can analyze both short-term and long-term equilibrium relationships between these variables. In this context, the ARDL model has been selected, as it facilitates the assessment of both short-term and long-term dynamics within a unified framework.

The main research question of the study is whether these macroeconomic variables have a significant long-run effect on suicide in Türkiye. The findings indicate that there is a long run cointegration relationship between the variables. According to the long-run coefficients, an increase in income and health expenditures decreases suicide, while an increase in consumer loans increases suicide. In addition, the long-run coefficients obtained with the FMOLS method are consistent with those from the ARDL model for income and consumer loans variables in terms of sign and statistical significance.

This article is structured as follows: First, the phenomenon of suicide was examined with its theories and causes. Subsequently, an assessment was made specifically for Türkiye. The literature review evaluated existing national and international studies and identified areas where the study could contribute. In the applied section, the main factors affecting suicide in Türkiye were analyzed using an econometric model created with selected variables. Recommendations for policymakers were developed based on the findings.

## **SUICIDE: THEORETICAL INVESTIGATION OF THE CONCEPT AND ITS CAUSES**

The origin of the word suicide has been shaped by different meanings in different languages. While the Arabic word “Nahr” means to cut or kill a living being, in Latin the roots “Se or suus” (own) and “caedere” (to kill) came together to form a term meaning “to kill oneself”. This term was transferred to Western languages as ‘suicide’ in English as of the mid-17th century and in French in the early 18th century. In Turkish, it was first introduced as ‘self-murder’ and then as ‘suicide’ with the Tanzimat period. When we look at the first use of the word suicide, it is known that it was first used linguistically in the dictionary written by François à Mesgnien Meninski and as a term in the work *Religio Medici* written by Sir Thomas Browne in 1642 (Kızılkaya & Kuzucu, 2022).

Throughout their lives, people encounter emotional triggers arising from internal or external factors. Suicide is a situation in which an individual punishes himself/herself and intentionally ends his/her life and is generally defined as a state of aggression associated with the feeling of anger directed inwards. This level of behavior constitutes a serious situation as an indicator of emotional and communicative problems and can occur as an important symptom of the difficulties experienced by an individual. WHO defines suicide as “conscious self-harm with varying degrees of lethal intent” (Weis, 1974). The deaths that occur as a result of this action deeply affect not only

the deceased person but also the individuals in his/her close environment. Considering the psychological pain and losses experienced by the relatives, it is emphasized that suicide is a situation that affects the society at large. Therefore, WHO considers suicide as a preventable public health problem (Ministry of Health, 2018).

According to Emile Durkheim (1897), suicide refers to any death that occurs as a direct or indirect result of a deed that the deceased performs even though he/she knows that it will result in death. Adler, on the other hand, defines suicide as an act of revenge. According to him, suicide aims to affect the person's relatives or relatives and is an action taken to ensure the recovery of what has been lost. From this perspective, Adler (1997) sees and defends suicide as a means of communication.

In recent years, WHO categorizes suicide in two groups: suicide act and suicide attempt. Real suicides result in death. However, sometimes suicide can remain in the thought stage or be stopped before death occurs. In this case, suicide attempts or thoughts are in question. Suicidal ideation is considered to be the state of an act before it turns into action. Suicide attempt, on the other hand, refers to actions that a person takes with the intent of taking his/her own life but do not result in death. As a matter of fact, suicide attempts include behaviors such as self-harm, self-murder, poisoning, as well as all non-fatal attempts to punish society, to send a message, to get their wishes accepted or to request help (Durkheim, 1897).

### Theories of Suicide

Suicide is a topic that has garnered attention from various disciplines throughout history and continues to be of significant concern today. Notably, Sigmund Freud (1953), a pivotal figure in psychology, presented two key hypotheses regarding suicide. The first suggests that individuals may resort to suicide as a way to cope with profound loss or hatred, especially when experiencing severe depression. The second hypothesis posits that self-destructive behavior can arise from heightened internal aggression. In his influential work, "Man Against Himself", Karl Menninger (1938) defined suicide as a manifestation of self-directed aggression, where an individual's anger towards others is redirected inward. Menninger (1938) identified three primary motives that drive suicidal thoughts: the desire to kill, the desire to be killed, and the desire to die. He further indicated that individuals who complete suicide often possess an underlying desire to end their lives, whereas those who attempt suicide may have a stronger, subconscious

inclination to continue living. Additionally, Ringel (1976) introduced the concept of "Presuicidal Syndrome", which he described as a clinical condition present in individuals exhibiting suicidal tendencies. Feelings of inadequacy, hopelessness, negative self-evaluation, and social withdrawal characterize this syndrome. As the intensity of death-related thoughts increases, there is a potential for these suicidal ideations to escalate into actionable plans (Harmancı, 2015).

Suicide represents a significant social phenomenon that poses a threat to social health and order, both historically and in contemporary society. This critical issue has attracted substantial attention from sociologists. In particular, Émile Durkheim (1897) conducted thorough studies that examined the relationship between social changes and suicide rates. He analyzed the evolving economic and social structures following the French Revolution and industrialization, focusing on the influence of religion on social integration and morality as they relate to the phenomenon of suicide (Kızılkaya & Kuzucu, 2022). Subsequent research has continued to explore suicide within a social context, particularly in relation to economic changes and their impact on suicide rates. For example, in their 1954 work "Sex and Suicide", Henry and Short introduced the "Balancing Theory", which posits that suicide rates tend to increase during periods of economic stagnation while decreasing during times of economic growth. Additionally, the "Cyclical Theory," articulated by Ginsberg in 1966, suggests that as individual satisfaction rises during periods of economic prosperity, there exists an inverse relationship between this satisfaction and suicide rates. (Lester, 2001; Kızılkaya & Kuzucu, 2022).

Economists Hamermesh and Soss (1974) conducted one of the earliest empirical studies exploring the link between unemployment and suicide, providing evidence that economic downturns may significantly impact mental health outcomes. Their study focused on the effects of regular income on individuals' well-being and the potential consequences of unemployment on suicidal behavior. The findings revealed that the decline in economic activity following the Second World War contributed to an increase in suicide rates. Furthermore, the researchers identified that social living conditions, unemployment, and personal expectations significantly influence suicidal behavior. The study concluded that suicide would occur when the sum of an individual's lifetime earnings and enjoyment of life is equal to zero (Hamermesh & Soss, 1974). According to the theoretical framework established by Hamermesh and Soss, a

decrease in perceived happiness below a specific threshold corresponds with an increased likelihood of suicide. They posited that individuals must maintain a certain minimum level of happiness—both in the present and their anticipated future—to derive enjoyment from life and possess the desire to continue living. Thus, adverse life events such as financial strain, bereavement, social isolation, interpersonal conflicts, and work-related stressors may lead to elevated suicide rates.

### Causes of Suicide

Suicide should be considered as a multidimensional and complex phenomenon. This event is shaped by the interaction of socioeconomic, psychological, sociological, environmental, physical, religious and many other factors. Therefore, it is not possible to understand or analyze suicides that occur for only one reason. Changes and transformations in the social structure cause differences in the rate of suicide cases and can affect this phenomenon.

Early theorists argued that economic stagnation may increase suicide rates, which may be caused by factors such as stress and distress caused by poverty (Brenner, 1979; Stack, 1981) and loss of social status and commitment (Durkheim, 1897; Mann & Metts, 2017). Durkheim categorized suicides into four categories according to the reasons for their occurrence. These are altruistic suicide, fatalistic suicide, selfish suicide, and anatomical suicide. Altruistic suicide refers to the individual's self-sacrifice for the sake of social values and the glorification of virtues such as loyalty and self-sacrifice. Fatalistic suicide is the result of the despair of individuals who strictly adhere to the rules and authority set by society due to the pressures of society. Selfish suicide, on the other hand, occurs when a person breaks ties with society, where individual freedoms and individualism are overemphasized. Anatomical suicide, on the other hand, occurs due to social disintegration and lack of order; here, the weakening of social norms and rules causes individuals to be out of harmony with society. Durkheim states that anatomical suicides are caused by social disruption. Factors such as economic contractions, business failures, bankruptcies and unemployment can put great psychological pressure on individuals and increase suicide rates (Durkheim, 1897). On the other hand, Marx (1846) and Peuchet (1838), drew attention to the economic negativities of capitalism, problems such as low wages, unemployment, and misery as the cause of suicide, and drew attention to non-economic social injustices that affect the private lives of non-working-class individuals. According to Marx, "Man, in his desire

for something better, realises that suicide is the last resort against the evils of private life" (Marx, 1846).

Generally, the causes of suicide are socio-economic problems caused by economic crises (divorce, unemployment, weakened social interaction, debt repayment difficulties, work stress, increased alcohol and tobacco use, mental illness, cuts in public mental health budgets, etc.). Social changes and mobilizations also have a significant impact on suicide. As a matter of fact, suicide can be associated with many economic factors such as unemployment, income level and poverty. For example, wars, migrations, diseases, and technological developments that deeply affect a society are some of these factors. Undoubtedly, mechanization and technological advances play a major role in facilitating human life. However, increasing mechanization reduces the need for human labor and leads to alienation of the individual from his/her own labor. This alienation may result in dissatisfaction with work and its results, loneliness, and consequently increased risk of suicide. In addition, increasing air pollution and diminishing clean water resources lead to significant deterioration in human health. These factors may cause a decrease in the standard of living, leading to pessimism and may have an effect that may lead to suicide. Other factors affecting suicide are religions and sects, wars, epidemics, natural disasters, modern society and urbanization structure, seasonality, races and cultures, family situations, age, gender, geography.

