THREE ESSAYS ON THE STRUCTURE OF DOMESTIC SAVINGS IN TÜRKİYE

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ABSTRACT

THREE ESSAYS ON THE STRUCTURE OF DOMESTIC SAVINGS IN TÜRKİYE

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The long-term low domestic savings accompanied by widening current account deficits have resulted in the prolonged need for foreign savings in Türkiye. Chronic dependence on foreign savings is not sustainable. For a small import-dependent country like Türkiye, it comes at the expense of the high costs of foreign borrowing and the increased vulnerability to global liquidity shocks. This thesis focuses on how to increase domestic savings and substitute them for foreign savings by analyzing the empirical determinants of domestic saving rates at macro and micro levels for Türkiye. At the macro level, aggregate private saving rate determinants are investigated using the newly constructed quarterly savings data for the thesis, covering years between 1990 and 2020 in Türkiye. The econometric analyses reveal the strong unitary crowding out effect of the public saving rate on the private saving rate as well as the negative effects of the domestic debt stock and household credit rates while emphasizing the positive impacts of the corporate credit and investment rates, the real sector confidence index, the income growth rate, and the real interest rate. Micro-level analyses are based on firm-level and household budget survey data. The panel data analyses reveal that the operating profit margin is the primary determinant of the corporate saving rate for the listed companies on Borsa Istanbul during 2010-2019. The household budget survey data 2019 shows that the desired saving rate is higher than the actual saving rate for Turkish households using various econometric methods.

Keywords: Determinants of savings, Türkiye, Bounds test, fixed effects, panel GLS.

ÖZ

TÜRKİYE'DE YURTİÇİ TASARRUFLARIN YAPISI ÜZERİNE ÜÇ İNCELEME

DİKMEN, Aytaç
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Türkiye'de, genişleyen cari işlemler açıklarının eşlik ettiği uzun dönemli düşük yurtiçi tasarruflar, yabancı tasarruflara uzun süreli ihtiyaca neden olmuştur. Yabancı tasarruflara kronik bağımlılık sürdürülebilir değildir. Türkiye gibi ithalata bağımlı küçük bir ülkede, bu, yüksek dış borçlanma maliyetleri ve küresel likidite şoklarına artan kırılganlık pahasına gerçekleşir. Bu tez, Türkiye'de yurt içi tasarrufların mikro ve makro seviyede ampirik belirleyicilerini analiz ederek, yurt içi tasarrufların yabancı tasarrufların yerini alıp nasıl artırılacağına odaklanmaktadır. Makro seviyede, toplam özel tasarrufların belirleyicileri, bu tezde Türkiye'de ilk defa türetilen 1990-2020 dönemini kapsayan çeyreklik tasarruf verisi kullanılarak incelenmiştir. Ekonometrik analizler, özel tasarruf oranının; kamu tasarruf oranından bir büyüklüğündeki dışlama katsayısı kadar güçlü olmak üzere, yurtiçi borç stoku oranından ve hanehalkı kredi oranından olumsuz etkilendiğini ancak şirket kredi oranı, şirket yatırım oranı, şirket güven endeksi, gelir büyüme oranı ve reel faiz oranı ile pozitif ilişkili olduğunu göstermektedir. Mikro seviyedeki analizler, firma seviyesinde verilere ve hanehalkı bütçe anket verilerine dayanmaktadır. Panel veri analizi, 2010-2019 döneminde Borsa İstanbul'da işlem gören firmaların tasarruf oranının temel belirleyici faktörünün faaliyet kâr marjı olduğunu ortaya koymaktadır. 2019 yılı hanehalkı bütçe anket verileri, Türk hanehalklarının istenen tasarruf oranının gerçekleşen tasarruf oranından daha yüksek olduğunu göstermektedir.

Anahtar Kelimeler: Tasarrufların belirleyicileri, Türkiye, Sınır testi, Sabit etkiler, panel genellemeli en küçük kareler.

To my parents Sülbiye and Yüksel

And

To my wife, the rainbow in the dark, and my daughter, the princess of the universe

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I would like to sincerely thank my supervisor, Professor Esma Gaygısız, for her encouragement, supervision, and help during the preparation of this thesis. She has constantly shown her close interest and support; none of this would have been possible without her friendly touch. I am grateful to Dr. Gaygısız both for scientific standby and for close friendship.

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LIST OF ABBREVIATIONS

2SLS	Two-Stage Least Squares
AD	Aggregate Demand
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARCH	Autoregressive Conditional Heteroskedasticity
ARDL	Auto Regressive Distributed Lag
BIC	Bayes Information Criterion
CBRT	Central Bank of Republic of Türkiye
CCR	Canonical Co-integrating Regression
CCREDITS	Company Credits
COICOP	Classification of Individual Consumption by Purpose
COVID-19	Coronavirus Disease of 2019
CPI	Consumer Price Index
CUSUM	Cumulative Sum
CUSUMQ	Cumulative Sum of Squares
DGP	Data-Generating Process
DK	Driscoll-Kraay
DOLS	Dynamic Ordinary Least Squares
DPDQML.FE	Quasi-Maximum Likelihood Linear Fixed Effect Dynamic Panel Data
ECM	Error Correction Model
EG	Engle Granger
ESA	European System of Accounts
EU	European Union
FE	Fixed Effects
FGLS	Feasible Generalized Least Squares
FMOLS	Fully Modified Ordinary Least Squares
G7	The Group of Seven

G20	The Group of Twenty
GDP	Gross Domestic Product
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
GNDI	Gross National Disposable Income
GNI	Gross National Income
GNP	Gross National Product
GPDI	Gross Private Disposable Income
HAC	Heteroskedasticity and Autocorrelation Consistent
HBS	Household Budget Survey
HHCREDITS	Household Credits
HQ	Hannan Quinn
IAS	International Accounting Standards
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
ITMRT	Industry and Technology Ministry of the Republic of Türkiye
IV	Instrumental Variables
LIML	Limited-Information Maximum Likelihood
LM	Lagrange Multiplier
LSDV	Least Squares Dummy Variable
LSDVC	Bias-Corrected Least Squares Dummy Variable
MLE	Maximum Likelihood Estimation
MPI	Macroprudential Policy Index
MPS	Marginal Propensity to Save
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PCSE	Panel-Corrected Standard Errors
PDP	Public Disclosure Platform
POLS	Pooled Ordinary Least Squares
PSB	Presidency of Strategy and Budget
PUNCI	Persistence of Uncertainty Index
RE	Random Effects

RESET	Regression Equation Specification Error Test
RSCI	Real Sector Confidence Index
SC	Schwarz Criterion
SIC2	Two-Digit US Standard Industrial Classification
SME	Small and Medium Enterprises
SNA	System of National Accounts
TL	Turkish Lira
TurkStat	Turkish Statistical Institute
UK	United Kingdom
UNCI	Uncertainty Index
US	United States
USD	United States Dollar
VAR	Vector Autoregression
VCE	Variance-Covariance Matrix of the Estimators
VECM	Vector Error Correction Model
WB	World Bank
WEO	World Economic Outlook

CHAPTER I

INTRODUCTION

While savings is simply defined as the difference between income and consumption, it conceptually means postponing consumption of today to a future date and regarded as deferred consumption. Savings is, undoubtedly, one of the most discussed concepts in economics. One of the two most important reasons for this is that savings, in relationship with investment and growth, is included in different theories as the source of capital accumulation and/or growth. The second reason is that the consumption and saving decisions of today are simultaneously taken, linked dynamically in an intertemporal framework.

Since the analysis of the relationship between savings and investment, or the role of savings in economic growth is not within the scope of this thesis, growth models in which savings is included as a variable will not be mentioned. Also, structural models of consumption or saving decisions will not be examined, but rather an empirical approach will be followed in this thesis.

This dissertation is a collection of three independent essays on the structure of domestic savings in Türkiye using applied econometrics, organized in the form of three chapters. The objective of this thesis is to empirically investigate the determinants of private savings both macro and micro, with the sub-components of corporate and household savings, framework in Türkiye.

Chapter 2 is composed of three sections. First, theoretical explanations for saving behavior are presented. Second, the related literature is summarized in macro and micro framework distinctions. Lastly, the results of the empirical literature are

provided in a comprehensive table. In Chapter 3, the macro determinants of private savings rate as a ratio of Gross Domestic Product (GDP) are investigated with newly and firstly constructed data over the period 1990-2020. In Chapter 4, to complement the above analysis, the determinants of corporate savings using listed firm data of Borsa Istanbul between 2010-2019 will be investigated within the microeconomic framework. Chapter 5 examines the micro-level determinants of household savings in Türkiye using household-level cross-sectional data obtained from the Household Budget Survey (HBS) of 2019 conducted by the Turkish Statistical Institute (TurkStat). Finally, Chapter 6 summarizes the main findings of the earlier chapters and gives general recommendations for the domestic savings of Türkiye. It is believed that the empirical evidence presented here sheds light on the understanding of private saving decisions and helps for better policies to increase private savings in Türkiye. Specifically, the findings shed new light on the debate as to whether the crowding-out effects of public savings on private savings are full or partial. Also, the importance of the real sector confidence index in determining private savings appears.

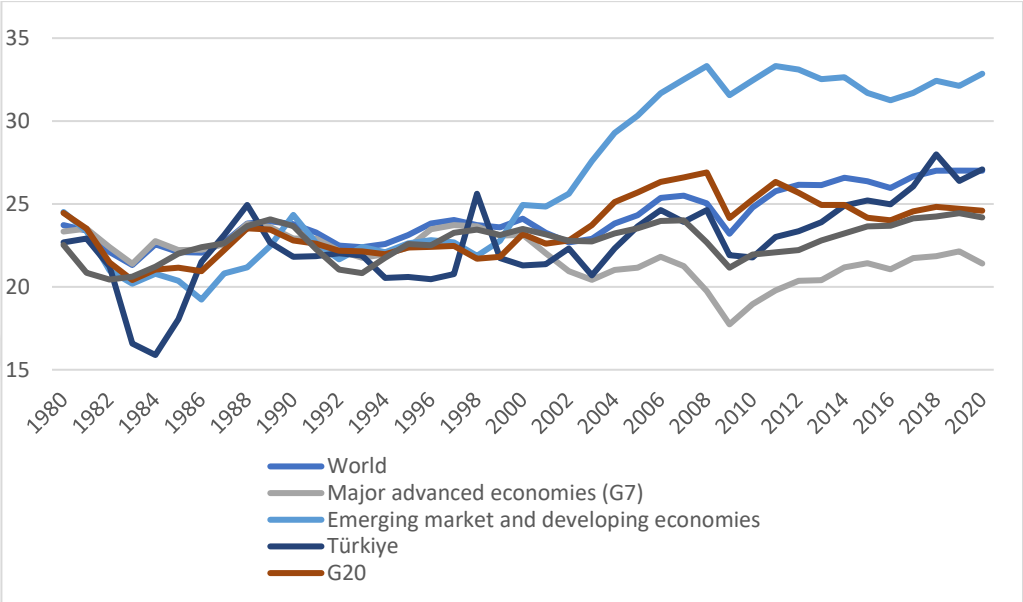
I.A. TURKISH SAVING RATE IN INTERNATIONAL CONTEXT

One of the stylized facts of the Turkish economy is a historically low level of domestic saving rates, relative both to other similar countries and to its long-run average investment rate. According to the data from the International Monetary Fund (IMF) World Economic Outlook (WEO) database, between 1980 and 2020, Türkiye's investment rate has averaged around 25 percent of GDP. This is higher than the saving rate, which has been at 22 percent of GDP.

As illustrated in Figure 1[1], Türkiye's national saving rate is below the aggregate world saving rate for the whole period from 1980 to 2020, only except for the years 1987,

[1] In both Figure 1 and Figure 2, data is from IMF-WEO. Given the inadequacies, inconsistencies and biases of international macroeconomic saving data that gathered and/or published by various sources, IMF-WEO database provides a most comprehensive and consistent data set covering a large number of countries and a long time period. World comprises 196 countries, Emerging market and developing economies comprises 155 countries, and OECD consists of 38 countries. Unweighted averages are used, no difference is observed in the case of median usage. Furthermore, it should be noted that, for Türkiye,

1988, 1998, and 2018. Moreover, compared with emerging markets and developing economies, Türkiye has a relatively low saving rate, except for the years of 1982, 1986, 1987, 1988, 1989, 1992, and 1998. It is also worth stressing that after 2000, the gap has widened.



Source: IMF (2023).

Figure 1 Savings in International Comparison, 1980-2020 (% of GDP)

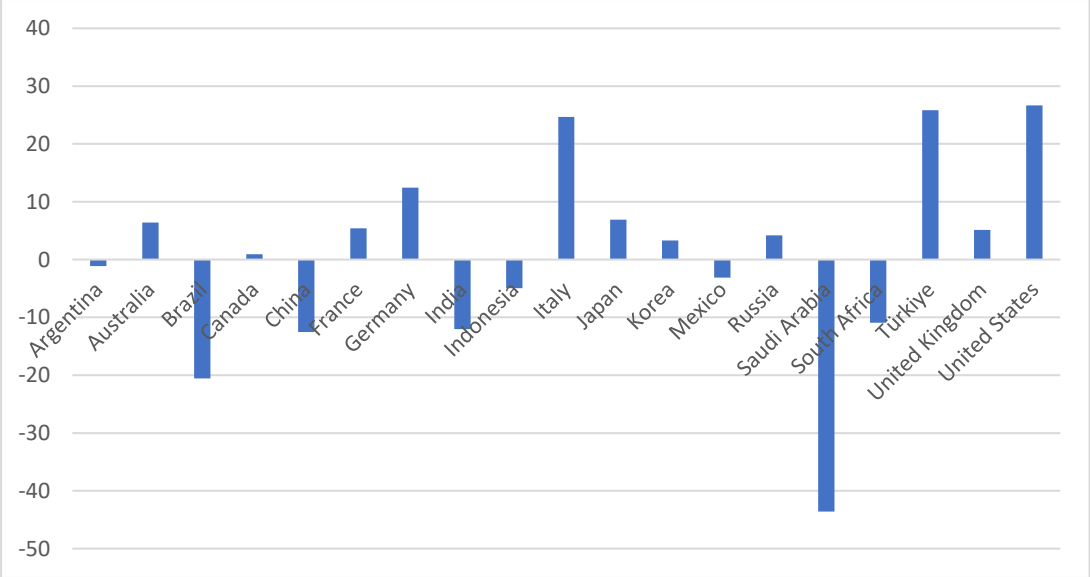
From Figure 1, it is also noted that saving rates do not show significant divergence both over time and relative to other countries grouped by income in the 1980s and 1990s[2]. Specifically, from 1980 to 1998, the saving rates of country groups are stable at around 22 percent of GDP and show a similar pattern, but then there is substantial dispersion across countries during the 2000s. In particular, saving rates in major advanced economies (G7, The Group of Seven) have declined significantly from 24

IMF-WEO data used here for the international comparisons is different from the one that will be used for time series analysis in Chapter 3.

[2] For a detailed statistical account of international trends in saving rates, see Loayza et al. (2000), Grigoli et al. (2014, 2018), De Serres et al. (2003) and Dayal-Gulati and Thimann (1997), among others. However, as stated in Deaton (1989), measurement issues of savings are different across countries and cross-country comparisons raise doubts. See Berry (1985), Fry (1988), and Gersovitz (1988) for this type of data problems.

percent in 1998 to 17 percent in 2009 while saving rates in emerging market and developing economies have risen strongly from 21 percent in 1998 to 34 percent in 2008, widening the gap between two country groups. From 2009 onwards, saving rates have shown an increasing trend in all country groups other than G20 (The Group of Twenty) countries where saving rates increased sharply during 2010-2011, since then they have declined systematically. Furthermore, saving rates in emerging markets and developing economies have shown similar patterns with G20 countries.

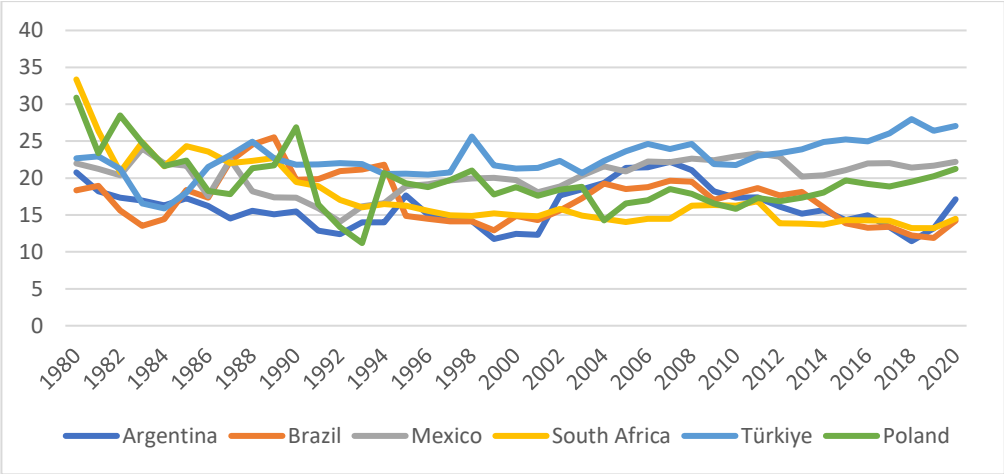
Within G20 countries, the saving performance of economies is shown briefly in the figure below. Over the past decade, Türkiye has experienced the second-highest growth in savings among all G20 nations. Further, there are only four countries that have increased saving rates both during the last forty years and ten years, of which Türkiye has had the highest increase during the last ten years.



Source: IMF (2023).

Figure 2 Evolution of Savings in G20 Countries, 2010-2020 (% of GDP)

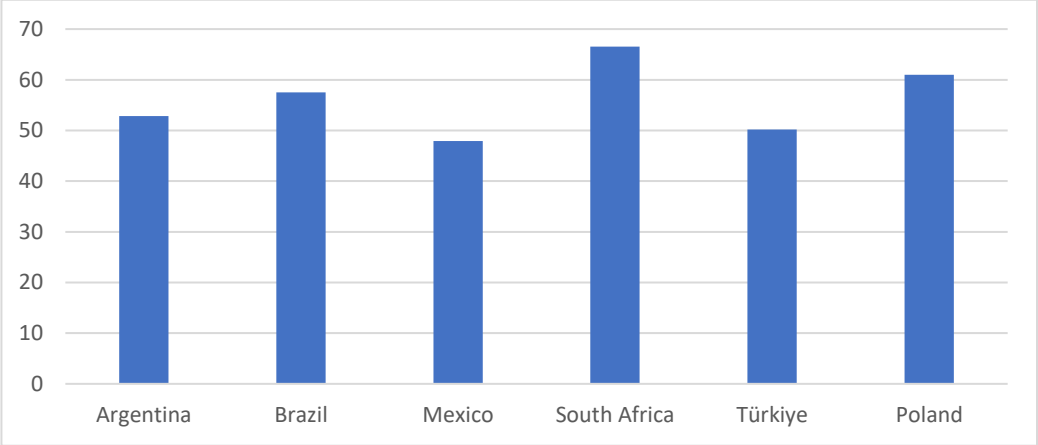
While the Turkish saving experience presented above shows that Türkiye, especially since 2000, is an outlier among emerging market and developing economies group with the low level of saving rate, it is no longer a low-level outlier among a group of emerging economies that have also experienced high inflation periods (Figure 3).



Source: IMF (2023).

Figure 3 Evolution of Savings in Similar Countries, 1980-2020 (% of GDP)

It is also noteworthy that on average, over the last forty years, the volatility of the saving rate in Türkiye is lower than in most of the comparator countries, as indicated in Figure 4 below.



Source: IMF (2023).

Figure 4 Volatility of Savings in Comparator Countries, 1980-2020

I.B. A BRIEF ANALYSIS OF TURKISH SAVING BEHAVIOUR

Since the savings can be affected by policies (for example; tax policy, interest rate policy, minimum wage policy) and by changes in macroeconomic fundamentals (for example; growth, inflation, exchange rate, employment level, budget balance, current

account balance), in order to better understand the empirical results on saving dynamics of Türkiye presented in the following chapters, giving brief information about Turkish economy is fruitful[3].

Türkiye experienced a severe debt and balance of payments crisis from 1978 to 1980 and started the 1980s with a macroeconomic stabilization and liberalization program under military rule[4]. In the early 1980s, trade account liberalization was initiated with heavy export subsidies and reduced import quotas, interest rate ceilings on loans and deposits were lifted, daily nominal foreign currency rates were announced and external flows were partially decontrolled with easing external borrowing by firms and banks and allowance of foreign exchange holdings for residents. The program enjoyed some success in terms of inflation, current account deficit, and public sector deficit during 1983-1987, with the help of the military regime. Nevertheless, following the restoration of parliamentary democracy in 1987, macroeconomic imbalances resurfaced. In the late 1980s, to enable the funding of public deficits without hindering private investment, capital account[5] liberalization was introduced. This involved the removal of all foreign exchange controls, complete liberalization of the capital account, and the monitoring of interest rates by the central bank. (Türel, 2003), (Akyüz and Boratav, 2003). Since the domestic financial markets were liberalized in the presence of high inflation, high-interest rates, and high public sector deficit with the shift from central bank financing to direct security issues[6], there was a massive increase in short-term capital inflow to the private, especially banking sector resulting

[3] A full historical analysis of Turkish economy is beyond the scope of this thesis. In this context, giving a detailed information and discussions about the structure of Turkish economy is not intended by this chapter. For this aim, see inter alia, Yentürk (2003), Yeldan (2001), and Boratav (2005).

[4] The financial policies of the 1980s are well explained in detail in Akyüz (1990).

[5] (i) The foreign exchange rates were freely settled in the transaction of banks and foreign currency brokers, (ii) restrictions of foreign exchange denominated assets of domestic investor were abolished, and (iii) constraints on the local bank credit from abroad were lifted. Furthermore, firm shares and public securities were leted to trade by foreigners. The limitations over the profit transfers to abroad were also lifted.

[6] Before the financial liberalisation programme of 1980, the central bank was the basic source of the deficit finance, with the policy environment of post-1980 period, access of Treasury to the central bank funds have been heavily limited (Özmen, 1998).

in appreciated domestic currency, increased private sector foreign borrowing and, domestic financed public sector deficits. During the 1990s, the cost of public debt was more than the inflation rate, averaging 30 percent (Akyüz and Boratav, 2003). This led to a fast increase in debt, speed currency substitution up, and the occurrence of a fragile banking system. As Özatay (2000) notes, domestic debt financing is unsustainable when real interest rates exceed the real growth and there is no balancing primary budget surpluses. During the 1991-1993 period, under the conditions of high real interest rates and extremely short debt maturities, the financing mechanism of the public deficit changed at the end of 1993, as such short-maturity domestic debt auctions were canceled[7], and Treasury started to rely upon resources of the Central Bank of Republic of Türkiye (CBRT) heavily[8]. This policy change led to a currency crisis in 1994 (The Turkish lira (TL) depreciated by almost 70 percent against United States dollar (USD) in the first quarter of 1994, the CBRT lost more than half of its international reserves, overnight interest rates jumped to 700 percent from a stable pre-crisis level around 70 percent, economic growth declined by 6 percent). After the 1994 crisis, despite several stabilization attempts with the IMF, economic conditions were unstable due to political uncertainty throughout the 1990s.

In the 2000s, after the 2000-01 banking crisis, due broadly to policies of the post-2001 stabilization program named "Transition to a Stronger Turkish Economy" aimed at reducing public deficit and public debt, inflation targeting monetary policy framework, restructured and re-capitalized banking sector, reduced interest rates and inflation, Türkiye enjoyed strong and uninterrupted growth, with an average growth rate of nearly 7 percent per year and consumer inflation declined to about 8 percent from a level of 68 percent over the period 2002-07. Healed growth expectations and plenty of foreign liquidity led to external capital flows that accelerated growth and expanded the

[7] As stressed in Özatay (2000), in November 1993, three of the four auctions, in December of the same year, four of the five were washed-out. Similarly, in September and October of 1993, the government adopted 19 percent of all offers.

[8] Celasun (1999) notes that based on legislations made in October 1993, cash facility was enlarged (From Treasury to CBRT). In August 1993, by the contribution of an annexed budget, a huge amount of additional funds was provided to the Treasury. The Treasury used up all of its 1993 resources, and 53 percent of the legal limit for 1994 in only the first 3 weeks of 1994.

current account deficit (IMF, 2010). Because of the massive decline in international trade and freeze of external flows effects of the 2008-09 global crisis, the monetary policy strategy was relaxed significantly, in particular, the Central Bank dropped the policy rate by 1025 basis points over October 2008 and November 2009. As outlined by the Organisation for Economic Cooperation and Development (OECD, 2010), these falls were the first in the OECD as well as other developing markets. Interest rates in Türkiye arrived at record fallings and real ones closed zero, which is not observed from the beginning of 2002. Furthermore, approximately 1,8 percent of GDP amounted to direct revenue, and expenditure stimulus measures were implemented for the period 2008-10. Also, from late 2008, the structure of external financing changed into shorter-term and single inflows[9].

Türkiye started the 2010s with a remarkable policy change on the monetary side. Facing strong short-term capital inflows, appreciating the lira, weakening competitiveness, promoting domestic credit growth, generating inflationary pressures, and raising imports, the Central Bank, since late 2010, implemented a new policy framework that put more weight on exchange rate developments and credit growth[10] where instead of one interest rate, a wide variety of instruments were utilized[11]. In the 2010s, Türkiye's economy had grown rapidly, with an average of almost 5.5 percent growth rate per year. In the summer of 2018, the uncertain global economic environment combined with Türkiye's vulnerabilities, especially in external debt which had steadily increased since 2011 and reached 54 percent of GDP in 2018, led to a lira sell-off and capital outflows. As highlighted by Özatay (2000), the economy of Türkiye faced a crisis in August 2018. As a result, it entered a recession in the 2018, third quarter. After 6 quarters, GDP reached its peak level before crisis. For example,

[9] Also, as pointed in Mauro et al. (2009), the robust fiscal conditions created an important fiscal space for Türkiye. Then, in the 2009-2010, Türkiye enforced countercyclical fiscal policy in response to shrinking economy.

[10] Özatay (2016) provides both significant and positive relationship between capital flows and credit in Türkiye.

[11] In the new policy framework, a relatively wide interest rate corridor described by overnight together with a one-week repo lending rate. Detailed information about this regime can be found in OECD (2012) and IMF (2012), among others.

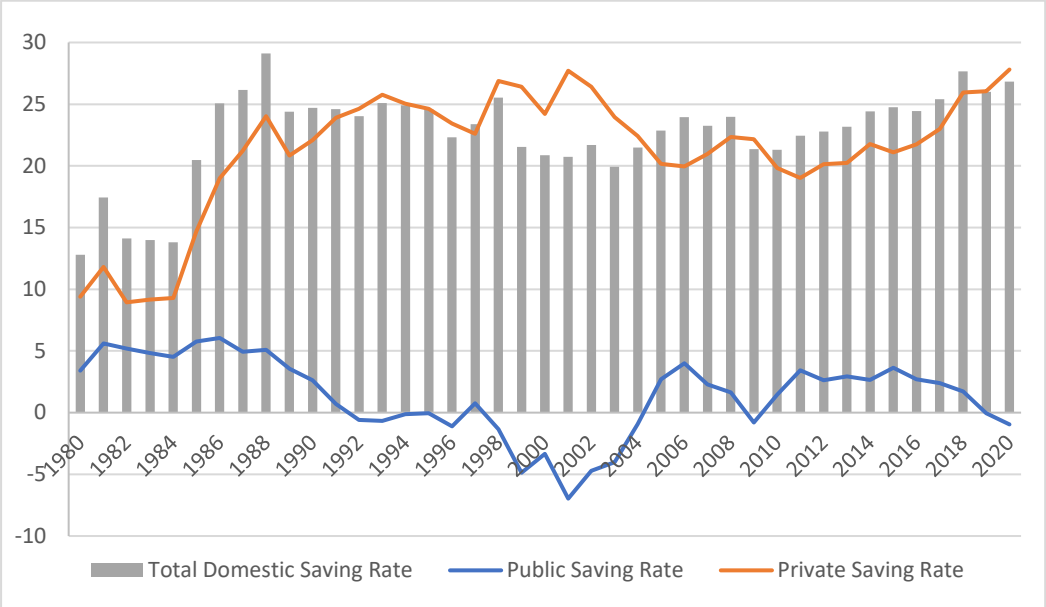
in August 2018, the exchange rate was undervalued by almost 40 percent in just two weeks, and the risk premia increased rose significantly. After these shocks, as well as during the COVID-19 pandemic, several radical measures, such as restrictions on foreign currency loans to corporates or banning of private contracts in terms of foreign currency among Turkish residents, were introduced to prohibit additional lacking of the lira and cut off further volatility[12]. Lastly, the Türkiye Economic Model was adopted in December 2021 with the liraisation strategy as a key and new element to promote greater use of the lira in the economy.

Given the main developments in the Turkish economy as summarized above, the figure below shows the domestic saving pattern during the 1980-2020 period. It should be noted that, in Türkiye, domestic saving data is produced by the Presidency of Strategy and Budget (PSB - Former Ministry of Development, previous State Planning Organization) under the preparation of the general balance of the economy, only an annual base and with the components of private and public.

The figure reveals that the increase in private savings corresponds to the decrease in public savings. The domestic saving rate, which was on average 14.4 percent in the first half of the 1980s, experienced a significant jump, especially over the 1984-1988 period when the domestic financial markets began to be liberalized and interest rates were frozen, with the effect of the approximately 160 percent increase in the private saving rate, reaching 29.1 percent in 1988. This rate is the highest in the last four decades. The domestic saving rate, which moved around an average of 24.4 percent during the 1989-1998 period, remained constant at 21.2 percent during 1999-2002. After that, the domestic saving rate, which was 19.9 percent in 2003, increased steadily, except for a temporary decrease in 2009, and reached 27.7 percent in 2018. Similarly, after the temporary decrease in 2019, the increase continued and reached 26.8 percent in 2020. Except for the increase due to the public saving increase over the

[12] These measures are well summarized in OECD (2021), among others. In addition to these, Türkiye's response to the COVID-19 pandemic can be read from IMF (2021), OECD (2023).

2002-2006 period, the increase in the domestic saving rate in the last forty years has always been due to private saving.



Source: PSB (2023).

Figure 5 Total, Private and Public Savings Rates in Türkiye (% of GDP)

Moreover, when we look at the development of Türkiye's domestic saving rate in a cyclical manner over the last forty years, the first thing that stands out is that the highest level of the relevant ten years has been reached every ten years, specifically; the highest value of the 1980s was reached in 1988, the 1990s in 1998, the 2000s in 2008, and the 2010s in 2018.

Also, as shown in Figure 5, a decomposition of the Turkish savings rate is interesting and unusual. In particular, after 1984, the two components comprising Türkiye's domestic savings have moved in a strong negative correlation with each other.
With the transition to parliamentary democracy and the implementation of elections in 1987, the public saving rate decreased steadily until the 2000-01 crisis, although there were one or two temporary improvements. In contrast to the private saving rate, after the 2000-01 crisis, the public saving rate strongly increased until 2006, thanks to the tight fiscal policy implemented within the framework of the post-2001 stabilization program named "Transition to a Stronger Turkish Economy" mentioned above. After

the crisis, strong efforts helped public deficits turning into surpluses. In subsequent years, this program makes a strong contribution to reach primary surpluses which are approximately 5 percent of GDP in each year of 2002-2007. In the context of the global crisis, the public saving rate continued to decline in the post-2007 period, when no new agreements were made after the 2007-2008 global crisis and the IMF program ending in 2007.

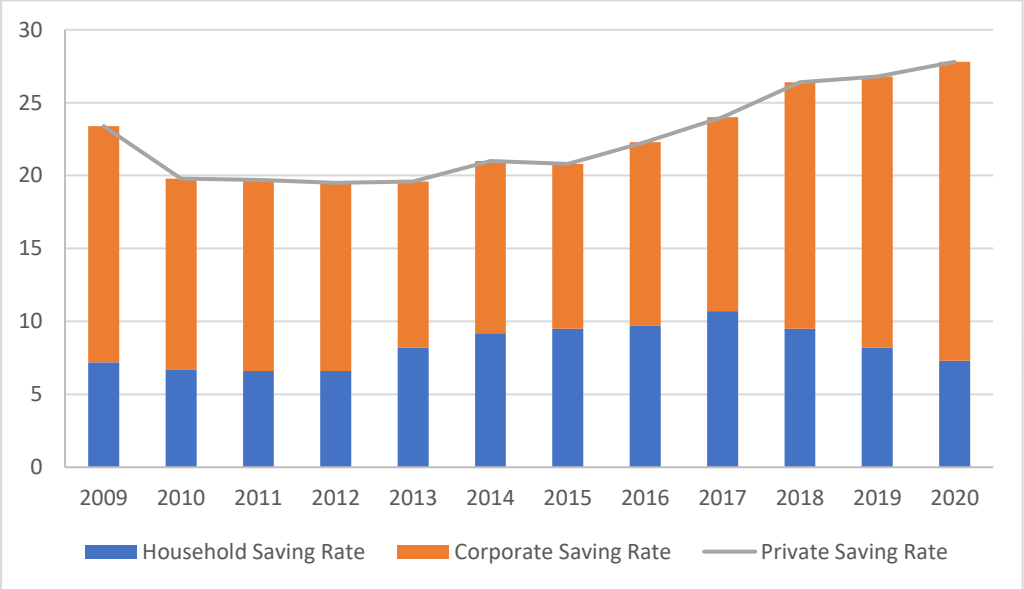
The private saving rate, unlike the public saving rate; increased sharply by 160 percent from 1984 to 1988 due mainly to high inflation and interest rates (Celasun and Tansel, 1993), the upward trend after the one-time decline in 1989 continued until 1993, fell between 1993-1997, and was volatile during the 1998-2001 crisis periods. After the 2000-01 crisis, the private saving rate decreased by 28 percent until 2006. Possible developments to explain the observed decline in the private saving rate from 2001 are higher public saving, lower interest rates, appreciated real effective exchange rate, relaxed liquidity constraints, improved income prospects, increased consumer confidence in the context of decreasing inflation and macroeconomic stabilization (IMF, 2007, 2012), (Van Rijckeghem, 2010), (WB, 2011), (Matur et al., 2012). Except for a temporary increase seen in the 2008 crisis, the decrease continued until 2011. In the period after 2011, the private saving rate increased steadily.

However, having looked at the dynamics of the aggregate domestic saving and its sub-components, public and private sector savings, it is important to examine the private sector saving with the sub-components of household and corporate sector savings. This type of analysis is also necessary for better policy recommendations. Since the factors affecting household and corporate sector savings are different, revealing the reasons for the developments in private savings is only possible by analyzing the disaggregated data of these two components.

Total domestic saving, with a breakdown into private and public, is produced by PSB in Türkiye. A disaggregation of private savings by households and by corporates, however, is not estimated by PSB. On the other hand, subcomponents of private savings are produced by TurkStat in the framework of Institutional Sector Accounts

from 2009 onwards. Although the differences between TurkStat and PSB data will be discussed in the following chapters, the graph obtained from TurkStat data is given below.

The figure below shows that, according to the Institutional Sector Accounts of TurkStat, the majority of private sector savings originated from corporate sector savings in 2009-2020. Notably, the share of household savings in total private sector savings is below 50 percentage in all periods of 2009-2020. Additionally, corporate saving increased drastically between 2017 and 2020, from 13.3 percent of GDP in 2017 to 20.5 percent in 2020.



Source: TurkStat (2023).

Figure 6 Private, Corporate and Household Savings Rates (% of GDP)

I.C. THIS STUDY

A considerable academic literature suggests that, besides the saving-growth link, a saving rate compatible with the investment needs of the economy is vital for the fragilities created by unexpected returns in external flows. Türkiye's experience shows that Türkiye's heavy reliance on unpredictable foreign capital to fund investments, due to insufficient domestic savings, makes it susceptible to boom-and-bust cycles. In

Türkiye, persistent saving-investment gaps, except during crisis times, have often been interpreted as the major source of severe current account deficit lasting for more than three decades. Therefore, the current account deficit, indirectly domestic savings, has, been taken into consideration in all policy settings, and diminishing the reliance of growth on external flows has been a precedence for policymakers in Türkiye.

In this regard, domestic savings not only play a crucial role in the performance of Türkiye's economic growth (via indirectly a consumption-driven domestic demand) but can also affect Türkiye's current account dynamics (because of the well-known Saving-Investment=Current Account Balance equation, S-I=CAB) which is indeed one of the main macroeconomic fundamentals for the sustainability of growth and macroeconomic stability.

Since the low level of total domestic savings is a fundamental problem for the Turkish economy, taking into account that private saving constitutes the major part of the total domestic savings and public savings depend mostly on political decisions and are under the direct control of the authorities, understanding the private saving dynamics is necessary and crucial for the analysis and policy recommendations to increase total domestic saving rate.

Aggregate private savings are calculated using investment and public balance data, with the help of balance of payments data. In other words, it is indeed a double residual item. Therefore, savings data may have existing deficiencies of other data, such as incredibly large stock investment (IMF, 2007), inadequate public sector coverage, and the degree of underground economy.

Moreover, except TurkStat's Institutional Sector Accounts data from 2009, the long period time series breakdown of the aggregate private savings into household or company savings is not available in Türkiye, making studies focusing on macroeconomic determinants of private savings, and thereby related policy frameworks less reliable. Empirical studies on Türkiye's aggregate saving dynamics take a perfect offsetting as given, in which permanent change in public saving or/and

corporate savings is exactly offset by an opposite change in household savings. In this case, there would be perfect household piercing of the corporate veil and perfect Ricardian equivalence, whose assumptions are impossible to hold at the same time.

In addition, in Türkiye, the overwhelming majority of existing studies use annual data and thus the empirical evidence on the dynamics of private saving with quarterly data is scarce. To our knowledge, using quarterly times series data, Uygur (2012) finds significant effects of public saving balance (public sector investment and saving difference), real exchange rate, and growth on private savings during 1987Q4-2006Q3. Yentürk et al. (2009) also analyze the interaction among savings, investments, and growth with quarterly data from 1987 to 2003 and conclude that, in Türkiye, the growth induces both savings and investments. Yavaş and Tunç (2016) examine the determinants of the private saving rate in Türkiye. They find inertia and partial crowding out effect on the private saving rate.

It is noteworthy that TurkStat completed the main revision works within the scope of compliance with the System of National Accounts (SNA-2008) and the European System of Accounts (ESA-2010) in 2016. The new national income series based year 2009 has created significant changes in Türkiye's saving rates compared to the old series. The reasons for this difference in saving rates between the old and new series are the increase in national income in level and real terms, the upward revision in gross fixed capital formation, and keeping the balance of payments data constant (SPB, 2017). In this context, Türkiye's total domestic saving rates, on average, between 1998 and 2015, was 16 percent according to the old series, while it was 23 percent according to the new series. Similarly, in 2015, which is the last of the common years of the two series, the saving rate was 15 percent according to the old series, while it was 26 percent according to the new series[13].

[13] Former estimations of national accounts may estimate the actual investment less. Due to, among others, especially extending the inclusion of companies from 7,000 to 3 million enterprises using Revenue Administration data, the weight of investment in GDP significantly raised after the new methodology, reducing the share of aggregate consumption in GDP. In particular, the higher investment ratio turned into a higher saving rate and lower consumption (WB, 2017).

After the revision in the saving series, it is important to evaluate what has been learned with the information from this new series in terms of updating and rethinking past policies. In this sense, in all studies on Turkish saving rates so far, it has been stated that Turkish saving rates are very low compared to international comparisons. As stated in Chapter 1, it has caught up with the world average, and also, compared to similar countries, it is not very low, but low with the new series. Similarly, in all academic and international organizations such as IMF and WB studies on Türkiye saving dynamics, the reasons for the great decline in savings rates after 2000 were investigated and policy recommendations were made to increase saving rates, some of which were put into practice, such as the implementation of the personal pension system and the reduction of public expenditures and investments.

Due to (i) the importance and share of domestic savings in the Turkish economy, being one of the macroeconomic variables that affect growth and current account balance and hence the welfare of Türkiye, (ii) the central role in all economic policy and incentive sets of policymakers in Türkiye, (iii) data limitations to make cross-country comparisons with high caution, (iv) the lack of official measurement and publication of disaggregate private saving data in Türkiye (for households and corporations); this thesis, without cross country analysis, will focus only on Turkish domestic saving new data at several levels of disaggregation (to the extent the data permits, however, for example, house price data does not permit), devoting particular importance to econometric methods.

Besides aggregate macro-level analysis, the thesis also delves into micro-level data on individual household savings and corporate savings. With motivation coming from some dissatisfaction with the available studies, this study aims to provide a contribution to the all-too-sparse literature on determinants of saving behavior in Türkiye, hoping to extend the existing literature in three directions. First, to our knowledge, except for three studies[14] by Uygur (2012), Yenturk et al. (2009), and Yavaş and Tunç (2016) with old series, all empirical work on Turkish saving dynamics

[14] We are aware of only three saving determinants studies on Türkiye that use quarterly data.

to date has used annual data, and especially with old series of saving produced by Ministry of Development. In contrast, this study uses a new (updated) series of both TurkStat and PSB and starts from 1990. Also, this is the first study making macro analysis with the longest data that is constructed as quarterly from the annual data of PSB (and Ministry of Development).

Second, as mentioned above, this is a comprehensive study that takes both the macro and micro-level data into account. In this context, unlike most research that takes profitability as a proxy for saving, firm-level analysis is conducted directly with firm saving data, compiled from financial statements of listed firms on Borsa Istanbul. Also, different from most of the empirical literature, the years 2003 and 2004 are excluded from the sample period to avoid inconsistency from the inflation accounting application.

Third, the private saving rate and public saving rate relation are found robustly negative with the unitary coefficient, and this is the first and unique finding for Türkiye. Furthermore, consumer credits impact private saving rates negatively while business credits affect them positively. Lastly, among others, the real sector confidence index is found one of the determinants of private saving rate, which is uncommon in the empirical literature on Türkiye.

In light of these considerations, after providing a broad literature review of the main micro and macro determinants of private saving based on a large number of empirical studies in the second chapter, the main content of the thesis is presented in chapters 3-5 and investigated, respectively, the determinants of private saving rate, corporate saving rate and household saving rate in Türkiye.

In Chapter 3, the macro determinants of private saving rate as a ratio of GDP are investigated with newly and firstly constructed data over the period 1990-2020. The estimation results favor the unitary offset coefficient of the public saving rate. This is particularly important because it questions the role and effect of public savings to increase private savings. As stated above, this finding is the first in the empirical

literature on Türkiye. Moreover, among others, results show the significant but different signed effects of consumer and business credits on private saving rates.

In Chapter 4, to complement the above analysis, the determinants of corporate saving using listed firm data of Borsa Istanbul between 2010-2019 will be investigated within the microeconomic framework.

Chapter 5 examines the micro-level determinants of household saving in Türkiye using household-level cross-sectional data obtained from the Household Budget Survey (2019) conducted by the TurkStat. We have chosen the year 2019 to isolate the disturbing effects of the COVID-19 pandemic in and after 2020. There are a number of different definitions of saving (Lusardi et al., 2001) and results can be quite different depending on the measurement of saving considered. Therefore, we have adopted four different definitions to measure household savings in this chapter. The first definition of household saving (S1), which is the most common definition, is given by the difference between monthly total disposable income and total monthly expenditure of households. Our second saving definition (S2) includes durable goods; our third definition considers jewelry, clocks, and watches; and our fourth definition of household saving involves health and education expenditures.

Finally, Chapter 6 summarizes the main findings of the earlier chapters and gives general recommendations for the domestic savings of Türkiye. It is believed that the empirical evidence presented here sheds light on the understanding of private saving decisions and helps for better policies to increase private saving in Türkiye. Specifically, the findings provide fresh insights into the ongoing discourse on whether the impact of public savings on private savings is complete or partial.

CHAPTER II

DETERMINANTS OF PRIVATE SAVING RATES

II.A. INTRODUCTION

Empirical works have been done in the previous years to understand and find the determinants of savings using different data, both country-specific and across countries. This literature can be broken down into two categories: Studies that investigate the determinants of private saving in a macro framework and those that analyze the determinants of components of private saving, namely household and corporate saving. Data availability is the most important factor in deciding the scope of the studies. In this vein, most empirical evidence comes from macro determinants while determinants of firm and household saving studies are much fewer in number.