TURKSTAT categorizes the reasons for suicide as follows: "Illness", "Family discord", "Difficulty making a living", "Commercial failure", "Sensual relationship and not being able to marry the person of his/her choice", "Failure to learn", "Other", "Unknown situations" (TURKSTAT, 2024).

Suicide has a profound impact on all societies, regardless of the cause. Not only mental illness but also physical illness (such as AIDS, cancer) can lead to suicide. The view of suicide also differs between cultures (Moscicki, 1995). While in Japan suicide is a behavior that honors the individual, in India it is an illegal phenomenon (Durgun & Durgun, 2017).

As a result, although human beings have the ability to adapt to all kinds of conditions, needs such as happiness, harmony, love and freedom are inherent in their nature. These needs exist as variable factors in the historical process and tend to lead to psychological reactions when they are blocked. These situations may cause individuals to choose a phenomenon such as suicide as one of their psychological reactions.

**Table 1.** Suicide Rates by Causes (2024)

| Cause of Suicide                                          | Percentage (%) |
|-----------------------------------------------------------|----------------|
| Other                                                     | 36.8           |
| Illness                                                   | 25.2           |
| Unknown                                                   | 21.8           |
| Economic problems                                         | 9              |
| Family incompatibility                                    | 4.3            |
| Emotional relationship and not marrying the person wanted | 2.6            |
| Educational failure                                       | 0.2            |
| Business failure                                          | 0.1            |

**Source:** TURKSTAT, Population and Demography Database

### Suicide in Türkiye

Suicide is a complicated phenomenon and a major public health problem that has a profound impact on public health and psychological well-being both in the world and in Türkiye. According to the country ranking in suicide incidents, the top five countries are Lithuania, Russia, Guyana, South Korea, and Belarus, while Türkiye ranks 94th in this list (World Population Review, 2025). When we look at the records on suicide worldwide, we see the following figures:

Suicide incidents in Türkiye started to be included in the Justice Statistics Yearbook in the form of short information in 1963, and after 1974, they started to be published as official data under the name of "Suicide Statistics" (Harmancı, 2015). While illness is the main cause of suicide, family unrest and financial difficulties are the second and third leading causes of suicide. Failure in education has the lowest rate among the reasons for suicide (TURKSTAT, 2020).

Table 1 presents data on the reasons for suicide. According to the findings in the table, the highest proportion of suicides is attributed to health problems, while the lowest proportion is associated with reasons such as education and business failure. However, the reasons categorized under "other" and "unknown"

categories also constitute a significant proportion. It can be said that economic problems have a significant place in these groups.

This situation reveals the direct impact of economic stress on individuals' mental health. It is understood that especially economic difficulties such as job loss, debt burden and general financial difficulties are powerful triggers that can lead individuals to suicide. Analyzing the data obtained in this context is of great importance in terms of understanding the impact of economic crises, unemployment rates and social security mechanisms on suicide rates.

One of the two basic variables used to understand suicide, the total number of suicides, refers to the absolute number of suicides that occur in a country during a given period, while the other, the crude suicide rate, refers to the number of suicides per 100,000 population per year. This ratio makes it possible to measure the relative intensity of suicidal tendencies by balancing out the population effect. These indicators are quite important for the effective planning of public policies, the guidance of healthcare services, and the development of robust crisis response mechanisms. Number of suicides and crude suicide rate for Türkiye between 2020 and 2024 are given in Table 2. The increase in the crude suicide rate over time during the period in question indicates that

**Table 2.** Crude Suicide Rate and Number of Suicides in Türkiye, 2020-2024

| Year | Crude Suicide Rate (per 100,000 population) | Number of Suicides |
|------|---------------------------------------------|--------------------|
| 2020 | 4.45                                        | 3,710              |
| 2021 | 4.98                                        | 4,194              |
| 2022 | 4.96                                        | 4,218              |
| 2023 | 4.79                                        | 4,089              |
| 2024 | 5.22                                        | 4,460              |

**Source:** TURKSTAT

**Table 3.** Suicides in Türkiye by Type of Actualization (2002-2024)

| Type of Suicide                                   | Total  |          |
|---------------------------------------------------|--------|----------|
|                                                   | Number | Rate (%) |
| By hanging                                        | 35,347 | 47.66    |
| Using Firearms                                    | 19,025 | 25.65    |
| Throwing from a high place                        | 8,192  | 11.05    |
| Taking chemicals                                  | 5,963  | 8.04     |
| Other                                             | 2,379  | 3.21     |
| By drowning                                       | 1,252  | 1.69     |
| Using a sharp instrument                          | 1,061  | 1.43     |
| Throwing off a train or another motorized vehicle | 345    | 0.47     |
| Using natural gas or lpg. etc.                    | 307    | 0.41     |
| By burning                                        | 295    | 0.40     |
| Total                                             | 74,166 | 100.00   |

Source: TURKSTAT

**Table 4.** Crude Suicide Rate and Number of Suicides by Province, 2024

| Province | Crude Suicide Rate (per 100,000 population) | Province | Number of Suicides |
|----------|---------------------------------------------|----------|--------------------|
| Karaman  | 11.01                                       | İstanbul | 631                |
| Bartın   | 9.18                                        | Ankara   | 300                |
| Aydın    | 8.08                                        | İzmir    | 265                |
| Tunceli  | 7.96                                        | Adana    | 170                |
| Burdur   | 7.95                                        | Antalya  | 168                |

Source: TURKSTAT

the tendency to commit suicide has become widespread at the social level. The observed increase may be due to improvements in statistical recording systems, as well as psychological processes associated with socioeconomic vulnerabilities. In any case, this situation represents a considerable risk to public health, underscoring the need to address the underlying structural, economic, and cultural dynamics comprehensively.

Table 3 presents the methods of total suicide cases occurring from 2002 to 2024 in Türkiye. In this table, it is seen that suicide by hanging is the most common type of suicide in Türkiye. Suicide by burning is less common.

Table 4 presents information on the number of suicides and crude suicide rate by province for 2024. In this table, the first 5 provinces with the highest and lowest number of suicides and crude suicide rate are shown. According to 2024 data, İstanbul has the highest number of suicides, while Karaman has the highest crude suicide rate.

In conclusion, The World Suicide Prevention Day (WSPD), established in 2003 by the International Association for Suicide Prevention (IASP) in collaboration with WHO, aims to raise awareness and reduce stigma surrounding suicide. Celebrated annually on September

10th, the day promotes the message that suicides are preventable. The theme for 2024-2026, "Changing the Narrative on Suicide" encourages a shift from a culture of silence and stigma to one of openness, understanding, and support. It emphasizes the importance of prioritizing mental health and suicide prevention in policymaking, advocating for increased access to care and support for those in need (WHO, 2024).

## LITERATURE

The phenomenon of suicide is examined through a multidisciplinary lens. Many studies in the literature suggest that suicide can be understood through social factors, such as social capital, divorce, and marriage, as well as economic factors like income level and unemployment.

Income level is frequently regarded as a significant factor in studies examining the economic determinants of suicidal behavior. While higher income is generally believed to enhance life satisfaction by improving individual well-being, it's essential to recognize that this relationship is often relative and contextual rather than absolute. Although it may vary depending on the social security structure, health systems, cultural factors and

income inequality level of the countries, studies mostly reveal a negative long-term relationship between income level and suicide. Neumayer (2003) conducted a panel data analysis involving 68 countries and found that per capita income had a negative and statistically significant impact on suicide rates. Additionally, he identified correlations between suicide rates and various factors such as unemployment, divorce, birth rates, and alcohol consumption, which align with theoretical expectations. In a study conducted by Sher (2006), the relationship between per capita income and suicide rates in 34 European countries based on 2003 data was analyzed by intergroup correlation analysis. The study highlighted that low-income levels are a contributing factor to suicide. In a study conducted by Chang et al. (2009), researchers analyzed the relationship between economic crises and suicide rates in Japan, Hong Kong, South Korea, Taiwan, Singapore, and Thailand. The study utilized a time series analysis covering the period from 1985 to 2006. The findings revealed that an increase in income was associated with a decrease in suicide rates, while an increase in unemployment rates was linked to a rise in suicide rates. Chen et al. (2009) examined the socio-economic determinants of suicide rates in OECD countries between 1980 and 2003 using panel data analysis and investigated how Japan's suicide dynamics differed from those of other countries. Suicide rates disaggregated by age and gender, as well as economic (real GDP per capita, growth, income inequality) and social indicators (divorce, birth, female labor force participation, alcohol consumption) were included in the model. The findings showed that high income and economic growth reduced suicide rates, while income inequality increased them. Suicide rates are more sensitive to economic indicators than to social indicators. In Japan, the impact of socio-economic factors is more pronounced compared to other OECD countries, particularly the positive relationship between women's labor force participation and suicide rates, which is explained by household economic pressures. Okada and Samreth (2013), using a panel ARDL approach, conducted a study of 13 European OECD countries, and their findings on the relationship between income and suicide support other studies. Findings indicate that in nine of the countries studied, divorce rates positively affect suicide rates, while GDP per capita negatively affects them.

Madianos et al. (2014), in their study on Greece, unlike other studies, aimed to investigate trends in suicide rates and their possible relationships with macroeconomic and behavioral factors. The findings

reveal a significant annual increase in suicide mortality rates in Greece following the onset of the financial crisis in 2008. The results demonstrate a strong relationship between unemployment rates and suicide rates, emphasizing the complex interplay between economic conditions and mental health outcomes. Erdem and Dinç (2022) conducted a comprehensive study examining the relationship between suicide rates and various socioeconomic factors. In their analysis, they classified suicide rates into four distinct groups: age-adjusted, male, female, and young individuals. The study utilized panel data from 47 countries, covering the period from 1996 to 2015. The results of the study demonstrated that the relationship between socioeconomic factors and suicide rates varied across the different groups. Consistent findings indicated that alcohol consumption positively influences suicide rates, while fertility rates negatively affect them. Furthermore, divorce was associated with increased suicide rates in all groups, except for the 15-29 age group. The analysis also revealed a negative correlation between GDP and female suicide rates, while a positive relationship was observed in other groups. Additionally, the study found a positive relationship between unemployment and both age-adjusted suicide rates and the 15-29 age group. An increase in household debt was linked to a rise in age-adjusted suicide rates. Notably, the study highlighted that women's participation in the labor force has a positive effect on female suicide rates, which can be attributed to the stress encountered in professional environments. Kızılkaya and Kuzucu (2022) explored the relationship between suicide rates and selected economic factors in 44 countries using panel data analysis. In their study from 2000 to 2019, they included variables such as unemployment, inflation, and female labor force participation rates in the model alongside the suicide rates for both genders. The analysis yielded the following results: a 1% increase in unemployment leads to a 2% increase in female suicides and a 4% increase in male suicides. Furthermore, a 1% increase in women's labor force participation rate results in a 10% increase in female suicides and a 16% increase in male suicides. Furthermore, an increase in the inflation rate leads to higher suicide rates for both males and females. Given the findings related to unemployment, the authors emphasize the importance of providing direct or indirect support to individuals through social support programs during periods of rising unemployment. Collins et al. (2021) contend that relying solely on traditional economic indicators does not provide a complete understanding of the

relationship between economic crises and suicide rates. To address this gap, they sought to analyze these impacts more comprehensively by integrating the variable of consumer sentiment index into their model, thereby capturing subjective perceptions of the economy. Findings from this US state-level study indicate that consumer confidence is more effective than traditional indicators in explaining suicide rates, and this effect is more pronounced among women. Baskak (2023) explored the relationship between suicide and unemployment in OECD countries using Panel VAR analysis and Panel Causality analysis. The study analyzed two independent variables: the female suicide rate and the male suicide rate, covering the period from 2000 to 2019 with annual frequency data. The findings indicate a unidirectional causality between unemployment and male suicide rates. The study emphasizes the importance of creating job opportunities to prevent suicides associated with unemployment, as well as the need for psychological support for unemployed individuals to help them navigate this difficult period.

When examining studies conducted specifically for Türkiye, it is noteworthy that the research by Altınanahar and Halicioğlu (2009) included various variables such as divorce, urbanization, and liquidation, in addition to the income variable within its analytical model. In the study covering 1974-2007, the ARDL bounds test approach was preferred to determine the relationship between the respective variables. The results show that the most dominant variable in explaining the suicide phenomenon is urbanization. The positive sign of this relationship indicates that unplanned urbanization in big cities in Türkiye may have significant effects on suicide cases. The long-term coefficients of other variables, income, liquidation, and divorce were found to be negative, positive, and positive, respectively, and the authors emphasize that these signs are consistent with expectations. Durgun and Durgun (2017) examined the relationship between suicide rates and income in Türkiye from 1975 to 2015. They used crude suicide rates and GDP per capita as variables in their analysis. To investigate this relationship, they applied the Hatemi-J cointegration test and the Granger causality test based on the Vector Error Correction Model (VECM). The results from the causality test, conducted after identifying a cointegration relationship, indicated a unidirectional causality from GDP per capita to the crude suicide rate. This finding suggests that income levels influence suicide rates. The idea that lower levels of social integration, such as rising unemployment, may lead to increased suicide rates is supported by recent empirical studies.

Dilber and Uysal (2020) examined the relationship between suicide and unemployment in Türkiye using the Granger causality test. The study analyzed quarterly data from 2005 to 2018, focusing on the ratio of suicides attributed to livelihood and commercial difficulties compared to the total number of suicides. The results indicated a unidirectional causality relationship, where an increase in the unemployment rate was found to lead to a rise in the suicide rate. The authors emphasized that prolonged periods of unemployment can drive individuals to depression by instilling a sense of helplessness. Karul (2025), who emphasized that suicide deaths are one of the best indicators of mental health, conducted a study examining the relationship between health expenditures and suicide rates. As a result of analyses using Fourier-based stationarity and cointegration tests and Dynamic Ordinary Least Squares method, a long-run relationship between health expenditure and total, male, and female suicide rates was found. The findings show that an increase in health expenditure reduces suicide rates in a statistically significant way. Finally, in Kavaklı's (2023) study, the relationship between suicide rates and socio-economic variables in Türkiye was analyzed for 26 regions covered by Nomenclature of Territorial Units for Statistics (NUTS) 2 Level for the period 2004-2019. The study utilized the Generalised Method of Moments (GMM) developed by Arellano and Bond (1991) based on dynamic panel data analysis, and socio-economic determinants that could influence suicide were evaluated using models structured according to gender. Within this framework, a total of six models were estimated, including, and excluding the per capita Gross Domestic Product (GDP) variable. The analysis results revealed that the marriage rate, labor force participation rate, and per capita GDP had a statistically significant and negative effect on suicide rates. In contrast, the divorce rate and the suicide rate from the previous period had a positive effect on the current period's suicide rates. Additionally, it was determined that there are significant differences in effects based on gender, and that men, in particular, exhibit more sensitive reactions to social variables such as divorce. The study findings indicate that rising unemployment rates during economic crises also have an upward effect on suicide rates.

## ECONOMETRIC MODEL AND DATA

Suicide, while primarily an individual act, is regarded as a social phenomenon that can disrupt societal stability. The increasing prevalence of suicide across different communities raises important questions regarding its

**Table 5.** Variables Used in the Analysis

| Abbreviation | Log Transformation | Description                                  | Source                                                        |
|--------------|--------------------|----------------------------------------------|---------------------------------------------------------------|
| SUI          | LSUI               | Number of suicides                           | TURKSTAT                                                      |
| GDP          | LGDP               | Gross domestic product per capita            | World Bank                                                    |
| CL           | LCL                | Consumer loan                                | CBRT (Central Bank of the Republic of Türkiye)                |
| UNP          | -                  | Unemployment, total (% of total labor force) | World Bank                                                    |
| CoL          | -                  | Cost of Living                               | Authors' calculation                                          |
| HE           | -                  | Health expenditure (% of GDP)                | OECD (Organisation for Economic Co-operation and Development) |

Source: Compiled by Authors.

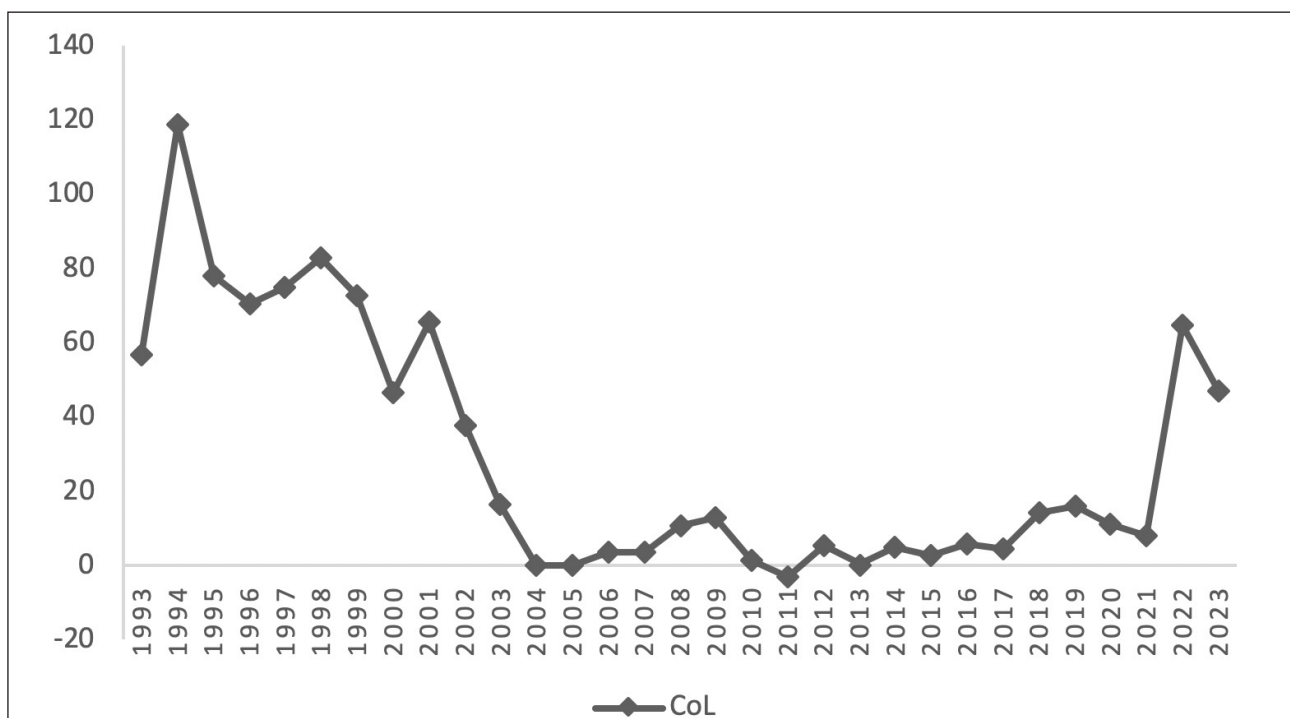
underlying causes. This research aims to explore the relationship between suicide and specific variables within Türkiye. The analysis utilizes annual data spanning from 1993 to 2023, taking into account the availability of relevant data. A comprehensive overview of the variables, including their corresponding abbreviations, is presented in Table 5.