II.B. THEORETICAL FRAMEWORK

To provide an analytical background, standard theories of saving will be summarized below. In economics, while the main distinction regarding saving behavior, its determinants, and macroeconomic consequences emerges in the context of the Keynesian paradox of thrift, other than this paradox, the determinants of saving behavior are discussed in the framework of consumption theories (Çolak and Öztürkler, 2012). However, it should be noted that, before modern consumption theories, according to classical schools, interest rates were the determinant of savings. Interest is the price of giving up consumption, the supply price of savings. In this school, savings play a decisive role in economic growth as they automatically turn into investments. Adam Smith evaluates the concept of savings with the concept of thrift.

Although the first important contributions regarding savings were made by Ramsey (1928), who suggested that optimal saving behavior would be achieved at the point where the marginal efficiency of capital and the growth rate of consumption was equal, and by Fisher (1930), who solved the optimal distribution of consumption (hence saving) with marginal benefits of consumption and interest rate in a two-period economy, the Keynesian theory of consumption, known also as the absolute income hypothesis, of Keynes (1936) is accepted as the first main source in the analysis of household consumption and saving behavior in macroeconomics.

Keynes (1936) pointed out eight primary motivations for the saving:

1. To save funds as a safety net against unanticipated events (the precautionary motivation),

2. To account for a projected future link between an individual's or his family's income and requirements that differ from the current one, such as that related to maintaining dependents, education for the family, or reaching old age (the life-cycle motivation),

3. To feel curiosity and appreciation, or the intertemporal substitution drive, which maintains that a higher actual consumption in the future is better than a lower consumption in the current moment (the inter-temporal substitution motivation),

4. To take pleasure in a steadily rising expense, as it fulfills a widespread inclination to anticipate a steadily rising level of living, as opposed to the opposite, even while the ability to enjoy may be dwindling (the progress motivation),

5. To have a sense of freedom and the ability to take action, even in the absence of a clear concept or precise action in mind (the independence motivation),

6. To get a large degree of flexibility to execute commercial or speculative ventures (the entrepreneurial motivation),

7. The purpose of a bequest is to leave a fortune (the bequest motivation),

8. To appease blatant miserliness, or irrational yet adamant inhibitions against actions of expenditure in general (the avarice motivation).

One further reason to save is added by Browning and Lusardi (1996) to the preceding list, which may be viewed as a discovery in contemporary society:

9. To save money for down payments on durable goods like automobiles, homes, and other items (the down-payment motivation).

In this context, based on the absolute income hypothesis, the essence is that consumption is determined by disposable income (income after taxes). The marginal propensity to consume is positive, the marginal propensity to save is less than one, and the average propensity to consume decreases (indicating an increase in the propensity to save) as income rises. A decline in the average propensity to consume results in reduced consumption, leading to a decrease in aggregate demand (AD) and potentially causing a recession—a phenomenon known as the paradox of thrift. Contrastingly, Kuznets (1946) demonstrated that over the long term, the average consumption tendency derived from national disposable income remains constant as income increases, contradicting the predictions of the absolute income hypothesis. Additionally, the individual's role in the decision-making process is not considered in this hypothesis.

It's important to highlight that Keynes (1936) holds the distinction of being the initial economist to introduce the concept of precautionary demand for money. Furthermore, he prioritizes the precautionary motive for saving in his considerations. Lastly, Keynes (1936) is credited with incorporating the concept of risk into behavioral economics, as noted by Ceritoğlu (2009).

Although the macroeconomic perspective of the Keynesian theory of consumption is coherent and motivating, empirical research indicates that it is insufficient to explain

household consumption and saving behavior. The empirical study of cross-sectional data demonstrates that the primary critique of the Keynesian method is that microeconomic fundamentals are absent.

Hayek (1932, 1941), assuming that the production factors are at full employment, suggests that compulsory saving can be made by shifting the production factors from the production of consumer goods to the production of investment goods since the demand for consumer goods and investment goods cannot be increased at the same time.

In an economy experiencing deflation, it was put forward by Pigou (1943) that due to the increase in the real value of households' wealth, there may be an increase in consumption, in other words, a decrease in saving, without an increase in disposable income (Pigou effect).

The relative income hypothesis of Duesenberry (1949) is seen as the second fundamental contribution in the macroeconomic framework to explain saving behavior. According to this hypothesis, in summary; consumption is a function of relative income (income relative to other households) (demonstration effect), affected by income distribution and previous consumption (wedge effect). Because of the wedge effect, the effect of the same amount of income increase to raise consumption is greater than the same amount of income decline to reduce consumption. The fact that consumption, hence saving, depends on income distribution and past consumption causes saving to increase more slowly than consumption as income increases and saving to decrease faster than consumption as income decreases.

The life-cycle theory of Modigliani and Brumberg (1954) is seen as the first fundamental contribution to the microeconomic framework to explain saving behavior. According to this hypothesis, in summary; consumption is regularized by saving against changing income in different periods to provide the highest benefit throughout life under the lifetime income constraint. For rational individuals, the expectation that their future income will increase reduces savings in the current period and the

expectation that their future income will decrease increases savings. When determining their saving, individuals are expected to make conscious expenditures at each age, taking into account not only their current income, but also their past and future income in line with demographic changes (they are expected to make low or negative savings at young ages, high in middle ages, and low or negative saving in retirement). By adjusting savings in all these periods, a certain level of consumption is achieved consistently throughout a lifetime. Nevertheless, savings will exhibit significant fluctuations throughout one's life. In simpler terms, the variability in income will directly manifest in the variability of savings. According to this hypothesis, the income growth, the social and demographic structure of the population (age, gender, occupation, education level, etc.), the existence and development level of the social security system, the level of wealth in the economy, wealth taxes and capital market size are important variables that determine saving. In this theory, it is explicitly assumed that there are no liquidity constraints with the same borrowing and lending interest rates. Additionally, strong assumptions are employed to exclude uncertainty and any type of savings linked to uncertainty from the discourse. These assumptions preclude the emergence of the precautionary motive for saving. Furthermore, individuals are presumed to be aware of their lifespan and lack any bequest motive.

The permanent income theory of Friedman (1957) is a monetarist contribution to the microeconomic framework to explain saving behavior. In this hypothesis, the decomposition of income into the components of permanent and transitory is crucial to understanding saving decisions. According to this hypothesis, in summary; consumption is a function of permanent income, which should be evaluated as the path of lifetime wealth, noting that Friedman (1957) suggests that it is feasible to forecast permanent income as a weighted sum of the individual's labor income from past periods. However, transitory income can be considered as sudden changes in current income, because of, for example, windfall gains or unexpected events. Since the age structure of the population and human capital and wealth are effective on permanent income, they all have an impact on saving decisions. Similar to the life-cycle hypothesis of Modigliani and Brumberg (1954), consumption is smooth but saving is

highly volatile, due mainly to the complete reflection of transitory income changes in saving, with no effect on consumption. For rational individuals, the expectation that their future income will increase reduces savings in the current period and the expectation that their future income will decrease increases saving. Besides, if consumer confidence is high, saving decreases. Since growth today is evaluated as the leading indicator for the growth in future, if today's growth is high, more growth is expected in the future and saving will decrease (Wonnocatt, 1978; Sachs and Larrain, 1993). According to this hypothesis, high growth rates of income reduce saving. Also, consumption and saving reduce the depth of cyclical fluctuations. While the average propensity to save tends to increase during periods of economic expansion, it tends to decrease during periods of economic contraction. In this context, consumption expenditure acts as a balance by moving in the opposite direction of cyclical movements. In this theory, it is explicitly assumed that there are no liquidity constraints with the same borrowing and lending interest rates. Also, uncertainty and any form of saving associated with uncertainty are eliminated from discussion through strong assumptions, not allowing for the emergence of the precautionary motive for saving. This theory, unlike the life-cycle theory of Modigliani and Brumberg (1954), has infinitely lived consumers.

The precautionary demand for saving hypothesis of Leland (1968) is also based on the intertemporal optimization principle and the principle that consumption (hence saving) can be substituted between periods. In Leland's (1968) two-period consumption model, the second-period income is stochastic, showing the existence of uncertainty leading to a precautionary demand for saving. According to this hypothesis, in summary; if uncertainty about future income rises, saving in the current period increases to smooth consumption since the uncertainty of future consumption will also increase. In this context, if financial markets are underdeveloped and there is a problem accessing financial instruments, or if the insurance market does not work effectively, saving increases due to precautionary motives.

Feldstein (1974) is one of the pioneers of studies that explain the motivation to save for reasons such as social security and bequest, called the transfer saving hypothesis.

Feldstein (1974), in summary; adds expected retirement payments to the saving function as an element of wealth, assumes that the marginal and average effects of this variable are the same, and considers the weighted sum of the elements of wealth other than social security as a single variable. According to Feldstein (1974, 1980), there is a significant negative relationship between social security wealth and saving.

The random walk hypothesis of Hall (1978), in the neoclassical framework, suggests that changes in consumption are independent of expected changes in income. Unlike the life-cycle theory of Modigliani and Brumberg (1954) and the permanent income theory of Friedman (1957), the expected income is not associated with past income but is estimated accurately within the framework of rational expectations. Therefore, unless there is an unexpected change in income, consumption, hence saving, will not change. If there is an unexpected change in income since this change cannot be predicted, there will be an unexpected change in consumption, and hence in saving, and it is not possible to predict these changes. In other words, consumption and saving proceed randomly. The assumptions of this theory do not allow both the unexpected change in income to affect saving, and also the expected change in income does not affect saving.

Within the scope of the transfer saving hypothesis, Kotlikoff and Avia (1981) suggest that institutional structures related to inheritance, especially in large families, could replace legal markets that allow intergenerational income and wealth transfer and hence affect saving. Furthermore, Kotlikoff and Avia (1981) suggest that capital accumulation can be explained by intergenerational transfers rather than lifetime savings and such transfers are more intense among the rich.

Bernheim et al. (1985), in the framework of again the transfer saving hypothesis, argue that, with a bequest motive, parents and children are in a voluntary intergenerational transfer relationship that maximizes utility. The bequest motive, here, is a motivation that is conditional on exchange (in exchange for children exhibiting certain behaviors and providing certain services). In this context, factors such as population growth rate, life expectancy, retirement period, and differences in family structures may have an

impact on total savings. Additionally, the saving behavior of the elderly segment of the population should be analyzed in more detail.

Deaton (1991) argues that rather than the volatility of current income realizations, individuals can decrease the volatility of consumption via their past accumulated savings. In this analysis, even a low level of liquid assets could be enough to stabilize consumption about income. According to Deaton's (1991) buffer-stock saving model, the likelihood of encountering liquidity constraints in the future increases the optimal level of saving.

According to Laibson (1997), if consumers have a hyperbolic discounting process regarding their future income expectations, the optimal saving level determined at the beginning of the period will always be below the optimal value at the end of the period (hyperbolic discounting hypothesis). According to this hypothesis, at the end of the period, the consumer always regrets the saving decision she/he made at the beginning of the period. To prevent this situation, the consumer chooses a commitment such as a mortgage loan, and reaches the targeted savings at the end of the period. Therefore, variables such as housing loans, home ownership, and private retirement insurance should be among the determinants of saving.

Wan (2011) suggests that a household with a speculative saving motive may under-or-over save depending on the distortions in financial markets and housing policies. Distortions may be measured by variables such as the human capital of the household, expected increases in housing prices, down payment rates for housing, and level of indebtedness. According to this speculative saving hypothesis, the bubble in housing prices and the increase in the household's indebtedness level significantly positively affect total saving.

II.C. RELATED EMPIRICAL LITERATURE

Numerous factors influence saving behavior; important policy variables include fiscal policy, government saving, social security arrangements, financial market growth, and

macroeconomic stability. Non-policy variables including growth, demography, and outside influences also have a big impact. Although the line separating policy from non-policy factors is a matter of debate, it highlights the fact that only a limited number of savings-related variables are directly impacted by policymakers; growth, demographics, and external factors, for example, may be impacted by economic policy but are not in and of themselves policy variables.

II.C.1 Policy Factors

II.C.1.1 Fiscal Policy and Government Saving

Fiscal policy, encompassing aspects like tax structure, tax incentives, transfers, and income redistribution, can influence saving behavior. Notably, the impact of government saving is a robust finding, indicating that it only partially crowds out private savings. In other words, an increase in government savings contributes to the overall enhancement of national savings.

In the Ricardian equivalence framework, there is an assertion of a one-to-one substitution effect between public and private savings. In prior academic investigations employing panel data, there has been a consistent practice of excluding public savings from private savings, and the degree of this exclusion has exhibited variability among different studies. In other words, while the Ricardian equivalence does not hold perfectly, varying degrees of equivalence have been observed. For instance, in a study based on 30 years of data from 150 countries (Loayza et al., 2000), a 1% increase in public savings reduces private savings by 0.29% in the same year. In the long term, this reduction occurs at the level of 0.69%. Despite not having a perfect one-to-one relationship in Ricardian equivalence between public and private savings, a negative and strong relationship exists.

When examining the impact of subcategories of public expenditures on savings, an increase in specific public expenditures, such as education, health, and infrastructure, which serve as alternatives to transactions performed by the private sector, will reduce

private sector expenditures. Stated differently, an increase in specific public expenditures, which serve as alternatives to transactions conducted by the private sector, will result in a reduction of private sector expenditures. Consequently, private savings will experience an increase. However, if public expenditures are directly provided to consumers in the form of cash assistance, its impact on private savings is uncertain, as it may lead to an increase in disposable income (Grigoli et al., 2014).

Panel data studies show that more government saving is associated with lower private saving (Loayza et al. (2000), IMF (2005). But the offsets are not all there is, particularly in poorer nations. For example, offsets of -0.5 and -0.2 are found by Loayza et al. (2000) and IMF (2005), meaning that a one percentage point increase in public saving increases overall saving by 0.5–0.8 percentage points. These partial offsets can result from several things, including Ricardian effects, habit formation, the effect of government borrowing on credit availability, real interest rates, or the adoption of social security or unemployment coverage, two programs financed by social security taxes, which have reduced the need for private saving.

II.C.1.1 Social Security Systems

There is a lot of thought put into how social security programs affect individual saving habits. It is believed that these retirement-focused systems affect individual saving intentions. The size of pension systems and private saving rates do, however, only slightly correlate when data from different nations are examined (IMF, 1995b). Feldstein (1980, 1995) discovered that pay-as-you-go pension plans had a significant detrimental effect on individual savings; nevertheless, both empirical and theoretical challenges have been made to these conclusions (Busch and Wueger, 1981; Koskela and Viren, 1983). According to some economists, public pension plans could even promote saving by raising people’s knowledge of how important retirement planning is.

In the Defined Contribution Pension System, characterized by the non-accumulation of contributions from workers and the distribution of funds collected within a specific

period to other aids within the same period, the entirety or a fraction of retirement pensions is anticipated to be consumed by retirees. However, the exact impact on private savings is uncertain because the extent of consumption is unknown. On the other hand, the compulsory retirement system, funded entirely by individuals or employees, can exclude voluntary savings. If voluntary savings and the mandatory amount are perfect substitutes, the implemented policy will not affect private savings. Establishing this balance is often difficult, so the impact of a fully funded pension system on private savings is uncertain (Grigoli et al., 2014).

II.C.1.3 Financial Market Development

The evolution of the financial markets has a complicated effect on saving. Although the growth of financial markets offers additional opportunities for saving and maybe greater returns, it also makes borrowing simpler, which could result in less saving (Bayoumi, 1993; Ostry and Levy, 1995). The degree of monetization, as determined by the ratio of broad money (M2) to GDP, is one often cited indicator of the difficulty of quantifying the growth of financial markets. Studies regularly indicate a positive and substantial association between saving and financial market growth, as assessed by the monetization ratio (Edwards, 1995; Johansson, 1996; Harrigan, 1995), despite insufficient data on particular indicators such as total assets or geographical density. This shows that the growth of the financial industry has generally had a favorable effect on saving.

II.C.1.4 Macroeconomic Stability

WB (1993) states that a prevalent explanation for Southeast Asia's high saving rates is the stability of macroeconomic conditions. Fostering growth, development, and saving is seen to depend critically on maintaining low volatility in fiscal results, inflation, interest rates, and currency rates (Gavin et al., 1996). This study investigates the possible effects of volatility on saving in Asia and Latin America by measuring it using the departure of inflation from a moving average.

II.C.2 Non-Policy Factors

II.C.2.1 Income and Growth

According to previous panel data studies, this variable is identified as one of the most significant determinants with a positive coefficient for savings. With few exceptions, most of these studies have found that income and income growth have a positive relationship with savings. In addition to the increase in income, a similar effect has been observed in the elevation of income groups. Among all income groups including the highest income group, there exists a robust positive relationship between income and savings. As the income group rises, the marginal savings rate increases, leading to higher-income groups saving more (Dynan et al., 2000).

Permanent Income Hypothesis and Life-Cycle Income Hypothesis predict that a significant portion of the income increase is saved, and an increase in income will lead to an increase in savings. The idea suggested by the Consumption Habits Hypothesis, that an increase in income will not change consumption expenditures or will change them with a delay, implies that the income increase will be directly transferred to savings. This, in turn, reinforces the relationship between income increase and savings. However, if consumption habits change, an increase in income can lead to a decrease in savings by increasing consumption. Similarly, the presence of consumer borrowing constraints, the existence of consumers at the minimum subsistence level, and higher income expectations for the future can reduce the savings tendency by increasing consumption when there is an increase in income. (Grigoli et al., 2014).

According to the Permanent Income Hypothesis, an increase in income, being an indicator of future income growth, will increase expenditures due to the rise in income expectations, thereby reducing savings. For instance, periods of high consumer confidence indicate an increase in expectations for future income, leading to increased consumption expenditures during such times. In addition to the expectation channel, income growth, causing a continuous increase in income, can lead to an increase in consumption while reducing savings.

However, if consumption is a perfect substitute for wealth in terms of utility, an increase in income used for wealth accumulation reduces consumption and increases savings.

According to the Life Cycle Income Hypothesis, an increase in income has a positive impact on savings. On an individual level, in the absence of bequest motives, and from a societal standpoint, in the absence of alterations in population structure and income growth, savings exhibit a sustained constancy.

However, an increase in income for young individuals will lead to an increase in savings. As the savings made by young individuals become larger than the savings spent by the elderly, an overall increase in savings will be observed. Life Cycle Income Hypothesis forms the foundational findings for subsequent studies.

There are two main reasons why the growth rate plays a significant role in explaining the saving rate. To begin with, saving and growth have always been correlated throughout long periods, different geographical locations, and developmental stages (see Bosworth, 1993, and Schmidt-Hebbel et al., 1996). The second point is that the relationship between saving and investment-based production suggests that higher levels of domestic saving, which in turn encourage higher levels of domestic investment, often lead to higher growth, especially in situations where the economy is not running at its steady state.

The relationship between saving and growth has its theoretical foundation in Modigliani's life-cycle hypothesis. This theory states that growth increases the income of the young in comparison to the old, which has a beneficial impact on saving (Modigliani, 1970). Furthermore, development and increased earnings raise a greater number of families in developing nations beyond the subsistence level, where saving becomes possible, and also increase the sensitivity of households to changes in interest rates (Ogaki et al., 1996). However, the permanent-income hypothesis raises the possibility of a negative correlation between growth and saving since consumers who look forward and expect their permanent earnings to rise may choose to save money

aside for future needs. Studies generally find a strong and positive correlation between savings and real per capita GDP growth. The positive coefficient is consistent with several hypotheses, including habit development and Modigliani's aggregation effect. This is corroborated by Carroll and Weil's (1994) examination of United States (US) household data, which shows that young people save more when wage growth is predictable because of habit development and uncertainty about future earnings. In his exploration of "growth transitions," Rodrik (2000) concludes that, while the precise process is not specified, such transitions result in notable and long-lasting gains in saving performance. There are differing results in Türkiye; Özcan et al. (2003) indicate no significant effect, but IMF (2007) finds a considerable and statistically significant positive coefficient.

II.C.2.3 Terms of Trade

Research consistently indicates a favorable impact of terms of trade improvements (as seen in Loayza et al. (2000), IMF (2005), and related studies). As mentioned in the theoretical literature, this aligns with expectations for temporary movements in terms of trade. While Özcan et al. (2003) observe this outcome for Türkiye, it lacks confirmation in IMF (2007).

II.C.2.4 Inflation

The impact of inflation on private savings is unclear, with studies suggesting both positive and negative correlations. Inflation may lead to higher nominal interest rates and measured family income, influencing savings positively. However, inflation can also result in less saving in economies with uncertain income prospects. Empirical investigations have found negative or zero inflation coefficients.

An increase in inflation can potentially enhance precautionary savings by disrupting macroeconomic stability and increasing uncertainty. However, during periods of heightened uncertainty and crisis, trust in financial instruments may decline, leading to a reduction in savings despite rising inflation (Grigoli et al., 2014). Hence, some

studies investigations have chosen to exclude periods with inflation rates surpassing a range of 50 percent in both positive and negative directions from their analyses. Another impact of inflation comes from the real interest rate channel. Expectations of high inflation can result in a decrease in real interest rates. Changes in real interest rates have both income and substitution effects, making the overall impact on savings uncertain. On the other hand, an increase in inflation can potentially boost savings by causing the prices of goods in consumers' possession to rise. While some previous studies have found a positive correlation between inflation and savings, many have concluded that the effect is ambiguous. Some studies, such as Dayal-Ghulati and Thimann (1997), have even identified a negative impact. Therefore, the causality between inflation and private savings remains uncertain.

II.C.2.5 Credit

In empirical investigations, credit frequently turns out to be statistically significant; nevertheless, the precise form—level of credit/GDP vs change in credit/GDP—varies. For instance, whilst IMF (2005) focuses on the relevance of credit/GDP change, Loayza et al. (2000) emphasize the importance of credit/GDP level. If the level plays a big part, it means that liquidity limitations are important for saving, but if the credit/GDP ratio changes, it means that liquidity constraints are important only when they change. Carroll (2008) highlights that the former is consistent with typical models of liquidity limitations, whilst the latter is in line with predictions from buffer-stock saving models. Under these circumstances, reducing liquidity restrictions leads to a decrease in target wealth, and wealth is spent in the process of moving to a new stable state.

Research results in Türkiye are not the same. When Özcan et al. (2003) excluded variables like inflation and government savings from a restricted regression, the level of credit/GDP ratio was shown to be significant. According to IMF (2005), there was no statistically significant correlation between the coefficient and the change in the credit/GDP ratio. Howevert since the model accounts for factors that are strongly correlated with credit, such as inflation and public savings, we believe that the latter

result may be the product of possible multi-collinearity. Gross and Souleles (2002) provide further information about how credit works. According to their research, raising credit limits causes debt levels to rise right away. Furthermore, people respond to the higher limitations, even if they were previously below their credit limit, which is consistent with the buffer-stock saving hypothesis.

II.C.2.6 Real Interest Rate

According to the Permanent Income Hypothesis and the Life Cycle Income Hypothesis, an increase in interest rates creates income, substitution, and wealth effects on consumers. The postponement of consumption due to changes in interest rates can be referred to as the substitution effect. An increase in interest rates encourages depositors (lenders) to increase their deposits, promoting additional savings, while consumers borrowing at high interest rates may defer their consumption. The substitution effect of an interest rate increase will affect both borrowers and lenders in the same direction, causing both parties to defer consumption and increase savings. There is also an income effect of an interest rate increase on consumers. From the lender's perspective, an increase in interest rates implies an increase in income, thereby increasing consumption. However, for the borrower, an interest rate increase signifies a rise in costs, resulting in an opposite income effect. The wealth effect involves the increase in real interest rates lowering the present value of future labor income, pulling down total wealth. Studies suggest that a decrease in wealth is associated with reduced consumption. However, the impact of wealth decline on savings is uncertain. Therefore, considering these three effects together, the impact of an interest rate increase on savings is uncertain for lenders and negative for borrowers. The overall effect depends on the intensity of the income and substitution effects.

In previous studies, a clear relationship between real interest rates and savings could not be consistently found. Some studies reported a positive relationship between these variables, while others identified a negative relationship. Studies indicating a negative relationship believe that the income effect dominates, whereas those showing a

positive relationship claim that the substitution effect prevails. Furthermore, while some studies indicate a positive elasticity of saving to interest rates, as found by Balassa (1990) and Fry (1995), the coefficients are often small and occasionally insignificant. Positive interest rate impacts have been reported for emerging economies by Ogaki et al. (1996), but the effects are minor and income-dependent. Masson et al. (1998) suggest comparatively weaker impacts of interest rates on private saving, while Bandiera et al. (2000) argue that interest rates have minimal impact on saving unless data are aggregated.

II.C.2.7 Wealth

Wealth's role in consumption is suggested by studies, showing a marginal medium-term tendency for consumption wealth from housing (0.04-0.10) and stock market wealth (0.04-0.07), especially among the elderly. The duration and strength of the wealth effect, whether from housing or financial wealth, vary across studies. The impact on consumption tends to diminish over 1-3 years for stock market wealth, but no study specifically examines the wealth effect in Türkiye.

II.C.2.8 Demographics

According to the life-cycle model, alterations in demographics have an impact on saving behaviors. It is predicted that an increase in the proportion of working-age individuals compared to retirees will increase savings (Lahiri, 1989; Bosworth, 1993; Higgins and Williamson, 1996). However, long-term patterns in saving are better explained by demographic changes than by transient fluctuations.

Studies by Graham (1987) and Masson et al. (1998) suggest a correlation between lower saving rates and a higher proportion of elderly and young individuals compared to those in the workforce. Nevertheless, Hurd (1990), Carroll and Summers (1991), and Haque et al. (1999) question the extent to which demographic factors impact individual saving practices, arguing that the prediction of dissipation among the elderly in the lifecycle model may not always hold.

Different savings behaviors are observed among various age groups. When examining age groups, the most significant factor influencing savings is the dependency ratio of the young and elderly. The youth dependency ratio is determined by dividing the population under the age of 15 by the working-age population in the 15-64 age range. Similarly, the elderly dependency ratio is calculated by dividing the population aged 65 and over by the working-age population in the 15-64 age range. An increase in both young and elderly dependency ratios negatively impacts savings. Most previous studies argue that there is a negative relationship between dependency ratios and private savings. These studies propose that an increase in the share of the young and elderly population within the total population leads to an increase in consumption expenditures and a decrease in savings.

Another demographic variable related to population is urbanization. Urbanization affects savings through several channels. The increase in urbanization is expected to reduce savings as urban areas generally offer more consumption opportunities than rural areas. On the other hand, the higher income uncertainty in rural areas, coupled with the prevalence of public services such as education and healthcare more widely in urban areas compared to rural areas, can lead to increased uncertainty in rural regions and decreased uncertainty in urban areas (Ceritoglu and Eren, 2013). Therefore, it is expected that precautionary savings, which compensate for uncertainty, will be higher in rural areas. However, the population residing in rural areas is typically lower-income and financially weaker compared to urban areas, suggesting a lower tendency for savings in rural areas. Considering the combination of consumption opportunities favoring urban areas and precautionary savings, along with income and wealth disparities favoring more savings, the impact of urbanization on savings is uncertain. (Grigoli et al., 2014).

Edwards (1996), Loayza et al. (2000), and Grigoli et al. (2014) found a negative relationship between private savings and urbanization in their studies.

Changes in the youth and old-age dependence ratios, or the share of the young and elderly in the working-age population, appear to have a significant effect, according to

several studies. A one percentage point decrease in the youth-dependency ratio is linked, according to Loayza et al. (2000), to a 0.3 percentage point short-term rise in the saving rate (and a 0.5 percentage point long-term increase). Comparable numbers for the old-age dependence ratio show more noticeable rises over the long and short terms, respectively, of 2.8 and 1.4. It is not unexpected that these factors do not show significance in research conducted specifically in Türkiye because the variability in the series is small.

II.C.2.9 External Factors

Examining the effects of outside variables on saving in economies involved in international commerce is pertinent. The current account balance and private domestic savings have continuously demonstrated a positive correlation (Edwards, 1995; Masson et al., 1995). This implies that saving money abroad can somewhat replace saving money at home, but not completely. Since private saving is determined as domestic investment plus the current account surplus less public savings, it is concerning that the regression equation includes the current account balance in addition to public savings. As a result, the current account balance's high significance levels might be a statistical artifact. Insufficient levels of domestic savings can present a challenge, as they may not be substantial enough to fund necessary investments and support economic growth. This inadequacy often leads to an increased dependence on foreign financing. The rise in foreign financing, in turn, triggers a current account deficit. Therefore, low savings rates are directly related to the current account deficit. Loayza et al. (2000) indicated that a 1% deterioration in the current account results in a short-term decrease of 0.33% and a long-term decrease of 0.60% in savings. The current account deficit also includes borrowing constraints that affect the deficit countries' access to foreign financing. The financing cost of the current account deficit arises due to the need for borrowing an amount equivalent to the current account deficit. This cost influences savings and investment decisions. An increase in this cost will positively affect savings from the borrower's perspective, such as an increase in borrowing interest rates (Grigoli et al., 2014).

II.C.3 Summary of Empirical Literature

Having briefly discussed the main saving theories and reviewed the determinants of private saving in general, following Grigoli et al. (2014), expected signs of saving determinants can be summarized in the table below.

Table 1 Summary of Empirical Literature on Private Saving Determinants

Category	Specific Variable	Expected Sign
Income	Income level, current	A
	Income level estimated temporary	+
	Income level, estimated permanent	0 or +
	Gap between current to estimated income	+
	Income growth, current	A
	Income growth, expected future	A
Wealth	Total wealth	A
	Net assets	A
	Net foreign assets	A
Rates of return	Real interest rate	A
Relative prices	Consumer price index, current level	+
	Consumer price index, current inflation	+
	Consumer price index, expected inflation	A
	Terms of trade, current	0 or +
	Terms of trade, estimated temporary	+
	Terms of trade, estimated permanent	0 or +
	Real exchange rate, level	A
	Real exchange rate, expected change	A
Classical Uncertainty	Financial risk, instability, crisis	A or +
	Uncertainty	A
	Political risk, instability	A
	Violent conflict	A
	Variance of innovations to saving determinants	+
Knightian uncertainty	Measures of Knightian uncertainty	A or +
Borrowing constraints	Credit flows, current	-
	Money flows, current	-
Financial depth	Credit stock	A
	Money stock	A
	Financial assets	A
Demographics	Old-age dependency	-
	Young-age dependency	-
	Urbanization	A
Distribution	Income concentration	A
	Wealth concentration	A
	Capital income share	+
Fiscal policy	Public sector saving	-
	Public sector budget balance	0 or -
	Public consumption	A
	Public education and health spending	A
	Public pensions spending	A
	Public in-kind transfers	A

Table 1 (continued)

Category	Specific Variable	Expected Sign
Pension system	Pay-as-you-go pension transfers to old	A
	Mandatory fully-funded system contributions	0 or +
	Fully-funded pension assets	A
Households and firms	Corporate saving effect on household saving	0 or -

Notes: * A: Ambiguous, +/-: Significantly positive/negative, 0: Insignificant

CHAPTER III

A MACROECONOMETRIC ANALYSIS OF PRIVATE SAVINGS DETERMINANTS IN TÜRKİYE: A BOUNDS TEST ANALYSIS

III.A. INTRODUCTION

In this chapter, the determinants of the private saving rate for Türkiye are analyzed. For this purpose, the private saving to GDP ratio in Türkiye between 1990-2020 is tried to be explained by the following eight explanatory variables employing an Auto Regressive Distributed Lag (ARDL) Bounds test analysis for a long-run equilibrium relationship. These eight explanatory variables for the private saving to GDP ratio are; (1) government saving to GDP ratio, (2) growth of real GDP, (3) domestic debt stock to GDP, (4) private investment to GDP ratio, (5) overnight real interest rate, (6) company confidence level, (7) company credits to GDP ratio, and (8) household credits to GDP ratio.

The ARDL bounds testing approach, a cointegration method pioneered by Pesaran and Shin (1999) and Pesaran et al. (2001), is employed to assess the existence of a long-term relationship among variables. This method offers several advantages over traditional cointegration tests. Firstly, it can be applied regardless of whether the series are integrated of order 0 (I(0)) or 1 (I(1)). Secondly, a straightforward linear transformation allows for the derivation of an unrestricted error correction model featuring both short and long-term dynamics. Thirdly, empirical evidence indicates that this method consistently yields reliable results even with small sample sizes.

Section B gives a brief review of related empirical literature on the private saving rate. The presentation of data and variables employed in the model is given in Section C

where the integration order of variables is determined by using both Augmented Dickey-Fuller (ADF) and Kapetanios tests (Kapetanios, 2003 and 2005). The integration orders are decided based on Kapetanios test[15] results since, contrary to the ADF test, it gives us the opportunity to check for unit roots with up to five structural break points.

The ARDL Bounds testing algorithm, which is proposed by Pesaran and Shin (1997) and then improved by Pesaran, Shin and Smith (2001), is reviewed in section D. Section E is devoted to the estimation of the Bounds test model. In Section F, a robustness analysis is carried out by using Fully Modified Ordinary Least Squares (FMOLS) method (Phillips and Hansen (1990)), Dynamic Ordinary Least Squares (DOLS) method (Stock and Watson (1993)), and Canonical Cointegration Regression (CCR) method (Park (1992)) estimators together with the cointegration tests of Hansen Parameter Instability test (Hansen, 1992), Phillips-Ouliaris test (Phillips and Ouliaris, 1990), Engle-Granger Cointegration test (Engle and Granger, 1987) and Gregory Hansen test (Gregory and Hansen, 1996a and 1996b) with structural breaks, Finally, Section G is reserved for discussion and concluding remarks.

III.B. LITERATURE REVIEW

WB (2011) provides a comprehensive overview of the determinants and dynamics of household savings in Türkiye and globally in the Türkiye Country Economic Report. Using household budget surveys and alternative time series, the report discusses the main findings and factors influencing savings. These include the structural determinants of household savings in Türkiye, the impact of exchange rate management on savings and growth, the role of employment incentives in influencing savings behavior, the relationship between education and growth, the effect of financial markets on household savings mobilization, and the importance of precautionary savings in Türkiye. Additionally, the report emphasizes that the effects

[15] The Kapetanios unit root test is an extension of Zivot and Andrews unit root test (Zivot and Andrews, 1992).

of government policies such as fiscal regulations, taxation, and institutional savings cannot be ignored in influencing household savings behavior. The report details factors that increase and decrease savings, stating, for example, that the decrease in household savings contributes to the decline in savings rates. It also suggests that income-enhancing and rational macroeconomic policies that reduce economic vulnerabilities will promote savings. Determinants of private savings include real interest rates, gross disposable income, the young dependency ratio, and the inflation rate. The level of development of financial markets can also play a significant role in increasing savings. In addition to these factors, factors such as credit growth, high inflation, low-income levels, and a high exchange rate could decrease savings rates. According to time series analyses of the determinants of private savings, increasing public savings by 1% in Türkiye is predicted to reduce private savings by 0.38% to 0.68%. The report also compares Türkiye's savings calculations with those of other countries on a broad scale. In international comparisons, it is emphasized that savings rates in Türkiye are lower than the OECD country average and the savings rates of countries in the same income group as Türkiye. Additionally, the report highlights that the declining interest rates and increasing credit flow in Türkiye, coupled with rising consumption trends, are the most significant factors contributing to the decline in savings.

Van Rijckeghem (2010) examined private savings and their determinants in Türkiye using both the household budget survey for the years 2004-2008 and modeling of the country's macroeconomic time series. The research focused on the determinants of private savings in Türkiye from 1988 to 2009, analyzing their impact on savings using time series analysis techniques, including public savings (and lagged public savings), overall balance, GDP deflator, GDP per capita growth, ex-ante real rate, terms of trade (index), terms of trade (change), change in private credits, unemployment rate, and business confidence indicator variables. Four regression models were estimated primarily using the OLS (Ordinary Least Squares) estimator. The findings suggest that the growth in the terms of trade (referred to as change), change in credit, ex-ante real interest rate, and unemployment rate, as well as GDP per capita growth (even with the expected positive sign), are not statistically significant. Public savings is the most emphasized variable and is estimated at approximately -0.63 in both models.

Therefore, as stated in the research, the hypothesis that public savings and private savings are inversely related is supported by this finding. An important factor in increasing savings is the GDP deflator, estimated at approximately 0.05 in both models. Conversely, it is noted that increases in the change in private credits and the business confidence indicator variables have a diminishing effect on private savings. Additionally, based on the research findings, the limited impact of fiscal policy instruments on private savings is discussed, suggesting that measures such as reducing taxes on interest income may not produce the desired effect. The study also utilized the IV (Instrumental Variables) regression technique in its cross-sectional data analysis, examining the impact of income, urban location, social security scheme, private sector, having interest income, health risk, homeownership, head aged (40-60 / 60+), household size, share member age, education, and extended family variables on private savings from 2004 to 2008 in five separate models. Among the significant findings from this model, it is emphasized that the variables most increasing private savings are health risk, ranging from 0.27 to 0.25, and income, ranging from 0.14 to 0.22.

Hevia (2010) initially compared Türkiye's national savings level with that of numerous different countries. For this purpose, an unbalanced panel dataset was created, covering the period from 1980 to 2008 and including indicators of savings rates and determinants for 104 developing and developed countries. Regression lines and scatter plots were frequently utilized, with particular emphasis on evaluating where Türkiye's savings rate stood relative to other countries. The general results indicated that Türkiye's savings rate is lower compared to similar countries. Public savings, among the most important variables in the study, is mentioned as an effective policy tool for increasing the savings rate. While increases in public savings partially offset decreases in private savings reflecting a partial Ricardian equilibrium, according to the study's estimates, an increase of 10% in public savings is projected to increase the savings rate slightly below GDP in the short term and almost half of GDP in the long term. Therefore, the research emphasizes that avoiding public savings can be a useful tool for increasing the savings rate. Although it was found that negative trade shocks reduce savings rates, it was noted that during the relevant period, this trade

imbalance did not significantly contribute to the decrease in Türkiye's current savings rate. It is highlighted that the country's macroeconomic uncertainties increase savings rates for precautionary reasons, and therefore, the significant decrease in the inflation rate observed in Türkiye is suggested to be one of the factors behind the decrease in the savings rate. While financial liberalization negatively affects savings in the short term, it is noted that financial liberalization increases national savings in the long term. Additionally, demographic variables also affect savings rates; it is stated that increases in young and old dependency ratios and urban population growth negatively impact savings. Another important point emphasized in the study is the expectation that Türkiye's savings rate will increase as future income increases. This claim is supported by the finding that high-income increases lead to higher savings rates. Furthermore, in the study, a savings equation was calculated with the aim of bringing realistic assumptions to the future evolution of different savings determinants such as income growth and public savings (the main purpose is to determine the savings rate). Projections from the equation indicate that income growth, public savings, and credit flow are important determinants of national savings rates. The forecasts obtained from the equation show that increasing private income growth from an annual rate of 2.6% to 4% would lead to an approximate 2.6 percentage point increase in the private savings rate in the long term (by 2030). A 10% increase in public savings would reduce private savings by approximately 1.7 percentage points in the short term and 3.4 percentage points in the long term. Additionally, reducing the annual rate of private credit creation from 8% to 5% could lead to an approximate 2 percentage point increase in private savings in the long term.

Deaton (1989), proposes a simple model to understand the saving behavior of households in developing countries. Although this model is generally based on the temporally extended framework of utility maximization commonly used in the literature, it does not yield the standard result (consumption being proportional to permanent income). The paper believes that the specific assumptions required for the standard result are not suitable for most households in developing countries. Therefore, the model differs from the standard literature in four important points. Firstly, households in developing countries are often larger than those in the US or Europe,

with a much greater tendency for multiple generations to live together. Such households do not need a hump or retirement savings because resources are shared between workers and dependents, and property passes from parents to children. Secondly, the uncertainty of agricultural income and its spread to other sectors based on agriculture affects many people in agrarian economies. Uncertainty in low income poses a real threat to consumption levels and can have a strong impact on how income is saved and spent. Thirdly, another departure from the standard model is the assumption that borrowing is not allowed. While this is an oversimplified assumption, it may be valid in cases where access to credit is limited or borrowing costs are high. Fourthly, the difference in saving behavior between advanced and developing countries is evident in the model he develops. In this model, saving serves as a buffer between uncertain and unpredictable income and already low consumption. The study suggests that this model could be an important tool for understanding the saving behavior of households in developing countries and that this behavior leads to different approaches to welfare concerns, focusing on protecting the consumption of those with relatively low incomes. This study could play an important role in the design of economic policies in developing countries and in evaluating the effectiveness of social assistance programs.

Schmidt-Hebbel and Serven (1997) aimed to evaluate the factors influencing savings rates and shed light on the relationship between savings, investment, and growth, as well as to review the findings of previous research on this topic. While addressing the factors influencing savings rates in developing countries, the report also examines the impact of financial reforms on savings rates. Among the factors influencing savings rates, the report mentions income levels, interest rates, inflation, the development of financial markets, access to credit, tax policies, social security systems, and demographic factors. The report also highlights that the positive correlation between savings and investment is an indicator of low international capital mobility.

In the WB (2014), Türkiye’s overall financial situation was examined with a focus on the relationship between savings behavior and future economic growth potential. The report emphasizes that Türkiye’s private savings rate showed a significant decline

from levels exceeding 22% of GDP in the late 1990s to 12.7% in 2011. Additionally, the report highlights that Türkiye's investment rates are nearly half of China's and well below the average of all developing countries. The report suggests that Türkiye's economic growth faces challenges such as high current account deficits and low savings rates, and recommends a transformation in public finance policies to sustain economic growth. This transformation includes increasing savings rates for more investment and redirecting public expenditures towards investment. Furthermore, the report indicates that Türkiye needs to reduce its dependency on external finance and utilize more internal resources for sustainable economic growth. The empirical section of the report relies on data from the 2010 household survey. This dataset includes various socio-economic aspects (such as disposable income and the household head's employment in the public sector), precautionary motives, and life cycle risks (such as the household head's registration with social security agencies, registration with the social security agency for public employees, unknown social security registration status, health spending risk, and involuntary unemployment of the household head). It also encompasses demographic factors (including the household head's age and the proportion of household members in different age groups for example household head 60+ years old, share of household members aged 0-5 years, share of household members aged 6-14 years, share of household members aged 15-19 years, share of household members aged 60+ years, education levels of the household head and spouse, and household size), wealth-related factors (such as interest income, homeownership status, ownership of a second home, and land ownership for construction), as well as variables indicating the household's possession of public health insurance and access to hot water for low-income households. Then, two models were estimated with net financial savings and net total savings as dependent variables. The findings indicate that the variable with the greatest impact on both types of savings is health spending risk (approximately 1.5 in both models), while the variable household has health public insurance is recorded as the most significant negative impact on both savings variables (approximately -0.73 in both models).

The IMF (2007) addresses the savings rates in Türkiye and the factors influencing these rates. The report utilizes empirical findings from previous studies and covers the

widest period from 1980 to 2005. Particularly, the report highlights that Türkiye's savings rates remain low compared to other countries, indicating weak performance in savings compared to its peers. Structural issues such as high inflation, low-income levels, and underdeveloped financial markets are cited among the reasons for the low private savings rates. However, it is noted that the decline in savings rates is partially offset by factors such as high public savings and low inflation. Factors such as income levels, age, education, financial development, and tax policies are recommended to be considered to increase savings rates. The report also discusses the inverse relationship between public savings and private savings rates, advocating for a balance between increasing public savings and private savings rates. Additionally, regression analyses are used to analyze the reasons for the decline in private savings rates. Variables such as the growth rate of GDP per capita, labor productivity growth, GDP growth, inflation, gross public savings, terms of trade, real interest rates, exchange rates, unemployment rate, credit growth, and dependency ratios (elderly and young) are used to examine the factors influencing savings rates. The results suggest that a rise in terms of trade, growth in labor productivity, increased GDP per capita, overall GDP growth, and inflation all contribute positively to savings. On the other hand, higher levels of gross public savings, government net lending, private credit flows, credit to GDP ratio, and dependency ratios tend to decrease savings.