Reasons such as unemployment, low income, and debt burden can be associated with suicide in terms of creating psychological problems such as hopelessness and depression. Additionally, people may face significant challenges in meeting their basic needs due to the rising cost of living and financial stress. This struggle can lead to serious emotional and psychological problems. As more individuals find it difficult to cope with these situations and fall into despair, the incidence of suicide in society may rise. Cost of living, which indicates that the rate of

increase of the income earned falls behind inflation, is not only an economic indicator but also an important criterion in terms of social justice and quality of life, and since there is no data set for it, it was measured using the following formula:

$$\text{Cost of Living Rate} = (1 + \text{Annual Inflation Rate}) / (1 + \text{Annual Rate of Increase in Per Capita Income}) - 1 \quad (1)$$

The concept of cost of living, which is often confused with inflation, also includes income, and as can be seen from the formula above, if the increase in inflation in a country is faster than the increase in income, it will be correct to talk about cost of living in that country (Eğilmez, 2022). Figure 1 shows cost of living rates calculated for the relevant years. It is observed that cost of living ratios calculated by considering the inflation rate and per capita income have positive values except for 2011. Positive values of the

**Figure 1.** Calculated Cost of Living Rates (%)

Source: Authors' calculations.

result indicate that inflation increases more than income. This situation shows that inflation has increased more than income, in other words, people are faced with cost of living. Peaking in 1994, cost-of-living rates fluctuated in the following years and entered a downward trend. While it remained at low levels between 2004-2015, it is observed that it started to increase in the following years.

In the study where annual data are used, the literature is first analyzed, and the variables of cost-of-living rate and consumer loans are integrated into the model to ensure originality. The natural logarithm of the number of suicides, GDP per capita, and consumer loans variables in the model is taken and the model formulated to examine the cointegration relationship between suicide and other variables is as follows:

$$LSUI = \beta_0 + \beta_1 LGDP + \beta_2 LCL + \beta_3 UNP + \beta_4 CoL + \beta_5 HE + \mu_t \quad (2)$$

where  $b_0$  is constant term,  $\mu_t$  is the error term of the model. The descriptive statistics for all variables are outlined in Table 6. The analysis covers a sample period of 31 annual observations, ranging from 1993 to 2023. The normality test, developed from the framework established by Jarque and Bera (1987), offers a statistical method to determine whether a data series follows a normal distribution. The null hypothesis of the test is that the data is normally distributed. If the p-value obtained is greater than 0.05, the null hypothesis cannot be rejected, so it is concluded that the series is suitable for a normal distribution. Based on the probability values from the Jarque-Bera test, all series in this analysis are found to be normally distributed.

## METHODOLOGY AND MODEL ESTIMATION

The dataset utilized in this study comprises 31 annual observations. In time series analysis, a limited number of observations may diminish the statistical power of the model, particularly in traditional cointegration tests.

**Table 6.** Descriptive Statistics

|             | LSUI      | LGDP      | LCL       | UNP      | CoL       | HE        |
|-------------|-----------|-----------|-----------|----------|-----------|-----------|
| Mean        | 7.881545  | 8.820658  | 16.96670  | 9.943581 | 30.27837  | 4.293839  |
| Median      | 7.943073  | 9.106423  | 18.21046  | 10.28500 | 13.18691  | 4.444000  |
| Maximum     | 8.347116  | 9.480799  | 21.08133  | 14.02600 | 119.0389  | 5.494000  |
| Minimum     | 7.113956  | 7.685372  | 10.08568  | 6.495000 | -2.836273 | 2.446000  |
| Std. Dev.   | 0.315601  | 0.567932  | 3.280371  | 1.948337 | 33.47940  | 0.828277  |
| Skewness    | -0.700975 | -0.577568 | -0.720418 | 0.040799 | 0.902543  | -0.883614 |
| Kurtosis    | 2.760048  | 1.771577  | 2.274620  | 2.704103 | 2.653776  | 2.847658  |
| Jarque-Bera | 2.613091  | 3.672676  | 3.361155  | 0.121692 | 4.363516  | 4.063974  |
| Probability | 0.270754  | 0.159400  | 0.186266  | 0.940968 | 0.112843  | 0.131075  |

**Source:** Authors' calculations.

Therefore, it is crucial to select alternative methods that have been shown to be valid in the literature for handling small sample sizes. In this context, the ARDL approach stands out because it can be worked with a relatively small number of observations. Narayan (2005) provides bounds test critical values that are specifically tailored for small sample sizes, thereby validating the use of the ARDL approach for time series consisting of 30 observations. Another important difference of the ARDL bounds test developed by Pesaran et al. is that it can be applied to series with different degrees of stationarity. Another noteworthy distinction of this cointegration test is that it can be applied to series with different degrees of stationarity. In other words, it can be applied regardless of whether the series are stationary at level or stationary at first difference. Since there are no appropriate table critical values when the variables included in the analysis are stationary in their second differences, the cointegration relationship between the variables cannot be examined with this test (Pesaran et al., 2001; Narayan, 2005). Therefore, the stationarity of the series should first be examined by unit root tests.

As a first step, if the series possess unit roots, and if so, at which level they are stationary are analyzed with the conventional unit root tests Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests. ADF test, developed by Dickey and Fuller (1979), along with PP test, introduced by Phillips and Perron (1988), both serve to evaluate the presence of a unit root in a time series. The null hypothesis ( $H_0$ ) for these tests posits that the series possesses a unit root. To establish that the series is stationary—indicating that it does not contain a unit root—it is necessary to reject the null hypothesis. This rejection requires that the calculated test statistic exceeds the critical values in absolute terms. The KPSS test, as developed by

**Table 7.** Unit Root Tests

| Variables |      | Level     |           | $\Delta$   |             |
|-----------|------|-----------|-----------|------------|-------------|
|           |      | Int       | Int+Trend | Int        | Int+Trend   |
| LSUI      | ADF  | -1.7744   | -3.8789** | -8.5574*** | -8.6231***  |
|           | PP   | -2.6447*  | -3.8789** | -9.5841*** | -11.721***  |
|           | KPSS | 0.7112**  | 0.1772**  | 0.3306***  | 0.146436**  |
| LGDP      | ADF  | -0.9832   | -1.5500   | -5.9429*** | -6.0919***  |
|           | PP   | -0.9683   | -1.6696   | -5.9429*** | -6.0127***  |
|           | KPSS | 0.7477    | 0.1769*   | 0.1048***  | 0.0873***   |
| LCL       | ADF  | -2.2155   | -1.3509   | -3.6175**  | -4.9016***  |
|           | PP   | -3.5637** | -1.1165   | -5.1943*** | -6.6005***  |
|           | KPSS | 0.8353    | 0.2186    | 0.3936**   | 0.0727***   |
| UNP       | ADF  | -2.1602   | -2.8588   | -4.4687*** | -4.4168***  |
|           | PP   | -1.8579   | -2.3151   | -4.5480*** | -4.7330***  |
|           | KPSS | 0.5257**  | 0.0947*** | 0.0989***  | 0.0806***   |
| CoL       | ADF  | -1.7556   | -1.6971   | -8.4924*** | -9.9543***  |
|           | PP   | -1.7556   | -1.5097   | -8.2284*** | -15.5096*** |
|           | KPSS | 0.4938*   | 0.2086*   | 0.2208***  | 0.1224**    |
| HE        | ADF  | -2.0450   | -1.4884   | -4.2957*** | -4.7038***  |
|           | PP   | -2.0497   | -1.4884   | -4.3005*** | -4.6770***  |
|           | KPSS | 0.2464    | 0.1679    | 0.2921***  | 0.0903***   |

**Note:** Significant at 10% (\*), 5% (\*), and 1% (\*\*\*). Unlike the ADF and PP tests, the null hypothesis of KPSS is that the data are stationary. D is the difference operator.

**Source:** Authors' calculations.

Kwiatkowski et al. (1992), is distinguished from other unit root tests by its null hypothesis, which asserts the absence of a unit root. In this methodology, the Lagrange Multiplier (LM) test statistic is compared against predetermined critical values. Should the LM test statistic fall below these critical values, the null hypothesis cannot be rejected, indicating that the series is stationary and does not exhibit a unit root. The outcomes of each unit root test for all series are detailed in Table 7.

Upon analyzing the unit root test results presented in Table 7, it is noted that the ADF and PP tests yield similar findings regarding the level values of the series, whereas the KPSS test displays slight discrepancies. The series, which are non-stationary at their level values (not  $I(0)$ ), may become stationary when their first differences are taken. Therefore, the unit root tests were repeated using the first differences of the series. The results from the ADF and PP unit root tests indicate that the null hypothesis can be rejected at the 5% significance level. Conversely, according to the KPSS test, the null hypothesis stating that the series are stationary cannot be rejected at the same significance level. Overall, all test results suggest that the series are integrated of order one, indicating they are stationary at the first difference. These findings fulfill the prerequisites for the ARDL bounds test approach, which stipulates that the series should not be integrated at the second order ( $I(2)$ ).

The ARDL bounds testing approach comprises three distinct stages. The first stage consists of determining whether a long-run relationship exists among the

variables included in the model. After establishing this relationship, the next steps involve estimating the long-run and short-run elasticities (Narayan & Smyth, 2006). The ARDL model derived from Equation 2 is as follows:

$$LSUI_t = \alpha_0 + \sum_{i=1}^p \alpha_{1i} LSUI_{t-i} + \sum_{j=0}^{q_1} \alpha_{2j} LGDP_{t-j} + \sum_{k=0}^{q_2} \alpha_{3k} LCL_{t-k} + \sum_{l=0}^{q_3} \alpha_{4l} UNP_{t-l} + \sum_{r=0}^{q_4} \alpha_{5r} CoL_{t-r} + \sum_{s=0}^{q_5} \alpha_{6s} HE_{t-s} + \varepsilon_t \quad (3)$$

Where  $p$ ,  $q_1$ ,  $q_2$ ,  $q_3$ ,  $q_4$ , and  $q_5$  denote the maximum lag values associated with each variable, while  $\varepsilon_t$  represents the error term. Equation 4 is formulated to assess the presence of cointegration among the variables, outlined as follows

$$\Delta LSUI_t = \beta_0 + \gamma_1 LSUI_{t-1} + \gamma_2 LGDP_{t-1} + \gamma_3 LCL_{t-1} + \gamma_4 UNP_{t-1} + \gamma_5 CoL_{t-1} + \gamma_6 HE_{t-1} + \sum_{i=1}^{p-1} \beta_{1i} \Delta LSUI_{t-i} + \sum_{j=0}^{q_1-1} \beta_{2j} \Delta LGDP_{t-j} + \sum_{k=0}^{q_2-1} \beta_{3k} \Delta LCL_{t-k} + \sum_{l=0}^{q_3-1} \beta_{4l} \Delta UNP_{t-l} + \sum_{r=0}^{q_4-1} \beta_{5r} \Delta CoL_{t-r} + \sum_{s=0}^{q_5-1} \beta_{6s} \Delta HE_{t-s} + \varepsilon_t \quad (4)$$

Equation 4 is used to test whether there is a long-term cointegration relationship between the variables. The hypotheses derived using equation (4) are as follows:

$$H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0$$

$$H_1: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq 0$$

In the ARDL bounds testing, the null hypothesis is tested using the F-test to investigate the existence of a long-run relationship between variables. As can be seen from the hypothesis, the F-test analyzes the joint significance of the coefficients on the lagged values of the variables. When the calculated F statistic value is compared with the critical

values, it is possible to make a definite decision regarding cointegration if it is outside the critical limits. To reject the null hypothesis that there is no cointegration, this statistic value should be higher than the upper bound of the critical values (Narayan and Narayan, 2005).

The error correction model to be estimated to obtain short-term dynamics, which expresses how much the series deviate from the long-term equilibrium value and to what extent this deviation will be corrected in the next period, is as follows:

$$\Delta LSUI_t = \theta_0 + \sum_{i=1}^{p-1} \lambda_{1i} \Delta LSUI_{t-i} + \sum_{j=0}^{q_1-1} \lambda_{2j} \Delta LDGP_{t-j} + \sum_{k=0}^{q_2-1} \lambda_{3k} \Delta LCL_{t-k} + \sum_{l=0}^{q_3-1} \lambda_{4l} \Delta UNP_{t-l} + \sum_{r=0}^{q_4-1} \lambda_{5r} \Delta CoL_{t-r} + \sum_{s=0}^{q_5-1} \lambda_{6s} \Delta HE_{t-s} + \phi ECM_{t-1} + \varepsilon_t \quad (5)$$

where  $\phi$  is the adjustment coefficient indicating the extent to which the balance deviation in the past period is corrected in the current period. Initially, the results of the bounds test, along with the relevant diagnostic tests, are detailed in Table 8. Moreover, the findings of the ARDL (1,2,1,0,0,0) model are detailed in the appendix of the study (Appendix-Table A1).

While the appropriate lag length can be determined according to different information criteria, for this study, it is determined using the Akaike Information Criterion

(AIC), and the maximum lag length is taken as 2. The calculated F statistic is higher than table critical upper bound values at 1% significance level, this result indicates that there is a cointegration relationship between the variables. When the results of the Breusch-Godfrey Serial Correlation LM test are analyzed first among the diagnostic tests in Table 8, it is observed that the probability value is greater than 0.05. In this case, the null hypothesis of no serial correlation cannot be rejected. Similarly, the probability value of the Breusch-Pagan-Godfrey (heteroskedasticity) test is greater than 0.05, so the null hypothesis for this test is that the error variances are all equal cannot be rejected. It is observed that the probability value of the Ramsey RESET test performed to investigate whether there is a specification error in the model is higher than 0.05. In this case, the null hypothesis of correct specification of the Ramsey RESET test fail to reject, this shows that the functional form is correct, there is no specification error in the model. The Jarque-Bera test results confirm that the series in the model are normally distributed. In addition to all these, when CUSUM and CUSUMQ graphs (Appendix-Figure A1) are analyzed, it is observed that the test statistics remain inside the 5% confidence interval, which indicates that the estimated coefficients are stable.

**Table 8.** Bounds Test Results for Cointegration in the Specified ARDL Model

| F-statistics            | Significance Level | Critical Value              |        |
|-------------------------|--------------------|-----------------------------|--------|
|                         |                    | I(0)                        | I(1)   |
| 5.799561***             | 10%                | 2.407                       | 3.517  |
|                         | 5%                 | 2.91                        | 4.193  |
|                         | 1%                 | 4.134                       | 5.761  |
| Diagnostic Tests        |                    |                             |        |
|                         |                    | Statistic                   | Prob   |
| LM Test                 |                    | 0.9730                      | 0.6148 |
| Heteroskedasticity Test |                    | 0.4591                      | 0.8841 |
| Ramsey-RESET Test       |                    | 0.1054                      | 0.7492 |
| Jarque-Bera             |                    | 1.0889                      | 0.5802 |
| CUSUM                   |                    | Stable (Appendix-Figure A1) |        |
| CUSUMQ                  |                    | Stable (Appendix-Figure A1) |        |

**Note:** Null hypothesis for cointegration test: "There is no cointegration". (\*\*\*) indicate that the null hypothesis is rejected at 1% significance level.

**Source:** Authors' calculations.

**Table 9.** Estimated Long-Run Coefficients

| Variable | Coefficient | Std. Error | t-Statistic | Prob.     |
|----------|-------------|------------|-------------|-----------|
| LGDP     | -0.399968   | 0.114130   | -3.504499   | 0.0024*** |
| LCL      | 0.146231    | 0.018065   | 8.094519    | 0.0000*** |
| UNP      | 0.012814    | 0.010930   | 1.172331    | 0.2556    |
| CoL      | -0.000789   | 0.000952   | -0.829148   | 0.4173    |
| HE       | -0.060920   | 0.027835   | -2.188606   | 0.0413**  |
| C        | 9.118228    | 0.865231   | 10.53849    | 0.0000    |

**Note:** Significant at 10% (\*), 5% (\*), and 1% (\*\*\*).

**Source:** Authors' calculations.

The ARDL (1,2,1,0,0,0) model was estimated by determining the lag length according to the AIC criteria, and Table 9 demonstrates the long-term coefficients of the relevant model. Since some variables are incorporated in the model by taking their logarithms, the coefficients of these variables are also interpreted as the elasticity coefficients of the variables. The coefficients for the LGDP, LCL, and HE demonstrate statistical significance and are in line with anticipated outcomes. The coefficient of the LGDP variable is estimated at -0.399968 and is statistically significant at the 1% level ( $p = 0.0024$ ). This result implies that a 1% increase in GDP leads to an approximate 0.40% decrease in the dependent variable in the long run. The negative and significant relationship suggests that GDP exerts a dampening effect on the dependent variable over time. The coefficient associated with LCL is 0.146231 and is highly statistically significant ( $p = 0.0000$ ). A long-term increase of 1% in consumer loans is statistically associated with an average increase of 0.146% in suicide cases. The estimated coefficient for HE, which represents the share of health expenditure in GDP and is included in level form, is -0.060920 with a p-value of 0.0413, indicating

Table 10 presents the estimation results of the error correction model. A coefficient of the error correction term between 0 and -1 indicates a convergence to the long-run equilibrium state, while a positive value indicates a divergence from the equilibrium state (Pata et al., 2016). In other words, the coefficient of  $ECM_{t-1}$ , which is the one-period prior value of the residual series obtained from the long-run ARDL model, indicates how much of the short-run imbalance can be corrected in the long-run (Nkoro & Uko, 2016). The coefficient of the error correction term (ECM) is estimated at -1.008211 and is statistically significant, indicating the presence of a stable long-run relationship between the variables. The negative sign of the ECM is consistent with the theoretical expectation, suggesting that any short-run disequilibrium is corrected toward the long-run equilibrium. The magnitude of the coefficient implies that approximately 100.8% of the deviation from long-run equilibrium is corrected within one period, meaning that the adjustment is very rapid, and the system overshoots the equilibrium slightly in the subsequent period.