Loayza et al. (1998) aimed to investigate international trends among savings and the determinants of savings in their research. The data used in the study covers a maximum period of 35 years (1960-1994) and includes 112 developing and 22 industrialized countries (unbalanced panel data set). The significant heterogeneity in countries' savings behavior is associated with differences in levels of development, growth performance, and country-specific and time-specific differences in fiscal and financial policies. In order to clarify this hypothesis, the basic savings trends observed in industrialized and developing countries and the correlations among these savings determinants are investigated. For this purpose, explanatory variables such as gross national savings, gross private savings, gross national disposable income (GNDI), terms of trade, real interest rate, inflation, money/GNDI, private financial wealth, private credit flows, social security rate, old dependency ratio, young dependency

ratio, and urban population ratio are used in the research. The study divides the countries into two groups: the overall sample (developing countries + industrial countries) and developing countries versus industrial countries. According to the models, there is a positive correlation between savings rates and real per capita income levels, which is stronger in developing countries compared to industrial economies. There is also a positive correlation between savings rates and real per capita income growth rates, which is stronger for industrial economies than for developing countries. A significant positive correlation is found between gross national savings rates and gross domestic investment rates, which is higher for developing countries than for industrial economies. There is a positive and high correlation between national savings rates and public savings rates, which is even greater in the subgroups of developing and industrial countries. The correlation between national or private savings rates and real interest rates varies between 0.31 and 0.34 (the lowest coefficient is in industrial countries). The correlation between savings rates and inflation rates is generally negative, ranging from -0.50 to 0, with a larger correlation in industrial countries and a smaller one in developing countries. There is a positive correlation between savings and private financial wealth, which is significant and large for industrial countries. The pattern of the relationship between savings and dependency population is almost opposite. Overall, there is a positive correlation of approximately 0.34 between savings and old-age dependency ratios, although this relationship varies at the subgroup level. On the other hand, there is usually a negative correlation between savings rates and young dependency ratios, which is consistent for both industrial and developing countries. While there are positive coefficients estimated between savings and urbanization (overall), the sign of the correlation varies at the subgroup level, depending on the country groups. There is a high correlation between the level of development (reflected by real per capita income levels) and variables related to savings. In addition to the empirical findings of the study, it is stated that countries with higher savings generally exhibit more stable savings rates over time.

In the project conducted by Loayza et al. (1998), the savings and consumption flows of countries over time series were revealed, and a new database related to the key determinants of these series was defined. The dataset has been improved in many ways

compared to existing datasets by the researchers. In the first stage, it expanded its coverage to a broader set of developing and industrialized countries. In the second stage, data inconsistencies in the time series belonging to countries in the database were corrected. In the third stage, definitions related to the composition of the public sector were merged. In the fourth stage, savings information that accounted for adjustments related to capital gains and losses resulting from inflation and actual exchange rate depreciations was generated. In the final stage, standard savings determinants were defined in the new database. The scope of the new database is also summarized in the research.

Loayza et al. (2000) stated in their research that savings rates show significant differences across countries and over time. They created a large panel dataset using country data of interest (including OECD countries and up to 150 countries, including developing countries) to investigate the determinants of private savings and the policy and non-policy factors behind savings inequalities using panel data analysis techniques. The study used variables such as real gross private disposable income (GPDI), real GPDI growth, real interest rate, M2/GNP (Gross National Product), terms of trade, urbanization ratio, old and young dependency, inflation rate, government saving/GPDI, and private credit flow/GPDI as regressors. While the widest period covered was 1964-1995, the research also examined three sub-periods: 1970-79, 1980-89, and 1990-95. In addition to GMM (Generalized Method of Moments) estimators, alternative estimators such as static OLS, POLS (Pooled Ordinary Least Squares), and FE (Fixed Effects) (within) estimators were used, and the findings were evaluated. It is noted that changes in a variable affecting savings are reflected in savings rates only after a few years, indicating that private savings rates move slowly. While it is stated that real per capita income levels and growth rates increase private savings, it is also noted that the income effect is greater in developing countries than in developed countries. In the long term, doubling per capita income in developing countries increases the private savings rate by about 10% of per capita income. Similar findings apply to the growth variable, where a 1% increase in growth similarly increases the private savings rate. Inflation, as another macro variable, has a positive effect on savings rates and is considered a reason for saving. Another significant finding is that

while a 4% increase in GNDI in the short term raises savings by 2.8% of GNDI, in the long term, this value is recorded as only 1.2%. The research interprets this finding as evidence against the validity of the Ricardian equivalence. Increases in dependency ratios among demographic variables negatively affect private savings rates. Moreover, the negative effect of an increase in the elderly dependency ratio on savings is more than twice that of the young dependency ratio.

Loayza et al. (1998) emphasize the complexity of factors influencing saving behavior by examining the determinants of private saving rates. The study identifies several non-policy determinants of saving, including persistence, income, growth, demographics, and uncertainty. It is noted that private saving rates exhibit persistence and remain highly correlated over time, even after accounting for other factors. The full effects of changes in saving determinants are expected to take years to materialize, with long-term effects estimated to be about twice as large as short-term effects. Real per capita income positively influences saving rates, with a more significant impact in developing countries. However, this effect diminishes at higher income levels. Income inequality can also influence saving behavior, with concentration potentially affecting household saving positively but corporate and public saving negatively. Age-related consumer heterogeneity is described as a cornerstone of the life-cycle hypothesis, predicting a hump-shaped pattern in saving behavior over a lifetime. However, empirical evidence shows that elderly individuals save more than predicted by this hypothesis. Additionally, changes in the young-age and old-age dependency ratios tend to lower private saving rates. While greater uncertainty is expected to raise savings due to precautionary motives, empirical evidence on the relationship between uncertainty (proxied by inflation or urbanization rates) and saving rates is mixed.

In a study by Masson et al. (1998), the private saving behaviors of both industrialized and developing countries were examined using both time series and cross-sectional data analysis frameworks. Initially, the study analyzed industrialized and developing countries separately and then evaluated them together. The research covered data from 21 industrial countries for the period 1971-1993 and data from 40 developing countries for the period 1982-1993. Model estimation was performed using OLS and the first

difference IV techniques. According to the results of the overall panel estimated with the IV estimator, the variable with the most significant negative impact on private savings, with a coefficient of -0.81, was the government budget surplus/GDP variable. The subsequently estimated coefficients with negative signs were government investment (-0.42) and government current expenditure (-0.14), indicating that increases in these variables reduce savings. However, the coefficient for the current account/GDP variable was calculated as 0.71, indicating that increases in this variable lead to increased savings. Statistically significant coefficients for other variables could not be obtained in the IV model. According to the OLS estimates, the rankings are similar, with the coefficient for government budget surplus to GDP being -0.60, government current expenditure to GDP being -0.32, government investment to GDP being -0.24, and the dependency ratio being -0.14. Additionally, in this model, the per capita GDP relative to the US variable has a coefficient of 0.50, indicating that this variable most significantly increases savings. Furthermore, the current account to GDP and GDP growth rate were calculated as 0.44 and 0.14, respectively. Thus, the study emphasizes that government expenditure, demographics, and growth are significant determinants of private savings rates across all countries.

Denizer and Wolf (1998) compared the savings elasticities of transition and market economies and examined the reasons behind savings differences among transition economies from 1989 to 1995. The research covered transition economies in Eastern and Central Europe, as well as the three Baltic states and the twelve non-Baltic successor states of the Soviet Union. It examined the gross domestic savings to GDP ratio, calculated residually from the current account deficit and gross domestic investment, using ten regression models. The first four models examined market economies over the widest time frame, while transition economies were examined in three different periods. These models included GDP growth, money supply (M2)/GDP, inflation, dependency ratio, urbanization ratio, terms of trade change, and a war dummy variable. The remaining six models focused solely on transition economies and were expanded to include the liberalization index (and its lagged value), internal liberalization index, external liberalization, and price liberalization (these models each used a different liberalization variable). When considering the

general model covering the 1989-1995 period (excluding liberalization variables), it was found that GDP per capita positively influenced savings in both transition and market economies. The dependency ratio and urbanization ratio were only significant in market economies, with negative effects of approximately -0.18 and -0.17, respectively. Inflation was significant only in transition economies, with a reducing effect of -0.001. Money supply had a positive effect of 0.07 in transition economies but a negative effect of -0.07 in market economies. Terms of trade change were significant only in market economies, with an estimated coefficient of 0.12, indicating an increasing effect on savings. Finally, the war dummy variable was significant only in transition economies, leading to a reduction in savings of approximately -0.20. On the other hand, the coefficients obtained from the liberalization variables (in the remaining six models) showed that the liberalization index (lagged), internal liberalization (lagged), external liberalization (lagged), and price liberalization (lagged) variables had reducing effects on savings in transition economies. Additionally, the study highlighted that if liberalization is perceived as an indicator of future growth, this behavior is consistent with adjustment in the face of a J-curve evolution.

Attanasio et al. (1999) aim to determine the fundamental relationships between savings, investment, and growth rates in detail for the period of 1960-1995. The study utilizes data on investment, savings, and growth rates from 150 countries. Additionally, it examines how the dynamic relationship between these variables affects macroeconomic trends in different countries by creating four different datasets from the core dataset. The study employs OLS and GMM-IV estimators to predict the relationship between investment, savings, and growth for both the long and short terms. The findings indicate that in the long term, savings rates positively (with positive coefficients) influence growth, while investment rates have a limited impact on growth. It is observed that investment rates are dependent on savings rates in the long term, and this finding is emphasized. In the short term, investment rates are found to increase growth, albeit with a limited effect, while savings rates do not affect growth in the short term. Furthermore, the results indicate that different control variables (life expectancy, public consumption, population aged 15-65, human capital proxy) do not

significantly influence the outcomes and that the use of dynamic models becomes more important as the time series dimension grows. Although the study assigns the public consumption variable as a control variable, it is noted that all investment, savings, and growth variables have a negative impact on it.

Obstfeld and Rogoff (2000) study the Feldstein-Horioka puzzle, which is related to the absence of perfect capital mobility among countries, by analyzing the gross national savings and investment data from a total of 56 countries (including some OECD countries excluding Israel) using POLS panel data analysis techniques for the period 1991-1997. The puzzle is based on the observation that national savings rates are highly positively correlated with investment rates across countries. The findings from regression models of four different segmented groups of countries consistently indicate that national savings have a positive effect on investment (with coefficients ranging from 0.41 to 0.60). The results also emphasize the possibility of factors other than savings rates influencing investment rates.

In a study by Aghion et al. (2009), the focus is on whether a country can achieve faster growth by saving more. The study models the data on GDP per capita and savings rates for 118 countries (noted as an unbalanced dataset) from 1960 to 2000 using the OLS technique. They find that savings significantly increase growth quantitatively. In addition to the basic regression model, the study is strengthened with simulation and model calibration techniques. Another important point emphasized in the study's findings is that in the medium term, the quantitative importance of savings on technology diffusion should not be overlooked.

In his study examining the savings behavior of ten developing countries (including Türkiye), Collins (1991) first highlights that the national savings rates of rapidly growing countries (Hong Kong, Korea, Taiwan, and Singapore) are higher (22.1% and 15.4%) than those of slow-growing countries. The research primarily estimates four regression models, with the first group including all countries and the second group focusing on countries in the low-income bracket (excluding Indonesia and Burma). The models analyze the ratio of aggregate savings to GNP, real per capita income, and

real economic growth rate using the OLS technique. It emphasizes that both explanatory variables have a positive coefficient, indicating that real per capita income and economic growth rate have a stimulating effect on savings.

Loayza and Shankar (1998) examined the factors influencing private savings rates in India. The study aimed to understand the impact of indicators such as public savings, financial market returns, and private disposable income on private savings and evaluate the significance of these effects from an economic policy perspective. It was noted that, compared to other countries, India's savings rates during the period 1960-1991 were higher than those of South Asia and low-income countries but below the average of China, East Asia, and OECD countries. Particularly when compared to East Asian countries, India was said to be more reliant on foreign savings (including savings, investment, and growth performance). Time series analysis techniques were employed in the study, and using the Johansen cointegration test, they found a cointegration relationship in four different models (robust checks were aimed by using percentage changes in savings). The first model included household savings, corporate savings, real unadjusted private disposable income, inflation, dependency ratio, and interest rate. The second model consisted of adjusted private savings, adjusted public savings rate, real private disposable income, dependency ratio, inflation, interest rate, and the share of agricultural income in GDP. The third model included private savings augmented with consumption expenditure on durables, adjusted public savings rate, real private disposable income, dependency ratio, inflation, interest rate, and the share of agricultural income in GDP. The last model comprised the private saving rate, public saving rate, real private disposable income, dependency ratio, inflation, interest rate, and the share of agricultural income in GDP. The results of the normalized long-term model using the MLE (Maximum Likelihood Estimation) estimator showed that the dependency ratio was negative and statistically significant in all models, with coefficients ranging from -0.77 to -1.08. The interest rate was significant in all models, with coefficients ranging from 0.15 to 0.25. The agricultural variable was present in all models except the first one, with coefficients ranging from 0.26 to 1.007 and being significant in all models. Inflation was statistically significant in only the first and second models, with coefficients ranging from -0.009 to 0.11. Another variable

expected to have a negative impact on savings, the public saving rate, was statistically significant in all models, with coefficients ranging from -0.14 to -0.29. Real private disposable income was significant only in the second model, with a coefficient of 0.05. Additionally, the coefficient for real unadjusted private disposable income in the first model was also 0.05. Therefore, increases in disposable income, interest rates, inflation, and agriculture primarily increase savings, while increases in public savings and the dependency ratio decrease savings.

Uygur (2012) conducted a study evaluating the macroeconomic factors influencing savings in Türkiye. The study transformed annual data from 1987 to 2006 into a quarterly format and utilized time series techniques to uncover long and short-term relationships. The Johansen vector cointegration test indicated a long-term cointegration relationship among the variables, following which a short-term vector error correction model (VECM) was estimated. The research focused on two different regression models with savings as the dependent variable. In the first model, the explanatory variables included the growth rate, real effective exchange rate, total credit stock, and annual government savings deficit, constituting a long-term cointegration model. When the long-term model was estimated, a coefficient of 0.53 was obtained for the growth variable. While the coefficients for the exchange rate and credit variables were negatively aligned with expectations, they were not statistically significant, and no significant prediction was obtained for the government savings variable. In the second model, savings, growth, real effective exchange rate, and government savings were included, also exhibiting a long-term cointegration relationship. When the long-term model was estimated, a coefficient of 0.52 was obtained for growth, and -0.12 for the real effective exchange rate, but no statistically significant coefficient was obtained for government savings.

In a study specific to Türkiye conducted by Özcan and Günay (2012), a model for private savings in Türkiye was estimated based on macroeconomic and social variables determining private savings behavior from 1975 to 2006. Using time series techniques, regression equations based on an error correction model (ECM) were estimated, and the findings revealed that inertia and public savings were among the most important

factors determining private savings. Additionally, it was emphasized that economic growth, trade deficit, financial depth, real interest rates, and inflation had a reducing effect on private savings, while financial liberalization and real interest rates had an increasing effect. Among the social variables, it was found that the youth and elderly dependency ratios had a negative impact on savings, urbanization reduced savings, and while the proportion of the population with university education increased private savings, the proportion of those with only secondary education decreased them. Furthermore, the study highlighted that public savings were among the factors that most negatively affected private savings.

Erdoğdu (2012) examined the effects of fiscal policies on private sector savings in Türkiye within the framework of the life-cycle approach using non-linear time series analyses (Threshold Vector Autoregression-VAR) and graphs of impulse response functions). The study utilized data on the changes in the ratio of private sector savings to GDP, changes in the ratio of public debt to GDP, and changes in the real interest rate. Through the threshold technique, the threshold value required for interest and expansionary fiscal policies to have an expansionary effect was calculated to be 1.4%. The results indicated that an increase in public debt exceeding this threshold value of 1.4% signifies the implementation of loose fiscal policies in the economy. Under this regime, the application of expansionary fiscal and contractionary monetary policies would lead to a decrease in savings by creating a consumption effect. An examination of the indicators obtained from the impulse response functions revealed that expansionary fiscal policy exhibits asymmetric responses. Furthermore, it was noted that under a tight fiscal policy regime, the impact of fiscal shocks persists for approximately 3 years, while under a loose fiscal policy regime, the persistent effect of fiscal expansion is higher.

Sancak and Demirci (2012) conducted a study to investigate the factors influencing changes in Türkiye's national savings and revealing the impact of savings on the country's growth. In their research, they utilized published data on macroeconomic variables such as national savings, growth rates, current account deficits, investments, and net capital inflows between 1998 and 2009. They compared Türkiye's data with

that of OECD countries or some developed European Union (EU) countries. The tables created in the study indicated that Türkiye's domestic savings rates were low compared to international standards, leading to a tendency towards foreign savings due to the inability of domestic savings to meet investments alone. Furthermore, it was emphasized that increasing savings is crucial for the Turkish economy, as they are essential for achieving sustainable economic growth, reducing unemployment, and increasing welfare.

Mangır and Ertuğrul (2012) tested the validity of the Feldstein-Horioka hypothesis for Türkiye based on the relationship between investment, savings, and capital mobility. Their research focused on the relationship between domestic savings and investments during the period 1998-2010 (using quarterly frequency data). They applied the ARDL boundary test and Kalman filtering technique as time series analysis techniques. However, the annual frequency of domestic savings data posed an observation problem, so the researchers converted the annual data into quarterly data for econometric analysis. The study indicated evidence of a long-term relationship between investments and savings, showing that an increase in domestic savings (by 0.74%) leads to an increase in investments in the long term. This finding suggests low capital mobility in the Feldstein-Horioka hypothesis. Additionally, in the short term, an increase in real savings growth also leads to an increase in real investment growth (by 0.20%). Finally, the findings obtained through the Kalman filtering technique support previous findings that the relationship between investment and savings is stable and decreasing.

In their research focusing on the savings gap issue in the Turkish economy and its key determinants between 1987 and 2010, Özlale and Karakurt analyzed the changes in private savings rates, public savings, the savings deposit interest rate, inflation, the ratio of credit to the private sector as a percentage of GDP, and the population dependency ratio using time series techniques. They used OLS (robust standard errors using the heteroscedasticity and autocorrelation consistent (HAC) var-cov matrix) to estimate the regression model. The findings of the regression model indicated that an increase in inflation and the savings deposit interest rate leads to an increase in savings,

while an increase in public savings, the ratio of credit to the private sector as a percentage of GDP, and the population dependency ratio has a negative impact on savings. Furthermore, the research suggested that while an increase in public savings reduces private savings, this reduction is not one-to-one, meaning that increasing public savings can help offset the overall savings gap. Additionally, a decrease in macroeconomic uncertainty weakens the precautionary savings inclination and decreases private savings. Lastly, as expected, an increase in the population dependency ratio restricts individuals' ability to save, negatively affecting savings.

Matur et al. (2012) aimed to estimate a reduced-form model for savings in Türkiye between 1980 and 2008 to investigate the significant potential determinants of private savings in the macroeconomic, demographic, financial, uncertainty, and government policy framework. They utilized time series analysis techniques such as unit root tests and the Johansen cointegration test. During the research's modeling stage, factors such as real income per capita, public saving rate, inflation, the growth rate of real income per capita, real exchange rate, banking credits rate to the private sector about GDP, real interest rates, young dependency ratio, old dependency ratio, urbanization rate, and the rate of female labor force participation were incorporated as variables. The findings of the regression model indicate that the variables increasing private savings are per capita income (with an estimated coefficient of 0.21), real interest rate (0.15), and inflation (0.04). On the other hand, the variables decreasing savings are the old dependency rate (-4.64), public saving rates (-0.38), private credit/GDP (-0.37), and per capita income growth (-0.15). The researchers highlight from these findings that the ability of fiscal policies to influence private savings in Türkiye is limited.

Özcan et al. (2012) conducted a study examining the macro and socio-economic determinants of private investments in Türkiye, covering the periods from 1975 to 2008. The research employed time series analysis techniques and utilized OLS estimation to develop a model for the 1975-2008 period and a separate model for the 1988-2008 period. The study considered macro variables such as the private saving rate, current account deficit ratio, money supply (M2), public saving rate, real interest rate on saving deposits, credit to the private sector, terms of trade, GNP, GNP growth,

inflation rate, a political instability variable, and socio-economic variables including the female labor participation rate, women with university degrees, divorce rate, demographic life-cycle variables such as age dependency ratios (younger than 15 and older than 65), urbanization ratio, life expectancy at birth, as well as education and labor force variables. The signs of the coefficients estimated for the 1988-2008 period were found to be consistent with those of the 1975-2008 period (in other words, a coefficient that is positive in one model is not negative in the other model). The findings indicated that among the macro variables, the variables with the most significant negative impact on savings in both models were the current public saving rate (-0.67 and -0.99), M2 (-0.43 and -0.97), public savings (-0.53 and -0.30, but the -0.30 value is statistically insignificant), followed by GNP (-0.34 and -0.89). On the other hand, the macro variables that increased savings were the real interest rate on saving deposits (0.42 and 0.66), credit to the private sector (0.27 and 0.75), GNP (0.09 and 0.21), terms of trade (0.002 and 0.27), and inflation (0.04 and 0.07). Additionally, among the demographic life-cycle variables, while the life expectancy at birth variable had a negative impact on savings (-0.02 and -0.02), no statistically significant coefficient was obtained for the urbanization ratio variable.

If we analyze the crowding out related empirical studies, we think that the following studies are important.

Malley and Moutos (1996) provide empirical evidence supporting complete crowding out in Sweden through the application of a Vector Error Correction Model. Additionally, Algan et al. (2002) observed significant crowding-out effects in nations characterized by a substantial proportion of public spending in activities that can be substituted. Wong and Tang (2010) apply dynamic panel models to a dataset of 55 countries over 1972-2004 and estimate a long-run coefficient of -2.1 for crowding out the effect of government savings for developing countries. Paiva and Jahan (2003) investigated the empirical determinants of private savings in Brazil over the period 1965 to 2000 and found empirical evidence that government savings have been crowding out private savings with a long-run offset coefficient of -0.84 and a short-run coefficient of -1.04. Their findings imply full crowding out in the short run for

Brasil. Mitra (2006) finds empirical evidence that government investment has been crowding out private investment. The estimation results show that a one percent increase in government investment results in a significant decrease in private investment by 0.738 percent.

Özcan et al (2003) state that the public saving rate has a partial impact on reducing the private saving rate, but they did not find evidence supporting the "full crowding out" hypothesis. Their examination spans from 1968 to 1994, involving the estimation of an empirical model for private savings in Türkiye. The results indicate a significant inertia in private saving rates. Yavaş and Tunç (2016) explore the factors influencing the private saving rate in Türkiye, emphasizing the impact of mortgage debt. Their findings reveal a notable persistence in the saving rate, and they identify a substantial partial crowding-out effect on the private saving rate attributed to the public saving rate. Ayas (2022) employs the Fourier approach analyzing data from 1975 to 2018 in Türkiye. The results of the study indicate that a 1% increase in public-sector investments leads to a 2.98% decrease in private-sector investments. Ayas (2022) identifies a unidirectional causality from public fixed investment to private sector fixed capital investments in Türkiye from 1974 to 2018. Van Rijckeghem (2010) reports an offset coefficient of -0.63; Özcan et al. (2003) find an offset coefficient between -0.42 and -0.656; IMF (2007) finds an offset coefficient between -0.72 and -0.77; and Matur et al. (2012) estimates an offset parameter of -0.38.

Kalem (2015) analyzes the relationship between public investment and private investment in Türkiye by using the 1976-2012 period yearly data set and the results of the study show that public sector investments crowd out private investment with an offset coefficient of -0.35.

Gök (2014) runs an IV/GMM time series estimation for the period between 1985 and 2010 for Türkiye and analyzes the determinants of private savings in Türkiye.

Kaytancı (2017) examined the connection between private and government investments in the Turkish economy for the period from 1985Q4 to 2016Q2 using the

ARDL bound test. The findings of the study indicate that government investments negatively impact private investments, both in the long run and the short run.

There are also studies finding crowding-in effect for Türkiye: İyidiker and Özuğurlu, 2001; Yavuz, 2005; Kuştepeli, 2005; Altunç and Şentürk, 2010; Durkaya, 2012; Cural vd. 2012; Yılancı ve Aydın, 2016; Çelik, 2016; Demir; 2017; Tarla and Temiz, 2020.

Athukorala and Sen (2004), and Gök (2014) showed that an increase in public savings caused a crowding out effect of private savings.

Pitoňáková (2018) explores the factors influencing the private sector saving rate in Slovakia and discovers that an uptick in public savings suggests the presence of a crowding-out effect.

As explained above, when investigating the determinants of aggregate private savings, among other things, it is important to choose exact variables that proxy the factor whose effect is being investigated. The differences in variable selection and conclusions reached for a few outlined studies are exemplified in the table below.

Table 2 Selected Empirical Studies of Private Saving Determinants in Türkiye

Category	Specific Variable	Empirical Findings		
		Positive	Negative	Insignificant
Inertia	Lagged dependent variable	1, 5, 7	3	3
Income	The level of real per capita gross private disposable income	1, 4		
	The growth rate of real per capita private disposable income	1	4	1
	The logarithm of real per capita disposable income	6		
	Logarithm of the GNP	5		
	Growth of logarithm of GNP		5	
	Real GDP growth per capita	2, 7	3	3, 7
Inflation	The annual change in the logarithm of the GNP deflator	1, 5		
	Consumer Price Index inflation		6	6
	Annual inflation in GDP Deflator	4		
	GDP deflator	2		
	GDP deflator (% change)	3		
Interest rate	Real interest rate on saving deposits	5	1	1, 5
	The real interest rate on 12-month savings deposits		2, 4	2
	Real discount rate	6		
	Interbank overnight interest rate		7	
Exchange rate	Real exchange rate (deviation from trend)		2	2
Employment	Unemployment rate	2, 5		2, 5

Table 2 (continued)

Category	Specific Variable	Empirical Findings		
		Positive	Negative	Insignificant
Financial depth	M2/GNP	1	5	
Borrowing constraints	Private sector credit/GPDI	1		1
	Private sector credit/GDP	5	6	6
	The ratio of banking credits to the private sector to GDP		4	
	Change in claims on the private sector to GDP ratio		2	2
	Change in private credit as % of GDP		3	
	New mortgage originations/GDP		7	
	New non-mortgage credit originations/GDP		7	
	Outstanding mortgage debt/GDP	7		7
	The flow of business credit/GDP	7		
Demographics	The percentage of the population living in urban areas	1		1
	Life expectancy at birth		1, 5	
	The ratio of the population younger than 15 to the total population	5	1	1
	The ratio of the population older than 65 to the total population	1, 2	2, 4, 5	1, 2
Terms of trade	The ratio of nominal exports to nominal imports			5
	The ratio of nominal exports/imports to real exports/imports	1, 3		
	Change in terms of trade	2		2
	Terms of trade (index)	3	7	
Current account	The difference between imports and exports over GPDI	1		1
	Difference between imports and exports over GNP		5	
Public saving	Public sector saving/GPDI		1, 2	
	Public sector saving/GDP		3, 7	
	Public sector saving/GNP		5	
	General government public saving/GNDI		4	
	Government budget deficit/GDP	6		

Notes: (1) Özcan et al. (2003), OLS, 1968-1994, % GPDI
(2) IMF (2007), ECM, 1980-2005, % GDP
(3) Van Rijckeghem (2010), OLS, ECM, 1988-2009, % GDP
(4) Matur et al. (2012), Johansen, 1980-2008, % GNDI
(5) Özcan et al. (2012), OLS, 1975-2008, % GNP
(6) Gungor et al. (2014), ARDL, PCA, 1960-2008, %GPDI
(7) Tunc and Yavas (2016), OLS, GMM, 1999Q1-2014Q2, % GDP
In the table, numbers show related studies. The information is such that, for example "(1) Özcan et al. (2003), OLS, 1968-1994, % GPDI" represent: the study is of Özcan et al. (2003), the used method is OLS, the period under investigation is between 1968 and 1994, the dependent variable used to estimate private saving is the ratio of total private saving to GPDI, respectively.

III.C. DATA AND VARIABLES

In this study, the macro determinants of the total private sector saving rates in Türkiye will be investigated by covering the years between 1990 and 2020. In the analyses, quarterly data is used. The reason for using quarterly data is the concern to increase

the number of observations and to allow the model to better capture short-term saving behaviors and reactions to economic changes since there is not enough long and consistent data on all the variables for the determinants of saving rates in the theoretical and empirical literature. The reason for starting the period from 1990 is the constraint concerning the availability of quarterly data for all variables used in the different models obtained under this study[16]. Moreover, since 1980s marked a dramatic structural change in the Turkish economy, as explained in Chapter 1, there was a regime shift with an impact on the determination of private savings after 1989, which corresponds to capital account liberalization for Türkiye. Before the 1989 reforms, for example, there was no fully functioning capital market, interest rates were not liberalized, and the credit market was not liberalized. The reason for terminating the study in 2020 is that the post-2020 data includes the effects of the COVID-19 pandemic, a type of event that has never been encountered before, the effects of which began to be seen in Türkiye in the second half of 2020. In this context, this chapter is, to our knowledge, the first study to analyze the Turkish private sector saving rate on a quarterly basis with comparable data, starting from 1990.

III.C.1. Data

In Türkiye, macro-level savings data is calculated and announced annually by PSB under the title of "General Balance of the Economy", disaggregating public and private saving data. These data calculated by PSB originally started in 1987 but were derived as far back as 1975. In addition, total domestic savings data, regardless of public and private sectors, starting from 1950, is available on PSB's website.

On the other hand, "Institutional Sector Accounts" have been disclosed to the public by TurkStat since 2016. These accounts consist of Non-Financial Corporations, Financial Corporations, General Government, Households, and Non-Profit Institutions

[16] In Türkiye, TurkStat has been gathering national accounts information since 1929, and GDP calculations, utilizing both production and expenditure approaches, have been computed in both nominal and real terms following the principles of the 1968 System of National Accounts since 1972 (WB, 2008). The data has been regularly released on a quarterly basis since 1987. Therefore, in this study examining private sector total saving relative to GDP, the earliest possible date on a quarterly basis could have been 1987.

Serving Households and show how income is earned, spent, and saved. Within the scope of these accounts, beginning from 2009, on an annual basis, GDP, Gross National Income (GNI), Gross National Disposable Income, and total savings of institutions are calculated in detail for private, household, and corporate sectors. The limitations of this data, among others, are that it is annual, did not exist before 2009, and is calculated as general government savings rather than the entire public. The table comparing the savings data announced to the public by PSB and TurkStat for the period 2009-2020 is given below.

As can be seen from the table above, there is no significant difference between the two data sets. In this context, considering that the time length of the mentioned data is not suitable for time series analysis, TurkStat data were not used in this study.

Table 3 Domestic Savings as % of GDP in Türkiye between 2009-2020 Based on PSB and TurkStat

Years	Total		Private		Public/General Government	
	PSB	TurkStat	PSB	TurkStat	PSB	TurkStat
2009	21,4	21,9	22,2	23,4	-0,8	-1,5
2010	21,3	21,8	19,8	19,8	1,5	2,0
2011	22,5	23,0	19,0	19,7	3,4	3,3
2012	22,8	23,4	20,1	19,5	2,6	3,9
2013	23,2	23,9	20,2	19,6	2,9	4,3
2014	24,4	24,9	21,8	21,0	2,7	3,9
2015	24,8	25,2	21,1	20,8	3,6	4,4
2016	24,5	25,0	21,7	22,3	2,7	2,7
2017	25,4	26,0	23,0	24,0	2,4	2,0
2018	27,7	28,0	25,9	26,4	1,7	1,6
2019	26,0	26,3	26,0	26,8	0,0	-0,5
2020	26,8	27,0	27,8	27,8	-1,0	-0,8

Source: TurkStat (2023) and PSB (2023).

The three main sources used by PSB while generating the "General Balance of the Economy" are; GDP and expenditure components of GDP calculated by TurkStat (in TL on a quarterly basis), balance of payments accounts compiled by the CBRT (in USD on a monthly basis) and Central Government Budget (in TL on a monthly basis) data announced by the Ministry of Treasury and Finance.

In order to constitute the general balance of the Turkish economy, the following aggregates are calculated and/or obtained by PSB:

1. GNI = GDP + Net Factor Incomes from abroad (Incomes received from abroad by residents – Incomes paid to nonresidents)

2. GNDI = GNI + Net Current Transfers from abroad (Current Transfers from abroad by residents – Current Transfers paid to nonresidents)

3. Total Domestic Savings = GNDI – Total Consumption.

4. GNDI = Public Disposable Income + Private Disposable Income

5. Public Saving = Public Disposable Income – Public Consumption

6. Public Disposable Income = Tax Revenues + Non-tax Revenues + Factor Income + Social Funds – Net Current Transfers to the Private Sector – Net Current Transfers to Foreign Sectors

7. Public Consumption = Current Expenditures

8. Private Saving = Private Disposable Income – Private Consumption

9. Private Disposable Income = GNDI – Public Disposable Income

For the data, before 2009; in PSB calculations, Private Disposable Income is not calculated as an independent income item, but obtained from equation (9), in other words, obtained as a residual. Moreover, in TurkStat calculations, Private Consumption is not calculated independently; first, the sum of public consumption, public investment, and public stock changes is deducted from GDP, and then, the residual is distributed to private consumption, private investment, and private stock changes. Therefore, Private Savings calculated by PSB is the difference of two

residuals. Moreover, in the public sector saving data announced by PSB, unlike TurkStat calculations, all the following institutions and organizations are included in the definition of the public sector, with a broader scope.

- Central Government Budget (before 2006, Consolidated Budget) = General Budget + Special Budget + Regulatory Authorities
- Local Governments
- Extrabudgetary Funds
- Revolving Funds
- General Health-Care Insurance
- Social Security Institutions
- Unemployment Insurance Funds
- State Economic Enterprises

Since GDP is a required step to reach GNDI and also all variables are expressed as a ratio to GDP in this study, it would be useful to give some information about the GDP data, as well.

In Türkiye, important changes were made in the 1987-based year national income calculation, and the 1998-based year GDP calculation was started in 2008. The series with 1998 based year has been calculated since 1998, no retrospective data has been produced. The “GDP through Harmonized Expenditures” series was created by PSB for the period 1980-1997, based on TurkStat’s 1998 based year series, and GNDI and saving data consistent with this new series were revised starting from 1998. Similarly, in 2016, comprehensive revisions were made to the national income calculations, and

the GDP calculation was started with the base year of 2009[17]. In this study, the "GDP through Harmonized Expenditures" data generated by PSB for the 1990-1997 period and the GDP data announced by TurkStat for the 1998-2020 period were used.

As a result, PSB's annual public and private sector saving data are derived on a quarterly basis using the following method, under several assumptions.

(1) First, the values for the 1990-1997 period of the 1998 based year the "GDP through Harmonized Expenditures" data, which was created annually by PSB for the 1980-1997 period, are converted into quarters, by taking the quarterly distribution and weight of the 1987 based year GDP data calculated by TurkStat for the 1990-1997 period into account. As a result, the GDP series for the period 1990Q1-2020Q4 was generated consistently.

(2) Considering that the majority of the public sector consists of the central government budget (before 2006, consolidated budget), the public sector calculated by PSB is proxied with the central government budget (before 2006, consolidated budget) announced by the Ministry of Treasury and Finance. Central government budget (before 2006, consolidated budget) data is disclosed to the public on a monthly basis. By deducting interest expenses and other current transfers from the central government budget revenues, the central government budget disposable income was found on a monthly basis and converted to quarterly. Similarly, by adding up the central government budget's personnel expenses, Social Security Institution state premium expenses, and goods and service purchase expenses, the central government budget consumption was found on a monthly basis and converted to a quarterly basis. Taking into account the distribution and weights of the quarterly central government budget disposable income and central government consumption

[17] For a comprehensive analysis that provides detailed and comparative information about both the changes made in 2008 and the revision made in 2016, see, among many others, Yükseler (2008), Yükseler (2017) and Boratav et al. (2018).

data throughout the year, PSB's annual public disposable income and PSB's annual public consumption data were found quarterly, respectively. By taking the difference of these quarterly data, PSB's data was obtained as quarterly.

(3) In Türkiye, Net Factor Income and Net Foreign Current Transfers data are disclosed to the public monthly in USD by the CBRT within the scope of Balance of Payments. By PSB, in the process of calculating domestic saving data, while reaching GNDI from GDP, both data are created annually in TL. Taking into account the quarterly weight and distribution of the CBRT data within the year, the Net Factor Incomes and Net Foreign Current Transfers data announced annually by PSB within the "General Balance of the Economy" were obtained on a quarterly basis.

(4) Thus, by adding the quarterly Net Factor Incomes and Net Foreign Current Transfers obtained in paragraph (3) to the GDP data obtained in paragraph (1), the GNDI series for the period of 1990Q1-2020Q4 was obtained. The annual total of the quarterly GNDI data found with this method and the annual GNDI data announced by PSB within the scope of the "General Balance of the Economy" are compatible and consistent.

(5) Then, private disposable income on a quarterly basis was obtained by subtracting the quarterly public disposable income calculated in paragraph (2) from the quarterly GNDI calculated in paragraph (4).

(6) PSB's annual private consumption data was found as quarterly, taking into account the distribution and weights of the private consumption data announced to the public quarterly within the scope of national income calculations by TurkStat.

(7) Lastly, quarterly private saving values were obtained by subtracting the quarterly private consumption calculated in paragraph (6) from the quarterly private disposable income calculated in paragraph (5).

(8) In addition, similar to the method followed in paragraph (6) above, taking into account the distribution and weights of the private sector and public sector gross fixed capital formation data within the year, which are announced to the public on a quarterly basis within the scope of national income calculations by TurkStat, respectively, PSB's annual private and public sector investment data are calculated as quarterly.

Raw data used in the calculation of model variables are briefly summarized below.

- GDPRAW: GDP (nominal), taken from TurkStat.

- GSRAW: Government Saving (Public Saving, nominal), taken from Presidency of Strategy and Budget.

- PSRAW: Private Saving (nominal), taken from Presidency of Strategy and Budget.

- SRAW: Total Saving (nominal), taken from Presidency of Strategy and Budget.

- GIRAW: Government Investment (Public Investment, nominal), taken from Presidency of Strategy and Budget.

- PIRAW: Private Investment (nominal), taken from Presidency of Strategy and Budget.

- IRAW: Total Investment (nominal), taken from Presidency of Strategy and Budget.

- CRAW = Total private sector credit (nominal), taken from the Central Bank of the Republic of Türkiye.

- USDRAW = USDTR Exchange Rate, taken from the Central Bank of the Republic of Türkiye.

- RERRAW = Real Effective Exchange Rate, taken from Central Bank of the Republic of Türkiye.

- INTRAW = Overnight interest rate, taken from the Central Bank of the Republic of Türkiye.

- MRAW = M2 Money Stock (nominal), taken from the Central Bank of the Republic of Türkiye.

- RSCI = Real Sector Confidence Index, taken from Central Bank of the Republic of Türkiye.

- CPI = ICOC Wage Earners Cost of Living Index 1985 = 100, taken from Istanbul Chamber of Commerce (ICOC), 1985 = 100.

- DEBTRAW = Domestic Debt Stock (Nominal), taken from the Ministry of Treasury and Finance.

- CCREDITS: Company credits (nominal), taken from the Central Bank of the Republic of Türkiye.

- HHCREDITS: Household credits (nominal), the sum of consumer credits, automobile credits, housing credits, and credit card payments, taken from the Central Bank of the Republic of Türkiye.

One of the factors determining the variables used in the model was whether the relevant variables were available or could be derived on a quarterly basis. For example, some demographic variables, such as old dependency ratio, young dependency ratio, urbanization rate, and female labor force participation rate, which are frequently

among the determinants of saving in the empirical literature, could not be tested as explanatory variables due to the lack of quarterly data from 1990.

III.C.2. Model Variables

The variables used in our model and their calculations are as follows:

- ***psr*** Private saving to GDP ratio (dependent variable)
  - Obtained as PSRAW/GDPRAW
- ***gsr*** Government saving to GDP ratio
  - Obtained as GSRAW/GDPRAW
- ***rir*** Overnight real interest rate (nominal interest rate-inflation rate)
  - Obtained as INTRAW- INF
  - INF is calculated as Δln(CPI)
- ***gr*** Growth of real GDP
  - Obtained as Δln(RGDP)
  - RGDP is calculated as GDPRAW/CPI
- ***dds*** Domestic debt stock to GDP
  - Obtained as DEBTRAW/GDPRAW
- ***pinvr*** Private investment to GDP ratio
  - Obtained as PIRAW/GDPRAW
- ***cconf*** Company confidence for time t
  - RSCI value at time *t-1*
- ***cc_gdp*** Company credits to GDP ratio
  - Calculated as CCREDITS/GDPRAW
- ***hc_gdp*** Household credits to GDP ratio
  - Calculated as HHCREDITS/GDPRAW

Table 4 Descriptive Statistic for Variables (1990Q1-2020Q4)

	psr	***gsr***	***cc_gdp***	***rir***	***gr***	***dds***	***pinvr***	***cconf***	***hc_gdp***
Mean	0.238	-0.001	0.841	0.311	0.008	0.863	0.219	99.8	0.310
Median	0.233	0.012	0.486	0.189	0.014	0.749	0.224	101.9	0.216
Maximum	0.616	0.725	2.485	2.005	0.362	1.741	0.274	116.7	0.767
Minimum	-0.562	-0.412	0.222	-0.051	-0.278	0.271	0.142	58.7	0.003

Notes: psr: private savings to GDP ratio (dependent variable), gsr: government savings to GDP ratio, rir: overnight real interest rate (nominal interest rate-inflation rate), gr: growth of real GDP, dds: domestic debt stock to GDP, pinvr: private investment to GDP ratio, cconf: company confidence for time t, cc_gdp: company credits to GDP ratio, hc_gdp: household credits to GDP ratio.

Source: Author's own calculations.

The descriptive statistics for the variables used in our model can be seen in the table above. For the whole period of 1990-2020, the average private saving to GDP ratio is 23.8%, average government saving to GDP ratio is -0.1%, average company credits to GDP ratio is 84.1%, the average real interest rate is 31.1%, average real GDP growth rate is 0.8% (per quarter), average domestic debt stock to GDP is 86.3%, average private investment to GDP ratio is 21.9%, average company confidence for time t is 99.8 index-unit and average household credits to GDP ratio is 31.0%.

III.C.3. Integration Order of Variables

It is essential to examine the integration order of variables employed in this chapter since time series data is used in this analysis. In order to ascertain the integration order of variables, the study utilizes ADF (Fuller, 1976; Dickey and Fuller, 1979, Cheung and Lai, 1995) and Kapetanios unit root tests (Kapetanios, 2003 and 2005). These tests are carried out using Gretl software which allows us to include seasonal dummies with the corresponding asymptotical adjustments. The reported p values of Gretl are specific to the sample size and seasonally adjusted random walk processes.

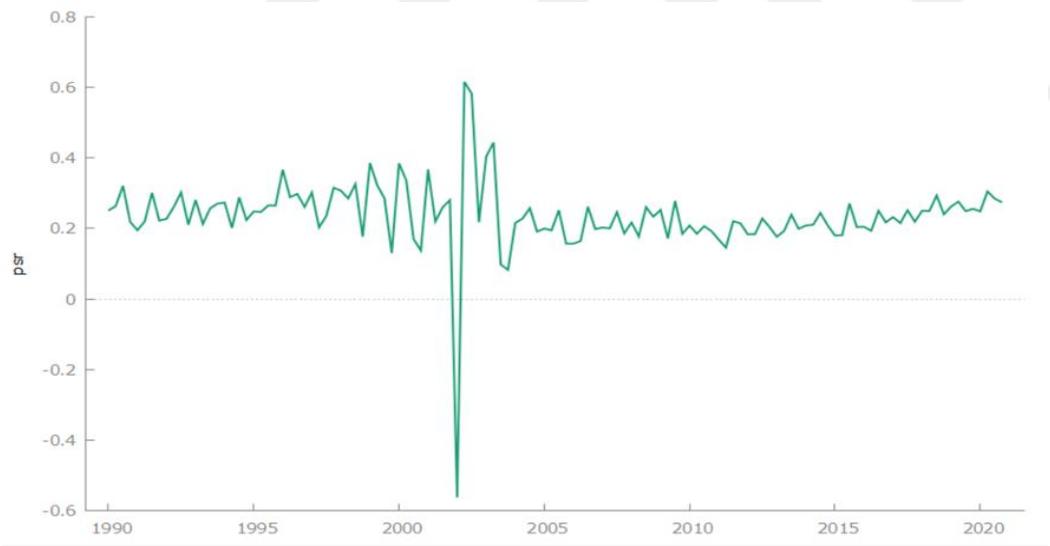
The test proposed by Kapetanios (2005) is an extension of Zivot and Andrews' (1992) unit root test. Kapetanios' (2005) unit root test controls for up to 5 level and/or trend breaks under the alternative hypothesis of trend stationarity. The main advantage of this procedure is that break dates are endogenously defined. Below we examine the integration order of variables one by one.