**Table 10.** Error Correction Model

| Variable            | Coefficient | Std. Error | t-Statistic | Prob.     |
|---------------------|-------------|------------|-------------|-----------|
| $\Delta$ (LGDP)     | -0.015677   | 0.093983   | -0.166810   | 0.8693    |
| $\Delta$ (LGDP(-1)) | 0.283874    | 0.069044   | 4.111463    | 0.0006*** |
| $\Delta$ (LCL)      | -0.014386   | 0.026899   | -0.534814   | 0.5990    |
| $ECM_{t-1}^*$       | -1.008211   | 0.137947   | -7.308694   | 0.0000*** |

**Note:** Significant at 10% (\*), 5% (\*), and 1% (\*\*\*).

**Source:** Authors' calculations.

statistical significance at the 5% level. This means that a one-unit increase in the share of health expenditures (i.e., a 1 percentage point increase) is associated with a decrease of about 6.1% in the dependent variable in the long run. The negative and significant coefficient suggests that increasing health expenditure shares may have a reducing effect on suicide, which is the dependent variable over time. The findings obtained in this study regarding the relationship between suicide and health expenditures are consistent with the results reported by Karul (2025). On the other hand, the results on the relationship between suicide and income level are in line with the findings of Altınanahtar and Halıcıoğlu (2009) and Kavaklı (2023) in the national literature. This situation reveals that the current analyses are both up-to-date and consistent with previous studies and make an important contribution to the related literature.

After confirming a cointegration relationship among the variables, the Fully Modified Ordinary Least Squares (FMOLS) method was used to estimate the long-run coefficients. The FMOLS estimation addresses both serial correlation and endogeneity in the regressors, resulting in reliable estimates of the long-run parameters. According to the FMOLS estimation results in Table 11, a 1% increase in the GDP variable reduces the dependent variable by approximately 0.22% in the long run. This indicates a statistically significant negative relationship. 1% increase in the CL variable results in an approximately 0.12% increase in the dependent variable. This relationship is positive and quite strong. A comparison of the long-run coefficient estimates derived from the ARDL model and those obtained through the FMOLS method indicates that the GDP and CL variables exhibit consistent coefficient signs and significance levels across both models. These

**Table 11.** FMOLS Long-Run Coefficient Estimates

| Variable | Coefficient | Std. Error | t-Statistic | Prob.     |
|----------|-------------|------------|-------------|-----------|
| LGDP     | -0.223029   | 0.081265   | -2.744460   | 0.0113**  |
| LCL      | 0.123963    | 0.014261   | 8.692562    | 0.0000*** |
| UNP      | 0.012802    | 0.009479   | 1.350666    | 0.1894    |
| CoL      | 0.000521    | 0.000780   | 0.667959    | 0.5105    |
| HE       | -0.010713   | 0.023678   | -0.452465   | 0.6550    |
| C        | 7.648461    | 0.585136   | 13.07126    | 0.0000    |

**Note:** Significant at 10% (\*), 5% (\*), and 1% (\*\*\*).

**Source:** Authors' calculations.

results underscore the reliability of the estimates for the GDP and CL variables and affirm the stability of the long-run relationships identified in the analysis.

In conclusion, the presence and direction of the causal relationships among the variables were analyzed using the Granger causality test based on the Toda-Yamamoto method. Toda and Yamamoto (1995) critically evaluated the validity of the F-statistic employed in the Granger causality test, highlighting its lack of a standard distribution when the series within the system are non-stationary. In response to this limitation, they proposed an innovative methodology—now referred to by their names—that facilitates the estimation of a Vector Autoregressive (VAR) model using the level values of the series, even in the presence of non-stationarity. This development allows for the application of the standard Wald test, thereby enhancing the robustness of the analysis. This methodology does not consider the degree of integration of the series or the potential cointegration relationships that may exist between them. To accurately estimate the VAR model for this test, it is imperative first to establish the lag length ( $k$ ) and the maximum degree of integration of the series ( $d_{\max}$ ). Following the determination of these parameters, the VAR model of degree  $[k + d_{\max}]$  can be estimated. The formulation of the VAR ( $k + d_{\max}$ ) model utilized in the Toda and Yamamoto test is as follows (Dritsaki, 2017):

$$Y_t = \lambda_1 + \sum_{i=1}^{k+d_{\max}} \beta_{1i} Y_{t-i} + \sum_{i=1}^{k+d_{\max}} \phi_{1i} X_{t-i} + e_{1t} \quad (6)$$

$$X_t = \lambda_2 + \sum_{i=1}^{k+d_{\max}} \beta_{2i} Y_{t-i} + \sum_{i=1}^{k+d_{\max}} \phi_{2i} X_{t-i} + e_{2t} \quad (7)$$

In the first model, the null hypothesis  $H_0: \phi_{1i}=0$ , which states that variable  $x$  is not the Granger cause of variable  $y$ , is tested with the Wald test, which conforms to a  $\chi^2$  distribution with  $k$  degrees of freedom, against the alternative hypothesis, which states that it is the Granger cause. Similar remarks can be made about the second model. The Wald test is applied to the first  $k$  coefficients of the coefficient's matrix, i.e., additional terms ( $d_{\max}$ ) are

not included in the restriction (Yılancı & Özcan, 2010). The results of the Granger causality test based on the Toda-Yamamoto method are presented in Table 12.

As can be seen from Table 12, the null hypothesis that GDP per capita is not the Granger cause of suicide and the null hypothesis that consumer loans are not a Granger cause of suicide are rejected at the 5% significance level. In contrast, the null hypotheses suggesting that cost of living, unemployment, and health expenditures do not Granger-cause suicide cannot be rejected at the 5% significance level.

## CONCLUSION AND RECOMMENDATIONS

Suicide, while often viewed as an individual concern, represents a serious global issue that transcends national boundaries and welfare disparities. It is essential to recognize it as a significant social problem. The factors contributing to suicide are complex and multifaceted, encompassing psychological, social, genetic, and biological dimensions. Notably, individuals who attempt suicide frequently exhibit mood disorders, with depression being the most common. Depression is characterized by a pervasive sense of sadness, feelings of grief, diminished pleasure in life, and low energy levels. Additionally, risk factors for depression may include past traumatic experiences, individual psychological attributes, and sociocultural elements such as low socioeconomic status, unemployment, and marital separation. Addressing these underlying factors is crucial for effective prevention and intervention strategies.

This study examines the relationship between suicide in Türkiye and various socioeconomic factors, including income levels, unemployment, consumer loans, cost of living, and health expenditures. Drawing on annual data from 1993 to 2023, this study incorporates consumer loans and cost of living variables into the model, thereby differentiating it from the existing body of literature on the

**Table 12.** Causality Test Results

| H <sub>0</sub> | k+d <sub>max</sub> | Chi-sq | p-values | Decide       |
|----------------|--------------------|--------|----------|--------------|
| LGDP=>LSUI     | 3                  | 10.164 | 0.0062   | Causality    |
| LCL=>LSUI      | 3                  | 21.705 | 0.0000   | Causality    |
| UNP=>LSUI      | 3                  | 1.7122 | 0.4248   | No Causality |
| CoL=>LSUI      | 3                  | 0.8648 | 0.6489   | No Causality |
| HE=>LSUI       | 3                  | 2.8778 | 0.2372   | No Causality |
| LSUI=>LGDP     | 3                  | 29.933 | 0.0000   | Causality    |
| LCL=>LGDP      | 3                  | 19.628 | 0.0001   | Causality    |
| UNP=>LGDP      | 3                  | 5.9079 | 0.0521   | No Causality |
| CoL=>LGDP      | 3                  | 3.9712 | 0.1373   | No Causality |
| HE=>LGDP       | 3                  | 7.0327 | 0.0297   | Causality    |
| LSUI=>LCL      | 3                  | 10.112 | 0.0064   | Causality    |
| LGDP=>LCL      | 3                  | 20.953 | 0.0000   | Causality    |
| UNP=>LCL       | 3                  | 2.9585 | 0.2278   | No Causality |
| CoL=>LCL       | 3                  | 1.6346 | 0.4416   | No Causality |
| HE=>LCL        | 3                  | 1.8174 | 0.4031   | No Causality |
| LSUI=>UNP      | 3                  | 16.734 | 0.0002   | Causality    |
| LGDP=>UNP      | 3                  | 3.3796 | 0.1846   | No Causality |
| LCL=>UNP       | 3                  | 2.5542 | 0.2788   | No Causality |
| CoL=>UNP       | 3                  | 5.7348 | 0.0568   | No Causality |
| HE=>UNP        | 3                  | 4.8372 | 0.0890   | No Causality |
| LSUI=>CoL      | 3                  | 6.5895 | 0.0371   | Causality    |
| LGDP=>CoL      | 3                  | 7.3247 | 0.0257   | Causality    |
| LCL=>CoL       | 3                  | 1.8006 | 0.4064   | No Causality |
| UNP=>CoL       | 3                  | 24.052 | 0.0000   | Causality    |
| HE=>CoL        | 3                  | 37.188 | 0.0000   | Causality    |
| LSUI=>HE       | 3                  | 52.411 | 0.0000   | Causality    |
| LGDP=>HE       | 3                  | 9.8000 | 0.0074   | Causality    |
| LCL=>HE        | 3                  | 39.565 | 0.0000   | Causality    |
| UNP=>HE        | 3                  | 7.6276 | 0.0221   | Causality    |
| CoL=>HE        | 3                  | 40.842 | 0.0000   | Causality    |

**Note:** The decisions in the table were made based on the 5% significance level.

**Source:** Authors' calculations.

subject. Individuals may experience feelings of hopelessness and despair due to economic stress, particularly when they face challenges in meeting necessities such as food, shelter, and healthcare. These challenges are often exacerbated during periods of economic crisis characterized by persistent price increases and an expanding gap between income and expenditures. Consequently, individuals enduring prolonged economic difficulties and financial uncertainty may find themselves losing their zest for life and commitment to well-being. When income growth fails to match inflation rates, individuals become increasingly vulnerable to the rising cost of living. This diminishment in purchasing power has the potential to induce feelings of depression and diminish motivation. Furthermore, the relationship between consumer loans and suicide can be attributed to the psychological effects of financial issues faced by individuals. Factors such as inflation and elevated living costs may make borrowing an appealing option for those unable to meet basic needs with their current income, particularly in times of crisis. However, high interest rates and the unsustainable nature of debt accumulation can create a burdensome cycle, resulting in significant stress, anxiety, and psychological pressure for affected individuals.

The relationship between suicide and these variables is analyzed with the ARDL bounds testing approach. Primarily, all series are tested for unit roots using three different unit root tests (ADF, PP, KPSS) and all of them are stationary at most in their first difference. Since the F statistic value estimated according to the result of the subsequent cointegration test is greater than the critical upper bound value at 5% significance level, it is confirmed that there is a cointegration relationship between the variables. In the long-term results of the ARDL model, several independent variables are found to have statistically significant effects on the dependent variable. Specifically, GDP per capita and health expenditure variables have significant negative coefficients, indicating that increases in these variables lead to a reduction in the dependent variable over the long term. These findings suggest that changes in these explanatory factors exert a constraining influence on the dependent variable within the scope of the model. In contrast, the consumer loans variable shows a statistically significant positive effect, indicating that increases in this variable lead to an increase in the dependent variable, suicide, in the long run. In addition, the error correction term is negative and statistically significant. To test the

consistency of the long-term relationship, the FMOLS method was also applied in addition to the ARDL model. The results generally support the ARDL findings. Indeed, variables LGDP and LCL were found to be statistically significant, negatively, and positively, respectively, in both models. These findings demonstrate that these variables have consistent long-term effects on the dependent variable. Finally, the causality relationship between the variables was analyzed using the Toda-Yamamoto test. The results indicate that both income and consumer loans are Granger causes of suicide at a 5% significance level. However, no causal relationships were found between unemployment, the cost of living, or health expenditure and suicide.

Suicide is intricately linked to an individual's psychological well-being. Recognizing this issue is the pivotal first step for both the individual and their family. Practical strategies for addressing mental health challenges include abstaining from alcohol and drugs, engaging in fulfilling hobbies that enhance motivation, seeking support from healthcare professionals, spending time in nature, and establishing small, achievable goals that reinforce a sense of purpose in life. While consumer loans can serve as a valuable resource for addressing immediate financial needs, individuals who enter into such agreements without careful consideration may encounter significant stress and feelings of helplessness. In this respect, economic solutions alone are insufficient in the fight against debt; the simultaneous provision of psychological support and debt management services plays a crucial role.

To begin with, individuals should enhance their financial literacy to the point where they can create their own budget plans. Institutions must conduct thorough analyses of individuals' repayment capabilities before approving loans. For those who are unable to repay due to unemployment and other factors, debt restructuring, and support funds should be offered as viable options. Per capita income is recognized as one of the most important indicators of a nation's welfare. In countries with low per capita income or significant income inequality, individuals may lose hope for their future. When long-term unemployment is added to this situation, it becomes inevitable for individuals to feel trapped, inadequate, and insecure. During this period, the state must provide free, accessible, and effective mental health services, and gather feedback on the positive effects of these services on individuals. Policies aimed at ensuring fairness in income distribution, reducing poverty, and setting the minimum wage above the poverty line are

essential. These measures are necessary not only to minimize suicide rates but also to create a sustainable quality of life throughout society, reduce crime rates, prevent brain drain, and improve overall well-being. As part of a long-term strategy to combat unemployment, projects that enhance employment opportunities should be developed, and social assistance programs should be strengthened. This support is vital to help individuals navigate the challenges of unemployment, especially during times of crisis.

Policies to be developed should be addressed with a holistic approach, considering the multidimensional causes of suicide. Suicide is a preventable public health issue, requiring early intervention and ongoing psychological support mechanisms. In this context, the expansion of mental health centers not only supports the well-being of individuals, but also enables more sustainable and cost-effective spending in the healthcare system by investing in preventive services rather than curative services. Educational campaigns play a crucial role in increasing public awareness about available support methods. These initiatives are essential for informing individuals about the resources and assistance that can be accessed, ultimately fostering a more informed and supportive community. The role of media in addressing the issue of suicide is critical, and it is essential to implement media policies that frame suicide as a preventable and manageable crisis. It is important to understand that reporting on suicide in a detailed and sensational manner can have a detrimental impact on vulnerable individuals, potentially triggering suicidal behaviors. Consequently, such news stories must be presented by established ethical standards. The underlying causes and risk factors of suicide cases in society should be examined in detail, and policies should be developed in light of these factors. It should not be forgotten that a strong social capital, which both enhances the level of social welfare and strengthens the ties between individuals and their lives, is an essential element of sustainable development, not only sociologically but also economically and politically.

## REFERENCES

- Adler, A. (1997). Psikolojik aktivite, Çev. Belkıs Çorakçı, 3. Baskı, İstanbul: Say Yayınları.
- Altınanahtar, A. & Halicioğlu, F. (2009). A dynamic econometric study of suicides in Turkey. MPRA Paper No. 15568. <https://mpra.ub.uni-muenchen.de/15568/>
- Baskak, T. E. (2023). OECD ülkelerinde işsizlik ve intihar girişimleri ilişkisi: Panel Var analizi ve Panel Granger nedensellik analizi. *İşletme Araştırmaları Dergisi*, 15(1), 437-451. <https://doi.org/10.20491/isarder.2023.1596>
- Borges, G., Nock, M. K., Haro Abad, J. M., Hwang, I., Sampson, N. A., Alonso, J., Andrade, L. H., Angermeyer, M. C., Beautrais, A., Bromet, E., Bruffaerts, R., de Girolamo, G., Florescu, S., Gureje, O., Hu, C., Karam, E. G., Kovess-Masfety, V., Lee, S., Levinson, D., Medina-Mora, M. E., Ormel, J., Posada-Villa, J., Sagar, R., Tomov, T., Uda, H., Williams, D. R., & Kessler, R. C. (2010). Twelve-month prevalence of and risk factors for suicide attempts in the World Health Organization World Mental Health Surveys. *The Journal of Clinical Psychiatry*, 71(12), 1617-1628. <https://doi.org/10.4088/JCP.08m04967blu>
- Brenner, M. H. (1979). Mortality and the national economy. A review, and the experience of England and Wales, 1936-76. *The Lancet*, 314(8142), 568-573.
- Chang, S., S. Gunnell, D., Sterne, J. A. C., Lu, T. H., & Cheng, A. T. A. (2009). Was the economic crisis 1997-1998 responsible for rising suicide rates in east/southeast asia? A time-trend analysis for Japan, Hong Kong, South Korea, Taiwan, Singapore and Thailand. *Social Science and Medicine*, 68(7), 1322-1331. <https://doi.org/10.1016/j.socscimed.2009.01.010>
- Chen, J., Choi, Y. J., & Sawada, Y. (2009). How is suicide different in Japan? *Japan and the World Economy*, 21(2), 140-150. <https://doi.org/10.1016/j.japwor.2008.06.001>
- Collins, A., Cox, A., Kizys, R., Haynes, F., Machin, S., & Sampson, B. (2021). Suicide, sentiment and crisis. *The Social Science Journal*, 58(2), 206-223.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366), 427-431.
- Dilber, T., & Uysal, D. (2020). İşsizlik ve intihar arasındaki ilişki: Türkiye örneği. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 16(3), 729-744. <http://dx.doi.org/10.17130/ijmeh.798469>
- Dritsaki, C. (2017). Toda-Yamamoto Causality Test between Inflation and Nominal Interest Rates: Evidence from Three Countries of Europe. *International Journal of Economics and Financial Issues*, 7(6), 120-129.
- Durgun, F., & Durgun, B. (2017). Suicide - income relationship: Causal analysis for Turkey. *Dicle University Journal of Economics and Administrative Sciences*, 7(14), 398-416.
- Durkheim, E. (1897). Le suicide. Paris, Fransa: F. Alcan.
- Eğilmez, M. (2022). Hayat pahalılığı ve enflasyondan farkı. <https://www.mahfiegilmez.com/2022/08/hayat-pahalig-ve-enflasyondan-fark.html>. (25.02.2025).
- Erdem, C., & Dinç, M. (2022). The socioeconomic determinants of suicide: A panel data analysis. *Yıldız Social Science Review*, 8(1), 1-12. <https://doi.org/10.51803/yssr.1146860>
- Freud, S. (1953). Mourning and Melancholia, in: J. Strachey, Ed., The Standard Edition of the Complete Psychological Works of Sigmund Freud, 14, London: Hogarth Press.
- Harmancı, P. (2015). Dünya'daki ve Türkiye'deki intihar vakalarının sosyodemografik özellikler açısından incelenmesi. *Hacettepe University Faculty of Health Sciences Journal*.
- Hamermesh, D., & Soss, M. N. (1974). An economic theory of suicide, *Journal of Political Economy*, 82(1), 83-98. <https://doi.org/10.1086/260171>
- Jarque, C. M., & Bera, A. K. (1987). A test for normality of observations and regression residuals. *International Statistical Review / Revue Internationale de Statistique*, 55(2), 163-172.
- Karul, Ç. (2025). The Impacts of Health Expenditures on Suicidal Deaths: The Case of Türkiye. *The International Journal of Economic and Social Research*, 21(1), 83-97.
- Kavaklı, M. (2023). Türkiye'de intiharın sosyo-ekonomik ve sosyo-psikolojik belirleyicileri: Düzey 2 için bir panel veri çözümlemesi. *Bursa Uludağ Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 42(1), 55-71.