III.C.3.1. Private savings to GDP ratio (psr)

A plot of the private savings to GDP ratio (psr) versus time is presented in the figure below. The graph shows the quarterly private savings to GDP ratio (psr) from the first quarter of 1990 to the last quarter of 2020.

From visual inspection of the time series graph in the figure below, the series is suspected to follow a pure random walk pattern implying no trend. From this graph, the series is suspected to have seasonality, as well.

The table below reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1.



Source: Author's own calculations based on PSB (2023) data.

Figure 7 Private savings to GDP ratio (psr) in Türkiye between 1990-2020

Both Kapetanios and ADF tests conclude that psr is I(1). Hence, psr is not an I(2) variable. This is a crucial point since in the Bound Test Cointegration Procedure none of the variables is allowed to be I(2). This condition is held.

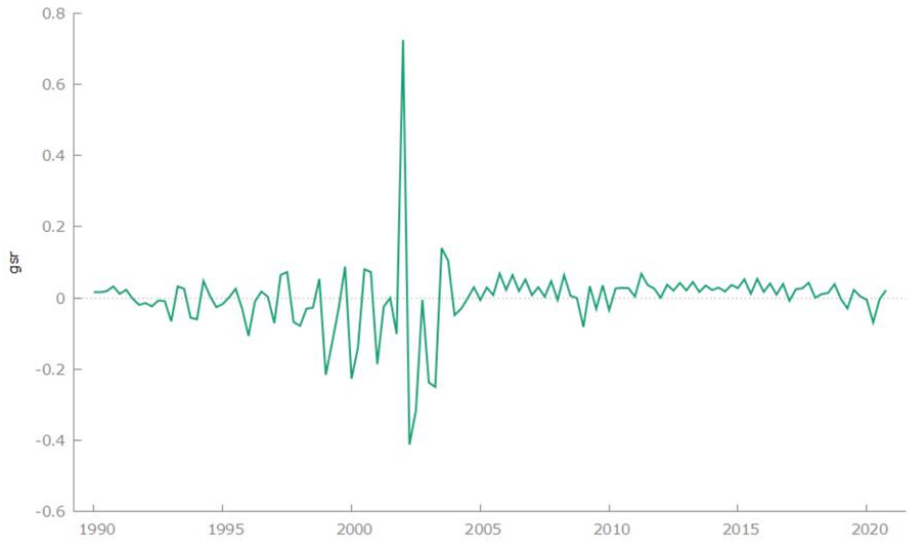
Table 5 Unit Root Tests for Private Savings to GDP Ratio (psr)

Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
psr Best suitable Data-Generating Process (DGP) for unit root testing (Visual inspection for graph): Pure Random Walk (no drift, no trend)	The test statistic: -8.170 Critical value (5%): -8,343 Do not reject H_0. There is unit root.	• Test without constant plus seasonal dummies, with 8 lags. The test statistic: -0.127101 Prob-value: 0.64 Do not reject H_0. There is unit root.
Δpsr	The test statistic: -10.521 Critical value (5%): -8,343 Reject H_0. No unit root.	• Test without constant plus seasonal dummies, with 7 lags. The test statistic: -7.77967 Prob-value: 0.000 Reject H_0. No unit root.
Order of Integration	I(1)	I(1)
Decision	psr ~ I(1)	

Source: Author's own calculations.

III.C.3.2. Government savings to GDP ratio (gsr)

A plot of the government savings to GDP ratio (gsr) versus time is presented in the figure below. The graph shows the quarterly government savings to GDP ratio (gsr) from the first quarter of 1990 to the last quarter of 2020.



Source: Author's own calculations based on PSB (2023) data.

Figure 8 Government savings to GDP ratio (gsr) in Türkiye (1990-2020)

From visual inspection of the time series graph in the figure above, the series is suspected to follow a pure random walk pattern implying no trend. From this graph, the series is suspected to have seasonality, as well.

The table below displays the outcomes of the unit root test for the gsr series. The null hypothesis for both the ADF test and the Kapetanios test is the presence of a unit root. The most suitable lag length for the ADF test is determined using the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1. Kapetanios and ADF test conflicts but we decide based on Kapetanios test since it takes into account up to 5 structural breaks. Consequently, it is concluded that gsr is I(1). Hence gsr is not an I(2) variable. This is a crucial point since in the Bound Test Cointegration Procedure none of the variables is allowed to be I(2). This condition is held.

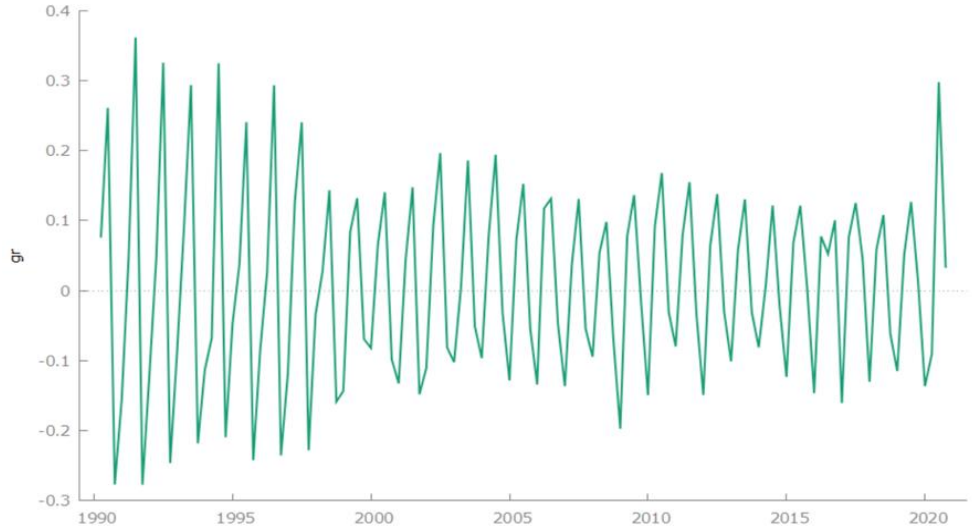
Table 6 Unit Root Tests for Government Savings to GDP Ratio (gsr)

Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
gsr Best suitable DGP for unit root testing (Visual inspection for graph): Pure Random Walk (no drift, no trend)	The test statistic: -7.4337 Critical value (5%): -8,343 Do not reject H_0. There is unit root.	• Test without constant plus seasonal dummies, with 2 lags. The test statistic: -6.09732 Prob-value: 0.000 Reject H_0. There is no unit root.
Δgsr	The test statistic: -10.7317 Critical value (5%): -8,343 Reject H_0. There is no unit root.	na
Order of Integration	I(1)	I(0)
Decision	gsr ~ I(1)	

Source: Author's own calculations.

III.C.3.3. Growth of Real GDP (gr)

A plot of the growth of real GDP (gr) versus time is presented in the figure below. The graph shows the quarterly growth of real GDP (gr) from the first quarter of 1990 to the last quarter of 2020.



Source: TurkStat (2023).

Figure 9 Growth of Real GDP (gr) in Türkiye (1990-2020)

From visual inspection of the time series graph in the figure above, the series is suspected to follow a pure random walk pattern implying no trend. From this graph, the series is suspected to have seasonality, as well.

The table below reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1.

Table 7 Unit Root Tests for Growth of Real GDP (gr)

Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
gr Best suitable DGP for unit root testing (Visual inspection for graph): Pure Random Walk (no drift, no trend)	Test statistic: -19.6374 Critical value (5%): -8,343 Reject H_0. There is no unit root.	• Test without constant plus seasonal dummies, with 7 lags. Test statistic: -2.67 Prob-value: 0.007 Reject H_0. There is no unit root.
Δgr	na	na
Order of Integration	I(0)	I(0)
Decision	gr ~ I(0)	

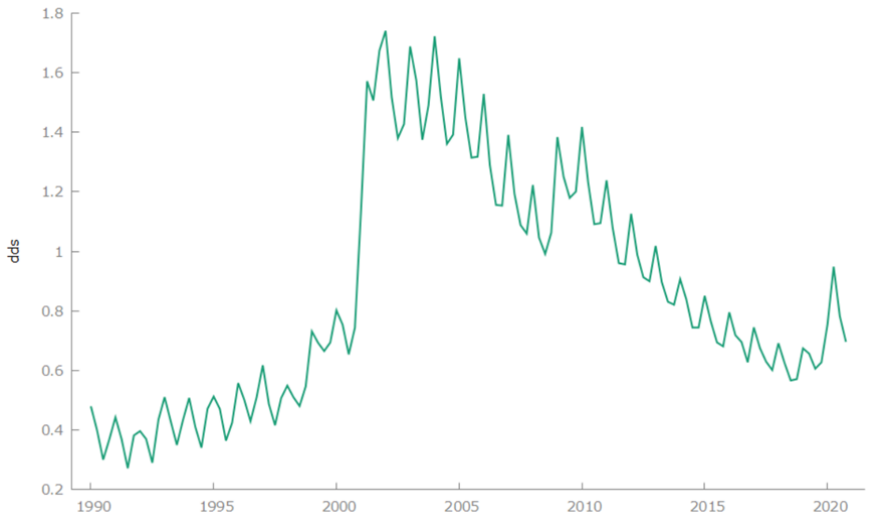
Source: Author's own calculations.

Both Kapetanios and ADF tests conclude that gr is I(0). Hence gr is not an I(2) variable. This is a crucial point since in the Bound Test Cointegration Procedure none of the variables is allowed to be I(2). This condition is held.

III.C.3.4. Domestic debt stock to GDP (dds)

A plot of the domestic debt stock to GDP (dds) versus time is presented in the figure below. The graph shows the quarterly domestic debt stock to GDP (dds) from the first quarter of 1990 to the last quarter of 2020.

From visual inspection of the time series graph in the figure below, the series is suspected to follow a random walk with drift and trend pattern implying both linear and quadratic trend behavior. From this graph, the series is suspected to have seasonality, as well.



Source: TurkStat (2023) and MTF (2023).

Figure 10 Domestic debt stock to GDP (dds) in Türkiye (1990-2020)

The table below reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1.

Table 8 Unit Root Tests for Domestic Debt Stock to GDP (dds)

Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
dds Best suitable DGP for unit root testing (Visual inspection for graph): Random Walk with drift and trend	Test statistic: -12.1682 Critical value (5%): -8,343 Reject H_0. There is no unit root.	• Test with constant and trend plus seasonal dummies, with 9 lags. The test statistic: -1.524 Prob-value: 0.822 Do not reject H_0. There is unit root.
Δdds	na	• Test without constant plus seasonal dummies, with 5 lags. The test statistic: -7.562 Prob-value: 0.000 Reject H_0. No unit root.
Order of Integration	I(0)	I(1)
Decision	dds ~ I(0) since the ADF test is not robust to structural breaks	

Source: Author's own calculations.

Kapetanios and ADF test conflicts but we decide based on Kapetanios test since it takes into account up to 5 structural breaks. Consequently, it is concluded that ddr is I(0). Hence ddr is not an I(2) variable. This is a crucial point since in the Bound Test Cointegration Procedure none of the variables is allowed to be I(2). This condition is held.

III.C.3.5. Private investment to GDP ratio (pinvr)

A plot of the private investment to GDP ratio (pinvr) versus time is presented in the figure below. The graph shows the quarterly private investment to GDP ratio (pinvr) from the first quarter of 1990 to the last quarter of 2020.

From visual inspection of the time series graph in the figure below, the series is suspected to follow a random walk with a drift pattern implying a linear trend. From this graph, the series is suspected to have seasonality, as well.

Source: Author's own calculations based on PSB (2023) data.

Figure 11 Private investment to GDP ratio (pinvr) in Türkiye (1990-2020)

The table below reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1.

Table 9 Unit Root Tests for Private Investment to GDP Ratio (pinvr)

Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
pinvr Best suitable DGP for unit root testing (Visual inspection for graph): Random Walk with drift	The test statistic: -7.511 Critical value (5%): -8,343 Do not reject H_0. There is unit root.	• Test with constant plus seasonal dummies, with 5 lags. The test statistic: -2.056 Prob-value: 0.263 Do not reject H_0. There is unit root.
Δpinvr	The testest statistic: -8.824 Critical value (5%): -8,343 Reject H_0. There is no unit root.	• Test without constant plus seasonal dummies, with 4 lags. The test statistic: -4.536 Prob-value: 0.000 Reject H_0. No unit root.
Order of Integration	I(1)	I(1)
Decision	pinvr ~ I(1)	

Source: Author's own calculations.

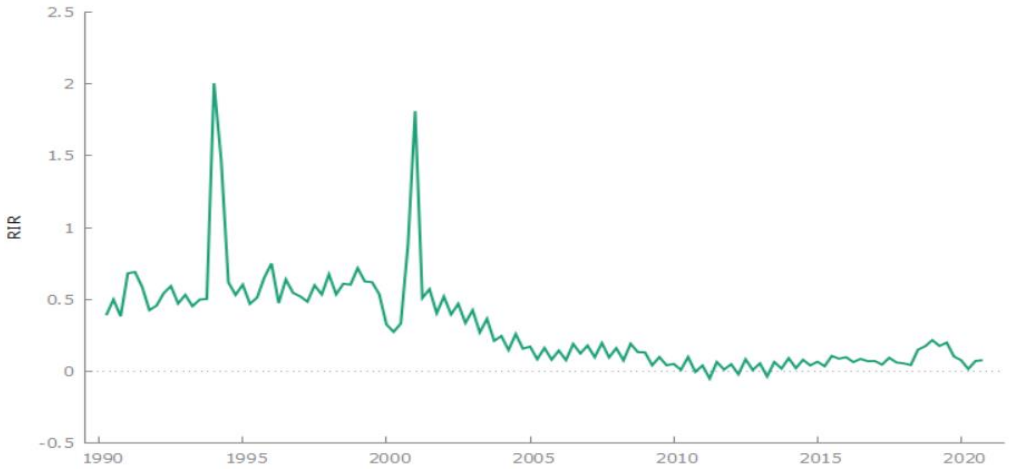
Both Kapetanios and ADF test conclude that pinvr is I(1). Hence pinvr is not an I(2) variable. This is a crucial point since in Bound Test Cointegration Procedure none of the variables is allowed to be I(2). This condition is held.

III.C.3.6. Overnight real interest rate (rir)

A plot of the overnight real interest rate (rir) versus time is presented in the figure below. The graph shows the quarterly overnight real interest rate (rir) from the first quarter of 1990 to the last quarter of 2020.

From visual inspection of the time series graph in the figure below, the series is suspected to follow a random walk with drift and trend pattern implying both linear and quadratic trend behavior. From this graph, the series is suspected to have seasonality, as well.

The table below reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1.



Source: CBRT (2023).

Figure 12 Overnight real interest rate (rir) in Türkiye (1990-2020)

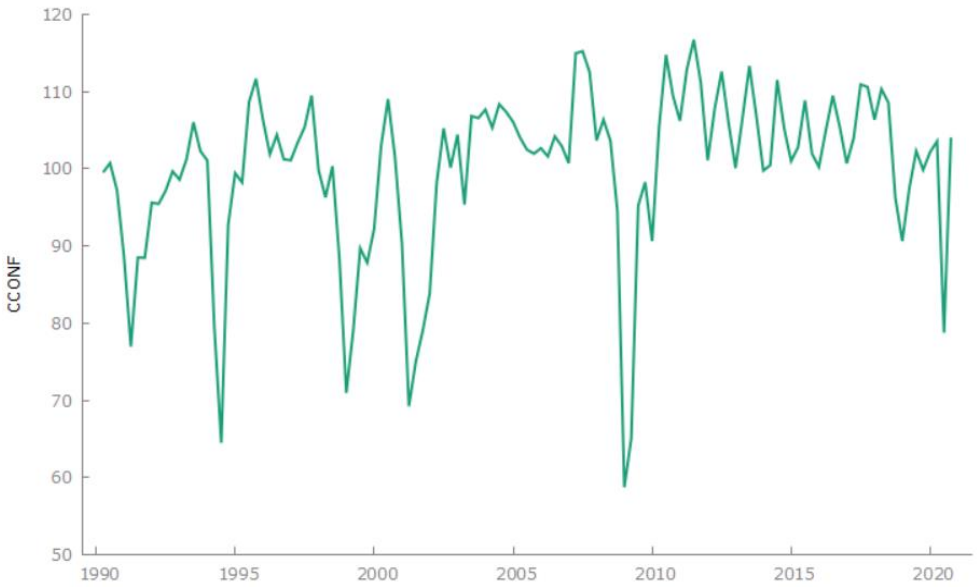
Table 10 Unit Root Tests for Overnight Real Interest Rate (rir)

Variables	Kapetanios Test [H_0: unit root]	ADF Test [H_0: unit root]
rir Best suitable DGP for unit root testing (Visual inspection for graph): Random Walk with drift and trend	The test statistic: -8.23715 Critical value (5%): -8,343 Do not reject H_0. There is unit root.	• Test with constant and trend plus seasonal dummies, with 6 lags. The test statistic: -1.270 Prob-value: 0.646 Do not reject H_0. There is unit root.
Δrir	The test statistic: -11.612 Critical value (5%): -8,343 Reject H_0. There is no unit root.	• Test without constant plus seasonal dummies, with 5 lags. The test statistic: -7.636 Prob-value: 0.000 Reject H_0. No unit root.
Order of Integration	I(1)	I(1)
Decision	rir ~ I(1)	

Source: Author's own calculations.

Both Kapetanios and ADF test conclude that rir is I(0). Hence rir is not an I(2) variable. This is a crucial point since in the Bound Test Cointegration Procedure none of the variables is allowed to be I(2). This condition is held.

III.C.3.7. Company confidence for time t (cconf)



Source: CBRT (2023).

Figure 13 Company confidence (cconf) in Türkiye (1990-2020)

A plot of the company confidence (cconf) versus time is presented in the figure above. The graph shows the quarterly company confidence for time t (cconf) from the first quarter of 1990 to the last quarter of 2020.

From visual inspection of the time series graph in the figure above, the series is suspected to follow a random walk with drift pattern implying a slight linear trend. From this graph, the series is suspected to have seasonality, as well.

The table below reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1.

Table 11 Unit Root Tests for Company Confidence (cconf)

Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
cconf Best suitable DGP for unit root testing (Visual inspection for graph): Random walk with drift	The test statistic: -7.582 Critical value (5%): -8,343 Do not reject H_0. There is unit root.	• Test with constant plus seasonal dummies, with 3 lags. The test statistic: -5.159 Prob-value: 0.000 Reject H_0. There is no unit root.
Δcconf	The test statistic: -12.1236 Critical value (5%): -8,343 Reject H_0. There is no unit root.	na
Order of Integration	I(1)	I(0)
Decision	cconf ~ I(1)	

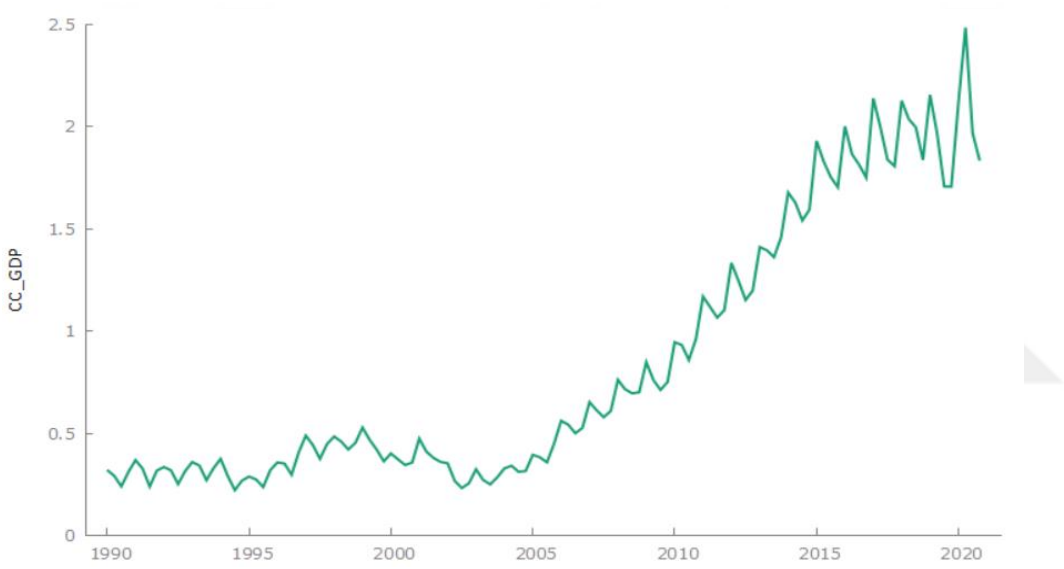
Source: Author's own calculations.

Kapetanios and ADF test conflicts but we decide based on Kapetanios test since it takes into account up to 5 structural breaks. Consequently, It is concluded that cconf is I(1). Hence cconf is not an I(2) variable. This is a crucial point since in the Bound Test Cointegration Procedure none of the variables is allowed to be I(2). This condition is held.

III.C.3.8. Company credits to GDP ratio (cc_gdp)

A plot of the company credits to GDP ratio (cc_gdp) versus time is presented in the figure below. The graph shows the quarterly company credits to GDP ratio (cc_gdp) from the first quarter of 1990 to the last quarter of 2020.

From visual inspection of the time series graph in the figure below, the series is suspected to follow a random walk with drift and trend pattern implying both linear and quadratic trend behavior. From this graph, the series is suspected to have seasonality, as well.



Source: CBRT (2023).

Figure 14 Company credits to GDP ratio (cc_gdp) in Türkiye (1990-2020)

The table below reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1.

Kapetanios and ADF test conflicts but we decide based on Kapetanios test since it takes into account up to 5 structural breaks. Consequently, it is concluded that cc_gdp

is I(0). In the Bound Test Cointegration Procedure, none of the variables is allowed to be I(2). This condition is held.

Table 12 Unit Root Tests for Company Credits to GDP ratio (cc_gdp)

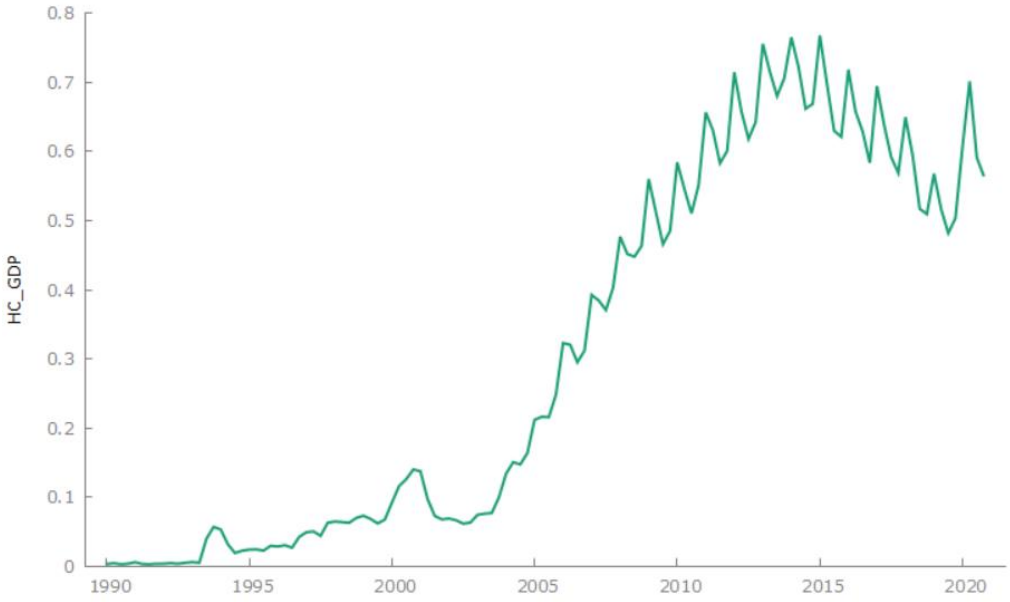
Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
cc_gdp Best suitable DGP for unit root testing (Visual inspection for graph): Random walk with drift and trend	The test statistic: -13.8341. Critical value (5%): -8,343 Reject H_0. There is no unit root.	• Test with constant and trend plus seasonal dummies, with 8 lags. The test statistic: -1.919 Prob-value: 0.644 Do not reject H_0. There is unit root.
∆cc_gdp	na	• Test with constant plus seasonal dummies, with 12 lags. Test statistic: -1.336 Prob-value: 0.615 Do not reject H_0. There is unit root.
∆∆cc_gdp	na	• Test without constant plus seasonal dummies, with 11 lags. Test statistic: -5.912 Prob-value: 0.000 Reject H_0. No unit root.
Order of Integration	I(0)	I(2)
Decision	cc_gdp ~ I(0) since the ADF test is not robust to structural breaks	

Source: Author's own calculations.

III.C.3.9. Household credits to GDP ratio (hc_gdp)

A plot of the household credits to GDP ratio (hc_gdp) versus time is presented in the figure below. The graph shows the quarterly household credits to GDP ratio (hc_gdp) from the first quarter of 1990 to the last quarter of 2020.

From visual inspection of the time series graph in the figure below, the series is suspected to follow a random walk with drift and trend implying both linear and quadratic trend behavior. From this graph, the series is suspected to have seasonality, as well.



Source: CBRT (2023).

Figure 15 Household credits to GDP ratio (hc_gdp) in Türkiye (1990-2020)

Table 13 Unit Root Tests for Household Credits to GDP ratio (hc_gdp)

Variables	**Kapetanios Test [H_0: unit root]**	**ADF Test [H_0: unit root]**
hc_gdp Best suitable DGP for unit root testing (Visual inspection for graph): Random walk with drift and trend	The test statistic: -10.019 Critical value (5%): -8,343 Reject H_0. There is no unit root.	• Test with constant and trend plus seasonal dummies, with 12 lags. Test statistic: -2.449 Prob-value: 0.354 Do not reject H_0. There is unit root.
Δhc_gdp	na	• Test with constant plus seasonal dummies, with 11 lags. The test statistic: -2.421 Prob-value: 0.136 Do not reject H_0. There is unit root.
ΔΔhc_gdp	na	• Test without constant plus seasonal dummies, with 10 lags. The test statistic: -5.040 Prob-value: 0.000 Reject H_0. No unit root.
Order of Integration	I(0)	I(2)
Decision	hc_gdp ~ I(0) since the ADF test is not robust to structural breaks	

Source: Author's own calculations.

The table above reports the results of the unit root test for the series. The null hypothesis of both the ADF and Kapetanios test is unit root. The optimal lag length of the ADF test is chosen by the Schwarz information criterion, and the Kapetanios test is run under five structural breaks (the model specification is both level and trend breaks) with a trimming parameter of 0.1. Kapetanios and ADF test conflicts but we decide based on Kapetanios test since it takes into account up to 5 structural breaks. Consequently, it is concluded that hc_gdp is I(0). In the Bound Test Cointegration Procedure, none of the variables is allowed to be I(2). This condition is held.

III.C.3.10. Summary for All Series

The table below summarizes the order of integration of all series. As we have stated before if Kapetanios and ADF test conflicts we decided based on Kapetanios test since it takes into account up to 5 structural breaks. The I(1) detected series are as follows: *psr* (private saving to GDP ratio), *gsr* (government saving to GDP ratio), *rir* (overnight real interest rate), *pinvr* (private investment to GDP ratio) and *cconf* (company confidence for time t). The I(0) detected series are as follows: *cc_gdp* (company credits to GDP ratio), *gr* (growth of real GDP), *dds* (domestic debt stock to GDP), *hc_gdp* (household credits to GDP ratio).

Table 14 Order of Integration of Model Variables

	Decision for Order of Integration	Kapetanios	ADF
psr	*I(1)*	I(1)	I(1)
gsr	*I(1)*	I(1)	I(0)
cc_gdp	*I(0)*	I(0)	I(2)
rir	*I(1)*	I(1)	I(1)
gr	*I(0)*	I(0)	I(0)
dds	*I(0)*	I(0)	I(1)
pinvr	*I(1)*	I(1)	I(1)
cconf	*I(1)*	I(1)	I(0)
hc_gdp	*I(0)*	I(0)	I(2)

Notes: psr (private saving to GDP ratio), gsr (government saving to GDP ratio), cc_gdp (company credits to GDP ratio), rir (overnight real interest rate), gr (growth of real GDP), dds (domestic debt stock to GDP), pinvr (private investment to GDP ratio), cconf (company confidence for time t), hc_gdp (household credits to GDP ratio).

Source: Author's own calculations.

III.D. BOUNDS TEST FOR THE EXISTENCE OF A LEVEL RELATIONSHIP

To explain the idea behind the Bounds test procedure consider an ECM for a cointegration relationship:

$$\Delta Y_t = \beta_0 + \gamma_0 \Delta X_t + \delta_0 \Delta Z_t + \varphi v_{t-1} + e_t \qquad (1)$$

This form can be generalized by adding up to *p-lagged* terms for dependent variables to solve any possible autocorrelation problem as follows:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \varphi v_{t-1} + e_t \qquad (2)$$

Here, v_{t-1} the error-correction term is the OLS errors from the long-run "cointegrating regression" of:

$$Y_t = \alpha_0 + \alpha_1 X_t + \alpha_2 Z_t + v_t \qquad (3)$$

Note that in practice since the error terms v_{t-1} are unknown the OLS residuals $\hat{v}_{t-1}$ of cointegrating regression are used:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \varphi \hat{v}_{t-1} + e_t$$

The steps of Pesaran's Bounds Test can be summarized as follows:

Step 1 We can use unit root tests such as ADF and Kapetanios to check that none of the series we are working with are I(2).

Step 2 Recall the ECM equation in (2):

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \varphi v_{t-1} + e_t \qquad (2)$$

with the cointegrating regression given in (3) as $Y_t = \alpha_0 + \alpha_1 X_t + \alpha_2 Z_t + v_t$. If this cointegrating relationship holds, we can write the error term as follows:

$$v_{t-1} = Y_{t-1} - \alpha_0 - \alpha_1 X_{t-1} - \alpha_2 Z_{t-1}$$

Substituting it in the ECM equation (2) yields:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \varphi(Y_{t-1} - \alpha_0 - \alpha_1 X_{t-1} - \alpha_2 Z_{t-1}) + e_t$$

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \varphi Y_{t-1} - \varphi\alpha_0 - \varphi\alpha_1 X_{t-1} - \varphi\alpha_2 Z_{t-1} + e_t$$

$$\Delta Y_t = \beta_0 - \varphi\alpha_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \varphi Y_{t-1} - \varphi\alpha_1 X_{t-1} - \varphi\alpha_2 Z_{t-1} + e_t$$

$$\Rightarrow \Delta Y_t = \mu_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \theta_0 Y_{t-1} + \theta_1 X_{t-1} + \theta_2 Z_{t-1} + e_t \quad (4)$$

where $\mu_0 = \beta_0 - \varphi\alpha_0$, $\theta_0 = \varphi$, $\theta_1 = -\varphi\alpha_1$ and $\theta_2 = -\varphi\alpha_2$.

Pesaran et al. (2001) call this Eq.4 as "conditional ECM". If there is cointegration, the error correction terms must be significantly different than zero in equation (4). Hence, we need to carry out an "F-test" of the hypothesis, $H_0 : \theta_0 = \theta_1 = \theta_2 = 0$; against the alternative that H_0 is not true: $\mathrm{H_A}$: at least one of them is nonzero .

Step 3 The appropriate values for the maximum lags, p, q_1, and q_2 must be selected. Generally, these maximum lags are determined by using one or more of the information criteria of Akaike Information Criterian (AIC), the Schwarz (Bayes Information) criterion SC (BIC), Hannan Quinn (HQ), etc.. In this context, the BIC is used because of its consistency as a model selector.

Step 4 A key assumption in the ARDL/Bounds Testing methodology developed by Pesaran et al. (2001) is that the errors in equation (4) must exhibit serial independence. Once a suitable version of (4) has been estimated, the researcher should use the Lagrange Multiplier (LM) autocorrelation test to check if the errors are serially independent.

Step 5 The selected model must be "dynamically stable". For this purpose, we need to check if all of the inverse roots of the characteristic equation associated with our model lie strictly inside the unit circle.

Step 6 Bounds Test can now be carried out. Recall equation (4):

$$\Delta Y_t = \mu_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \theta_0 Y_{t-1} + \theta_1 X_{t-1} + \theta_2 Z_{t-1} + e_t \quad (4)$$

To test the joint significance of long-run coefficients an "F-test" must be carried out where $H_0 : \theta_0 = \theta_1 = \theta_2 = 0$ and $\mathrm{H_A} : \text{at least one of them is nonzero}$. By this test, the absence of a long-run equilibrium relationship between the variables is checked. This absence coincides with zero coefficients for Y_{t-1}, X_{t-1} and Z_{t-1} in equation (4). A rejection of H_0 implies that we have a long-run relationship.

Here, The F-test statistic's distribution is entirely non-standard. Precise critical values for the F-test are unavailable when dealing with an arbitrary combination of I(0) and I(1) variables. Nevertheless, Pesaran et al. (2001) present limits on the critical values of the F-statistic. They offer lower and upper bounds for various scenarios, with the lower bound assuming all variables are I(0) and the upper bound assuming all variables are I(1). Indeed, the actual situation may lie somewhere between these two extreme cases.

If the calculated statistic is lower than the lower bound we do not reject the null hypothesis of $H_0 : \theta_0 = \theta_1 = \theta_2 = 0$. If the calculated statistic is higher than the upper bound we reject the null hypothesis of $H_0 : \theta_0 = \theta_1 = \theta_2 = 0$ which implies that there is cointegration. Finally, if the F-statistic falls between the bounds, the test is inconclusive.

Following Banerjee et al. (1998), to get rid of nonsensical cointegration, one should also perform a "Bounds t-test" of $H_0 : \theta_0 = 0$, against $H_1 : \theta_0 < 0$. If the t-statistic for Y_{t-1} in equation (4) is greater than the "I(1) bound" value tabulated by Pesaran et al.

(2001; pp.303-304), this would support the conclusion that there is a long-run relationship between the variables. If the t-statistic is less than the "I(0) bound", we would conclude that there is no such long-run relationship between the variables.

Step 7 If the bounds test leads to the conclusion of cointegration, one can estimate the long-run equilibrium relationship between the variables as follows:

$$Y_t = \alpha_0 + \alpha_1 X_t + \alpha_2 Z_t + v_t \qquad (5)$$

as well as the usual ECM:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{t-j} + \sum_{k=0}^{q_2} \delta_k \Delta Z_{t-k} + \varphi \hat{v}_{t-1} + e_t \qquad (2)$$

where $\hat{v}_{t-1} = Y_{t-1} - \hat{\alpha}_0 - \hat{\alpha}_1 X_{t-1} - \hat{\alpha}_2 Z_{t-1}$, and $\hat{\alpha}_0$, $\hat{\alpha}_1$ and $\hat{\alpha}_2$ are the OLS estimates of the α_0, α_1 and α_2 in (5).

Step 8 Recall equation (4) and note that at long-run equilibrium, $\Delta Y_t = 0$, $\Delta X_{t-j} = \Delta Z_{t-k} = 0$. Then the long-run coefficients for *X* and *Z* can be obtained as $-\theta_1 / \theta_0$ and $-\theta_2 / \theta_0$ respectively.

$$Y^* = \left(\frac{\mu_0}{-\theta_0}\right) + \left(\frac{\theta_1}{-\theta_0}\right) X^* + \left(\frac{\theta_2}{-\theta_0}\right) Z^*$$

III.E. BOUNDS TEST ESTIMATION RESULTS

The ARDL bounds testing approach, introduced by Pesaran et al. (2001), is designed to examine the existence of a long-term relationship between variables. This method offers several advantages compared to traditional cointegration tests. It is particularly advantageous when dealing with variables of different orders of integration, such as I(0), I(1), or a combination of both. The robustness of the technique is notable,

especially in situations involving a single long-term relationship among the underlying variables within a small sample size.

The private sector saving to GDP ratio (psr) is modeled as function of government saving to GDP ratio (*gsr*), company credits to GDP ratio (*cc_gdp*), over-night real interest rate (*rir*), growth of real GDP (*gr*), domestic debt stock to GDP (*dds*), private investment to GDP ratio (*pinvr*), company confidence for time t (*cconf*), household credits to GDP ratio (*hc_gdp*) and required dummy variables:

$$psr_t = f\left(gsr_t, cc\_gdp_t, rir_t, gr_t, dds_t, pinvr_t, cconf_t, hc\_gdp_t, dummies\right)$$

The following *unrestricted constant and no trend specification* for ARDL estimation is adopted and estimated[18] for $t \in \{1990Q1,\ldots,2020Q4\}$:

$$\begin{aligned}
\Delta psr_t = {} & a_0 + b_0 psr_{t-1} + b_1 gsr_{t-1} + b_2 cc_gdp_{t-1} + b_3 rir_{t-1} + b_4 gr_{t-1} \\
& + b_5 dds_{t-1} + b_6 pinvr_{t-1} + b_7 cconf_{t-1} + b_8 hc_gdp_{t-1} \\
& + \sum_{j=1}^{q_1-1} c_{1j} \Delta gsr_{t-j} + \sum_{j=1}^{q_2-1} c_{2j} \Delta cc_gdp_{t-j} + \sum_{j=1}^{q_3-1} c_{3j} \Delta rir_{t-j} \\
& + \sum_{j=1}^{q_4-1} c_{4j} \Delta gr_{t-j} + \sum_{j=1}^{q_5-1} c_{5j} dds_{t-j} + \sum_{j=1}^{q_6-1} c_{6j} \Delta pinvr_{t-j} \\
& + \sum_{j=1}^{q_5-1} c_{7j} cconf_{t-j} + \sum_{j=1}^{q_5-1} c_{8j} hc_gdp_{t-j} \\
& + d_1 \Delta gsr_t + d_2 \Delta cc_gdp_t + d_3 \Delta rir_t + d_4 \Delta gr_t + d_5 \Delta dds_t \\
& + d_6 \Delta pinvr_t + d_7 \Delta cconf_t + d_8 \Delta hc_gdp_t \\
& + e_1 Q1_t + e_2 Q2_t + e_3 Q3_t + e_4 DUM2002_t + e_5 DUM2008_t + \varepsilon_t
\end{aligned}$$

where *psr* is private saving to GDP ratio (dependent variable), *gsr* is government saving to GDP ratio, *cc_gdp* is consumer credits to GDP ratio, *rir* is the over-night real interest rate, *gr* is growth of real GDP, *dds* is domestic debt stock to GDP, *pinvr* is private investment to GDP ratio, *cconf* is company confidence for time t, *hc_gdp* is household credits to GDP ratio, *Q1* is seasonal dummy for first quarter, *Q2* is seasonal dummy for second quarter, *Q3* is seasonal dummy for third quarter, and *DUM2002*

[18] In Eviews, this specification is denoted as Case 3 (Unrestricted Constant and No Trend)).

and *DUM2008* are dummy variables for 2002 and 2008. Note that instead of de-seasonalized series we added the seasonal dummies into the equation. This is theoretically equivalent to de-seasonalize the dependent variable by Frisch-Waugh theorem.

The corresponding error correction specification can be written as:

$$EC_t = psr_t - \frac{b_1}{b_0} gsr_t - \frac{b_2}{b_0} cc\_gdp_t - \frac{b_3}{b_0} rir_t - \frac{b_4}{b_0} gr_t - \frac{b_5}{b_0} dds_t - \frac{b_6}{b_0} pinvr_t - \frac{b_7}{b_0} cconf_t - \frac{b_8}{b_0} hc\_gdp_t$$

The bounds test null hypothesis is as follows:

$$H_0 : b_0 = b_1 = b_2 = b_3 = b_4 = b_5 = b_6 = b_7 = b_8 = 0$$

For the best ARDL specification, the automatic selection of Eviews based on the Schwarz (BIC) criterion is used. For this top-down automatic lag selection process, the maximum lags for dependent variables and regressors are chosen as 4. The model selection table can be found below.

Table 15 Model Selection Criteria Table: Alternative ARDL Specifications

LogL	AIC	BIC	HQ	Adj. R-sq	Specification
346.387	*-5.775*	*-5.217*	*-5.548*	*0.987*	*ARDL(1, 1, 4, 1, 0, 2, 0, 0, 0)*
343.841	-5.747	-5.213	-5.531	0.987	ARDL(1, 1, 4, 1, 0, 1, 0, 0, 0)
334.040	-5.644	-5.207	-5.466	0.985	ARDL(1, 1, 0, 1, 0, 1, 0, 0, 0)
343.108	-5.734	-5.200	-5.517	0.986	ARDL(1, 1, 4, 0, 0, 2, 0, 0, 0)
340.682	-5.709	-5.199	-5.502	0.986	ARDL(1, 1, 4, 0, 0, 1, 0, 0, 0)
340.506	-5.705	-5.196	-5.499	0.986	ARDL(1, 1, 2, 1, 0, 2, 0, 0, 0)
342.855	-5.730	-5.196	-5.513	0.986	ARDL(1, 1, 3, 1, 0, 2, 0, 0, 0)
338.129	-5.681	-5.195	-5.484	0.985	ARDL(1, 1, 2, 0, 0, 2, 0, 0, 0)
338.042	-5.679	-5.194	-5.482	0.985	ARDL(1, 1, 1, 1, 0, 2, 0, 0, 0)
340.385	-5.703	-5.194	-5.497	0.986	ARDL(1, 1, 2, 0, 0, 2, 0, 1, 0)

Source: Author's own calculations.

According to the estimation results, the following $ARDL(1,1,4,1,0,2,0,0,0)$ specification is selected by the algorithm. To cure any remaining heteroscedasticity and autocorrelation problem, the HAC standard error and covariances (Barlett Kernel, Newey-West fixed bandwidth=5) are preferred.

$$\begin{aligned} psr_t = {} & e_0 + e_1 psr_{t-1} + e_2 gsr_t + e_3 gsr_{t-1} + e_4 cc\_gdp_t + e_5 cc\_gdp_{t-1} \\ & + e_6 cc\_gdp_{t-2} + e_7 cc\_gdp_{t-3} + e_8 cc\_gdp_{t-4} + e_9 rir_t + e_{10} rir_{t-1} \\ & + e_{11} gr_t + e_{12} dds_t + e_{13} dds_{t-1} + e_{14} dds_{t-2} + e_{15} pinvr_t + e_{16} cconf_t + e_{17} hc\_gdp_t \\ & + e_{18} Q1_t + e_{19} Q2_t + e_{20} Q3_t + e_{21} DUM2004_t + e_{21} DUM2008_t + \varepsilon_t \end{aligned}$$

The estimated coefficients are reported in the table below.

Table 16 Estimation of ARDL(1,1,4,1,0,2,0,0,0) Specification

Dependent variable: psr_t				
Explanatory Variables	Coefficient	Std. Error	t-Statistic	Prob.
psr_{t-1}	0.467	0.081	5.752	0.000
gsr_t	-0.999	0.012	-82.990	0.000
gsr_{t-1}	0.449	0.081	5.519	0.000
cc_gdp_t	0.082	0.021	3.913	0.000
cc_gdp_{t-1}	-0.057	0.019	-3.097	0.003
cc_gdp_{t-2}	0.043	0.018	2.356	0.021
cc_gdp_{t-3}	0.008	0.026	0.320	0.750
cc_gdp_{t-4}	-0.060	0.024	-2.545	0.013
rir_t	0.008	0.006	1.285	0.202
rir_{t-1}	0.018	0.008	2.286	0.025
gr_t	0.120	0.026	4.625	0.000
dds_t	-0.072	0.018	-4.055	0.000
dds_{t-1}	0.091	0.025	3.625	0.001
dds_{t-2}	-0.035	0.019	-1.877	0.064
$pinvr_t$	0.206	0.070	2.925	0.004
$cconf_t$	0.000	0.000	2.850	0.005
hc_gdp_t	-0.053	0.022	-2.469	0.015
Q1	0.004	0.007	0.552	0.583
Q2	0.008	0.010	0.818	0.416
Q3	0.021	0.010	2.153	0.034
DUM02	-0.014	0.009	-1.627	0.107

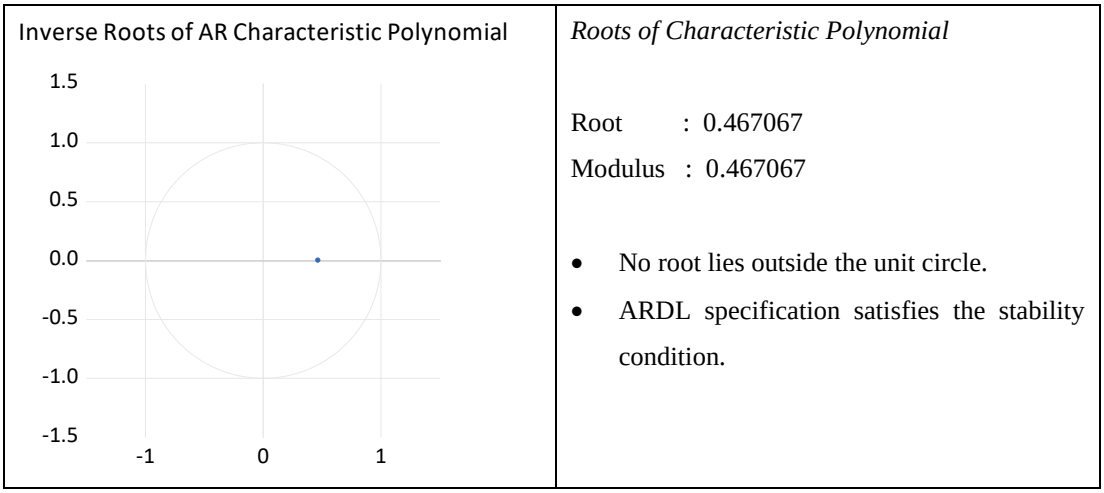
Table 16 (continued)

Dependent variable: psr_t				
Explanatory Variables	Coefficient	Std. Error	t-Statistic	Prob.
DUM08	-0.002	0.007	-0.335	0.738
C	0.038	0.037	1.022	0.309
R-squared	0.989	Akaike info criterion	-5.767	
Adjusted R-squared	0.986	Schwarz criterion	-5.221	
F-statistic	381.918	Hannan-Quinn criteria.	-5.546	
Prob(F-statistic)	0.000	Durbin-Watson stat	1.899	

Notes: psr is private saving to GDP ratio (dependent variable), gsr is government saving to GDP ratio, cc_gdp is consumer credits to GDP ratio, rir is over-night real interest rate, gr is growth of real GDP, dds is domestic debt stock to GDP, pinvr is private investment to GDP ratio, cconf is company confidence for time t, hc_gdp is household credits to GDP ratio, Q1 is seasonal dummy for first quarter, Q2 is seasonal dummy for second quarter, Q3 is seasonal dummy for third quarter, and DUM2002 and DUM2008 are dummy variables for 2002 and 2008.

Source: Author's own calculations.

The selected ARDL model must be dynamically stable. For this purpose, we need to check if all the inverse roots of the characteristic equation associated with our model lie strictly inside the unit circle. Since the selected ARDL model has 1 lagged dependent variable, there is only one root to check. The table below shows that our ARDL specification of $ARDL(1,1,4,1,0,2,0,0,0)$ is dynamically stable.



Source: Author's own calculations.

Figure 16 Stability of ARDL(1,1,4,1,0,2,0,0,0) Specification

A key assumption in the ARDL Bounds Test procedure of Pesaran et al. (2001) is that the errors must be non-autocorrelated. Once a suitable ARDL specification has been estimated, the researcher should use the LM autocorrelation test to check if the errors are non-autocorrelated. The table below shows that there is no autocorrelation problem at 5 percent significance level up to 8 lags.

While the ARDL relies solely on the assumption of serially uncorrelated residuals, this study examines additional assumptions. These include the absence of heteroscedasticity, no Autoregressive Conditional Heteroscedasticity (ARCH) effect, no errors in regression specification, adherence to a normal distribution, and no parameter instability in the model. This verification aims to assess the proximity of our model to the true model for dependable and valid inferences. The table below shows that there is no heteroscedasticity in the model using four different tests and their three different variations at a 5 percent level of significance. The white test passes homoscedasticity at 1 percent level of significance. On the other hand as stated below the table, white test suffers from low degrees of freedom and therefore is not carried out with white cross terms. However, the power of test is still low even in this form without cross terms.

Table 17 Autocorrelation Diagnostics up to 8th Order

	Breusch-Godfrey Serial Correlation LM Test			
Null hypothesis	F-statistic	Prob [F]	χ^2	Prob [χ^2]
No AR(1) type serial correlation	0.242	0.624	0.304	0.582
No AR(2) type serial correlation	0.787	0.458	1.973	0.373
No AR(3) type serial correlation	0.521	0.669	1.980	0.577
No AR(4) type serial correlation	1.310	0.272	6.452	0.168
No AR(5) type serial correlation	1.628	0.161	9.822	0.080
No AR(6) type serial correlation	1.596	0.158	11.501	0.074
No AR(7) type serial correlation	1.485	0.183	12.511	0.085
No AR(8) type serial correlation	1.340	0.235	12.992	0.112

Source: Author's own calculations.

Table 18 Heteroscedasticity Diagnostics (Four Different Tests)

	Homoscedasticity Test Results					
Tests [H_0: Homoscedasticity]	F-statistic	Prob [F]	T.R^2	Prob [χ^2]	Scaled ESS	Prob [χ^2]
Breusch-Pagan-Godfrey	1.643	0.053	32.460	0.070	24.856	0.304
Harvey	0.892	0.605	20.206	0.570	28.843	0.149
Glejser	1.448	0.114	29.589	0.129	25.800	0.260
Tests [H_0: Homoscedasticity]	F-statistic	Prob [F]	T.R^2	Prob [χ^2]	Scaled ESS	Prob [χ^2]
White	1.696	0.043	33.221	0.059	25.439	0.277

Note: In the White test, due to degrees of freedom, the white cross terms are not included. Even with this form the test is expected to suffer from low degrees of freedom and the power of the test is low.

Source: Author's own calculations.

The table below shows that there is no ARCH effect problem at a 5 percent significance level up to 8 lags.

Table 19 ARCH Diagnostics up to 8 lags

	ARCH LM Test			
Null hypothesis	F-statistic	Prob [F]	χ^2	Prob [χ^2]
No ARCH(1) type ARCH effect	0.015	0.901	0.016	0.900
No ARCH(2) type ARCH effect	0.432	0.651	0.880	0.644
No ARCH(3) type ARCH effect	0.702	0.553	2.142	0.543
No ARCH(4) type ARCH effect	1.371	0.249	5.459	0.243
No ARCH(5) type ARCH effect	1.082	0.375	5.438	0.365
No ARCH(6) type ARCH effect	0.854	0.532	5.211	0.517
No ARCH(7) type ARCH effect	1.407	0.211	9.682	0.207
No ARCH(8) type ARCH effect	1.254	0.276	9.937	0.270

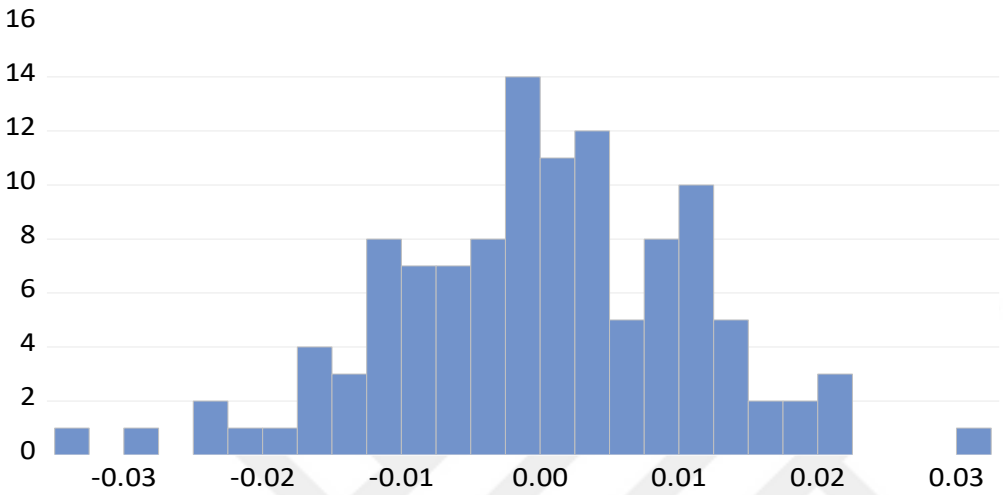
Source: Author's own calculations.

The null hypothesis of the Jarque-Bera test is a joint hypothesis of the skewness and the excess kurtosis being zero. A probability value higher than 0.05, such as the one given in the table below, implies that the residuals are consistent with having skewness and excess kurtosis zero (samples from a normal distribution have an expected skewness of 0 and an expected excess kurtosis of zero), and hence normally distributed. The plot of model residuals shows a good distribution as shown in the figure below.

Table 20 Normality Diagnostic [Jarque-Bera Test]

Normality Test [H_0: disturbance term has normal distribution]	
Jarque-Bera Statistic	1.658
Prob [Jarque-Bera]	0.437

Source: Author's own calculations.



Source: Author's own calculations.

Figure 17 Histogram of the Residuals of the ARDL(1,1,4,1,0,2,0,0,0) Model

The Regression Equation Specification Error Test (RESET) was introduced by Ramsey (1969) as a means to identify general functional form misspecification in regression models. The underlying concept is straightforward: in a properly specified model, nonlinear functions of independent variables should not be statistically significant when incorporated into the estimated equation. The test is structured to detect errors related to (1) omitted variables and (2) the inappropriate use of lagged dependent variables, (3) simultaneous-equation bias, (4) nonlinear functional forms. The table below shows that there is no functional form misspecification problem in the regression equation at a 5 percent significance level (RESET).

Table 21 RESET Test [Regression Equation Specification Error Test]

Omitted Variable Test [H_0: There is no specification error]	
RESET Statistic (Likelihood Ratio)	2.435
Prob [RESET]	0.119

Source: Author's own calculations.

Brown et al. (1975) suggested two tests (Cumulative Sum-CUSUM and Cumulative Sum of Squares CUSUMQ) by using the recursive residuals to check for the parameter stability of the models. The use of CUSUM and CUSUMQ tests to check for parameter stability of selected ARDL specification within the Bounds test procedure is also advised by Pesaran and Pesaran (1997). If the CUSUM and CUSUMQ graphs lie within the critical upper and lower bounds drawn at the 5% significance level, the null hypothesis that the model is stable is not rejected.

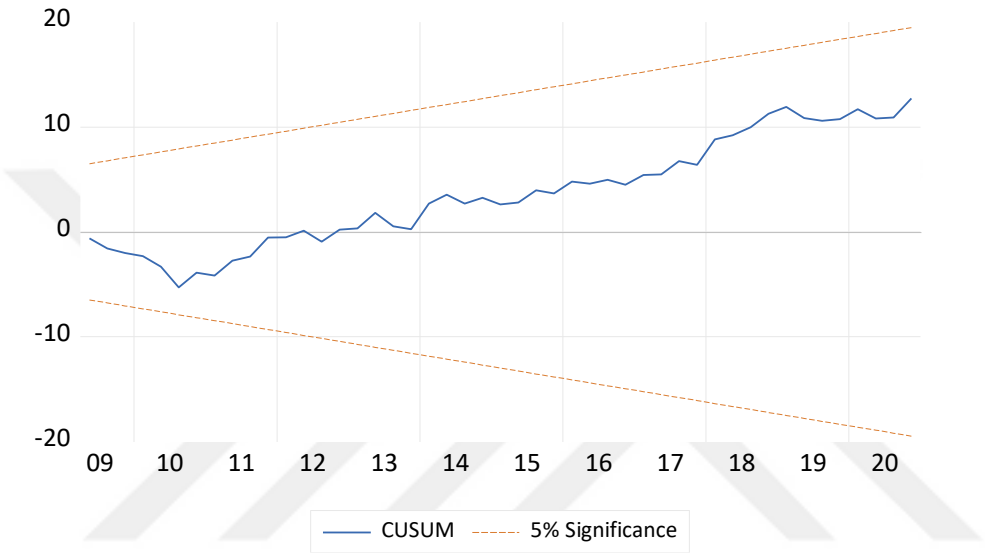


Figure 18 CUSUM Bounds for Coefficient Stability

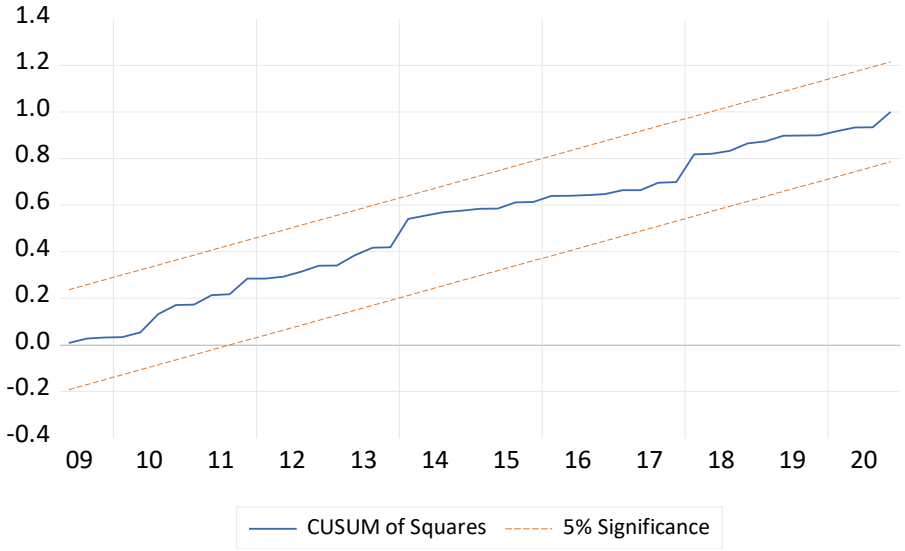


Figure 19 CUSUMQ Bounds for Coefficient Stability

As can be seen from the figure above, both CUSUM and CUSUMQ plots remain within the 5% level of significance upper and lower bounds, implying that the estimated coefficients are stable in our model.

Recursive residual analysis calculates standardized one-step-ahead prediction errors. The estimated coefficients and corresponding variances are updated as additional observations are added into the model. The residuals from one-step-ahead prediction may provide an indication of deviations from the residual mean of zero, outliers, or changing residual variance as observations are added. Hence, recursive residuals are useful not only to control parameter stability but also to control the indication of outliers, heteroscedasticity, serial correlation, and functional misspecification. As can be seen from the figure below, based on the recursive residual analysis, the model is stable.

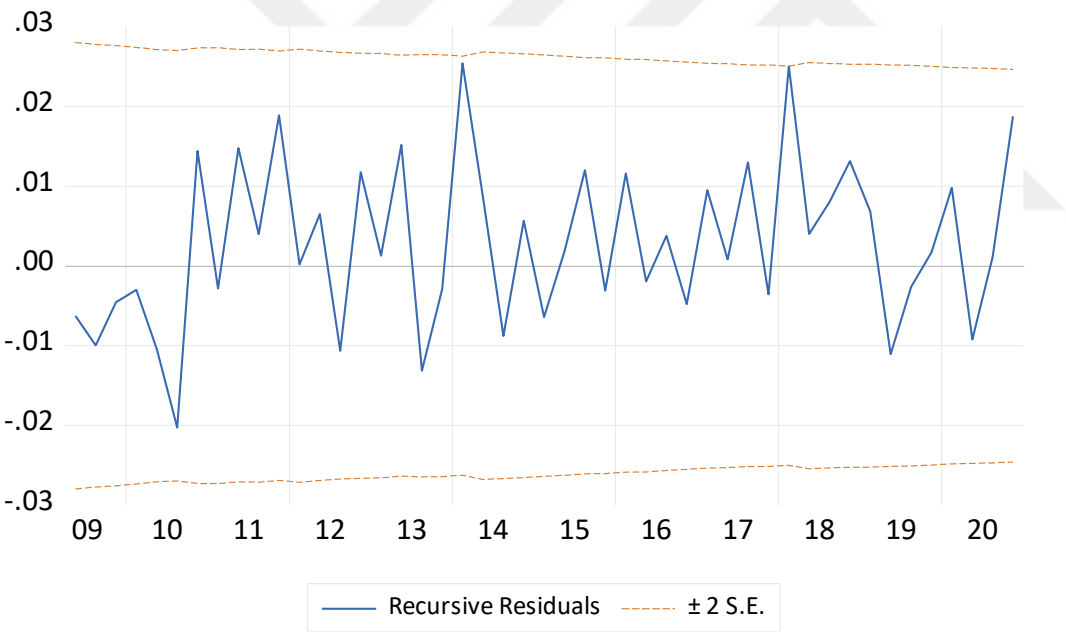


Figure 20 Recursive Residuals Analysis for Coefficient Stability

The recursive coefficient check is carried out by a graph that consists of all of the coefficients. These plots give information on the stability of coefficients as the sample size increases from its minimum to the last observation. We do not observe any parameter stability problem for none of the coefficients.

Figure 21 Recursive Coefficients Test for Coefficient Stability

The ARDL long run form and bounds test is estimated and the results are shown in the tables below.

Table 22 Long-Run Equation for Private Saving to GDP Ratio (psr)

Dependent variable: psr_t		
Explanatory Variables		
gsr_t	*Coefficient*	-1.032***
	Std. Error	*0.037*
	Prob.	*0.000*
cc_gdp_t	*Coefficient*	0.030***
	Std. Error	0.010
	Prob.	0.003
rir_t	*Coefficient*	0.049***
	Std. Error	0.016
	Prob.	0.004
gr_t	*Coefficient*	0.225***
	Std. Error	0.046
	Prob.	0.000

Table 22 (continued)

Dependent variable: psr_t		
Explanatory Variables		
dds_t	*Coefficient*	-0.030**
	Std. Error	0.015
	Prob.	0.039
$pinvr_t$	*Coefficient*	0.387***
	Std. Error	0.112
	Prob.	0.001
$cconf_t$	*Coefficient*	0.001*
	Std. Error	0.001
	Prob.	0.085
hc_dgp_t	*Coefficient*	-0.100***
	Std. Error	0.031
	Prob.	0.002

*Notes: (1) Asterisks *, **, and *** represent significance levels at 10, 5, and 1% respectively.*

(2) psr is private saving to GDP ratio (dependent variable), gsr is government saving to GDP ratio, cc_gdp is consumer credits to GDP ratio, rir is over-night real interest rate, gr is growth of real GDP, dds is domestic debt stock to GDP, pinvr is private investment to GDP ratio, cconf is company confidence for time t, hc_gdp is household credits to GDP ratio.

Source: Author's own calculations.

In the estimated long-run equation, the reported standard errors are HAC Newey-West standard errors. As can be seen, all the coefficients are significant at a 1% level of significance except for the *cconf* variable whose estimated coefficient is statistically significant at 10 percent.

The signs of the coefficients are as theoretically expected: government saving to GDP ratio (*gsr*), domestic debt stock to GDP (*dds*), and household credits to GDP ratio (*hc_gdp*) have negative impacts on private saving to GDP ratio (*psr*) in the long-run.

On the other hand, company credits to GDP ratio (*cc_gdp*), over-night real interest rate (*rir*), growth of real GDP (*gr*), private investment to GDP ratio (*pinvr*), and company confidence for time t (*cconf*) have positive effects on private saving to GDP ratio (*psr*) in cointegration equation (i.e. in the long run).

As can be seen from the table below the F-Bounds test statistic is 9.88 which is higher than the 5% level of significance upper bound value of 3.39. This implies that the error correction terms in the ARDL model are jointly significant as required for the existence of a cointegration relationship. Moreover, the t-Bounds test statistic is -6.563063. The lower bound for this test is given as -4.72 and hence we reject the null hypothesis that the error correction coefficient is equal to zero. As known t-Bounds test makes sure that the cointegration is not nonsensical as this test checks whether the speed-of-adjustment coefficient (error correction coefficient) equals zero (null hypothesis) or less than zero (alternative hypothesis).

Table 23 F-Bounds and t-Bounds Test Results

F-Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.881073	5%	2.22	3.39
t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-6.563063	5%	-2.86	-4.72

According to the ECM results shown in the table below, it is seen that the coefficient of $\hat{u}_{t-1}$ (ecm term) is negative and statistically significant as expected. Statistically significant $\hat{u}_{t-1}$ coefficient (*speed of adjustment* term) suggesting that psr adjusts to changing factors (explanatory variables) with a lag; about 53 percent of the discrepancy between long-term and short-term psr is corrected within a quarter.

Table 24 Error Correction Model Estimates

ECM Regression: Dependent Variable: Δpsr_t		Sample: 1990Q1 2020Q4		
Case 3: Unrestricted Constant and No Trend		Included observations: 116		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0383	0.0095	4.0483	0.0001
Δgsr_t	-0.9991	0.0074	-135.38	0.0000
Δcc_gdp_t	0.0823	0.0172	4.7969	0.0000
Δcc_gdp_{t-1}	0.0092	0.0151	0.6108	0.5428
Δcc_gdp_{t-2}	0.0518	0.0171	3.0240	0.0032

Table 24 (continued)

ECM Regression: Dependent Variable: Δpsr_t		Sample: 1990Q1 2020Q4		
Case 3: Unrestricted Constant and No Trend		Included observations: 116		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δcc_gdpt-3	0.0601	0.0187	3.2104	0.0018
Δrirt	0.0083	0.0052	1.5883	0.1156
Δddst	-0.0720	0.0151	-4.7843	0.0000
Δddst-1	0.0352	0.0145	2.4263	0.0172
Q1	0.0038	0.0063	0.6049	0.5467
Q2	0.0078	0.0089	0.8751	0.3838
Q3	0.0207	0.0076	2.7272	0.0076
DUM02	-0.0145	0.0036	-4.0664	0.0001
DUM08	-0.0024	0.0030	-0.8186	0.4151
$\hat{u}_{t-1}$ **(ecm term)**	-0.5329	0.0542	-9.8275	0.0000 ++
R^2	0.9950	Akaike criterion		-5.9054
Log likelihood	357.5	Schwarz criterion		-5.5493
F-statistic	1446.2	HQ criterion		-5.7608
Prob (F-statistic)	0.0000	DW statistic		1.8991

Notes: ++ The reported p-value in this row is incompatible with the t-Bounds distribution. The correct table values are given by the t-Bound test critical values. The upper t-bound value [I(0) case] is -2.86, lower t-bound value is -4.72 [I(1) case].

Source: Author's own calculations.

III.F. ROBUSTNESS CHECK (FMOLS, DOLS, CCR)

FMOLS, DOLS, and CCR consider the autocorrelation and endogeneity problems that could appear in the presence of cointegration. The FMOLS method was introduced by Phillips and Hansen (1990), the DOLS method was proposed by Stock and Watson (1993), and the CCR by Park (1992). In our equation of private savings to GDP ratio, there can be some endogeneity problems particularly due to the government saving to GDP ratio (gsr) variable. These three estimators allow us to check the consistency of Bounds test results since they are robust to this type of endogeneity problems. However, to apply FMOLS, DOLS, and CCR, the order of integration of all the variables should be I(1). Recall that some of the variables included in the Bounds Test model were I(0). Hence, these I(0) variables cannot be included into the equation which would be estimated by FMOLS, DOLS, and CCR.

In this study we have four I(1) explanatory variables therefore we include these regressors into the models that FMOLS, DOLS, and CCR estimators are used since to apply FMOLS, DOLS, and CCR, the order of integration of all the variables should be I(1). In addition, the Gregory Hansen cointegration test routine of Stata allows four explanatory variables only.

Table 25 Long-Run Coefficients with FMOLS, DOLS, CCR and EG Estimators

Dependent Variable: psr_t						
Explanatory Variables		FMOLS	DOLS	CCR	EG	ARDL
gsr_t	*Coefficient*	*-0.958*	*-1.024*	*-0.976*	*-0.972*	*-1.032*
	Std. Error	0.033	0.089	0.053	*0.029*	*0.037*
	Prob-score	0.000	0.000	0.000	*0.000*	*0.000*
	t statistic for H_0: coef=-1	1.291	-0.274	0.454	0.966	-0.887
	Prob-score for H_0: coef=-1	0.197	0.784	0.651	0.336	0.377
	Full-crowding out [i.e. H_0: coef=-1]	not rej.	not rej.	not rej.	not rej.	not rej.
rir_t	*Coefficient*	0.043	0.074	0.050	0.029	0.049
	Std. Error	0.012	0.017	0.015	0.011	0.016
	Prob-score	0.001	0.000	0.001	0.010	0.004
$pinvr_t$	*Coefficient*	0.450	0.619	0.496	0.391	0.387
	Std. Error	0.115	0.133	0.117	0.101	0.112
	Prob-score	0.000	0.000	0.000	0.000	0.001
$cconf_t$	*Coefficient*	0.001	0.002	0.001	0.001	0.001
	Std. Error	0.000	0.000	0.000	0.000	0.001
	Prob-score	0.000	0.000	0.001	0.001	0.085
C	*Coefficient*	-0.025	-0.110	-0.018	0.043	na
	Std. Error	0.045	0.063	0.053	0.039	na
	Prob-score	0.581	0.082	0.737	0.271	na
Obs.		115	113	115	116	116
R-squared		0.913	0.937	0.911	na	na

Notes: (1) psr: private savings to GDP ratio, gsr: government saving to GDP ratio, rir: overnight real interest rate, pinvr: private investment to GDP ratio, and cconf: company confidence for time t.
(2) Deterministic variables included in regression are DUM02, DUM08, Q1, Q2, Q3.
(3) The ARDL column reports the Bounds test procedure estimated long-run coefficients in the previous section for the included variables here. Since the variables are not the same in the Bounds test equation in the previous section, their estimated coefficients cannot be directly compared. However; to report the robustness of the estimated coefficients, these values are provided here.

Source: Author's own calculations.

The following variables are employed to explain private savings to GDP ratio (*psr*):

$$psr_t = f\left(gsr_t, rir_t, pinvr_t, cconf_t, dummies\right)$$

where *gsr* is government saving to GDP ratio, *rir* is overnight real interest rate, *pinvr* is private investment to GDP ratio and *cconf* is company confidence for time t. The included dummy variables are Q1, Q2, and Q3 seasonal dummies and DUM02 and DUM08 for 2002 and 2008.

In the table above, the FMOLS, DOLS, CCR, and Engle Granger (EG) estimates are reported. We see that the estimation results confirm the robustness of the estimated long-run coefficients of the Bounds test since the estimated coefficients are very close to each other. Particularly, the coefficient of *gsr* (government saving to GDP ratio) is quite important since if it is equal to -1 this illustrates the existence of full crowding out hypothesis. Above, the necessary t-statistic to test this hypothesis is also provided (t statistic for H_0: coef=-1). The full crowding out hypothesis (i.e. H_0: coef=-1) is not rejected in any of the cases (FMOLS, DOLS, CCR, and EG) which shows the robustness of the "full crowding out" finding for Türkiye between 1990-2020.

Table 26 Cointegration Tests without Structural Break (FMOLS, DOLS and CCR)

Hansen Instability Test	H_0: There is cointegration		
	FMOLS	DOLS	CCR
prob-score	0.085	> 0.2	0.080
Decision	cointegration	cointegration	cointegration
Phillips-Ouliaris Test	H_0: There is no cointegration		
	FMOLS	DOLS	CCR
prob-score (tau)	0.000	0.000	0.000
prob-score (z)	0.000	0.000	0.000
Decision	cointegration	cointegration	cointegration
Engle-Granger Procedure	H_0: There is no cointegration		
Zt Statistic	-8.121		
5% critical value	-4.538		
Decision	cointegration		

Source: Author's own calculations.

To check for cointegration (long-run equilibrium relationship) between the variables, the Hansen Parameter Instability test, Phillips-Ouliaris Test, Engle Granger Cointegration test, and Gregory Hansen Cointegration Test under Structural Break are employed.

The following table reports the cointegration test results without regime shift for each estimation method. It is seen that for each of them, the cointegration is supported (Hansen Parameter Instability test and Phillips-Ouliaris Test).

The existence of structural breaks leads to inefficient estimation, thereby reducing the power of cointegration tests (Gregory and Hansen, 1996). To address the potential presence of a structural break or regime shift, this study employs the Gregory–Hansen tests for cointegration. The Gregory-Hansen test for cointegration with regime shift was introduced by Gregory and Hansen (1996). The table below presents the results of the Gregory Hansen cointegration test. The null hypothesis of the test posits "no cointegration," while the alternative suggests cointegration with a single shift at an unknown point in time. Gregory and Hansen (1996) report three cointegration statistics: ADF, Zt, and Za. They conduct Monte Carlo studies to evaluate the size and power of these statistics and conclude that the results with Zt appear to be the best in terms of size and power (Gregory and Hansen, 1996, p.114). Therefore, for the Gregory and Hansen test, we mainly focus on Zt statistic results. Test values show that Zt and Za statistics support the cointegration hypothesis at a 5% level of significance and ADF statistic supports at 10% level of significance.

Table 27 Cointegration Test with Structural Break

Gregory-Hansen Test	H0: There is no cointegration
ADF statistic	-6.79
5% critical value	-6.84
10% critical	-6.58
Decision	cointegration (10% level of sig.)
Zt statistic	-10.23
5% critical value	-6.84
10% critical	-6.58
Decision	cointegration (5% level of sig.)
Za statistic	-111.29
5% critical value	-88.47
10% critical	-82.3
Decision	cointegration (5% level of sig.)

Source: Author's own calculations.

III.G. DISCUSSION

The model estimated on newly and firstly constructed quarterly macro data for Türkiye over the period 1990-2020 specifies a long-run relationship between the private saving rate and its determinants, allowing for a rather fast speed of convergence and some short-run dynamics. The choice of regressors is guided by theory, prior empirical work, and data limitations.

The cointegration equation (long-run equilibrium relationship) estimated by the ARDL Bounds test procedure for private savings to GDP ratio (psr) is as follows:

$$psr_t = \underset{\substack{(0.036511)\\[0.0000]}}{-1.032372}\, gsr_t + \underset{\substack{(0.009736)\\[0.0031]}}{0.029552}\, cc\_gdp_t + \underset{\substack{(0.016323)\\[0.0036]}}{0.048725}\, rir_t + \underset{\substack{(0.046394)\\[0.0000]}}{0.224882}\, gr_t - \underset{\substack{(0.014501)\\[0.0392]}}{0.030335}\, dds_t + \underset{\substack{(0.112005)\\[0.0008]}}{0.386872}\, pinvr_t + \underset{\substack{(0.000501)\\[0.0854]}}{0.000871}\, cconf_t - \underset{\substack{(0.031371)\\[0.0020]}}{0.099871}\, hc\_gdp_t$$

where *psr* is private saving to GDP ratio (dependent variable), *gsr* is government saving to GDP ratio, *cc_gdp* is company credits to GDP ratio, *rir* is the over-night real interest rate, *gr* is growth of real GDP, *dds* is domestic debt stock to GDP, *pinvr* is private investment to GDP ratio, *cconf* is company confidence for time t, *hc_gdp* is household credits to GDP ratio, *Q1* is seasonal dummy for first quarter, *Q2* is seasonal dummy for second quarter, *Q3* is seasonal dummy for third quarter, and *DUM2002* and *DUM2008* are dummy variables for 2002 and 2008.

The coefficient of government saving to GDP ratio (*gsr*) is estimated as -1.0323 which reveals a full *crowding-out* of private saving by public saving since the null hypothesis that this coefficient is -1 is not rejected as its t-statistic[19] is -0.887 and the

[19] $t_{coef_{gsr}=-1} = \dfrac{-1.032372-(-1)}{0.036511} = -0.887$

corresponding probability score is 0.377[20]. *Consequently, the results show that for Türkiye within the period of 1990-2020, a full crowding-out of private saving by public saving is estimated in the long run.*

Another important finding is that the estimated coefficient of company credits to GDP ratio (*cc_gdp*) is positive. This implies that an increase in company credits (ratio to GDP ratio) leads to an increase in private savings (ratio to GDP) in the long run. The reason for the positive effect of company credits on private savings may be that companies use some of their credits to maintain their investments and to avoid paying the recurring cost of external funds (Eisfeldt and Muir, 2014). One can explain the mechanism as follows: the rise in company credits boosts the total output (GDP), and then with the increase in GDP the private saving rate goes up. This implies that a rise in the credit use of companies have a positive effect on private savings in the long run. On the other hand, the expansion in household credit use shows an opposite effect in the long run since the estimated coefficient of household credits to GDP ratio (*hc_gdp*) is -0.099871 and hence negative. Below the estimated ECM equation is reported. It is seen that the coefficient of $\hat{u}_{t-1}$ (ecm term) is negative and statistically significant as expected. Statistically significant $\hat{u}_{t-1}$ coefficient (*speed of adjustment* term) suggesting that psr adjusts to changing factors (explanatory variables) with a lag; about 53 percent of the discrepancy between long-term and short-term psr is corrected within a quarter. This speed adjustment is rather *quick* and implies that:

- *99% percent of the discrepancy (can be thought of as almost full correction) between long-run and short-run psr would be restored within around 8.6 quarters[21] or around 26 months*[22].

---

[20] The 5% level of significance t-table value is $t_{108}^{0.025} = 1.98217$. The corresponding prob value is obtained from Gretl.

[21] $1 - 0.99 = e^{-0.5329t} \Rightarrow \ln(0.01) = -0.5329t \Rightarrow t = 8.641715$

[22] 8.641715x3=25.9 months.

- *75% percent of the discrepancy between long-run and short-run psr would be restored within only around 2.6 quarters[23] or around 8 months[24].*

- *50% percent of the discrepancy (half of the correction) between long-run and short-run psr would be restored within only around 1.3 quarters[25] or around 4 months[26].*

- *25% percent of the discrepancy between long-run and short-run psr would be restored within only around 0.54 quarters[27] or around 1.5 months[28].*

The coefficient of the change in government saving to GDP ratio[29] (Δgsr) is estimated as -0.9991 which reveals a full *crowding-out* of private saving by public saving since the null hypothesis that this coefficient is -1 is not rejected as its t-statistic[30] is 0.1216 and the corresponding probability score is 0.9035[31]. *Consequently, the results show that for Türkiye within the period of 1990-2020, a full crowding-out of private saving by public saving is estimated in the short run.*

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[23] $1-0.75=e^{-0.5329t} \Rightarrow \ln(0.25)=-0.5329t \Rightarrow t=2.601416$

[24] 2.601416x3 =7.8 months.

[25] $1-0.50=e^{-0.5329t} \Rightarrow \ln(0.50)=-0.5329t \Rightarrow t=1.300708$

[26] 1.300708x3=3.9 months.

[27] $1-0.25=e^{-0.5329t} \Rightarrow \ln(0.75)=-0.5329t \Rightarrow t=0.539843$

[28] 0.539843x3=1.6 months.

[29] The impact multiplier (short-run multiplier) of gsr.

[30] $t_{coef_{\Delta gsr=-1}}=\dfrac{-0.9999-(-1)}{0.0074}=0.1216$

[31] The 5% level of significance t-table value is $t_{101}^{0.025}=1.98373$. The corresponding prob value is obtained from Gretl.

The impact multiplier (short-run multiplier) of company credits to GDP ratio (*cc_gdp*) is statistically significantly estimated as a positive value (about 0.082). On the other hand, the short-run effect of domestic debt stock to GDP (*dds*) on private savings to GDP ratio (*psr*) is about -0.072 and hence pointing out a statistically significant negative relationship.

$$\Delta psr_t = \underset{\substack{(0.009458)\\[0.0001]}}{0.038288} \underset{\substack{(0.007380)\\[0.0000]}}{-0.999110}\,\Delta gsr_t + \underset{\substack{(0.017156)\\[0.0000]}}{0.082294}\,\Delta cc\_gdp_t + \underset{\substack{(0.015127)\\[0.5428]}}{0.009239}\,\Delta cc\_gdp_{t-1}$$
$$+ \underset{\substack{(0.017131)\\[0.0032]}}{0.051804}\,\Delta cc\_gdp_{t-2} + \underset{\substack{(0.018720)\\[0.0018]}}{0.060099}\,\Delta cc\_gdp_{t-3}$$
$$+ \underset{\substack{(0.005245)\\[0.1156]}}{0.008331}\,\Delta rir_t - \underset{\substack{(0.015057)\\[0.0000]}}{0.072040}\,\Delta dds_t + \underset{\substack{(0.014522)\\[0.0172]}}{0.035235}\,\Delta dds_{t-1}$$
$$+ \underset{\substack{(0.006267)\\[0.5467]}}{0.003791}\,Q1_t + \underset{\substack{(0.008886)\\[0.3838]}}{0.007776}\,Q2_t + \underset{\substack{(0.007606)\\[0.0076]}}{0.020744}\,Q3_t$$
$$- \underset{\substack{(0.003557)\\[0.0001]}}{0.014463}\,DUM02_t - \underset{\substack{(0.002971)\\[0.4151]}}{0.002432}\,DUM08_t$$
$$- \underset{\substack{(0.054229)\\[0.0000]}}{0.532933}\,\hat{u}_{t-1}$$

According to the Ricardian equivalence hypothesis, public and private savings are complements. Private individuals who anticipate the future and hold altruistic motivations towards their descendants completely internalize the understanding that government borrowing leads to increased future debt servicing and, consequently, postponed taxation. Due to their inclination to maintain a consistent level of consumption over time, these private agents opt to modify their savings behavior to completely counterbalance alterations in government saving, instead of making temporary adjustments to consumption. In this context, private agents do not view their government bond holdings as a form of net wealth (De Serres and Pelgrin, 2003).

Considering the lifetime budget constraints of households, if households decide to maximize their lifetime utilities, assuming that no shocks will affect their preferences, today's consumption decisions will be affected only by factors that change the lifetime budget constraint. Rational households will internalize government actions into their household budget constraints so that changes such as falling tax rates today will result in higher levels of debt in the future and accompanying tax increases to repay the debt.

In this case, the present value of future taxes, when discounted, remains constant and does not influence the overall magnitude of consumer incomes over their lifetime, without distorting current household decisions on consumption. In a situation where alterations in taxes (or government savings) do not impact current consumption, private savings demonstrate an equal but opposite change compared to the change in government savings. This direct and negative correlation between private and public savings is referred to as full Ricardian equivalence. However, the assumptions based on full Ricardian equivalence are extremely restrictive and are rejected by empirical studies because they cannot be fully met in real life (PSB, 2018).

Recall that in the estimated long-run equation of private savings to GDP ratio (**psr**), the coefficient of public saving rate is significantly negative but contrary to previous empirical studies, it is robustly minus one both in the long run and short-run equations, implying not partial but full crowding out. This, however, should not be evaluated as holding of Ricardian equivalence, as the link between the two could have been indirect and episode-specific, rather than reflecting private agents piercing the veil of intertemporal public finances. Besides, stringent theoretical assumptions, especially the absence of liquidity constraints, the absence of uncertainty regarding future government spending increase, and the presence of a non-distortionary tax system are not met in Türkiye.

In Türkiye, there is no empirical support for full Ricardian equivalence. Specifically, Van Rijckeghem (2010) identifies an offset coefficient of -0.63, Özcan et al. (2003) report an offset coefficient ranging from -0.42 to -0.66, IMF (2007) identifies an offset coefficient within the range of -0.72 to -0.77, and Matur et al. (2011) discover an offset coefficient between -0.38 and -0.58. Conversely, Özcan et al. (2003) identify a long-run coefficient on public saving of -1.2 in a particular specification where growth, credit, and current account are excluded, and the government is defined as the non-financial public sector. Also, Özcan and Peker (2018) find -1.2 in their long-run equation for Türkiye over 1985-2014. It should be noted that all these studies used the old saving data before the 2016 GNP revision. Moreover, in international panel studies, the estimated Ricardian offset coefficients encompass a wide range. Among

others; Corbo and Schmidt-Hebbel (1991) find coefficient between -0.16 and -0.50 for 13 developing countries over the period 1980-1987, Edwards (1996) reports range of -0.35 and -0.65 for 36 countries for 1970-1992, Loayza et al. (2000) estimate range of -0.05 and -0.38 for 150 countries between 1966 and 1995, De Serres and Pelgrin (2003)[32] find between -0.52 and -0.91 for 15 countries for 1970-2000 (Apart from panel regressions, individual country results are also presented in this study. In this context, the offset coefficient is found -1.028 for the United Kingdom (UK), -2.044 for Belgium, and -2.017 for the Netherlands), Bebczuk and Cavallo (2014) report a range of -0.15 and -0.28 for 64 countries over 1990-2012 and Grigoli et al. (2014) report a range of -0.01 to -0.39 for 165 countries from 1981 to 2012.

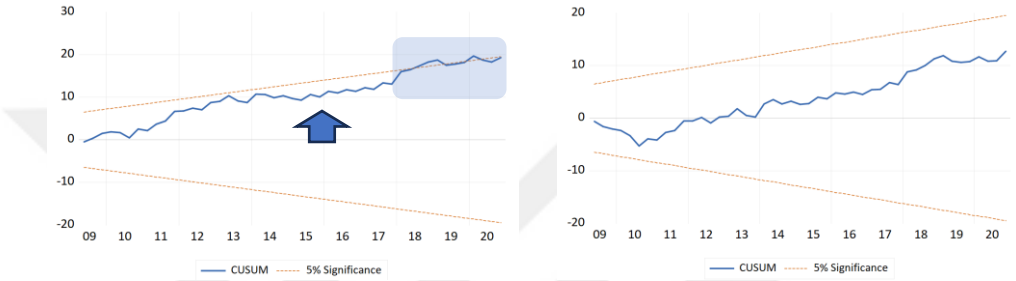
There might be three main reasons for the complete offset in the case of Türkiye. First is the signal effect of public sector saving (generally proxied by the primary balance of budget) to private agents. In particular, with Turkish experience of the high and prolonged budget deficit and debt stock, implementing an expansionary fiscal policy that will lead to a decrease in public savings can create an expectation in private agents such that a stabilization program will be implemented, reduce private consumption, and hence increase private saving by exactly the same rate as the change in public saving. Similarly, keeping the government budget deficit low, and hence public saving high also contributes to economic stability, and declining private saving by boosting household consumption. Second is the economic crisis environment of the Türkiye where households consume less and save more due to crisis while public saving may decrease due to decreased consumption and taxes collected from income and the implementation of social policies by the government. Third is the role and weight of the public sector in Türkiye where considering the size of the public sector expenditure on health and education, the decrease in these public expenditures due to the privatization of public enterprises and the increase in the number of private schools, universities, and hospitals may have been accompanied by a corresponding increase in household consumption expenditure. The work of this chapter was important not only

[32] Apart from panel regressions, individual country results are also presented in this study. In this context, the offset coefficient is found -1.028 for the UK, -2.044 for Belgium, and -2.017 for Netherlands.

for indicating the complete crowding out effects in the Turkish saving data but also for providing evidence for the different effects of private sector credits on saving. In particular, business credits to corporations have a positive while consumption credits to households have a negative impact on private saving rates. Additionally, since the real interest rate has a positive and statistically significant relation with the private saving rate, the substitution effect outweighs the income effect in Türkiye. Taking credit and interest rate effects together, it might be argued that the decline in the real interest rate may be associated with a shift in the supply of savings from households to corporations. Besides, it is found that stability confidence in the real sector makes firms save more. Moreover, it was also found that private sector investment rate and income growth rate had a positive impact while domestic debt stock had a negative impact on private saving rate. It is noteworthy that, signs of coefficients of public saving rate and domestic debt stock; signs of company credit, real sector stability confidence, and private investment rates are consistent. Finally, due to considerable transformations in the Turkish economy following the 2001 crisis, there have been corresponding adjustments in the saving behaviors of households and firms, as reflected by the presence of a significant dummy variable. Considering the short-run dynamics of this long-run relationship, the error term of the estimated model was tested for stationarity and the error term was found stationary at 99 percent confidence level.

Another important finding of the study is determining the importance of private sector confidence for time t. We assumed that private sector agents form their perceptions and expectations at the beginning of quarter t (or end of quarter t–1) according to the information set available, and then decide how to allocate their funds for quarter t. Thus; a lagged confidence indicator (lagged real sector confidence index, RSCI, of CBRT) is included with the name *cconf* (company confidence) to proxy for the private sector agents' perceptions and expectations of future economic conditions when they make decisions at the beginning of each quarter for the quarter ahead. As a justification of this assumption, we observed that when we used a contemporaneous confidence indicator instead of a lagged one as the explanatory variable for private savings, both the model diagnostics and the regression estimation results deteriorated substantially (See table and figure below).

Our estimation results show that real sector confidence (company confidence) matters more for private sector saving rates during crisis or bad economic conditions periods. If we do not include this variable in the model, we obtain the following CUSUM graph which illustrates clear instability in the model parameters in the absence of this variable (one-quarter lagged real sector confidence). A general upward shift towards the upper bound in the CUSUM graph is clearly detected if we omit the company confidence (*cconf*) variable. The problem becomes obvious and defective after bad economic conditions in the Turkish economy become particularly apparent (i.e., after 2018).



(a) Without company confidence variable (b) With company confidence variable

Source: Author's own calculations.