- Kızılkaya, O., & Kuzucu, H. (2022). The relationship between suicide cases and economic factors: Panel data analysis. *Karamanoğlu Mehmetbey Üniversitesi Sosyal ve Ekonomik Araştırmalar Dergisi*, 24(42), 62-80.
- Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root. *Journal of Econometrics*, 54(1-3), 159-178.
- Lester, B. Y. (2001). Learnings from Durkheim and Beyond: The economy and suicide. *Suicide and Life-Threatening Behavior*, 31(1), 15-31.
- Machado, D. B., Rasella, D., & Dos Santos, D. N. (2015). Impact of income inequality and other social determinants on suicide rate in Brazil. *PLOS ONE*, 10(4), e0124934. <https://doi.org/10.1371/journal.pone.0124934>
- Madianos, M. G., Alexiou, T., Patelakis, A., & Economou, M. (2014). Suicide, unemployment and other socioeconomic factors: Evidence from the economic crisis in Greece. *European Journal of Psychiatry*, 28(1), 39-49. <https://dx.doi.org/10.4321/S0213-61632014000100004>
- Mann, J. J., & Metts, A. V. (2017). The economy and suicide: An interaction of societal and intrapersonal risk factors [Editorial]. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 38(3), 141-146. <https://doi.org/10.1027/0227-5910/a000487>
- Marx, K. (1846). Peuchet on suicide. In D. Fernbach (Ed.), *Karl Marx: Surveys from Exile* (trans. C. B. Macpherson, pp. 197-202). London: Penguin Books, 1973.
- Mathieu, S., Treloar, A., Hawgood, J., Ross, V., & Köves, K. (2022). The role of unemployment, financial hardship, and economic recession on suicidal behaviors and interventions to mitigate their impact: A review. *Frontiers in Public Health*, 10, 907052. <https://doi.org/10.3389/fpubh.2022.907052>
- Moscicki, E. K. (1995). Epidemiology of Suicide, North American Perspectives. *International Psychogeriatrics*, 7(2), 137-148.
- Menninger, K. A. (1938). *Man against himself*. Harcourt, Brace.
- Ministry of Health (2018). <https://khgm.saglik.gov.tr/TR,46896/10-eylul-dunya-intihari-onleme-gunu.html> (25.02.2025).
- Narayan, P. K. (2005). The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics*, 37(17), 1979-1990. <http://dx.doi.org/10.1080/00036840500278103>
- Narayan, S., & Narayan, P. K. (2005). An empirical analysis of Fiji's import demand function. *Journal of Economic Studies*, 32(2), 158-168. <https://doi.org/10.1108/01443580510600931>
- Neumayer, E. (2003). Are socioeconomic factors valid determinants of suicide? Controlling for national cultures of suicide with fixed-effects estimation. *Cross-Cultural Research*, 37(3), 307-329. <https://doi.org/10.1177/1069397103253708>
- Nkoro, E., & Uko, A. K. (2016). Autoregressive distributed lag (ARDL) cointegration technique: Application and interpretation. *Journal of Statistical and Econometric Methods*, 5(4), 63-91.
- Nock, M. K., Borges, G., Bromet, E. J., Alonso, J., Angermeyer, M., & Beautrais, A. (2008). Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *The British Journal of Psychiatry*, 192(2), 98-105. <https://doi.org/10.1192/bjp.bp.107.040113>
- Nordt, C., Warnke, I., Seifritz, E., & Kawohl, W. (2015). Modelling suicide and unemployment: A longitudinal analysis covering 63 countries, 2000-11. *The Lancet Psychiatry*, 2(3), 239-245. <https://doi.org/10.1016/j.eurpsy.2015.03.003>
- Okada, K., & Samreth, S. (2013). A study on the socio-economic determinants of suicide: Evidence from 13 European OECD countries. *The Journal of Socio-Economics*, 45(Supplement C), 78-85. <https://doi.org/10.1016/j.socsc.2013.04.009>
- Pata, U. K., Yurtkuran, S., & Kalça, A. (2016). Energy consumption and economic growth in Turkey: ARDL bounds test approach. *Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 38(2), 255-271. <https://doi.org/10.14780/muiibd.281411>
- Pesaran, M. H., Shin, Y., & Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326.
- Peuchet, J. (1838). *Mémoires tirés des archives de la police de Paris*. Paris: Chez l'Éditeur.
- Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2), 335-346.
- Ringel, E. (1976). The presuicidal syndrome. *Suicide and Life-Threatening Behavior*, 6, 131-149.

- Sher, L. (2006). Per capita income is related to suicide rates in men but not in women. *The Journal of Men's Health & Gender*, 3(1), 39-42. <https://doi.org/10.1016/j.jmhg.2005.04.016>
- Socio-Political Field Research Centre (2020). <https://www.sahamerkezi.org/wp-content/uploads/2020/11/intihar-1.pdf>. (25.02.2025).
- Stack, S. (1981). Divorce and suicide: A time series analysis, 1933-1970. *Journal of Family Issues*, 2(1), 77-90. <https://doi.org/10.1177/0192513X8100200106>
- Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, 66(1-2), 225-250. [https://doi.org/10.1016/0304-4076\(94\)01616-8](https://doi.org/10.1016/0304-4076(94)01616-8)
- TURKSTAT (2020). Ölüm ve ölüm nedeni istatistikleri, 2015-2019 [Veri seti]. <https://data.tuik.gov.tr>
- TURKSTAT (2024). <https://data.tuik.gov.tr/Bulten/Index?p=Olum-ve-Olum-Nedeni-Istatistikleri-2023-53709>. (25.02.2025).
- Weis, M. A. (1974). Suicide. A handbook of psychiatry, (Ed.) S Arieti, New York. Basic books Inc. Publishers, 743-65.
- WHO (2018). Global health estimates 2016: deaths by cause, age, sex, by country and by region, 2000-2016.
- WHO (2021). Suicide world wide in 2019 global health estimates. <https://www.who.int/publications/i/item/9789240026643>. (25.02.2025).
- WHO (2024). <https://www.who.int/campaigns/world-suicide-prevention-day/world-suicide-prevention-day-2024>
- World Population Review (2025). <https://worldpopulationreview.com/>
- Yılcı, V., & Özcan, B. (2010). Analyzing the relationship between defense expenditures and GNP for Turkey under structural breaks. *C.Ü İktisadi ve İdari Bilimler Dergisi*, 11(1), 21-33.

## Appendix-1

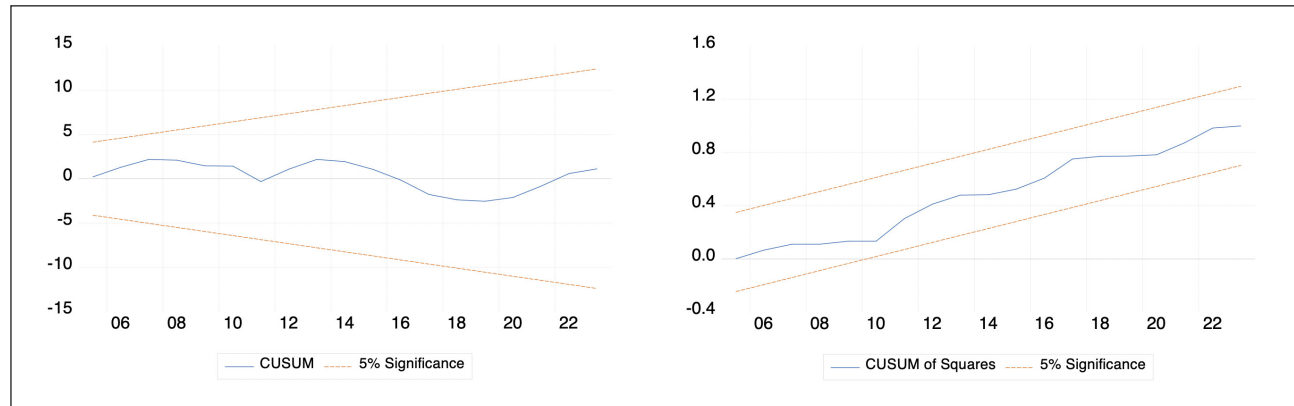


Figure A1. Graph of CUSUM and CUSUMQ

Table A1. ARDL (1,2,1,0,0,0) Model Results

| Variable | Coefficient | Std. Error | t-Statistic | Prob.     |
|----------|-------------|------------|-------------|-----------|
| LSUI(-1) | -0.008211   | 0.229022   | -0.035852   | 0.9718    |
| LGDP     | -0.015677   | 0.143030   | -0.109608   | 0.9139    |
| LGDP(-1) | -0.103701   | 0.159308   | -0.650946   | 0.5229    |
| LGDP(-2) | -0.283874   | 0.088268   | -3.216057   | 0.0045*** |
| LCL      | -0.014386   | 0.043790   | -0.328521   | 0.7461    |
| LCL(-1)  | 0.161817    | 0.046972   | 3.444981    | 0.0027*** |
| UNP      | 0.012919    | 0.011828   | 1.092264    | 0.2884    |
| CoL      | -0.000796   | 0.000903   | -0.880707   | 0.3895    |
| HE       | -0.061420   | 0.026835   | -2.288784   | 0.0337**  |
| C        | 9.193098    | 1.702561   | 5.399569    | 0.0000*** |

**Note:** Significant at 10% (\*), 5% (\*), and 1% (\*\*\*).

**Source:** Authors' calculations.