Figure 22 CUSUM Graphs with and without Company Confidence

With the omission of the company confidence variable (*cconf*) the model's heteroscedasticity diagnostics deteriorates substantially, as well: the model cannot pass Breusch-Pagan-Godfrey, Gejser, and White tests at a 5% level of significance even almost in all three variants of the tests. This illustrates the importance of this variable within the private savings equation.

Table 28 Deterioration in Heteroscedasticity Diagnostics in the Model without Company Confidence Variable

	Homoscedasticity Test Results					
Tests [H_0: Homoscedasticity]	F-statistic	Prob [F]	$T.R^2$	Prob [χ^2]	Scaled ESS	Prob [χ^2]
Breusch-Pagan-Godfrey	2.039	0.0128	33.356	0.0219	39.334	0.0040
Glejser	1.745	0.0448	29.522	0.0582	29.892	0.0532
White	1.879	0.0245	31.451	0.0360	37.087	0.0077

Table 29 Estimation Results with and without Company Confidence Variable

(a) Estimation results without company confidence (*cconf*) variable

$$psr_t = \underset{(0.035963)\,[0.0000]}{-1.022025}\, gsr_t + \underset{(0.010127)\,[0.0014]}{0.033351}\, cc\_gdp_t + \underset{(0.012230)\,[0.0791]}{0.021705}\, rir_t$$

$$+ \underset{(0.062530)\,[0.0008]}{0.216524}\, gr_t - \underset{(0.013422)\,[0.0167]}{0.032681}\, dds_t + \underset{(0.117788)\,[0.0151]}{0.291472}\, pinvr_t$$

$$- \underset{(0.038506)\,[0.0150]}{0.095420}\, hc\_gdp_t$$

(b) Estimation results with company confidence (*cconf*) variable

$$psr_t = \underset{(0.036511)\,[0.0000]}{-1.032372}\, gsr_t + \underset{(0.009736)\,[0.0031]}{0.029552}\, cc\_gdp_t + \underset{(0.016323)\,[0.0036]}{0.048725}\, rir_t$$

$$+ \underset{(0.046394)\,[0.0000]}{0.224882}\, gr_t - \underset{(0.014501)\,[0.0392]}{0.030335}\, dds_t + \underset{(0.112005)\,[0.0008]}{0.386872}\, pinvr_t$$

$$+ \underset{(0.000501)\,[0.0854]}{0.000871}\, cconf_t - \underset{(0.031371)\,[0.0020]}{0.099871}\, hc\_gdp_t$$

Notes: The values within parenthesis are standard errors and the brackets are the corresponding probability scores.

CHAPTER IV

THE DYNAMICS OF FIRM SAVING IN TÜRKİYE: A FIRM LEVEL PANEL DATA ANALYSIS

IV.A. INTRODUCTION

As noted earlier, it is more effective to analyze the determinants of the individual components of private savings: household and corporate savings. Given that the overwhelming majority of private savings is corporate savings, this is of special importance in Türkiye. This chapter will lay out the profile of corporate savings, while the next chapter will focus on household savings.

Table 30 Shares of Assets in Total for the Listed Companies of Borsa Istanbul

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cash/Cash Equivalents	12,9	9,1	10,6	9,7	10,1	9,2	10,4	11,5	11,4	13,0	12,0
Inventories	5,8	7,3	7,0	6,9	6,4	6,1	6,1	6,6	7,3	7,1	5,7
Financial Investments	17,0	12,4	10,8	9,3	8,7	8,7	7,5	7,7	6,9	8,0	9,7
Trade Receivables	28,4	31,6	29,1	29,2	29,1	28,6	27,7	28,4	24,2	21,6	29,1
Other Receivables	1,4	1,4	2,0	2,1	2,4	2,3	2,0	2,0	2,8	2,9	2,4
Investment Properties	1,4	1,5	1,6	1,8	1,7	1,6	1,9	1,9	1,8	1,8	1,3
Tangible Assets	20,2	20,7	21,6	22,8	23,2	24,2	24,3	23,3	25,1	20,5	16,2
Intangible Assets	3,7	3,5	5,5	6,4	5,8	6,8	7,5	6,8	7,4	7,2	5,6
Other Assets	9,2	12,5	11,6	11,9	12,5	12,4	12,6	11,8	13,1	17,9	18,0
Total Assets	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: Author's own calculations.

From the analysis of the above table, cash and cash equivalents, inventories, and trade receivables are relatively constant, as a share of total assets. On the other hand, the decline in financial investments is striking. Financial investments are important items that companies can sell and create liquidity when they are in a difficult situation. The

decrease in this item is almost 50 percent. In addition, among the other investment items of the companies in the 2010-2020 period, while the share of intangible assets increased, the tangible ones decreased.

From the inspection of table below, there are some significant changes in the composition of liabilities in companies' balance sheets in the 2010-2020 period. The most important point is that the share of borrowings increased by 50 percent. The importance of bank credits in financing companies' assets is increasing. Another important point about this is that while the share of loans in funding assets increases, the share of equity tends to decrease. Also, the share of trade payables, another type of financing indeed, is decreasing throughout the period. While the share of borrowings increasing and the share of trade payables decreasing is an expected result for listed companies, the decline in the share of equity is an unexpected result for these companies. It also should be noted that, as stated in Özlü and Yalçın (2010), the share of trade payables in corporate balance sheets is much larger in Türkiye than in other countries. It is noteworthy that almost 2 percent of firms' total liabilities is made up of other payables (payables to shareholders and other related parties), which is one of the non-financial system financing methods in Türkiye.

Table 31 Shares of Liabilities in Total for the Listed Companies of Borsa Istanbul

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Borrowings	20,1	22,6	21,9	23,9	24,0	25,9	27,9	27,8	30,5	30,9	30,4
Trade Payables	34,0	33,7	31,3	30,9	30,3	30,4	29,2	29,1	24,6	25,2	31,5
Other Payables	2,1	2,1	2,0	1,9	1,7	1,8	1,9	2,2	2,5	2,3	1,9
Debt Instruments	0,0	0,0	0,0	0,0	0,0	0,6	0,0	0,5	1,1	1,2	1,0
Equity	35,4	33,1	37,7	36,0	36,2	34,5	33,3	33,1	33,9	33,4	28,0
Other Liabilities	8,4	8,5	7,1	7,3	7,9	6,8	7,6	7,3	7,4	7,0	7,2
Total Liabilities	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: Author's own calculations.

In this chapter, Section B gives a brief review of related empirical literature for the dynamics of firm savings. The presentation of data and data source is given in Section C. The estimation of different models for the firm saving rate are done in Section D. The Section E is devoted to the three robustness check estimations. Finally, the Section F is reserved for discussion and concluding remarks.

IV.B. LITERATURE REVIEW

Auerbach (1982) focused on the measurement and determinants of corporate savings in the US in his study. The paper discusses the challenges and outcomes of measuring corporate savings in the US context, including the effects of taxation and market imperfections on corporate saving behavior. In order to investigate the relationship between corporate savings and consumption (the dependent variable) in the context of the life cycle hypothesis, regression analysis is employed based on data from 1960 to 1982, including variables such as consumption, lagged consumption, disposable income, household net worth, corporate retentions, and unemployment rate. The first model includes all explanatory variables except for lagged consumption, while the second model includes all explanatory variables except for lagged disposable income. The findings indicate that increases in disposable income (0.61 and 0.25) lead to an increase in consumption, increases in household net worth (0.009 and 0.007) lead to an increase in consumption, while unemployment rates (-0.45 and -2.11) lead to a decrease in consumption.

The corporate retention variable indicates that it decreases consumption in the first model but increases it in the second model (-0.02 and 0.30). Another model in the study focuses on nonfinancial corporate dividend behavior (also presented in two models). The first model has dividends as the dependent variable and includes explanatory variables such as dividends lagged, profits (adjusted, after tax), profits (non-adjusted, after tax), and inflation gain on debt, covering the period from 1953 to 1982. The second model covers the same period but excludes only the profits (non-adjusted after tax) variable. The findings show that increases in profits (adjusted, after tax) (0.80 and 0.80) have a positive effect on dividends, as well as increases in inflation gain on debt (0.04 and 0.03). However, the increase in profits (non-adjusted after tax) in the first model has a negative effect on dividends (-0.02), although this coefficient is not statistically significant. Overall, the paper presents a variety of empirical findings and regression analyses regarding the determinants of corporate saving and dividend behavior, as well as the impact of taxation on business and household behavior.

IMF (2006) aimed to examine the liquidity accumulation of companies in G7 countries, aiming to identify the reasons for this accumulation and its effects. They seek to understand why companies accumulate cash during profitable periods and prefer alternative investment options such as debt repayment and share buybacks. The study attributes the factors influencing alterations in cash and short-term investments to variables including firm size, firm age, sales volatility within the two-digit US Standard Industrial Classification (SIC2) industry, the proportion of intangible assets in long-term assets within SIC2 industry, Tobin's q within SIC2 industry, net assets from acquisitions as a percentage of total cash sources within SIC2 industry, sales volatility by country, the proportion of intangible assets in long-term assets by country, net assets from acquisitions as a percentage of total cash sources by country, yield spread of interest rates (%), and general government balance (% GDP). In the first model, a cross-sectional data model was estimated by taking averages for the period 2001-2004 (6,084 observations). In the second model, a panel regression model was estimated by taking averages for the periods 1996-1998, 1999-2001, and 2002-2004 (12,436 observations). While the findings of the models obtained using the Weighted (OLS) estimator generally overlap, it is noted that there are also differences. The size of the firm (coefficients -1.31 and 2.43) is significant and negative in both models, thus reducing short-term investments. The volatility of sales by the SIC2 industry (coefficients 0.17 and 0.15) is statistically significant in both models and has a positive effect on investments.

Conversely, variables such as firm age, yield spread of interest rates, general government balance, net assets from acquisitions as a percentage of total sources of cash by SIC2 industry, sales volatility by country, intangible asset share of long-term assets by country, and net assets from acquisitions as a percentage of total sources of cash by country do not exhibit statistical significance in either of the models. The variables representing intangible asset share of long-term assets by the SIC2 industry and Tobin's q by the SIC2 industry are statistically significant only in the first model. These two coefficients are estimated as 0.17 and 2.58, respectively. According to these findings, it is emphasized that firm size most significantly reduces short-term investments.

Özmen et al. (2012) analyze the determinants of corporate savings and whether these savings increase investments and ultimately growth using non-financial firms. The study employs panel data analysis techniques and utilizes FE and GMM estimators. Variables such as profit, tangibility rate, leverage ratio, GDP, real effective exchange rate, public debt as a percent of GDP, banking system liquid liabilities as a percent of GDP (as financial depth), saving rate (lagged), and the ratio of the market value of firms to book value (Tobin's q) are assigned as regressors, believed to affect firms' savings. The findings indicate that profits have a positive and statistically significant effect on firm savings, regardless of whether the firms are in manufacturing or non-financial sectors. Additionally, firm size and GDP positively influence both manufacturing (total model) and non-financial firms' savings. On the other hand, the real effective exchange rate, tangibility ratio, and leverage ratio have negative and statistically significant effects on savings, meaning that an increase in these ratios leads to a decrease in savings. However, there is no statistical evidence regarding the impact of the public debt as a percent of GDP variable on the savings of both types of firms. Financial depth only has a statistical and positive effect on manufacturing (total model) savings, while Tobin's q variable only increases the savings of non-financial firms. Furthermore, previous savings of firms also have a positive impact on their current savings and are statistically significant in all models.

Özmen and Yalçın (2007) analyze the financial structure and debt dollarization of the corporate sector in Türkiye, as well as the potential effects of external financial risks on the sector. The study utilizes firm-level data from a 10-year period. The research finds that debt dollarization and the short-term structure of debt are the main sources of vulnerability of the Turkish corporate sector to external financial shocks. Despite improvements in leverage ratios and interest rate risks after the 2001 crisis, the study suggests that debt dollarization and the short-term structure of debt remain the primary sources of vulnerability of the Turkish corporate sector to external financial shocks.

The research also observes a recent decrease in debt dollarization among small-scale and non-exporting firms in Türkiye's corporate sector. However, it notes that the level of debt dollarization in the sector remains high, indicating continued vulnerability to

external financial shocks. The study highlights the importance of understanding financial conditions, debt structures, and inter-sectoral vulnerability links to effectively manage and mitigate the impact of global financial risks on the Turkish economy. The authors recommend that policymakers focus on reducing debt dollarization and the short-term structure of debt in the corporate sector, as well as improving overall financial conditions and inter-sectoral linkages in the economy.

In a study by Yeşiltaş (2009), comprehensive firm-level data covering the period from 1992 to 2003 and encompassing nearly 75% of total employment in the Turkish manufacturing industry were used to test whether Turkish firms were under financial constraints. The firms were categorized as small, large, young, and mature. The final sample size for the study was 4,559. With the dependent variable being the final investment rates, explanatory variables in the model included cash flow to capital ratio and sales to capital ratio. Regression models were estimated using four different estimators (diff. GMM, system GMM, FE, and POLS estimators) employing panel data analysis techniques. Across all models estimated using the entire dataset, the cash flow to capital ratio variable was found to have the most significant positive effect on the investment rates variable (after its own lagged value), with coefficient estimates of 0.28, 0.42, 0.13, and 0.14 for the respective estimators.

Additionally, the squared term of this variable, derived from its square, was the only variable found to have a negative effect on the investment rates variable (with estimates of -1.19, -0.96, -0.33, and -0.13 for the respective estimators). The sales-to-capital ratio was found to be statistically significant only in the OLS and FE regressions, with estimates of 0.0038 and 0.01, respectively, indicating its positive impact on the dependent variable. These findings suggest a significant and positive relationship between firms' investments and cash flows. To further validate these findings, different models were constructed that included firm-specific characteristics such as size and age to investigate whether there were differences in investment behavior among these groups. However, the differences in investment cash flow sensitivity between these groups were not found to be statistically significant, indicating general financial constraints in the Turkish manufacturing industry.

Erol (2003) focused on the Turkish economy and investigated the impact of corporate debts on the determination of output prices in a developing economy. The study aims to explain the effects of short-term and long-term debts in 11 different sectors (food, textile, lumber, paper, fabricated metal, primary metals, chemicals, machinery, mining, agriculture, and fishery) on output pricing using panel data analysis techniques. The research analyzed data on the rate of change in the industry price index (as the dependent variable), short-term and long-term debts, real wages, and the cyclical term (real output growth multiplied by the debt ratio) during the period of 1990-1999. Two different models were estimated using the FE estimator from the panel regression models. The first model covered the manufacturing sectors (a total of 8), while the second model encompassed all 11 sectors. The coefficients of the explanatory variables in the estimated models were consistent in terms of their signs. In both models, an increase in real wages, the cyclical term, and long-term debt led to a decrease in the price index. However, it was noted that among these variables, long-term debt had the most significant impact on reducing the industry price index (approximately -1.03). On the other hand, the only variable found to increase the industry price index was short-term debt.

Yarba (2019) aimed to analyze whether non-financial firms in Türkiye used alternative financing sources outside traditional financing channels during periods of economic uncertainty, covering the period from 2007 to 2015. The study used dynamic panel data analysis techniques with the GMM estimator. Initially, the dependent variable was the other non-financial liabilities to total assets ratio (ONFL/TA), followed by the other non-financial liabilities to total liabilities ratio (ONFL/TL) variable, and to represent uncertainties, the study used the uncertainty index (UNCI), the persistence of uncertainty index (PUNCI), and macroprudential policy index (MPI). Control variables included macroeconomic variables (GDP Growth, inflation, government borrowing, financial development), firm characteristics (profitability, size, growth, tangibility, business risk), and an industry-specific factor (industry median other non-financial liabilities to total assets ratio and industry median other non-financial liabilities to total liabilities ratio). Modeling was done in two different groups based on firm sizes, and an overall model covering all firms was also used. Among the

findings of the overall model, UNCI was found to have a negative effect of approximately 0.002 on ONFL/TA, which was statistically significant. PUNCI, with an estimated coefficient of 0.01, had a positive impact on ONFL/TA. The coefficient for the MPI variable was estimated at 0.006, also statistically significant, indicating that both PUNCI and MPI had a positive effect on ONFL/TA. In the overall model with the dependent variable ONFL/TL, PUNCI was again estimated at 0.01, and the MPI coefficient was 0.008, both statistically significant. However, no significant coefficients were obtained for the UNCI variable in the overall model. When focusing on models that distinguish firms as large Small and Medium Enterprises (SMEs), it was found that neither UNCI nor MPI had a statistically significant effect on ONFL/TL in either the large or SME segments. However, MPI was uniformly statistically significant for SMEs, indicating that an increase in this index led to an increase in ONFL/TL for SMEs. In contrast, MPI did not have any significance for the ONFL/TL values of large firms. The PUNCI variable showed a pattern similar to MPI, with a positive effect on ONFL/TL for SMEs but no significance for large firms. Therefore, while MPI and PUNCI indicated a positive relationship with other non-financial debt ratios for SMEs, these findings were not robust for large firms. In models where ONFL/TA was the dependent variable, UNCI did not show significance in either the large or SME segments. However, PUNCI and MPI were both positively and significantly related to ONFL/TA in SME models. Therefore, they were found to have a positive effect on ONFL/TA. MPI did not have a statistically significant effect on the ONFL/TA values of large firms. These findings suggest that SMEs tend to use alternative financing sources, which are particularly important for small and medium-sized enterprises. Finally, the study emphasizes the importance of financial diversity and deepening for SMEs in terms of economic growth and stability.

Yarba and Yassa (2021) investigate the investment behavior between publicly listed and private companies in Türkiye using a firm-level dataset. The study covers the period from 2006 to 2018 and involves the analysis of data from over 1,000,000 non-financial firms. By employing a combination of coarsened and exact matching procedures and the difference-in-differences methodology, the research emphasizes the significant positive impact of listing on the stock market on the growth of

manufacturing firms. Following their listing on the stock market, these manufacturing firms experienced a substantial increase in their number of employees, total assets, and sales compared to their private counterparts that did not participate in the study. Additionally, the findings of the research indicate that publicly listed manufacturing firms invest more than their unlisted competitors in order to expand their operations.

Yarba (2021) examines the relationship between corporate indebtedness and investment in Türkiye using panel data analysis for the period of 2009-2019. To achieve this, a comprehensive dataset covering all manufacturing firms in Türkiye was used to analyze the relationship between corporate indebtedness and investment. Another objective of the study is to develop a model to understand the impact of corporate indebtedness levels on investment activities. The study utilized variables such as leverage, firm size, cash flow, maturity, and firm age as key determinants of investments. Additionally, the data was categorized into low-indebted and high-indebted groups. The model findings, using FE and GMM estimators, indicate a decreasing trend in investment rates with firm size, suggesting diminishing returns to scale in investment. It is observed that there is a significant inverted U-shaped relationship between corporate indebtedness and investment. This finding underscores the importance of understanding the impact of corporate indebtedness levels on investment activities. Being low indebted or high indebted also brings certain differences in firm investments. On average, a 10% increase in leverage leads to a 2% increase in investment rates for low-indebted firms, while it decreases investment by 3% for high-indebted firms.

Another point highlighted in the study is the expectation that the negative effect of high leverage is less significant for smaller firms due to their limited borrowing capacity and access to credit being a more serious issue. To test these expectations, firms were grouped into SMEs, micro-size, small firms, medium-sized firms, and large firms. In all cases, the coefficients for leverage and its squared term are significantly positive and negative, respectively. This finding indicates that the inverted U-shaped relationship between leverage and investments exists for all firm sizes. Particularly, the results show that the threshold point increases with firm size.

IV.C. DATA AND DATA SOURCES

As mentioned in Chapter 1, since 2016, the Institutional Sector Accounts have been prepared and disclosed to the public by TurkStat in Türkiye. These accounts consist of Non-Financial Corporations, Financial Corporations, General Government, Households, and Non-Profit Institutions Serving Households and show how income is earned, spent, and saved. Within the scope of these accounts, beginning from 2009, on an annual basis, GDP, GNI, GNDI, and total savings of institutions are calculated in detail for private, household, and corporate sectors. The limitation of this data is that it is not suitable for panel/cross-section analysis as it is not disclosed at the company level and it is not long enough for time series analysis. In order to see the share of the corporate sector in total domestic private savings, the table regarding the data of TurkStat is depicted below.

Table 32 Components of Domestic Saving (% of GDP) in Türkiye

Years	Total (C+D)	Public (D)	Private (C=A+B)	Household (A)	Corporate (B)	(Corporate/Private)*100
2009	21,9	-1,5	23,4	7,2	16,2	69,2
2010	21,8	2,0	19,8	6,7	13,1	66,2
2011	23,0	3,3	19,7	6,6	13,1	66,5
2012	23,4	3,9	19,5	6,6	12,9	66,2
2013	23,9	4,3	19,6	8,2	11,4	58,2
2014	24,9	3,9	21,0	9,2	11,8	56,2
2015	25,2	4,4	20,8	9,5	11,3	54,3
2016	25,0	2,7	22,3	9,7	12,6	56,5
2017	26,0	2,0	24,0	10,7	13,3	55,4
2018	28,0	1,6	26,4	9,5	16,9	64,0
2019	26,3	-0,5	26,8	8,2	18,6	69,4
2020	27,0	-0,8	27,8	7,3	20,5	73,7

Source: Author's own calculations based on Turkstat savings data.

As can be seen from the table above, the majority of private savings come from the corporate sector. In the 2009-2020 period, an average of 63 percent of total private savings belonged to the corporate sector.

This chapter discusses determinants of Turkish corporate sector saving by using firm-level data of Borsa Istanbul listed companies over the 2010-2019 period. The sample is started in 2010 for three reasons. First, since the inflation accounting was adopted

compulsory during the 2003-2004 period in Türkiye, the financial statements of the firms are not comparable with previous ones, and hence the earliest year may be 2005 for consistent data. Second, the data on dividend payments are of crucial importance when calculating corporate savings. Up to 2010, there was a twenty percent minimum profit distribution obligation for listed companies in Türkiye. Therefore, before 2010, distributed profits were not an internal decision taken based on the company's own cash and investment position and future forecast, but a decision required by related regulations. This situation prevented the determinants of saving from being company-specific. The third reason is that the earliest financial statements in which the effects of the 2008 global financial crisis have disappeared are from the 2010 period. On the other hand, besides the COVID-19 pandemic effects, although inflation accounting should be implemented in Türkiye in the period after 2020, the data produced by the financial statements after 2020, especially the profit item, may not reflect the inflationary environment, since it was postponed for two years by the Ministry of Finance of Türkiye. In this regard, the 2010-2019 period can be considered a relatively normal period in which there was no major crisis for the Turkish private sector.

There are two main datasets regarding the balance sheets and income statements information of the real sector in Türkiye. The CBRT introduced the Sectoral Balance Sheets dataset in 1989, which relies on surveys. This dataset is the earliest source of comprehensive and representative annual financial data, including balance sheets and income statements, for non-agricultural and non-financial companies in Türkiye. However, since the dividends payments, and hence savings, are unavailable, the CBRT data can be used for modeling only net profit margins as a proxy, not corporate savings[33].

Also, the administrative-based Entrepreneur Information System of the Industry and Technology Ministry of the Republic of Türkiye (ITMRT), started in 2006, contains the most detailed and the largest source of information on balance sheet and income statement data on Turkish non-agricultural and non-financial firms receiving data from

[33] This is also noted in WB (2011), Özmen et al. (2012), and Demircan ve Öz (2017).

many public institutions including TurkStat, The Revenue Administration having the universe of all incorporated firms' financial tables in Türkiye, and Social Security Institution. Indeed, the ITMRT data offer more disaggregated items than the CBRT counterpart. However, similar to the CBRT dataset, there are no undistributed profits data in the ITMRT dataset, and hence unsuitable for the calculation of firm savings. Furthermore, in both datasets, only the balance sheets and income statements of the companies are included, but not cash flow statements, from which some cash-based variables are constructed. Additionally, both financial statements available in these datasets are the legal financial statements prepared in accordance with the Tax Procedure Law. Since the main purpose of Tax Procedure Law is to maximize the tax revenues of government, this may increase the motivation of companies to prepare financial statements with the intention of paying less tax, that is, less reporting the revenue. On the other hand, financial statements available in these two datasets are not prepared in accordance with the International Accounting Standards/International Financial Reporting Standards (IAS/IFRS).

Besides, since financial statements of non-listed companies are not regularly audited by independent auditors, the quality of data from these two datasets might be less reliable. In this context, since the above-mentioned restrictions are not applicable for listed companies, analysis is decided to be done on the data of Borsa Istanbul listed companies. Moreover, it should be noted that Tobin's q, measured as the ratio of market value to book value of assets, free float ratio, calculated as the ratio of traded shares to total share capital, and foreign ownership rate are not observable for non-listed companies.

Borsa Istanbul, formerly named as Istanbul Stock Exchange, was established in 1985 and opened to trade on January 3, 1986 with 19 companies. Companies listed on the Borsa Istanbul are obligated to create their financial statements in alignment with the regulations set by the Capital Markets Board of Türkiye. These financial statements encompass the balance sheet, comprehensive income statement, cash flow statement, statement of changes in equity, and accompanying notes. According to related communiqués, these financial statements shall be drawn up in accordance with the

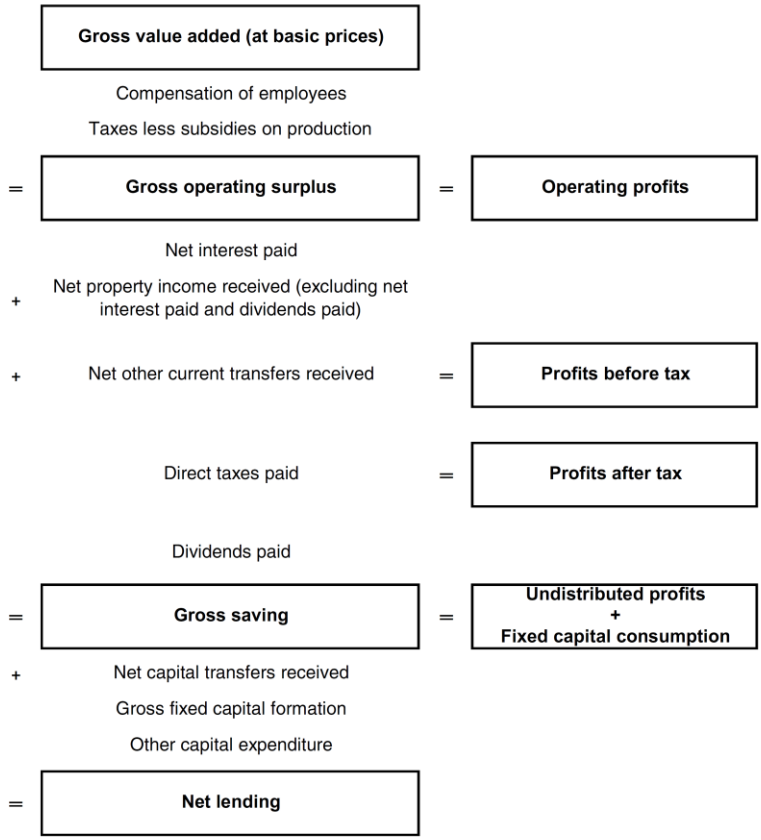
IAS/IFRS[34], audited by an independent auditor within the framework of independent auditing standards, and publicly disclosed by means of the electronic system of Public Disclosure Platform (PDP). The system disseminates data on "www.kap.org.tr" from the January 1, 2010. Moreover, some indicative market-based ratios, such as Tobin's q, measured as the ratio of market value to book value of assets, are calculated and sold by Finnet, a private database including all listed companies in Türkiye since Borsa Istanbul has found. In this context, financial statements of the listed companies are obtained from PDP while market-based ratios are compiled from Finnet.

In this study, data from companies that are traded on Borsa Istanbul and whose financial statements are publicly disclosed via PDP between 2010-2019 are used. Companies that were de-listed from Borsa Istanbul in a year between 2010 and 2019 are dropped from a dataset with all past items. Furthermore, the data for each item are taken if the corresponding company is listed during the 2010-2019 period. However, companies that become listed on Borsa Istanbul in 2020 are eliminated. Since the saving rate is the dependent variable, which is the ratio of undistributed profits to revenue, all data related to this year are deleted if the corresponding company does not have revenue data in the related year. Lastly, financial companies[35] (banks, intermediary institutions, insurance companies, financial leasing and factoring companies), investment companies (venture capital and private equity, securities, real estate), and companies whose scope of activities is sports, especially football are excluded. In this context, the dataset comprises 327 companies of Borsa Istanbul with 2761 observations spanning years from 2010 to 2019. The time dimension is 10, so there is no need to carry out panel time series tests (panel unit root and cointegration analysis) since these tests are asymptotic and are either not applicable or have very low power with such limited time series observations.

[34] In adherence to these guidelines, Turkish Accounting Standards/Turkish Financial Reporting Standards, as endorsed by the Public Oversight, Accounting, and Auditing Standards Authority, have been implemented in full compliance since the year 2013.

[35] Similar to many examinations of financial choices at the firm level, as seen in studies like Fama and French (2001) and DeAngelo et al. (2004), which concentrate on non-financial corporations.

Gross corporate savings, as typically defined in national accounts, include the sum of undistributed profits of businesses and the depreciation of fixed capital. In contrast, net corporate savings refer to undistributed profits or retained earnings (OECD, 2007). This particular definition applies at the level of individual enterprises, where net saving is expressed as the disparity between net profit and dividend payments (see figure below).



Source: OECD (2007)

As mentioned above, to calculate corporate savings without using a proxy variable, undistributed profits data is needed, which is only available for Borsa Istanbul listed firms in Türkiye. In most of the studies on Türkiye, it is observed that among other things, dividends distributed in cash are generally taken into account, while dividends given in the form of stocks are not. Additionally, according to the relevant legislation of the Capital Markets Board of Türkiye, among many other rules, if a company has a loss in the previous years, it cannot distribute profits, but this company's savings may have increased in the relevant year. Also, although the company did not make a profit

in the current year, it may have distributed profits from the previous year's profits, which may have reduced the company's savings. It has been observed that these issues are not taken into consideration in most of the studies on Türkiye using listed firm data. In this context, in this study, corporate saving is calculated as follows. First, the sum of current year's issued capital, restricted reserves appropriated from profits, prior years' profits or losses and paid capital increase is deducted from the sum of next year's issued capital, restricted reserves appropriated from profits, prior years' profits or losses. Then, this difference is compared with the equity attributable to equity holders of the parent. And then, whichever is larger is treated as corporate saving.

Below the table summarizes the variables employed in the empirical part of the study and their brief definitions.

Table 33 Variables of the Corporate Savings Model

Dependent Variable	
CS	Saving/Revenue (2010-2019)
Explanatory Variables	
OP	Operating Profit/Revenue
AE	Administrative Expenditures/Revenue
NFX	(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue
A	Assets (Firm Size)
CASH	Cash/Assets
WC	Working Capital/Capital
IN	Tangible Assets/Assets
CU	Current Assets/Non-Current Assets
BO	Borrowings (SR+LR)/Liabilities
TP	Trade Payables (SR+LR)/Liabilities
TR	Trade Receivables/Trade Payables
LEV	Liabilities/Assets
MVBV	Market Value/Book Value
P	Free Float Rate
F	Foreign Ownership Rate

Source: Author's own definitions.

IV.D. MODEL AND ESTIMATION RESULTS

In this subsection we present the corporate saving model and its estimation results. To estimate the corporate saving rate, we estimated the following generic function for firm *i*:

$$CS_i = f(OP_i,\ AE_i,\ NFX_i,\ A_i,\ CASH_i,\ WC_i,\ IN_i,\ CU_i,\ BO_i,\ TP_i,\ TR_i,\ LEV_i,\ MVBV_i,\ P_i,\ F_i) + u_i$$

where

- CS_i is "Saving/Revenue",
- OP_i is "Operating Profit/Revenue",
- AE_i is "Administrative Expenditures/Revenue",
- NFX_i is "(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue",
- A_i is "Assets (Firm Size)",
- $CASH_i$ is "Cash/Assets",
- WC_i is "Working Capital/Capital",
- IN_i is "Tangible Assets/Assets",
- CU_i is "Current Assets/Non-Current Assets",
- BO_i is "Borrowings (SR+LR)/Liabilities",
- TP_i is "Trade Payables (SR+LR)/Liabilities",
- TR_i is "Trade Receivables/Trade Payables",
- LEV_i is "Liabilities/Assets",
- $MVBV_i$ is "Market Value/Book Value",
- P_i is "Free Float Rate",
- F_i is "Foreign Ownership Rate" and
- u_i is the disturbance term.

The equation is first estimated by fixed and random effects (FE, RE) estimators, then the Panel-Corrected Standard Errors (PCSE) Panel the Feasible Generalized Least Squares (FGLS) estimator is employed to fix the problems of autocorrelation, heteroscedasticity and cross-sectional dependence.

IV.D.1 Fixed and Random Effects Estimates

The most general and frequently used panel data estimation techniques are fixed effects and random effects estimators. Below we estimate the corporate saving equation by both fixed and random effects. We also carry out the Hausman test to check if random effects estimator is consistent. The diagnostic tests of serial correlation, heteroscedasticity and cross sectional dependence are reported.

The table below reports the FE estimations where five explanatory variables are significant: OP (Operating Profit/Revenue), AE (Administrative Expenditures/Revenue), NFX ("Foreign Exchange Gains-Foreign Exchange Losses"/Revenue), A (Assets to proxy firm size) and TP (Short run and long run Trade Payables/Liabilities). The model is jointly significant. The F test for the significance of different intercept terms for each firm is significant which implies that the FE estimator is favored over the POLS estimation.

Table 34 Fixed Effects Estimation Results (Dependent Variable: CS)

	Coefficient	**Std. Err.**	**t-value**	**Prob-value**
OP	2.02***	0.47	4.27	0.00
AE	1.53***	0.51	2.99	0.00
NFX	-11.25***	0.54	-20.75	0.00
A	-35.81*	20.55	-1.74	0.08
CASH	-40.11	38.53	-1.04	0.30
BO	-32.75	20.49	-1.60	0.11
TP	-97.63***	27.49	-3.55	0.00
TR	0.00	0.00	-0.30	0.76
LEV	-11.53	15.37	-0.75	0.45
MVBV	-0.15	0.64	-0.24	0.81
F	-0.34	0.31	-1.09	0.28
Constant	368.37	189.59	1.94	0.05
F Test for Joint Significance			**R-squared**	
- F(20, 1898)	37.56		**Within**	0.2835
- Prob > F	0.00		**Between**	0.3068
F test FE vs POLS			**Overall**	0.1017
- F(300, 1901)	1.69			
- Prob > F	0.00			
Number of obs	2,220			
Number of groups	302			

Notes: CS is "Saving/Revenue" ratio of firm, OP is "Operating Profit/Revenue" ratio of firm, AE is "Administrative Expenditures/Revenue" ratio of firm, NFX is "(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue" ratio of firm, A is assets of firm (to proxy firm size), CASH is "Cash/Assets" ratio of firm, BO is "Borrowings (SR+LR)/Liabilities" ratio of firm, TP is "Trade Payables (SR+LR)/Liabilities" ratio of firm, TR is "Trade Receivables/Trade Payables" ratio of firm, LEV is "Liabilities/Assets" ratio of firm, MVBV is "Market Value/Book Value" ratio of firm, F is "Foreign Ownership Rate" of firm.

The table below reports the random effects estimation results where five explanatory variables are significant: OP (Operating Profit/Revenue), AE (Administrative Expenditures/Revenue), NFX ("Foreign Exchange Gains-Foreign Exchange Losses"/Revenue), A (Assets to proxy firm size) and TP (Short run and long run Trade Payables/Liabilities). The Wald test for joint significance implies that model is jointly significant.

Table 35 Random Effects Estimation Results (Dependent Variable: CS)

	Coefficient	**Std. Err.**	**t-value**	**Prob-value**
OP	2.00***	0.44	4.54	0.00
AE	2.02***	0.48	4.20	0.00
NFX	-8.08***	0.55	-14.80	0.00
A	4.06	3.18	1.28	0.20
CASH	-31.19	21.74	-1.43	0.15
BO	-32.76***	11.27	-2.91	0.00
TP	-29.70**	13.07	-2.27	0.02
TR	0.00	0.00	-0.32	0.75
LEV	-6.09	7.19	-0.85	0.40
MVBV	-0.06	0.54	-0.10	0.92
F	-0.05	0.11	-0.42	0.67
Constant	-4.33	26.14	-0.17	0.87
Wald Test for Joint Significance			**R-squared**	
- chi2(20)	350.37		**Within**	0.2666
- Prob > F	0.0000		**Between**	0.6848
Hausman Test (RE vs FE)			**Overall**	0.1369
- chi2(18)	462.56			
- Prob > chi2	0.0000			
Number of obs	2,220			
Number of groups	302			

Notes: CS is "Saving/Revenue" the ratio of firm, OP is "Operating Profit/Revenue" ratio of firm, AE is "Administrative Expenditures/Revenue ratio of firm, NFX is "(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue" ratio of firm, A is assets of firm (to proxy firm size), CASH is "Cash/Assets" ratio of firm, BO is "Borrowings (SR+LR)/Liabilities" ratio of firm, TP is "Trade Payables (SR+LR)/Liabilities" ratio of firm, TR is "Trade Receivables/Trade Payables" ratio of firm, LEV is "Liabilities/Assets" ratio of firm, MVBV is "Market Value/Book Value" ratio of firm, F is "Foreign Ownership Rate" of firm.

The results of Hausman test which compares the two sets of estimates (fixed effects and random effects) is reported in the table. The Hausman test's null hypothesis asserts that the random disturbance term is uncorrelated with the regressors. If the null hypothesis is rejected, the fixed effects estimator is selected; otherwise, random effects are deemed to provide better estimates. In other words, In the presence of the null hypothesis in the Hausman test, the random effects model is favored due to its greater

efficiency. Conversely, under the alternative hypothesis, the fixed effects model is at least as consistent and is therefore the preferred choice. According to the test results the null hypothesis of random effects is rejected: Hausman test points out the fixed effect estimator as the better method.

In the table below the results of modified Wald test for groupwise heteroskedasticity is reported for the chosen fixed effects estimation. The probability value of zero rejects the null hypothesis that there is no heteroscedasticity in the model and hence we conclude that there is heteroscedasticity problem in the model.

Table 36 Modified Wald test for Groupwise Heteroskedasticity

chi2 (301)	2800.000
Prob>chi2	0.000

The table below reports Levene's W0 statistic (Levene, 1960) which tests the equality of variances among groups, resilient in non-normal conditions, and two additional ones introduced by Brown and Forsythe (1974), have been proven to exhibit greater robustness compared to Levene's test, particularly in scenarios involving skewed populations (Stata, 2023, p. 2672). According to the table, all the statistics reveal the existence of heteroscedasticity in the model.

Table 37 Leven-Brown-Forsythe Heteroskedasticity test

W0	10.55	df(301, 1918)	Pr > F = 0.000
W50	2.09	df(301, 1918)	Pr > F = 0.000
W10	10.55	df(301, 1918)	Pr > F = 0.000

Notes: The table presents Levene's statistic (W0) alongside two statistics suggested by Brown and Forsythe, which substitute the mean in Levene's formula with alternative location estimators. The initial alternative (W50) substitutes the mean with the median, while the second alternative replaces the mean with the 10 percent trimmed mean (W10).

Below we see the results of Portmanteau IS-test for panel serial correlation (Inoue & Solon, 2006; Wursten, 2018). The test is specifically appropriate for fixed effects regressions and can accommodate various types of imbalances. The reported p-value of 0.00 points out that there is autocorrelation in the model.

Table 38 Portmanteau IS-test for Panel Autocorrelation

Variable	IS-stat	p-value	N	maxT	balance
Residual of FE model	132.94	0.00	302	10	gaps

The below table displays the Pesaran (2004) CD test, which examines cross-section dependence in panel time-series data. The identification of cross-section dependence among the series is crucial, as it can lead to biased and inconsistent empirical outcomes. The test results presented below show that there is cross-sectional dependence at 5% level of significance.

Table 39 Cross-Sectional Dependence Test

Variable	CD-test	p-value	average joint T	mean ρ	mean abs(ρ)
Residual of FE	195.92	0.00	7.40	0.00	0.37

Note: The Stata routine of xtcdf is used.

Since we need to correct the heteroscedasticity, cross-section dependence and autocorrelation problems detected in the model, a panel FGLS estimation method known as PCSE estimator (Beck and Katz, 1995) will be used in the next subsection.

IV.D.2 Selected Model: Panel-Corrected Standard Errors Estimates

The famous Parks Panel FGLS (Parks, 1967) estimator enables the inclusion of cross-sectional dependence along with heteroskedasticity and autocorrelation. However, its asymptotic standard error estimates are erroneously underestimated. Addressing this issue, Beck and Katz (1995) introduced a two-step, adjusted version of the less efficient OLS estimator, referred to as the PCSE estimator. The PCSE estimator exhibits favorable properties in small samples and resilience against cross-sectional dependence heteroskedasticity and autocorrelation. To deal with these problems in our preferred model, we will employ PCSE estimator in this sub-section.

The PCSE estimator is run with the addition of intercept dummy variables for each firm and years. In applied microeconometric studies, time fixed effects (year dummies) are typically put forward to control for macroeconomic shocks to obtain unbiased

estimates. Panel fixed effects (firm dummies) approximates or captures all time invariant unobserved factors such as firm characteristics to control for heterogeneity bias. Therefore, with the inclusion of year and firm dummies, we effectively estimate a two-ways fixed effects model where the time fixed effects are explicitly modelled via time dummies and the panel fixed effect are explicitly modelled via firm dummies. The combined model enables the removal of bias stemming from unobservable factors that vary over time but remain constant across firms. Additionally, it manages factors that vary across firms but remain constant over time. Moreover, the use of PCSE method as Panel Generalized Least Squares (GLS) estimator makes the results robust against cross-sectional dependence, heteroskedasticity and autocorrelation, as well. In other words, the preferred model is a two-ways fixed effects Panel GLS model which is robust to cross-sectional dependence, heteroskedasticity and autocorrelation.

The PCSE estimates are obtained with "pairwise", "nmk", "np1" and "psar1" options of Stata code[36]. The pairwise option specifies that, to calculate the covariance for each element in the covariance matrix, utilize all available observations (periods) that are shared between the two panels contributing to the covariance. The option of "nmk" specifies that standard errors be normalized by N-k, where k is the number of parameters estimated, rather than N, the number of observations. The "np1" option indicates that when estimating a common rho for all panels, the panel-specific autocorrelations should be weighted by T_i instead of the default T_i-1, where T_i represents the number of observations in each panel. This option influences the outcomes only in cases of unbalanced panels and when the correlation(ar1) option is specified. Lastly, the "psar1" option specifies that within panels, there exists first-order autocorrelation, and the coefficient of the AR(1) process is unique to each panel [psar1 denotes panel-specific AR(1)].

According to the estimation results, the corporate saving rate (CS) increases with the operating profit (OP), unlike net profit result of the most of the earlier studies. In this

[36] Stata's "xtpcse" command computes estimates of PCSE for linear cross-sectional time-series models, where the parameters are derived using either OLS or Prais–Winsten regression.

study, in line with the general findings in the international literature, firm size (A) is estimated to have a negative and significant impact on the saving rate of companies in Türkiye. Also, it is shown that financial leverage ratio (BO) (defined as the sum of short-run and long-run borrowings as a percent of total liabilities) significantly reduces corporate saving rate. The evidence supports the argument that trade payables (TP) leverage ratio (defined as the sum of short-run and long-run trade payables as a percent of total liabilities) has a negative and significant impact on corporate saving rate. Moreover, the indebtedness variable (LEV) significantly reduce the corporate saving rate in the above model.

Table 40 Selected Model: Panel-Corrected Standard Errors (PSCE) Estimates (Dependent Variable: CS)

	Coefficient	Std. Err.	t-value	Prob-value
OP	11.121***	4.131	2.690	0.01
AE	10.895**	4.613	2.360	0.02
NFX	-13.286*	7.354	-1.810	0.07
A	-43.336*	24.440	-1.770	0.08
CASH	-32.066	80.996	-0.400	0.69
BO	-29.393**	14.131	-2.080	0.04
TP	-96.845**	40.562	-2.390	0.02
TR	-0.001**	0.001	-1.930	0.05
LEV	-11.988**	5.067	-2.370	0.02
MVBV	-0.204**	0.099	-2.060	0.04
F	-0.420*	0.230	-1.830	0.07
Constant	338.252*	187.140	1.810	0.07
F Test for Joint Significance			**R-squared**	
Wald chi2(27)	79.44		Within	0.5032
Prob > F	0.02			

Notes: CS is "Saving/Revenue" ratio of firm, OP is "Operating Profit/Revenue" ratio of firm, AE is "Administrative Expenditures/Revenue" ratio of firm, NFX is "(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue" ratio of firm, A is assets of firm (to proxy firm size), CASH is "Cash/Assets" ratio of firm, BO is "Borrowings (SR+LR)/Liabilities" ratio of firm, TP is "Trade Payables (SR+LR)/Liabilities" ratio of firm, TR is "Trade Receivables/Trade Payables" ratio of firm, LEV is "Liabilities/Assets" ratio of firm, MVBV is "Market Value/Book Value" ratio of firm, F is "Foreign Ownership Rate" of firm.

The coefficient estimate in the regression equation with foreign ownership rate (F) suggests a significant negative association between corporate saving rate and foreign ownership rate, although the magnitude is small. Tobin's q (MVBV) has a negative and significant coefficient in the regression. The corporate saving rate decreases as firm market value relative to book value increases is consistent with the argument that

a high Tobin's q is associated with rapid growth of firms and thus financially less constrained firms that use more external funds and less necessity for retained earnings. Therefore, firms with higher Tobin's q prefer to rely less on savings as a source of finance. The net foreign exchange income ratio (NFX) is estimated to have a negative and significant impact on the corporate saving rate, which is consistent with dollarization arguments for corporate sector in Türkiye. Firms with a high ratio of trade receivables to trade payables (TR) are less likely to save because of the working capital shortage. The coefficient of this ratio is negative and significant, with small magnitude and modest significance. The estimation results show that administrative expense ratio to revenue (AE) has a positive impact on corporate saving rate. This finding suggests that this type of expense creates productivity, which increases future value, and hence corporate saving rate in Türkiye. As cash position (CASH) is an important control variable, it should be included in the model even if it is not significant. On the other hand, the insignificance can also result from the non-variation seen in the data or from sample specific issues.

IV.E. ROBUSTNESS CHECK (DIFFERENCE & SYSTEM GMM, QUASI-MAXIMUM LIKELIHOOD AND BIAS CORRECTED LSDV)

In this subsection we carry out three robustness check: (1) The first check is about the estimated values of the coefficients, (2) The second control will be about the direction of the impacts of variables (i.e. coefficient signs), and (3) Last check is about assessing the impact of adding a lagged CS (dependent variable) into the model as an explanatory variable which makes the equation a dynamic panel model.

To check for the values of the estimate coefficients we need to use other estimators which would be still consistent in case of autocorrelation, heteroscedasticity and cross-sectional dependence problems. The first candidate for this purpose is using robust standard errors. Driscoll and Kraay (1998) introduce a nonparametric covariance matrix estimator that generates heteroscedasticity-consistent standard errors resilient to broad forms of spatial (cross-sectional dependence) and temporal (serial correlation) dependencies, as outlined by Hoechle (2007) when the time dimension becomes large.

In other words, The Driscoll and Kraay (1998) standard errors are sufficient to resolve the issues heteroscedasticity, cross-sectional dependency, and autocorrelation. The table below represents the preferred fixed effects model with Driscoll and Kraay (DK) standard errors. Unfortunately, most of the variables are insignificant except OP and TP. In addition, the F-Test of the model rejects the joint significance of the variables. Therefore, we cannot use these results for the robustness check for the estimated values of the coefficients.

The other option is using the Panel FGLS estimator. Parks (1967) introduced the FGLS estimator as an effective method for estimating panel data with disturbances that are correlated both serially and contemporaneously. The Parks FGLS estimator is asymptotically efficient but requires the condition of $T \geq N$ which does not hold in our study since N=302 (firms) but T=10 (2010-2019) in our case. On the other hand, it is possible to use Parks FGLS estimator in Stata even when T<N. However, Moundigbaye et al. (2018) indicate that the resulting estimators do not perform well in this situation. Furthermore, to fit a model with cross-sectional correlation adjustment by Parks FGLS estimator, the panels must be balanced. This condition is not satisfied in our study since our data set is an unbalanced panel. Therefore the alternative panel FGLS estimator (Parks FGLS estimator) cannot be used to check for the values of estimated coefficients.

Table 41 Preferred Fixed Effects Model with Driscoll and Kraay (1998) Standard Errors (Dependent Variable: CS)

	Coefficient	Std. Err.	t-value	Prob-value
OP	2.02***	0.84	2.42	0.04
AE	1.53	1.05	1.46	0.18
NFX	-11.25	6.57	-1.71	0.12
A	-35.81	21.13	-1.69	0.12
CASH	-40.11	50.50	-0.79	0.45
BO	-32.75	17.57	-1.86	0.10
TP	-97.63*	51.77	-1.89	0.09
TR	0.00	0.00	-1.72	0.12
LEV	-11.53	7.84	-1.47	0.18
MVBV	-0.15	0.09	-1.72	0.12
F	-0.34	0.20	-1.66	0.13
Constant	368.37	209.88	1.76	0.11

Table 41 (continued)

	Coefficient	Std. Err.	t-value	Prob-value
F Test for Joint Significance			**R-squared**	
F(20, 9)	4.15		Within	0.28
Prob > F	0.02			

Notes: CS is "Saving/Revenue" ratio of firm, OP is "Operating Profit/Revenue" ratio of the firm, AE is "Administrative Expenditures/Revenue" ratio of the firm, NFX is "(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue" ratio of firm, A is assets of firm (to proxy firm size), CASH is "Cash/Assets" ratio of firm, BO is "Borrowings (SR+LR)/Liabilities" ratio of firm, TP is "Trade Payables (SR+LR)/Liabilities" ratio of firm, TR is "Trade Receivables/Trade Payables" ratio of firm, LEV is "Liabilities/Assets" ratio of firm, MVBV is "Market Value/Book Value" ratio of firm, F is "Foreign Ownership Rate" of firm.

As the second robustness control, the robustness of PCSE estimated coefficient signs is analyzed by comparing the results with those obtained by POLS (with time dummies), FE (Two-way fixed effects), and RE (with time dummies) estimators. We see that the significant coefficient estimates of all methods have the same signs with the PCSE estimator.

Table 42 Pooled OLS, FE, RE and PCSE Estimates

VARIABLES	POLS	FE	RE	PCSE
OP	1.996***	2.024***	2.003***	11.121***
	(0.000)	(0.000)	(0.000)	(0.007)
AE	2.011***	1.534***	2.016***	10.895**
	(0.000)	(0.003)	(0.000)	(0.018)
NFX	-8.064***	-11.247***	-8.079***	-13.286*
	(0.000)	(0.000)	(0.000)	(0.071)
A	3.629	-35.813*	4.061	-43.336*
	(0.260)	(0.082)	(0.200)	(0.076)
CASH	-29.381	-40.106	-31.191	-32.066
	(0.179)	(0.298)	(0.151)	(0.692)
BO	-32.009***	-32.752	-32.762***	-29.393**
	(0.005)	(0.110)	(0.004)	(0.038)
TP	-29.060**	-97.626***	-29.697**	-96.845**
	(0.027)	(0.000)	(0.023)	(0.017)
TR	-0.001	-0.001	-0.001	-0.001*
	(0.740)	(0.761)	(0.746)	(0.053)
LEV	-6.460	-11.530	-6.085	-11.988**
	(0.370)	(0.453)	(0.398)	(0.018)
MVBV	-0.105	-0.154	-0.056	-0.204**
	(0.845)	(0.811)	(0.917)	(0.039)
F	-0.046	-0.336	-0.048	-0.420*
	(0.683)	(0.275)	(0.673)	(0.068)
Constant	0.972	368.366*	-4.335	338.252*
	(0.991)	(0.052)	(0.868)	(0.071)
Time Effects	Yes	Yes	Yes	Yes
Firm Effects	No	Yes	No	Yes

Table 42 (continued)

VARIABLES	POLS	FE	RE	PCSE
- Robust to Autocorrelation?	No	No	No	Yes
- Robust to Heteroscedasticity?	No	No	No	Yes
- Robust to Cross Sectional Dependence	No	No	No	Yes
Observations	2,220	2,220	2,220	2,220
R-squared	0.139	0.284		0.503
Number of id		302	302	302

Notes: CS is "Saving/Revenue" ratio of the firm, OP is "Operating Profit/Revenue" ratio of the firm, AE is "Administrative Expenditures/Revenue" ratio of the firm, NFX is "(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue" ratio of firm, A is assets of firm (to proxy firm size), CASH is "Cash/Assets" ratio of firm, BO is "Borrowings (SR+LR)/Liabilities" ratio of firm, TP is "Trade Payables (SR+LR)/Liabilities" ratio of firm, TR is "Trade Receivables/Trade Payables" ratio of firm, LEV is "Liabilities/Assets" ratio of firm, MVBV is "Market Value/Book Value" ratio of firm, F is "Foreign Ownership Rate" of firm.

Source: Author's own calculations.

However, it is noteworthy that estimating under the existence of cross–sectional dependence, heteroscedasticity, and autocorrelation lead to bias, inconsistency, inefficient parameter estimation, and invalid test statistics (Andrew, 2005). Since these estimators (POLS, FE, and RE) are not robust to cross-sectional dependence, autocorrelation, and heteroscedasticity they are expected to suffer from these problems. Nevertheless, at least for the sign of coefficients (direction of the effects) we think that they would provide a basis for our estimations.

Table 43 Autocorrelation, Heteroscedasticity and Cross-Sectional Dependence Robustness of Static Models

VARIABLES	POLS	FE	RE	PCSE
- Robust to Autocorrelation?	No	No	No	Yes
- Robust to Heteroscedasticity?	No	No	No	Yes
- Robust to Cross-Sectional Dependence	No	No	No	Yes

Source: Author's own calculations.

As a last robustness check, we consider the possibility of dynamic panel data setup as a valid specification for our analysis. In other words, we assess the impact of adding a lagged CS (dependent variable) into the model as an explanatory variable. However,

an endogeneity problem arises with the traditional methods (RE, FE, and POLS) in the context of a dynamic panel data model particularly in the context of "small T, large N" context (Nickell, 1981). To solve this endogeneity problem (also known as Nickell bias in the related literature), the Dynamic Panel GMM has been developed to overcome the shortcomings of traditional estimators (FE, RE, and POLS). There are two primary dynamic Panel GMM (Generalized Method of Moments) estimators: the difference GMM introduced by Arellano and Bond (1991) and the system GMM proposed by Blundell and Bond (1998) and Arellano and Bover (1995). These models find application in various empirical studies. However, it is recognized that these GMM estimators may encounter the weak-instruments issue (Blundell and Bond, 1998). To address this concern, Blundell and Bond (1998) suggest the "System GMM estimator," which has become the most commonly employed approach in practice. Nevertheless, this estimator also relies on "instrumental variables" to handle endogeneity, and as demonstrated by Bun and Windmeijer (2010), the estimation process may still be susceptible to the weak-instruments problem. Furthermore, the additional moment conditions proposed by Blundell and Bond (1998) for the System GMM estimator are only valid under stringent conditions on the initialization of dynamic processes. As highlighted by Chudik and Pesaran (2017, p.1), the System GMM approach does not permit initial observations to systematically differ from the long-run means. Blundell and Bond (1998) also note that as the time dimension (T) increases, the number of instruments in the System GMM method grows quadratically, leading to the issue of instrument proliferation. Several solutions have been proposed in the literature to address this problem; however, Mehrhoff (2009, p.5) reports that in some instances, even the Fixed Effect estimator exhibits lower bias compared to the GMM estimator. Recently, maximum likelihood-based estimators and bias-corrected estimators were proposed and developed as alternatives for GMM estimators to get rid of their weak-instruments problem (Hsiao et al., 2002; Hayakawa and Pesaran, 2015; Kiviet, 1995; Judson and Owen, 1999; Bun and Carree, 2005; Dhaene and Jochmans, 2016; Breitung et al., 2021. The standard errors of these estimators are also robust to cross-sectional heteroskedasticity since they are obtained following Hayakawa and Pesaran (2015). Hence, for the reasons discussed above, in addition to the system GMM estimator we also employed the *bias-corrected least squares dummy variable*

(LSDVC[37]) *dynamic panel data* and *quasi-maximum likelihood linear fixed effect dynamic panel data* (DPDQML.FE[38]) estimators.

The estimation results are provided in the tables below. As can be seen, for the Difference GMM estimator we have acquired p-values for the Hansen test equal to 1, indicating a clear indication of invalid and weak instruments attributable to the issue of instrument proliferation. For System GMM estimator, the Hansen probability score is very close to 1 which is also problematic in the literature[39]. Even if we have tried different instrument sets this problem cannot be solved. We think that this may result from the observed low correlation between the variables of the data set since valid instruments require a high correlation between the instruments and endogenous variables. Therefore, for our preferred model, we cannot obtain healthy dynamic panel GMM estimates, neither by Difference GMM nor System GMM techniques. If we look at the estimates of alternative methods for dynamic panel specification, which are denoted by DPDQML.FE and LSDVC, we see that there are several significant coefficient estimates. Since they are not robust to cross-sectional dependence and serial correlation, we only compare their signs not their estimated values. As for the signs of the estimated coefficients, the estimates of DPDQML.FE and LSDVC confirm the signs of the coefficient estimates of the PCSE Panel FGSL estimator which is our preferred model. Hence, we conclude that the signs of estimated coefficients of our preferred PCSE Panel FGLS estimator model does not suffer from any endogeneity problem due to the omission of lagged dependent variable. Kiviet (1995) demonstrates that LSDVC frequently exhibits better performance in terms of bias and root mean squared error compared to dynamic panel GMM estimators.

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[37] XTLSDVC routine in Stata is employed to execute this estimator.

[38] XTDPDQML routine of Stata is used to run this estimator.

[39] If the probability derived from the Hansen test is very close to or equals 1, it indicates the validity of the instruments. This suggests that the asymptotic properties of the test, as outlined by Roodman in 2009, have not been fulfilled. Consequently, in such cases, the null hypothesis asserting the validity of instruments (validity of overidentifying restrictions) would be rejected if the probability falls below the selected significance level. Roodman (2009) recommends that the optimal range for the probability of the Hansen test should be between 0.05 and 0.8, with the most favorable range falling between 0.1 and 0.25.

Table 44 Difference and System GMM, Quasi-Maximum Likelihood, and Bias Corrected LSDV Estimates

VARIABLES	Dif. GMM	Sys. GMM	DPDQML.FE	LSDVC	Dyn.POLS
L.CS	2.705	2.397	0.973***	0.881***	0.674***
	(0.422)	(0.314)	(0.002)	(0.000)	(0.001)
OP	15.740	21.330	24.754***	14.076***	12.983***
	(0.301)	(0.230)	(0.000)	(0.000)	(0.000)
AE	23.111	28.576	28.480***	16.572***	15.373***
	(0.330)	(0.236)	(0.000)	(0.000)	(0.000)
NFX	-90.124	-73.595	-34.999***	-35.234***	-26.033***
	(0.328)	(0.260)	(0.000)	(0.000)	(0.000)
A	-34.566	-59.758	-69.845***	-9.973	3.844
	(0.890)	(0.323)	(0.001)	(0.486)	(0.242)
CASH	399.462	-597.375	-3.111	-32.062	-28.612
	(0.451)	(0.378)	(0.936)	(0.380)	(0.215)
BO	-84.071	-219.118	-46.721**	-36.763	-35.648***
	(0.406)	(0.268)	(0.032)	(0.148)	(0.002)
TP	-210.865	-290.698	-148.408***	-100.035***	-22.903*
	(0.297)	(0.300)	(0.000)	(0.005)	(0.091)
TR	-0.205	-0.015	-0.545*	-0.003	-0.003
	(0.742)	(0.505)	(0.099)	(0.991)	(0.761)
LEV	-66.637	-120.695	-22.823	-12.048	-6.170
	(0.383)	(0.265)	(0.256)	(0.528)	(0.397)
MVBV	-2.333	-2.563	-0.434	-0.162	-0.188
	(0.369)	(0.410)	(0.517)	(0.823)	(0.734)
F	-2.428	0.581	-0.319	-0.281	-0.040
	(0.352)	(0.310)	(0.310)	(0.410)	(0.727)
Constant		902.087	690.695***		-9.938
		(0.271)	(0.000)		(0.932)
Firm Effects (Firm dummies)	Omitted due to collinearity	Omitted due to collinearity	Omitted due to collinearity	Factor variables not allowed	If included method becomes FE
Time Effects (Year dummies)	Yes	Yes	Yes	Factor variables not allowed	Yes
Hansen Test	2.410 (1.000)	20.410 (0.944)	na	na	na
Observations	1,845	2,150	1,865	2,150	2,150
Number of id	286	296	278	296	na

Notes: (1) CS is "Saving/Revenue" ratio of the firm, OP is "Operating Profit/Revenue" ratio of the firm, AE is "Administrative Expenditures/Revenue" ratio of the firm, NFX is "(Foreign Exchange Gains-Foreign Exchange Losses)/Revenue" ratio of firm, A is assets of firm (to proxy firm size), CASH is "Cash/Assets" ratio of firm, BO is "Borrowings (SR+LR)/Liabilities" ratio of firm, TP is "Trade Payables (SR+LR)/Liabilities" ratio of firm, TR is "Trade Receivables/Trade Payables" ratio of firm, LEV is "Liabilities/Assets" ratio of firm, MVBV is "Market Value/Book Value" ratio of firm, F is "Foreign Ownership Rate" of firm.
(2) Dif. GMM is the "Difference GMM" estimator of Arellano and Bond (1991), Sys. GMM is the "System GMM" estimator of Blundel and Bond (1998), DPDQML.FE is "Quasi-maximum likelihood linear dynamic panel data" estimator for Fixed Effects of Hsiao et al. (2002), LSDVC is "bias corrected LSDV dynamic panel data" estimator of Bruno (2005), and Dyn.POLS is the Pooled OLS estimator but includes lagged dependent variable as explanatory variable.

Source: Author's own calculations.

The Monte Carlo study conducted by Judson and Owen (1999) strongly favors LSDVC estimator when the sample size (N) is small or moderately large, as indicated by Bruno

(2004 and 2005). Note that the estimates of LSDVC and our PCSE estimates are close to each other which can be seen as a check for the robustness of coefficient estimate values.

Table 45 Autocorrelation, Heteroscedasticity and Cross-Sectional Dependence Robustness of Dynamic Models

	Dif. GMM	Sys. GMM	DPDQML.FE	LSDVC	Dyn.POLS
- Robust to Autocorrelation?	Yes	Yes	No	No	No
- Robust to Heteroscedasticity?	Yes	Yes	Yes	Yes	No
- Robust to Cross Sectional Dependence?	No	No	No	No	No

Notes: Dif. GMM is "Difference GMM" estimator of Arellano and Bond (1991), Sys. GMM is "System GMM" estimator of Blundel and Bond (1998), DPDQML.FE is "Quasi-maximum likelihood linear dynamic panel data" estimator for Fixed Effects of Hsiao et al. (2002), LSDVC is "bias corrected LSDV dynamic panel data" estimator of Bruno (2005), and Dyn.POLS is the Pooled OLS estimator but includes lagged dependent variable as explanatory variable.

Source: Author's own calculations.

IV.F. DISCUSSION

Similar to previous studies on Türkiye's corporate sector saving behavior, corporate saving rate is closely associated with profitability. However, in the estimation above, the corporate saving rate increases with the operating profit, unlike net profit result of the most of the earlier studies. Therefore, operating profit margin, not net profit margin, is a natural candidate for a policy tool to increase private corporate saving rate in Türkiye. In this context, rather than tax policies, focusing on policies related with the cost of production and productivity is more crucial.

There have been numerous studies in the literature on the financing conditions of firms in Türkiye, showing that smaller firms are financially constrained, less accessing external financing even if they are potentially profitable. In developing countries such as Türkiye, since the financial constraints faced by small companies are much greater than those of large companies, small companies may necessarily increase their internal savings. In this condition, smaller enterprises generally exhibit a higher propensity to save a greater portion of their income compared to larger corporations, and they

depend more significantly on savings as a primary source of financing. (Bates and Henderson, 1967 and Horioka and Terada-Hagiwara, 2014). On the other hand, as stated in Özmen et al. (2012), as a company's assets increase, it is anticipated that the level of savings will also increase. Contrary to international evidence on corporate saving behavior (PSB, 2014), both Özmen et al. (2012) and Demircan and Öz (2017) ascertain that the size of a firm positively influences savings in Türkiye. However, Chen et al. (2017) discover that there is not a significant variation in firm savings based on firm size. Therefore, the sign of the firm size (proxied by the natural logarithm of total assets) coefficient is ambiguous. In this study, in line with the general findings in the international literature, firm size is estimated to have a negative and significant impact on the saving rate of companies in Türkiye. Indeed, this is consistent with the fact that in Türkiye, smaller firms, for which financial constraints are more binding, seem to finance their growth mostly through internal funds (retained earnings) while larger firms used both internal and bank financing.

The net effect of borrowing on corporate savings varies depending mainly on the cost of borrowing. High borrowing cost will increase the cost of external borrowing, increase interest expenses and reduce net profit. A decrease in net profit reduces distributable profit. On the other hand, in the case of low borrowing cost, there may be two different effects. First, lower cost can reduce interest expenses and increase net profit, and hence distributable profit. As a result, the corporate saving rate increases. Secondly, low cost may encourage external borrowing and reduce the need for internal savings. As a result, the saving rate decreases. In this study, it is shown that financial leverage ratio (defined as the sum of short-run and long-run borrowings as a percent of total liabilities) significantly reduces corporate saving rate.

Companies generally meet their financing needs from internal funds (retained earnings), inter-company (commercial) loans (trade credits) and the financial system (bank loans or other forms of market finance). One of these financing ways, namely commercial loans are payable-receivable relationships that occur as a result of forward buying or selling transactions between companies with which commercial relations are established. It is a type of indirect financing method outside the financial system. As

theoretically stressed, for example, according to Burkart and Ellingsen (2004) as well as Petersen and Rajan (1994, 1995), companies often utilize trade credit to supplement bank loans during periods of tightened financial conditions and reduced liquidity. Empirical evidence from studies by Garcia-Appendini and Montoriol-Garriga (2013), Ferrando and Mulier (2013), Casey and O'Toole (2014), McGuinness et al. (2018), and, Carbo-Valverde et al. (2016) supports the idea that trade credit serves as a valuable buffer for financially constrained firms. In this sense, increasing trade payables may cause companies to resort less to other funds (extarnal and/or internal). This, in turn, may reduce firms' internal incentive to save, ceteris paribus. The evidence supports this argument: trade payables leverage ratio (defined as the sum of short-run and long-run trade payables as a percent of total liabilities) is estimated to have a negative and significant impact on corporate saving rate.

Similarly, indebtedness (defined as the share of total non-equity liabilities to total assets) is expected to negatively affect the company's saving. Profitable companies tend to save more, while companies in debt save less. Consequently, Turkish companies burdened with high interest payments due to indebtedness are likely to save less (Özmen et al., 2012). As expected, indebtedness significantly reduces the corporate saving rate in the above model.

Foreign ownership ratio shows how much of the company's capital is owned by foreign investors. If foreigners increase their influence in the company by directly becoming partners in the company from outside the stock exchange, it can be expected that the financing need of the company will decrease and, in this respect, the need for internal funds will decrease. If foreigners increase their influence in the company through secondary market purchases from the stock exchange, instead of directly investing capital into the company, it will not have an impact on the company's saving decision at the first stage. In this case, considering that foreigners attach importance to longer-term and regular dividend payments, the company's dividend payments will be expected to increase, and therefore its internal saving will decrease. On the other hand, it is notoriously difficult to determine reasons of the foreign investors' stock investment. If foreigners invest in large companies, the companies can be expected to

increase their saving to finance the investment. Therefore, foreign ownership rate may be either negatively or positively related with corporate saving rate depending on conditions of the foreign investors. The coefficient estimate in the regression equation with foreign ownership rate suggests a significant negative association between corporate saving rate and foreign ownership rate, although the magnitude is small.

With respect to Tobin's q (the ratio of the market value of firm to the book value), two forces may determine the estimated coefficient. When a company's market value increases relative to its book value, firstly, the company may desire to reduce its profit distribution and increase its internal funds to finance new investment opportunity. Secondly, on the other hand, the company has more chance to access external finance (bank loans and/or paid capital increase as a secondary public offering), which reduces the need for internal funds to finance investment. However, in a relatively shallow equity market such as Türkiye's Borsa Istanbul, the increase in the market value of the company may have occured completely independent of the value and investment potential of the company. As a result of all these factors, mixed results should be expected. Tobin's q has a negative and significant coefficient in the regression. The corporate saving rate decreases as firm market value relative to book value increases is consistent with the argument that a high Tobin's q is associated with rapid growth of firms and thus financially less constrained firms that use more external funds and less necessity for retained earnings. Therefore, firms with higher Tobin's q prefer to rely less on savings as a source of finance.

Given the high degree of liability dollarization in corporate sector of Türkiye, it is crucial to include foreign exchange related item as an independent variable in testing the determinant of corporate saving behaviour. Increasing the share of the net foreign exchange income (calculated from the income statements by subtracting foreign exchange loss from foreign exchange gain) of company's in its revenue will cause the company to get rid of foreign exchange pressure and therefore save less for possible future payments. This net foreign exchange income ratio is estimated to have a negative and significant impact on the corporate saving rate, which is consistent with dollarization arguments for corporate sector in Türkiye.

As noted before, both trade payables and trade receivables are important components of Turkish corporate sector's liability and assets sides, respectively. These two external financing methods affect mostly the cash position of firms and determine the level of working capital. They are not financing methods that impact on investment plans. In this context, the two types of credits are included in the regression as explanatory variables. Firms with a high ratio of trade receivables to trade payables are less likely to save because of the working capital shortage. The coefficient of this ratio is negative and significant, with small magnitude and modest significance.

Lastly, the administrative expense is one of the important part in firm's operating expense. As stated in Banker et al. (2019) and Cleland and Bruno (1996), capitalization is included in this type of expense. Training fee and staff education fund expenses improves the human resources of firm and creates long term value. Banker et al. (2011) argues that administrative expense can be regarded as not only an resource-input expense but also an optimal investment to for firm's long-run profit. However, there are views that administrative expense may be the embodiment of the agency problems. Under all these discussions, administrative expense as a percent of revenue is included model as an independent variable to have an evidence for Türkiye. The estimation results show that administrative expense ratio to revenue has a positive impact on corporate saving rate. This finding suggests that this type of expense creates productivity, which increases future value, and hence corporate saving rate in Türkiye.

Findings from the estimated model show also that the cash position (defined as the ratio of cash and cash equivalences to total assets) coefficient is negative but insignificant for the regression in which corporate saving is used as dependent variable. Cash position is very important for both profit distribution in cash and working capital. Also, investment decisions depend on this position. In this context, the higher the cash position, the more facility to distribute profits, and the less desire to increase retained profits, all leads to decrease saving. As Verbeek (2017) rightly pointed out it is not a sin to have insignificant variables included in the regression since the insignificant effect of a variable is informative. Hence, as noted earlier, as cash position is an important control variable, it should be included in the model even if it

is not significant. On the other hand, the insignificance can also result from the non-variation seen in the data or from sample specific issues.

CHAPTER V

MICROECONOMIC DETERMINANTS OF HOUSEHOLD SAVINGS IN TÜRKİYE: A HOUSEHOLD LEVEL CROSS-SECTIONAL ANALYSIS

V.A. INTRODUCTION

Household savings can be described as the main domestic source of funds used to support capital investment, playing a crucial role in shaping long-term economic growth and hence affects the economic performance of countries and the welfare level of individuals (OECD, 2016). This chapter investigates the factors at the individual level that influence household savings in Türkiye, utilizing cross-sectional data collected from the HBS of 2019 conducted by the TurkStat. We have chosen year 2019 to isolate the disturbing effects of COVID-19 pandemic in and after 2020.

There are several different definitions of saving (Lusardi et al., 2001) and results can be quite different depending on the measurement of saving considered. Therefore, we have adopted four different definitions (S1, S2, S3 and S4) to measure household savings.

The first definition of definition of household saving (S1), which is the most common definition, is given by the difference between monthly total disposable income and total monthly expenditure of households:

$$S1 \equiv Disposable\ Income - Total\ Consumption$$

Our second definition of household saving (S2) considers durable goods. Durable goods are commonly characterized by a lifespan of at least three years. Consequently,

the household expenditure on durable goods can be considered a type of saving, as a portion of the expenditure is essentially an investment decision aimed at generating a stream of future consumption benefits. The second definition of savings adds durable goods expenditure of households into the S1 definition of savings. In other words, we exclude the durable goods consumption from total consumption:

$$S2 \equiv S1 + \text{Durable Goods Consumption}$$

or we can write this in the following alternative form:

$$S2 \equiv \text{Disposable Income} - (\text{Total Consumption} - \text{Durable Goods Consumption}).$$

Our third definition of household saving (S3) considers jewelry, clocks and watches. In Türkiye many households keep their savings in the form of gold, and hence gold is a widely used as a saving instrument in Türkiye. Unfortunately, there is no data on household gold expenditures directly. However, TurkStat HBS collects data on jewelry, clocks and watches spending of households. Following this idea, in this definition of saving, the expenditure on jewelry, clocks and watches is decided not to be included in household consumption measures. The third definition of savings (S3), for the reasons above, adds jewelry, clocks and watches expenditure of households into the S2 definition of savings. In this definition, apart from durable goods we also exclude jewelry, clocks and watches consumption from total consumption:

$$S3 \equiv S2 + \text{Jewelry, clocks and watches expenditure}$$

or we can write this in the following alternative form:

$$S3 \equiv \text{Disposable Income} - (\text{Total Consumption} - \text{Durable Goods expenditure} - \text{Jewelry, clocks, and watches expenditure}).$$

Our fourth definition of household saving (S4) considers health and education expenditures. One can consider the health and education expenditures as investments in human capital and insurance purchases as saving as well as durable good

consumption. This definition of savings includes health and education expenditure of households into the S3 definition of savings. In this definition, apart from durable goods, jewelry, clocks and watches consumption we also exclude health and education consumption from total consumption.

$$S4 \equiv S3 + \text{Health and Education expenditures}$$

or we can write this in the following alternative form:

$$S4 \equiv \text{Disposable Income} - (\text{Total Consumption} - \text{Durable Goods expenditure} - \text{Jewelry, Clocks and watches expenditure} - \text{health and education expenditures})$$

Note that it is important to make a distinction between actual saving rate and desired saving rate. The *actual saving rate* is calculated using the ex-post saving level which is the difference between income and consumption of the same period. It refers to the actual savings in the economy from the given level of income during the period of one year. This aspect of savings is considered in the calculation of *National Income*, hence, actual saving level is, by definition, equal to investment. On the other hand, *desired saving* refers to the planned saving by households and individuals during a given period of time. The amount of desired saving is given by *saving function* and the slope of this saving function is *marginal propensity to save (MPS)* or *desired saving rate*[40]. This is the saving intended to be made and, therefore, the *desired saving* can be thought as the difference between consumption in one period and income in the preceding period due to the adaptive behavior of households since they expect their current income close to the one in the preceding period. Consequently, *desired saving* might be lower or higher than *actual saving*. If *desired saving* falls short of *actual saving*; income and the saving made there-from would go up during the ensuing periods until desired and actual saving are equal at equilibrium income. If desired saving exceeds *actual saving*; income, and with it saving, would decline during the ensuing periods until it had fallen to the equilibrium level (Spiegel, H. W., 1991, p.609).

[40] We have estimated this saving function by GMM, 2SLS and LIML estimators in this study.

The saving rates calculated from actual *National Income Accounts* are actual saving rates whereas the saving rates obtained from the estimation of saving functions are the desired saving rates and they must not have confused each other.

In this study we have not only estimated the desired household saving rate but also calculated the actual household saving rate for 2019 as well.

As we have stated above, the desired saving rate simply relates the level of saving to the level of disposable household income. The desired saving rate is the slope of saving function. To estimate the desired saving rate, we estimated the following generic saving function using different saving definitions for household *i*:

$$\begin{aligned} Household\ Saving_i = f(&income\ level_i, age\ related\ dummies_i, \\ &household\ size\ related\ dummies_i, \\ &education\ related\ dummies_i, \\ &child\ related\ dummies_i, \\ &gender\ of\ household\ head\ dummy_i, \\ &working\ female\ dummies_i, \\ &household\ facility\ related\ dummies_i, \\ &insurance\ related\ dummies_i \\ &wealth\ related\ dummies_i) + u_i \end{aligned}$$

where u_i is the disturbance term.

Note that the estimation of desired saving rate involves an endogeneity problem (its contemporaneous correlation with the error term) since saving affects income through its impact on investment and capital accumulation (reverse causality situation). Another reason for endogeneity is measurement error in the income variable since the existence of a measurement error. There are commonly used techniques in handling this endogeneity problem in the literature such as Two-Stage Least Squares (2SLS) estimator, GMM estimator and Limited Information Maximum Likelihood (LIML) estimator. In this study we have used all these methods to estimate the household savings rate.

In this chapter, Section B gives a brief review of related empirical literature for the estimation of desired household saving rate. The presentation of data source is given in Section C. The estimation of desired household saving rate using 2SLS, LIML and GMM estimators for four different saving rate definitions (S1, S2, S3 and S4) is done in Section D. The Section E is devoted to the calculation of actual household saving rate of Türkiye in 2019. Finally, the Section F is reserved for discussion and concluding remarks.

V.B. LITERATURE REVIEW

Van Rijckeghem and Üçer (2009) focused on Türkiye's private savings in the years 2004-2005, investigating household savings rates and their determinants. Their study employed two different regression techniques: Probit regression and instrumental variable regression. The Probit regression, referred to as the first model, models the effect of explanatory variables such as Non-health expenditures, urban location, no health insurance, and numbers of household members on savings. The findings indicated that non-health expenditures had the most significant negative impact on private savings (-0.18). On the other hand, the absence of health insurance, considered as uncertainty in the study, was associated with higher savings (0.13). The presence of household members aged 60 and above was found to increase savings rates (0.19), while the presence of individuals under 15 years old decreased savings (-0.06). In the IV regressions separately estimated for 2004 and 2005, the effects of income, uncertainties, number of children in the household, and education variables on savings were compared. The results showed an increase in the coefficient for income from 0.14 in 2004 to 0.23 in 2005. The coefficients for the variable representing health risk, labeled as uncertainty, were estimated at 0.26 for 2004 and 0.28 for 2005, indicating that it was the variable that most increased private savings in the model. The presence of children aged 10-14 and 15-19 was found to have a negative impact on savings, and another finding of the study was that homeowners tended to save less compared to non-homeowners. Additionally, the study suggested that savings rates might be sensitive to economic conditions and that the recent decrease in savings rates could be due to the private sector realizing deferred expenditures following economic crises.

Kulikov et al. (2007) analyze the savings behavior of Estonian households in the microeconometric framework during the period of 2002-2005. The study emphasizes that the savings rate is positively related to both the regular and irregular income of households, but it is more significantly linked to temporary income. These findings are consistent with consumption smoothing theories. It has been observed that individuals who are self-employed have lower savings tendencies. Moreover, owning durable goods (especially vehicles) reduces savings. Younger and older individuals tend to save more than middle-aged individuals. As education levels increase, household savings decrease. Additionally, it is emphasized that these findings may be a result of intergenerational differences in the savings behavior of Estonian households rather than contradicting the predictions of the life cycle hypothesis.

Hüfner and Koske (2010) analyze the determinants of household savings rates in Germany and examine whether common factors in other industrial countries are effective. The study investigates the determinants of household savings rates in G7 countries using panel data analysis. The time span of the study varies, with series for France starting in 1978, Italy in 1975, and all other countries in 1970. The endpoint is 2008 for all countries except Italy and Japan, where the series end in 2007. They include various factors as determinants of savings, such as real household disposable income, real long-term interest rate, private consumption deflator, old-age dependence ratio, GDP share of liquid liabilities of banks and other financial intermediaries, GDP share of general government net financial liabilities, wealth effects, real stock prices, and real house prices. Panel cointegration tests, specifically the Kao cointegration test, are employed to demonstrate the long-term cointegration of these variables. The outcomes from the estimation of the panel error correction model reveal considerable variation in the magnitude of the error correction term across countries. For the US, Canada, and France, the deviation of the real savings rate from the equilibrium level is reduced by half in less than six months, whereas this process takes more than 1.5 years for the other four countries. Real household disposable income shows a positive correlation with the savings rate in Canada, Japan, Germany, France, and Italy, with coefficients ranging from 2.98 to 19.93. However, statistically significant coefficients are not observed for the US and the UK. In terms of the interest rate, it significantly

influences the savings rate in countries other than the US and the UK, with coefficients ranging from -0.43 to 0.87. The negative coefficients for Germany and France suggest that the substitution effect outweighs the income effect in these countries. The old-age dependency ratio is statistically significant in countries other than Germany, Italy, and Canada, with an estimated coefficient of -80.463, indicating a negative impact on savings. Real stock prices have a statistically significant influence in countries other than Japan and Italy, with a coefficient of -1.21, indicating a negative impact on savings. In conclusion, the old-age dependency ratio negatively affects savings, while real stock prices have a negative impact on savings in specific countries. The real house price variable is significant for the US, France, Italy, and the UK, with all coefficients estimated as negative, ranging from -4.76 to -8.65. The GDP share of general government net financial liabilities is only statistically significant for the US and France, with an approximate coefficient of 0.20, indicating an increase in savings. The GDP share of liquid liabilities of banks and other financial intermediaries is only statistically significant for France, with an estimated coefficient of -35.23. Finally, the private consumption deflator is significant for countries other than Germany and the UK, with positive coefficients (136.65 and 179.824) estimated. Additionally, this variable is significantly higher for France compared to other countries.

Cilasun (2009) examines the consumption and savings behavior of households under income risk and uncertainty in Türkiye. The study tests the precautionary savings hypothesis using social, demographic, and macro variables, utilizing household survey data from 2003 and 2004. Logit, probit, and 2SLS techniques are employed for model estimation. The findings emphasize the association between income risk and future income uncertainty, particularly for employed individuals. Therefore, it is expected that such uncertainty encourages employed individuals to save a portion of their income as precautionary savings. In addition to the traditional definition of savings, broader definitions including expenditures on durable goods are used in the analysis. The empirical investigations validate the forecasts of the precautionary savings hypothesis. It is noted that households elevate their savings in the face of risk and uncertainty, and a substantial portion of overall household savings is attributed to precautionary measures. Of the various types of risks examined, income risk emerges

as the primary worry for households, given that formal employment in the registered economy ensures a dependable income source and social security coverage. Furthermore, households adopt alternative strategies such as finding a second job and increasing the number of income earners in the family in addition to precautionary savings.

Horioka and Wan (2007) investigated the determinants of household savings rates in China using the life-cycle model. The research, covering the period from 1995 to 2004, analyzed Chinese household data using dynamic panel data analysis techniques. The study focused on three structures: rural, urban, and overall, with various comparisons available. The determinants of savings were assigned as income growth rate, inflation, dependency rate, and real interest rate. According to the findings obtained from the models estimated using the system GMM estimator, inflation is not statistically significant in overall and urban models; however, it is negative and statistically significant in the rural model. This indicates that inflation negatively affects savings in urban settings. The dependency rate is significant in rural and urban models, and overall, the old dependency rate increases savings. While the interest rate is not significant in the urban model, it is significant and positively related in the other two models. Income growth rate is statistically significant in all three models and positively affects savings. However, when compared, the coefficient is highest in the urban model at 0.40, while it is 0.54 in the rural model. Therefore, the income variable increases savings more in the rural model. These results provide mixed support for the life-cycle hypothesis and the permanent income hypothesis, indicating compatibility with the presence of continuity or persistence.

Bersales and Mapa (2006) focused on investigating the pattern of household savings in the Philippines, focusing on the periods from 1988 to 2003 (covering a total of 7 FIES surveys from 1985, 1988, 1991, 1994, 1997, 2000, and 2003). For the savings model, they used explanatory variables such as initial income, female labor force participation, life expectancy, percentage of young dependents, percentage of elderly, household income from abroad, number of banks, education, inflation rate, and number of closed banks, utilizing panel data analysis techniques. They attempted to

explain savings using four different models (some variables were not present in certain models) and estimated these models using the FE estimator. The variables initial income, education, proportion of young dependents, and proportion of elderly were statistically significant in all models, with all but the young dependents having a positive impact on savings. However, when comparing the effects of these variables, the income variable had the greatest impact. Female labor force participation and life expectancy were included only in the first model but were not statistically significant. The variable income from abroad was present in all models and was statistically significant, exerting the second-highest positive effect on savings after the income variable. The inflation variable was present in all models except the first but was not statistically significant. The number of closed banks was present in the second and third models but was not statistically significant.

Yükseler and Türkan (2008) aimed to not only closely examine households as a fundamental economic unit but also to reveal the direction and extent of their influence from the mentioned period of change. The study utilized survey results on household labor, budget, poverty, savings, and life satisfaction from the general period of 2002-2006. It analyzed the role of households in the labor market, income generation, income distribution among households, structure of consumption expenditure, distribution of consumption expenditure among households, changes in consumption patterns, savings tendencies, poverty, and life satisfaction. The research indicated that the average household savings rate, calculated from the household budget survey, showed general stability from 2002 to 2004. However, in 2005, due to a rapid increase in consumption, household savings decreased significantly, leading to a notable decline in the average savings rate. The average savings rate, which was 16.8% in the 2002-2004 period, decreased to 10.1% in 2005. Furthermore, the study emphasized the need to consider both the poverty rate and income levels in calculating negative savings rates in low-income groups.

Ceritoğlu (2009) examined the income, consumption, and saving dynamics of Turkish households within the framework of the life-cycle theory using the Turkish Household Budget Survey data from 2002 to 2009. The study employed cross-sectional analysis

techniques (OLS and GMM) along with cohort techniques (graphical findings provided) to analyze formal-informal income, formal-informal consumption, and formal-informal saving data. During the analysis, the sample households were stratified by location (urban-rural areas) to deepen the analysis, and significant differences between urban and rural households, particularly in terms of saving behavior, were noted. Furthermore, the study examined the income, consumption, and savings of formal and informal households. The analysis of these households provides insights into precautionary savings due to the higher income uncertainty in informal households, as they are expected to save more due to precautionary reasons. Ultimately, the validity of the life-cycle model and the precautionary saving hypothesis was assessed through the estimation of log-linearized Euler equations. In the examination of the precautionary saving hypothesis, the formal-informal data was utilized as an indicator for the risk variable. The estimation results indicated that the life-cycle model was not applicable to Türkiye, although there was no evidence suggesting that this lack of applicability was attributed to precautionary saving.

Yılmazer (2010) aimed to understand the savings profile and determinants of households in Türkiye and to present policy options to promote domestic savings to sustain economic growth. The study evaluated data compiled from a household survey covering the years 2007 and 2008 and including 79 provinces in Türkiye within the framework of tobit and probit regressions. The research examined the status of whether households have savings and their financial asset holding status. In the study, five models were used to evaluate savings, considering variables believed to affect savings such as household income, education status, age of household head, urbanicity, region, current work status, the number of income earners, household size, single female, and married variables. It was noted that the variable that most significantly increased savings in the models of whether households have savings or not is household income. Similar results were obtained in the models for financial assets, with income having the highest coefficient in these models as well. Interestingly, the education variable is statistically significant in the models for financial assets, with most coefficients being statistically significant and having positive effects on savings. Education variables differ from the model of whether households have savings in this regard. The number

of income earners is a statistically significant variable for whether households have savings, while it is statistically significant for not having savings. This variable has a negative impact on not having savings. Among the region variables, only Southeastern Anatolia, Central East Anatolia, and Northeastern Anatolia affect whether households have savings or not. Positive coefficients were estimated for this region in both models. The variables for married and single women are not significant in either of the models for whether households have savings or not. The household size variable reduces the likelihood of having savings while increasing the likelihood of not having savings. In the models for financial assets, household income and education level play an important role in the increase of financial and non-financial assets. Additionally, there are significant inequalities in the acquisition of financial and non-financial assets among net worth groups. Ownership of gold decreases with the age of the household head, but age does not have an effect on the amount of financial assets held in financial institutions. Furthermore, ownership of non-financial assets increases with the age of the household head. Finally, among the regional findings of the study, it was observed that households living in Istanbul, Eastern Marmara, and Western Marmara have higher savings rates compared to other regions.

Aktaş et al. (2012) conducted research on the structural determinants of household savings in Türkiye using the Household Budget Surveys covering the years 2003-2008. The study modeled variables believed to affect savings, such as income, age of the household head, education, household type, child dependency ratio, elderly dependency ratio, years of schooling, ratio of working females to females, wealth, and income, using the 2SLS estimator. Throughout the period under review, it was observed that the income variable had a positive effect on savings. The dependency rate variables were noted to be significant determinants of savings, with a lower proportion of dependent children or elderly individuals leading to higher savings rates. Additionally, the study found that the participation of women in the labor force has significant effects; households where women are employed at higher rates tend to have higher savings rates. Furthermore, households where the head is self-employed or an employer also have higher savings rates. It was also observed that when retirement pensions, which constitute a part of household income, are higher, the relative amount

of savings tends to be lower. The findings of the study underscore the strong evidence for precautionary savings.

Özlale (2012) has investigated the impact of education and health policies on savings in Türkiye. The study suggests that education and health expenditures increase savings and directly influence economic growth. Furthermore, the study presents findings indicating that education and health policies facilitate transitions between income strata, leading to improvements in savings behavior. Additionally, it emphasizes the positive externalities of education and health expenditures, highlighting the necessity of effective public policies. The study also provides a comparative analysis of health and education expenditures in the Turkish economy based on data from 1994 to 2005, comparing them with those of industrialized countries. Despite recent increases in these expenditures, Türkiye's spending on education and health is noted to be below the average of EU and OECD countries, while its infant mortality rate is above the average. In conclusion, the study offers insights into how education and health policies impact savings in the economy, emphasizing their positive contributions to economic growth and social welfare. As explained above, similar to the determinants of aggregate private savings discussed in Chapter 3, among other things, it is important to choose exact variables that proxy the factor whose effect is being investigated.

The differences in variable selection and in conclusions reached for a few outlined studies are exemplified in the table below.

Table 46 Selected Empirical Studies of Household Saving Determinants in Türkiye

Specific Variable	Empirical Findings		
	Positive	**Negative**	**Insignificant**
Income	1, 2, 3, 4, 5, 6, 7		
Household size	1, 4	1, 3, 6	
Urban location		3, 5, 6, 7	
Social security scheme	1, 3	4, 7	1, 5
Home ownership	3, 6, 7	5	
Car ownership		6	4
Aged 40-60	1, 2, 3, 4		1

Table 46 (continued)

Specific Variable	Empirical Findings		
	Positive	**Negative**	**Insignificant**
Aged over 60	1	2, 3	1
Interest income	7		3
Health risk	3		
Ratio of working females	4, 7		5
Young dependency ratio		4, 7	
Old dependency ratio	4, 7		5
Education	1, 2, 4, 6	7	1, 5

Notes: (1) Bozkuş and Üçdoğruk (2007)
(2) Cilasun and Kırdar (2009)
(3) Van Rijckeghem (2010)
(4) Aktaş et al. (2012)
(5) Çolak and Öztürkler (2012)
(6) Şengür and Taban (2016)
(7) Erdem (2017)

V.C. DATA SOURCE

In this study, to estimate the desired saving rate of households in Türkiye the cross-sectional data from the HBS conducted by the TurkStat for 2019 is used. We have chosen 2019 to get rid of the disturbing effects of COVID-19 pandemic in and after 2020.

HBS, conducted regularly by the TurkStat since 2002, serves as a crucial data source for obtaining insights into the socio-economic characteristics, income levels, and consumption patterns of households.

Additionally, it plays a key role in identifying societal needs and assessing the effectiveness of applied socio-economic policies. The survey samples households using a stratified two-stage cluster sampling method, with variations in the selection of households each month over the course of a year. The survey encompasses all settlements within the borders of the Republic of Türkiye. The classification of household consumption expenditures is carried out using Classification of Individual Consumption by Purpose (COICOP)/HBS has been used to classify the consumption expenditures of households. Data covers 11,399 households with 35,354 members.

V.D. DESIRED SAVING RATE OF HOUSEHOLDS IN TÜRKİYE

The estimation of desired saving rate involves an endogeneity problem (its contemporaneous correlation with the error term) since saving affects income through its impact on investment and capital accumulation (reverse causality situation). Another reason for endogeneity is measurement error in the income variable since the existence of a measurement error in the independent variable of a regression leads to the endogeneity problem.

There are commonly used techniques in handling this endogeneity problem in the literature such as 2SLS, GMM estimator and LIML estimator. In this study we have used all these methods to estimate the household savings rate.

V.D.1. Estimation Methods: 2SLS, LIML and GMM

In this study we have used 2SLS, GMM estimator and LIML estimator to address the problem of endogeneity due to reverse causality in the estimation of savings rate and possible existence of measurement errors in the independent variables.

V.D.1.1. Two-Stage Least Squares (2SLS) Estimator

Many economic models involve endogeneity situation where OLS is not capable of producing consistent parameter estimates. To solve the problem of endogeneity the instrumental variables estimator is used extensively. A popular form of that estimator is known as 2SLS. The model can be written as follows[41]:

$$\mathbf{y} = \mathbf{Y}\beta_1 + \mathbf{X}_1\beta_2 + \mathbf{u} = \mathbf{X}\boldsymbol{\beta} + \mathbf{u}$$

$$\mathbf{Y} = \mathbf{X}_1\boldsymbol{\Pi}_1 + \mathbf{X}_2\boldsymbol{\Pi}_2 + \mathbf{v} = \mathbf{Z}\boldsymbol{\Pi} + \mathbf{V}$$

[41] Items printed in lowercase and italicized (for example, *x*) are scalars. Items printed in lowercase and boldfaced (for example, **x**) are vectors. Items printed in uppercase and boldfaced (for example, **X**) are matrices.

where $\mathbf{y}$ is dependent variable; $\mathbf{Y}$ is the matrix of p endogenous explanatory variables; $\mathbf{X}_1$ is the matrix of included exogenous explanatory variables; $\mathbf{X}_2$ is the matrix of excluded exogenous explanatory variables; $\mathbf{X}=\begin{bmatrix}\mathbf{Y} & \mathbf{X}_1\end{bmatrix}$; $\mathbf{Z}=\begin{bmatrix}\mathbf{X}_1 & \mathbf{X}_2\end{bmatrix}$; $\mathbf{u}$ and $\mathbf{V}$ are vector of disturbance terms; $\boldsymbol{\beta}=\begin{bmatrix}\beta_1 & \beta_2\end{bmatrix}$ and $\boldsymbol{\Pi}=\begin{bmatrix}\boldsymbol{\Pi}_1 & \boldsymbol{\Pi}_2\end{bmatrix}$ are the vectors of parameters. The 2SLS estimator of $\boldsymbol{\beta}$ is obtained as follows:

$$\hat{\boldsymbol{\beta}}^{2SLS}=\left[\mathbf{X}'(\mathbf{I}-\mathbf{M}_\mathbf{Z})\mathbf{X}\right]^{-1}\mathbf{X}'(\mathbf{I}-\mathbf{M}_\mathbf{Z})\mathbf{y}$$

V.D.1.2. Limited-Information Maximum Likelihood (LIML) Estimator

The LIML method was suggested by Girshick and Haavelmo (1947) and formalized by Anderson and Rubin (1949). The LIML estimator is efficient within the class of single equation estimators when the errors are normally distributed. LIML estimator is a special case of *k-class estimator*. (Davidson and MacKinnon, 2001, p. 539). Limited information estimators (2SLS and LIML) do not take account of cross equation correlations embedded in the system as a whole.

The *k*-class estimator of $\boldsymbol{\beta}$ is given as follows:

$$\hat{\boldsymbol{\beta}}^{LIML}=\left[\mathbf{X}'(\mathbf{I}-k\mathbf{M}_\mathbf{Z})\mathbf{X}\right]^{-1}\mathbf{X}'(\mathbf{I}-\mathbf{M}_\mathbf{Z})\mathbf{y}$$

The LIML estimator of $\boldsymbol{\beta}$ is obtained by choosing k to be the minimum eigenvalue of $(\mathbf{Y}'\mathbf{M}_\mathbf{Z}\mathbf{Y})^{-1/2}\mathbf{Y}'\mathbf{M}_{\mathbf{X}_1}\mathbf{Y}(\mathbf{Y}'\mathbf{M}_\mathbf{Z}\mathbf{Y})^{-1/2}$ where $\mathbf{M}_{\mathbf{X}_1}=\mathbf{I}-\mathbf{X}_1(\mathbf{X}_1'\mathbf{X}_1)^{-1}\mathbf{X}_1'$.

V.D.1.3. Generalized Method of Moments (GMM) Estimator

The GMM procedure was introduced into the econometrics literature by Hansen (1982). It, basically, involves the estimation of the parameters of the model in question by imposing the restrictions assumed about the moments of the variables involved, to

the sample moments. It provides us with estimators of the parameters which are consistent but not necessarily efficient.

We can obtain an initial estimate of $\boldsymbol{\beta}$ by using 2SLS estimator and then compute the weighting matrix $\mathbf{W}$. With the help of this weighting matrix the GMM estimator can be obtained as follows:

$$\hat{\boldsymbol{\beta}}^{GMM} = \left[\mathbf{X}'(\mathbf{ZWZ}')\mathbf{X}\right]^{-1}\mathbf{X}'(\mathbf{ZWZ}')\mathbf{y}$$

V.D.2. Desired Savings Rates: Narrowest Definition of Savings (S1)

Various definitions of savings exist (Lusardi et al., 2001), and the outcomes may vary significantly depending on the specific measure of savings under consideration.

We have used four definitions (S1, S2, S3 and S4) to measure household savings. The first definition of savings (S1), which is the most common definition, is given by the difference between monthly total disposable income and total monthly expenditure of households:

S1≡Disposable Income-Total Consumption

The desired saving rate establishes a straightforward connection between the amount of savings and the level of disposable household income. The desired saving rate is the slope of saving function. To estimate the desired saving rate, we estimated the following saving function:

$$\begin{aligned} S1_i = {} & \beta_0 + \beta_1 Income\_monthly_i + \beta_2 DUM\_hhsize\_high_i \\ & + \beta_3 DUM\_hhsize\_morethanaverage_i + \beta_4 DUM\_edu\_cont_i \\ & + \beta_5 DUM\_fam\_child_i + \beta_6 DUM\_uni_i + \beta_7 DUM\_age\_55_i \\ & + \beta_8 Rate\_working\_females_i + \beta_9 DUM\_fam\_head\_f_i \\ & + \beta_{10} DUM\_income\_high_i + \beta_{11} DUM\_hh\_hotwater_i \\ & + \beta_{12} DUM\_hh\_private\_insurance_i + \beta_{13} DUM\_otherproperty3_i + u_i \end{aligned}$$

where $S1_i$ is savings level (first definition) and $Income\_monthly_i$ is household monthly disposable income. They represent the main variables of a household saving function. Note that in the equation, β_1 (coefficient of income) is the parameter for desired saving rate (marginal propensity to save). We also added some variables into saving function to control for wealth and other characteristics of households. The variables to control for household characteristics are:

- $DUM\_hhsize\_high_i$ is dummy variable for large household size[42],
- $DUM\_hhsize\_morethanaverage_i$ is dummy variable for more than average household size,
- $DUM\_edu\_cont_i$ is dummy variable for being taught in an education institution,
- $DUM\_fam\_child_i$ is dummy variable for having child[43],
- DUM_uni_i is dummy variable for university graduation,
- $DUM\_age\_55_i$ is dummy variable for age higher than 55,
- $Rate\_working\_females_i$ is rate of females working within total workers of household,
- $DUM\_fam\_head\_f_i$ is dummy variable for female family head,
- $DUM\_income\_high_i$ is dummy variable for high income level[44],
- $DUM\_hh\_hotwater_i$ is dummy variable for hot water availability in house,
- $DUM\_hh\_private\_insurance_i$ is a dummy variable indicating whether the household includes any member responsible for paying premiums for health insurance, individual retirement fund, discretionary retirement fund, etc.,

[42] 1 if the size of household is at least 3 standard deviations higher than the average household size; 0 otherwise.

[43] 1 if the household involves a couple with at least one resident child (code 22 in survey) or a lone parent with at least one resident child (code 23 in survey); 0 otherwise.

[44] 1 if the income of household is at least 3 standard deviations higher than the average household income; 0 otherwise.

- $DUM\_otherproperty3_i$ is dummy variable for household having a flat, shop or a detached dwelling.

Table 47 Estimation of Savings Function (Dependent variable: S1)

VARIABLES	GMM	2SLS	LIML
income_monthly	**0.147*** (0.000)**	0.146*** (0.000)	0.146*** (0.000)
dum_hhsize_high	-1,941*** (0.001)	-1,911*** (0.001)	-1,911*** (0.001)
dum_hhsize_morethanaverage	-136.2*** (0.000)	-135.0*** (0.000)	-135.0*** (0.000)
dum_edu_cont	-116.7** (0.011)	-117.0** (0.011)	-117.0** (0.011)
dum_fam_child	-134.8*** (0.001)	-135.3*** (0.001)	-135.3*** (0.001)
dum_uni	320.5*** (0.009)	324.5*** (0.009)	324.6*** (0.009)
dum_age_55	366.7*** (0.000)	365.8*** (0.000)	365.8*** (0.000)
rate_working_females	736.4*** (0.000)	736.8*** (0.000)	736.9*** (0.000)
dum_famhead_f	-190.0** (0.012)	-188.2** (0.013)	-188.2** (0.013)
dum_income_high	9,619*** (0.000)	9,643*** (0.000)	9,644*** (0.000)
dum_hh_hotwater	-320.9*** (0.000)	-317.6*** (0.000)	-317.5*** (0.000)
dum_hh_private_insurance	-346.4*** (0.001)	-344.1*** (0.001)	-344.0*** (0.001)
dum_otherproperty3	309.3*** (0.000)	309.0*** (0.000)	309.0*** (0.000)
Constant	-1,516*** (0.000)	-1,504*** (0.000)	-1,503*** (0.000)
Observations	11,399	11,399	11,399
R-squared	0.246	0.245	0.245
Instruments [for income_monthly]	sch_year age	sch_year age	sch_year age
Endogeneity Test [chi2(1)]	60.368*** (0.000)	60.051*** (0.000)	na
Hansen's J Test [chi2(1)]	0.098 (0.754)	0.098 (0.754)	0.113 (0.736)
First Stage Test [F test]	268.061*** (0.000)	268.061*** (0.000)	268.061*** (0.000)

Notes: (1) The values in parenthesis are corresponding probability values. Asterisk *, ** and *** represent significance level at 10, 5 and 1% respectively.

(2) The dependent variable is S1 in this regression. Note that this definition of savings is as follows: "S1≡Disposable Income-Total Consumption".

(3) *S1* is savings level (first definition), *income_monthly* is household monthly income, *dum_hhsize_high* is dummy variable for large household size, *dum_hhsize_morethanaverage* is dummy variable for more than average household size, *dum_edu_cont* is dummy variable for being taught in an education institution, *dum_fam_child* is dummy variable for having child, *dum_uni* is dummy variable for university graduation, *dum_age_55* is dummy variable for age higher than 55, *rate_working_females* is rate of females working within total workers of household, *dum_famhead_f* is dummy variable for female family head, *dum_income_high* is dummy variable for high income level, *dum_hh_hotwater* is dummy variable for hot water availability in house, *dum_hh_private_insurance* is dummy variable whether the household has any member, who pays premiums for private health insurance, individual retirement fund or discretionary retirement fund etc., *dum_otherproperty3* is dummy variable for household having a flat, shop or a detached dwelling.

To verify whether endogenous regressors in the model are genuinely exogenous, an endogeneity test was employed. The GMM estimation provides the C statistic (difference-in-Sargan), while for 2SLS estimation with an unadjusted Variance-Covariance Matrix of Estimators (VCE), the Durbin (1954) and Wu–Hausman (Wu, 1974; Hausman, 1978) statistics are presented. The outcomes of the tests are detailed in the table. In all cases (except LIML estimator for which the test is not available) the null hypothesis of no endogeneity is rejected and hence the use of estimators taking into account endogeneity is confirmed.

Before we dwell on estimation results given in the table, we should first check to make sure that the instruments (schooling year and age) are sufficiently correlated with saving rate (S1). To control the strength of the instruments we used the first stage test of Stata. The null hypothesis that used instruments are weak are rejected in all cases hence the first-stage test results proved that schooling year and age are not weak instruments. In addition, the reported F statistic is above the generally accepted threshold value of 10, as well. Consequently, we do not have a weak-instrument problem. Note also that first-stage test statistic is heteroskedasticity and autocorrelation-robust. On the other hand, in cases where the instruments exhibit weak correlation with the endogenous regressors, some Monte Carlo evidence indicates that the LIML estimator outperforms the 2SLS and GMM estimators (Poi, 2006; and Stock, Wright, and Yogo, 2002). For this reason, the estimation and test results of LIML estimator are also reported.

Another examination regarding instruments involves conducting a test for overidentifying restrictions. This test presupposes the validity of one instrument and subsequently assesses the validity of all other instruments, specifically checking whether these instruments are uncorrelated with the error term in the second stage. Therefore, we should also carry out a test of overidentifying restrictions to verify the validity of our instruments. In the table, the Hansen's J Test reports the tests of overidentifying restrictions. In fact, for the GMM estimator Hansen's (1982) J statistic $\chi 2$ test, for the 2SLS estimator Sargan's (1958) $\chi 2$ test; for the LIML estimator Anderson and Rubin's (1950) $\chi 2$ test are reported. A statistically significant test

statistic indicates that the instruments may not be valid. According to the results, we do not reject the overidentifying restrictions hence we confirmed that at least one instrument is valid. Tests of overidentifying restrictions effectively assess two distinct factors concurrently. First, they evaluate whether the instruments are uncorrelated with the error term. Second, they examine the possibility of equation mis-specification.

Therefore, a significant test statistic could indicate either an invalid instrument or an erroneously specified structural equation. Our estimation results reveal insignificant test statistics, affirming the absence of both invalid instruments and incorrectly specified structural equations.

Estimation results show that high household size (at least 3 standard deviations higher than the average household size which corresponds to household size higher than 5), more than average household size (household sizes which are more than 2.4), attending education, having child, being female family head, having hot water availability in house, paying premiums for private insurance, have negative effect on narrowest definition of total household savings level (S1 definition[45]).

In addition, having a university degree, being older than 55 years, rate of working females (sample average is %11), high level of annual disposable income (households with annual disposable income levels higher than 229,180 TL or 40,281 USD with 2019 prices) and owning other properties in the form of flat, shop or a detached dwelling have positive effect on narrowest definition of household savings level (S1)[46].

According to the estimation results, the *marginal propensity to save (desired savings rate)* of Turkish households in 2019 for the narrowest definition of savings (S1 definition[47]) is found to be *14.7 percent* (GMM estimation is our basis). The other two

[45] S1≡Disposable Income-Total Consumption.

[46] S1≡Disposable Income-Total Consumption.

[47] S1≡Disposable Income-Total Consumption.

estimators also confirm the robustness of this figure since their values are very close to this figure (14.6 percent).

V.D.3. Desired Savings Rates: Second Definition of Savings (S2)

Durable goods are commonly characterized by having a lifespan of at least three years. The household expenditure on durable goods can be viewed as a type of savings because a portion of the expenditure is considered an investment decision aimed at generating a continuous stream of future consumption services.

The second definition of savings adds durable goods expenditure of households into the S1 definition of savings. In other words, we exclude the durable goods consumption from total consumption.

S2≡S1+Durable Goods Consumption

or

S2≡Disposable Income-(Total Consumption- Durable Goods Consumption)

The estimated model is as follows:

$$\begin{aligned} S2_i = {} & \beta_0 + \beta_1 Income\_monthly_i + \beta_2 DUM\_hhsize\_high_i \\ & + \beta_3 DUM\_hhsize\_morethanaverage_i + \beta_4 DUM\_edu\_cont_i \\ & + \beta_5 DUM\_fam\_child_i + \beta_6 DUM\_uni_i + \beta_7 DUM\_age\_55_i \\ & + \beta_8 Rate\_working\_females_i + \beta_9 DUM\_fam\_head\_f_i \\ & + \beta_{10} DUM\_income\_high_i + \beta_{11} DUM\_hh\_hotwater_i \\ & + \beta_{12} DUM\_hh\_private\_insurance_i + \beta_{13} DUM\_otherproperty3_i + u_i \end{aligned}$$

where

- $S2_i$ is savings level (second definition),
- $Income\_monthly_i$ is household monthly disposable income,
- $DUM\_hhsize\_morethanaverage_i$ is dummy variable for more than average household size,

- $DUM\_hhsize\_high_i$ is dummy variable for large household size[48],
- $DUM\_edu\_cont_i$ is dummy variable for being taught in an education institution,
- $DUM\_fam\_child_i$ is dummy variable for having child[49],
- DUM_uni_i is dummy variable for university graduation,
- $DUM\_age\_55_i$ is dummy variable for age higher than 55,
- $Rate\_working\_females_i$ is rate of females working within total workers of household,
- $DUM\_fam\_head\_f_i$ is dummy variable for female family head,
- $DUM\_income\_high_i$ is dummy variable for high income level[50],
- $DUM\_hh\_hotwater_i$ is dummy variable for hot water availability in house,
- $DUM\_hh\_private\_insurance_i$ is dummy variable whether the household has any member, who pays premiums for health insurance, individual retirement fund or discretionary retirement fund etc.,
- $DUM\_otherproperty3_i$ is dummy variable for household having a flat, shop or a detached dwelling.

Before we dwell on estimation results given in the table, we should first check to make sure that the instruments (schooling year and age) are sufficiently correlated with saving rate (S2). To control the strength of the instruments we used the first stage test of Stata. The null hypothesis that used instruments are weak are rejected in all cases hence the first-stage test results proved that schooling year and age are not weak instruments. In addition, the reported F statistic is above the generally accepted threshold value of 10, as well. Consequently, we do not have a weak-instrument problem. Note also that first-stage test statistic is heteroskedasticity and autocorrelation-robust. On the other hand, if the instruments exhibit a weak correlation

[48] 1 if the size of household is at least 3 standard deviations higher than the average household size; 0 otherwise.

[49] 1 if the household involves a couple with at least one resident child (code 22 in survey) or a lone parent with at least one resident child (code 23 in survey); 0 otherwise.

[50] 1 if the income of household is at least 3 standard deviations higher than the average household income; 0 otherwise.

with the endogenous regressors, there is some Monte Carlo evidence indicating that the LIML estimator outperforms both the 2SLS and GMM estimators (Poi, 2006; and Stock et al., 2002). For this reason, the estimation and test results of LIML estimator are also reported.

To ascertain whether endogenous regressors in the model are genuinely exogenous, an endogeneity test was employed. The GMM estimation reports the C statistic (difference-in-Sargan), while for 2SLS estimation with an unadjusted VCE, the Durbin (1954) and Wu–Hausman (Wu, 1974; Hausman, 1978) statistics are presented. The results of the tests are documented in the table. In all cases (except LIML estimator for which the test is not available) the null hypothesis of no endogeneity is rejected and hence the use of estimators taking into account endogeneity is confirmed.

Another examination regarding instruments is a test of overidentifying restrictions. This test assumes the validity of one instrument and subsequently assesses the validity of all other instruments, checking whether these instruments are uncorrelated with the error term in the second stage. Therefore, we should also carry out a test of overidentifying restrictions to verify the validity of our instruments. In the table, the Hansen's J Test reports the tests of overidentifying restrictions. In fact, for the GMM estimator Hansen's (1982) J statistic $\chi 2$ test, for the 2SLS estimator Sargan's (1958) $\chi 2$ test; for the LIML estimator Anderson and Rubin's (1950) $\chi 2$ test are reported. A statistically significant test statistic indicates that the instruments may not be valid. According to the results, we do not reject the overidentifying restrictions hence we confirmed that at least one instrument is valid. Tests of overidentifying restrictions simultaneously examine two distinct factors. One assesses whether the instruments are uncorrelated with the error term, while the other considers the potential mis-specification of the equation. Therefore, a noteworthy test statistic could indicate either an invalid instrument or an incorrectly specified structural equation. Our estimation results reveal insignificant test statistics, confirming the absence of both invalid instruments and incorrectly specified structural equation situations. Estimation results show that high household size (at least 3 standard deviations higher than the average household size which corresponds to household size higher than 5), more than average

household size (household sizes which are more than 2.4), attending education programs, having child, being female family head, having hot water availability in house, paying premiums for private insurance, have negative effect on the second definition of total household savings level (S2 definition)[51].

In addition, having a university degree, being older than 55 years, rate of working females (sample average is %11), high level of annual disposable income (households with annual disposable income levels higher than 229,180 TL or 40,281 USD with 2019 prices), and owning other properties in the form of flat, shop or a detached dwelling have positive effect on the second definition of household savings level (S2)[52].

According to the estimation results, the *marginal propensity to save (desired savings rate)* of Turkish households in 2019 for the second definition of savings (S2 definition)[53] is found to be *28.5 percent* (GMM estimation is our basis). The 2SLS and LIML estimators also confirm the robustness of this figure since their values are very close to this figure (29.0 and 28.9 percents, respectively).

Table 48 Estimation of Savings Function (Dependent variable: S2)

VARIABLES	GMM	2SLS	LIML
income_monthly	**0.285*** (0.000)**	0.290*** (0.000)	0.289*** (0.000)
dum_hhsize_high	-1,932*** (0.000)	-2,054*** (0.000)	-2,054*** (0.000)
dum_hhsize_morethanaverage	-232.4*** (0.000)	-237.0*** (0.000)	-236.9*** (0.000)
dum_edu_cont	-145.2*** (0.000)	-143.8*** (0.000)	-143.8*** (0.000)
dum_fam_child	-93.37*** (0.004)	-91.96*** (0.004)	-91.86*** (0.004)
dum_uni	259.2*** (0.007)	242.9** (0.012)	244.2** (0.011)

[51] "S2≡Disposable Income-(Total Consumption- Durable Goods Consumption)" or simply "S2≡S1+Durable Goods Consumption".

[52] "S2≡Disposable Income-(Total Consumption- Durable Goods Consumption)" or simply "S2≡S1+Durable Goods Consumption".

[53] "S2≡Disposable Income-(Total Consumption- Durable Goods Consumption)" or simply "S2≡S1+Durable Goods Consumption".

Table 48 (continued)

VARIABLES	GMM	2SLS	LIML
dum_age_55	203.6*** (0.000)	206.2*** (0.000)	206.1*** (0.000)
rate_working_females	551.0*** (0.000)	545.6*** (0.000)	547.3*** (0.000)
dum_famhead_f	-217.5*** (0.001)	-224.2*** (0.000)	-224.7*** (0.000)
dum_income_high	7,934*** (0.000)	7,809*** (0.000)	7,821*** (0.000)
dum_hh_hotwater	-263.0*** (0.000)	-278.7*** (0.000)	-277.6*** (0.000)
dum_hh_private_insurance	-174.9** (0.033)	-186.9** (0.023)	-185.7** (0.025)
dum_otherproperty3	307.9*** (0.000)	308.2*** (0.000)	308.8*** (0.000)
Constant	-1,207*** (0.000)	-1,268*** (0.000)	-1,263*** (0.000)
Observations	11,399	11,399	11,399
R-squared	0.426	0.428	0.428
Instruments [for income_monthly]	sch_year age	sch_year age	sch_year age
Endogeneity Test [chi2(1)]	68.282*** (0.000)	62.060*** (0.000)	na
Hansen's J Test [chi2(1)]	1.566 (0.210)	1.566 (0.210)	1.926 (0.165)
First Stage Test [F test]	268.061*** (0.000)	268.061*** (0.000)	268.061*** (0.000)

Notes: (1) The values in parenthesis are corresponding probability values. Asterisk *, ** and *** represent significance level at 10, 5 and 1% respectively.

(2) The dependent variable is S2 in this regression. Note that this definition of savings is as follows: "S2≡Disposable Income-(Total Consumption- Durable Goods Consumption)" or simply "S2≡S1+Durable Goods Consumption".

(3) *S2* is savings level (second definition), *income_monthly* is household monthly income, *dum_hhsize_high* is dummy variable for large household size, *dum_hhsize_morethanaverage* is dummy variable for more than average household size, *dum_edu_cont* is dummy variable for being taught in an education institution, *dum_fam_child* is dummy variable for having child, *dum_uni* is dummy variable for university graduation, *dum_age_55* is dummy variable for age higher than 55, *rate_working_females* is rate of females working within total workers of household, *dum_famhead_f* is dummy variable for female family head, *dum_income_high* is dummy variable for high income level, *dum_hh_hotwater* is dummy variable for hot water availability in house, *dum_hh_private_insurance* is dummy variable whether the household has any member, who pays premiums for health insurance, individual retirement fund or discretionary retirement fund etc., *dum_otherproperty3* is dummy variable for household having a flat, shop or a detached dwelling.

V.D.4. Desired Savings Rates: Third Definition of Savings (S3)

In Türkiye, numerous households choose to store their savings in the form of gold, making gold a prevalent savings instrument in our country. Regrettably, there is a lack of direct data on household expenditures specifically related to gold. Nevertheless, the TurkStat HBS gathers information on household spending for items such as jewelry, clocks, and watches. Following this idea, in this definition of saving, the expenditure

on jewelry, clocks and watches is decided not to be included in household consumption measures.

The third definition of savings (S3), for the reasons above, adds jewelry, clocks and watches expenditure of households into the S2 definition of savings. In this definition, apart from durable goods we also exclude jewelry, clocks and watches consumption from total consumption.

S3≡S2+Jewelry, clocks and watches expenditure[54]

or

S3≡Disposable Income-(Total Consumption- Durable Goods expenditure-Jewelry, clocks, and watches expenditure)

The estimated model is as follows:

$$\begin{aligned} S3_i = {} & \beta_0 + \beta_1 Income\_monthly_i + \beta_2 DUM\_hhsize\_high_i \\ & + \beta_3 DUM\_hhsize\_morethanaverage_i + \beta_4 DUM\_edu\_cont_i \\ & + \beta_5 DUM\_uni_i + \beta_6 Rate\_working\_females_i + \beta_7 DUM\_fam\_head\_f_i \\ & + \beta_8 DUM\_income\_high_i + \beta_9 DUM\_hh\_private\_insurance_i \\ & + \beta_{10} DUM\_otherproperty1_i + \beta_{11} number\_of\_child_i + u_i \end{aligned}$$

where

- $S3_i$ is savings level (third definition),
- $Income\_monthly_i$ is household monthly disposable income,
- $DUM\_hhsize\_high_i$ is dummy variable for large household size[55],
- $DUM\_hhsize\_morethanaverage_i$ is dummy variable for more than average household size,

[54] Jewelry, clocks and watches expenditure coverage (COICOP V.2011 Codes): 12311, 12312, 12313.

[55] 1 if the size of household is at least 3 standard deviations higher than the average household size; 0 otherwise.

- $DUM\_edu\_cont_i$ is dummy variable for being taught in an education institution,
- DUM_uni_i is dummy variable for university graduation,
- $Rate\_working\_females_i$ is rate of females working within total workers of household,
- $DUM\_fam\_head\_f_i$ is dummy variable for female family head,
- $DUM\_income\_high_i$ is dummy variable for high income level[56],
- $DUM\_hh\_private\_insurance_i$ is dummy variable whether the household has any member, who pays premiums for health insurance, individual retirement fund or discretionary retirement fund etc.,
- $DUM\_otherproperty1_i$ is dummy variable for household having another piece of property: a detached dwelling, a flat, a summer house, a field, a plantation, a greenhouse, land, a shop, a hotel and
- $number\_of\_child_i$ is number of children in the household.

To check whether the endogenous regressors in the model are genuinely exogenous, we conducted an endogeneity test. In the case of GMM estimation, the C statistic (difference-in-Sargan) is presented, while for 2SLS estimation with an unadjusted VCE, the Durbin (1954) and Wu–Hausman (Wu, 1974; Hausman, 1978) statistics are provided. The test results are reported in the table. In all cases (except LIML estimator for which the test is not available) the null hypothesis of no endogeneity is rejected and hence the use of estimators taking into account endogeneity is confirmed.

Before we dwell on estimation results given in the table, we should first check to make sure that the instruments (hh_internet_number[57] and age) are sufficiently correlated with saving rate (S3). To control the strength of the instruments we used the first stage test of Stata. The null hypothesis that used instruments are weak are rejected in all

[56] 1 if the income of household is at least 3 standard deviations higher than the average household income; 0 otherwise.

[57] Number of internet service subscription in the household.

cases hence the first-stage test results proved that schooling year and age are not weak instruments. In addition, the reported F statistic is above the generally accepted threshold value of 10, as well. Consequently, we do not have a weak-instrument problem for the instruments hh_internet_number (number of internet service subscription in the household) and age. Note also that first-stage test statistic is heteroskedasticity and autocorrelation-robust. On the other hand, when the instruments exhibit a low correlation with the endogenous regressors, certain Monte Carlo evidence indicates that the LIML estimator outperforms both the 2SLS and GMM estimators (Poi, 2006; and Stock et al., 2002). For this reason, the estimation and test results of LIML estimator are also reported.

A second examination concerning instruments involves testing overidentifying restrictions. This test assumes the validity of one instrument and then assesses the validity of all other instruments, specifically checking whether the instruments are uncorrelated with the error term in the second stage. Consequently, we should conduct a test of overidentifying restrictions to validate the accuracy of our instruments. In the provided table, Hansen's J Test reports the tests of overidentifying restrictions. Specifically, for the GMM estimator, Hansen's (1982) J statistic $\chi 2$ test is reported, for the 2SLS estimator, Sargan's (1958) $\chi 2$ test is presented, and for the LIML estimator, Anderson and Rubin's (1950) $\chi 2$ test is documented. A statistically significant test statistic suggests that the instruments may not be valid. According to the results, we do not reject the overidentifying restrictions, confirming that at least one instrument is valid. Tests of overidentifying restrictions concurrently examine two distinct factors. One assesses whether the instruments are uncorrelated with the error term, while the other considers the potential mis-specification of the equation. Therefore, a noteworthy test statistic could indicate either an invalid instrument or an incorrectly specified structural equation. Our estimation results reveal insignificant test statistics, confirming the absence of both invalid instruments and incorrectly specified structural equation situations.

Estimation results show that high household size (at least 3 standard deviations higher than the average household size which corresponds to household size higher than 5),

more than average household size (household sizes which are more than 2.4), attending education programs, being female family head, number of children in the household have negative effect on the third definition of total household savings level (S3 definition)[58].

In addition, having a university degree, rate of working females (sample average is %11), high level of annual disposable income (households with annual disposable income levels higher than 229,180 TL or 40,281 USD with 2019 prices), paying premiums for private insurance, and owning other properties in the form of a detached dwelling, a flat, a summer house, a field, a plantation, a greenhouse, land, a shop, a hotel have positive effect on the third definition of household savings level (S3)[59].

According to the estimation results, the *marginal propensity to save (desired savings rate)* of Turkish households in 2019 for the third definition of savings (S3 definition) is found to be *30.6 percent* (GMM estimation is our basis). The 2SLS and LIML estimators also confirm the robustness of this figure since their values are very close to this figure (30.7 percents).

Table 49 Estimation of Savings Function (Dependent variable: S3)

VARIABLES	GMM	2SLS	LIML
income_monthly	**0.306*** (0.000)**	0.307*** (0.000)	0.307*** (0.000)
dum_hhsize_high	-1,892*** (0.000)	-1,865*** (0.000)	-1,865*** (0.000)
dum_hhsize_morethanaverage	-246.6*** (0.000)	-252.2*** (0.000)	-252.2*** (0.000)
dum_edu_cont	-159.1*** (0.000)	-162.1*** (0.000)	-162.1*** (0.000)
dum_uni	473.0*** (0.000)	462.6*** (0.000)	463.2*** (0.000)
rate_working_females	696.9*** (0.000)	696.4*** (0.000)	697.0*** (0.000)
dum_famhead_f	-361.0*** (0.000)	-363.5*** (0.000)	-363.7*** (0.000)
dum_income_high	8,806*** (0.000)	8,792*** (0.000)	8,797*** (0.000)

[58] "S3≡Disposable Income-(Total Consumption- Durable Goods expenditure- Jewelry, clocks and watches expenditure)" or simply "S3≡S2+Jewellery, clocks and watches expenditure".

[59] "S3≡Disposable Income-(Total Consumption- Durable Goods expenditure- Jewelry, clocks and watches expenditure)" or simply "S3≡S2+Jewellery, clocks and watches expenditure".

Table 49 (continued)

VARIABLES	GMM	2SLS	LIML
dum_hh_private_insurance	220.8**	218.4**	218.8**
	(0.013)	(0.015)	(0.014)
dum_otherproperty1	470.2***	466.7***	466.9***
	(0.000)	(0.000)	(0.000)
number_of_child	-40.12**	-39.74**	-39.74**
	(0.014)	(0.015)	(0.015)
Constant	178.8	177.3	178.9
	(0.429)	(0.433)	(0.429)
Observations	11,399	11,399	11,399
R-squared	0.418	0.418	0.418
Instruments [for income_monthly]	hh_internet_number age	hh_internet_number age	hh_internet_number age
Endogeneity Test [chi2(1)]	182.031***	181.967***	na
	(0.000)	(0.000)	
Hansen's J Test [chi2(1)]	1.978	1.978	1.774
	(0.159)	(0.159)	(0.182)
First Stage Test [F test]	1209.42***	1209.42***	1209.42***
	(0.000)	(0.000)	(0.000)

Notes: (1) The values in parenthesis are corresponding probability values. Asterisk *, ** and *** represent significance level at 10, 5 and 1% respectively.

(2) The dependent variable is S3 in this regression. Note that this definition of savings is as follows: "S3≡Disposable Income-(Total Consumption- Durable Goods expenditure- Jewelry, clocks and watches expenditure)" or simply "S3≡S2+Jewellery, clocks and watches expenditure".

(3) *S3* is savings level (third definition), *income_monthly* is household monthly income, *dum_hhsize_high* is dummy variable for large household size, *dum_hhsize_morethanaverage* is dummy variable for more than average household size, *dum_edu_cont* is dummy variable for being taught in an education institution, *dum_uni* is dummy variable for university graduation, *rate_working_females* is rate of females working within total workers of household, *dum_famhead_f* is dummy variable for female family head, *dum_income_high* is dummy variable for high income level, *dum_hh_private_insurance* is dummy variable whether the household has any member, who pays premiums for private health insurance, individual retirement fund or discretionary retirement fund etc., *dum_otherproperty1* is dummy variable for household having a detached dwelling, a flat, a summer house, a field, a plantation, a greenhouse, land, a shop, a hotel; *number_of_child* is number of children in the household.

V.D.5. Desired Savings Rates: Largest Definition of Savings (S4)

This type of definition of savings includes health and education expenditure of households into the S3 definition of savings. In this definition, apart from durable goods, jewelry, clocks and watches consumption we also exclude health and education consumption from total consumption.

S4≡S3+ Health and Education expenditures

or

S4≡ Disposable Income- (Total Consumption-Durable Goods expenditure- Jewelry, Clocks and watches expenditure- health and education expenditures)

We can consider the health and education expenditures as investments in human capital and insurance purchases as saving as well as durable good consumption.

The estimated model is as follows:

$$S4_i = \beta_0 + \beta_1 Income\_monthly_i + \beta_2 DUM\_hhsize\_high_i + \beta_3 DUM\_hhsize\_morethanaverage_i + \beta_4 DUM\_income\_lessthanaverage_i + \beta_5 DUM\_fam\_head\_f_i + \beta_6 DUM\_income\_high_i + \beta_7 number\_of\_child_i + \beta_8 DUM\_otherproperty1_i + u_i$$

where

- $S4_i$ is savings level (fourth definition),
- $Income\_monthly_i$ is household monthly disposable income,
- $DUM\_hhsize\_high_i$ is dummy variable for large household size[60],
- $DUM\_hhsize\_morethanaverage_i$ is dummy variable for more than average household size,
- $DUM\_income\_lessthanaverage_i$ is dummy variable for households with income level less than sample average,
- $DUM\_fam\_head\_f_i$ is dummy variable for female family head,
- $DUM\_income\_high_i$ is dummy variable for high income level[61],
- $number\_of\_child_i$ is number of children in the household,
- $DUM\_otherproperty1_i$ is dummy variable for household having another piece of property: a detached dwelling, a flat, a summer house, a field, a plantation, a greenhouse, land, a shop, a hotel and
- $number\_of\_child_i$ is number of children in the household.

[60] 1 if the size of household is at least 3 standard deviations higher than the average household size; 0 otherwise.

[61] 1 if the income of household is at least 3 standard deviations higher than the average household income; 0 otherwise.

To check if endogenous regressors in the model are in fact exogenous we used the endogeneity test. For GMM estimation, the C (difference-in-Sargan) statistic is reported whereas for 2SLS estimation with an unadjusted VCE, the Durbin (1954) and Wu–Hausman (Wu 1974; Hausman 1978) statistics are reported. The test results are reported in the table. In all cases (except LIML estimator for which the test is not available) the null hypothesis of no endogeneity is rejected and hence the use of estimators taking into account endogeneity is confirmed.

Before we dwell on estimation results given in the table, we should first check to make sure that the instruments (hh_internet_number (number of internet service subscription in the household), income_cash_wage (monthly wage income in cash) and hh_security_system (security guard/system availability in the household) for GMM and 2SLS estimators; income_cash_wage (monthly wage income in cash) and hh_security_system (security guard/system availability in the household) for LIML estimator) are sufficiently correlated with saving rate (S4). To control the strength of the instruments we used the first stage test of Stata. The null hypothesis that used instruments are weak are rejected in all cases hence the first-stage test results proved that schooling year and age are not weak instruments. In addition, the reported F statistic is above the generally accepted threshold value of 10, as well. Consequently, we do not have a weak-instrument problem. Note also that first-stage test statistic is heteroskedasticity and autocorrelation-robust. Conversely, in situations where the instruments exhibit weak correlation with the endogenous regressors, certain Monte Carlo evidence indicates that the LIML estimator outperforms the 2SLS and GMM estimators, as demonstrated by studies such as Poi (2006) and Stock, Wright, and Yogo (2002). For this reason, the estimation and test results of LIML estimator are also reported.

Another examination related to instruments involves assessing overidentifying restrictions. This test presupposes the validity of one instrument and subsequently examines the validity of all other instruments, checking whether these instruments are uncorrelated with the error term in the second stage. Hence, it is imperative to conduct a test on overidentifying restrictions to confirm the credibility of our instruments. The

table includes the results of Hansen's J Test, which assesses these overidentifying restrictions. Specifically, the GMM estimator employs Hansen's (1982) J statistic $\chi 2$ test, the 2SLS estimator utilizes Sargan's (1958) $\chi 2$ test, and the LIML estimator relies on Anderson and Rubin's (1950) $\chi 2$ test. A test statistic that is statistically significant suggests potential issues with the validity of the instruments. According to the results, we do not reject the overidentifying restrictions hence we confirmed that at least one instrument is valid.

Table 50 Estimation of Savings Function (Dependent variable: S4)

VARIABLES	GMM	2SLS	LIML
income_monthly	**0.441*** (0.000)**	0.519*** (0.000)	0.562*** (0.000)
dum_hhsize_high	-2,004** (0.024)	-2,418** (0.012)	-2,428** (0.012)
dum_hhsize_morethanaverage	-383.6*** (0.000)	-393.1*** (0.000)	-386.5*** (0.000)
dum_income_lessthanaverage	-1,195*** (0.004)	-792.0* (0.091)	-570.6 (0.283)
dum_famhead_f	-491.5*** (0.001)	-465.0*** (0.002)	-455.1*** (0.003)
dum_income_high	7,202*** (0.000)	5,655*** (0.003)	4,805** (0.026)
number_of_child	-112.6*** (0.001)	-113.6*** (0.001)	-113.2*** (0.001)
dum_otherproperty1	269.0*** (0.002)	257.6*** (0.003)	241.4*** (0.005)
Constant	856.6 (0.201)	188.3 (0.806)	-178.8 (0.838)
Observations	7,448	7,448	7,448
R-squared	0.372	0.382	0.387
Instruments [for income_monthly]	hh_internet_number income_cash_wage hh_security_system	hh_internet_number income_cash_wage hh_security_system	income_cash_wage hh_security_system
Endogeneity Test [chi2(1)]	19.311*** (0.000)	10.413*** (0.000)	na
Hansen's J Test [chi2(1)]	3.13971 (0.208)	3.13971 (0.208)	1.747 (0.186)
First Stage Test [F test]	206.628*** (0.000)	206.628*** (0.000)	134.221*** (0.000)

Notes: (1) The values in parenthesis are corresponding probability values. Asterisk *, ** and *** represent significance level at 10, 5 and 1% respectively.

(2) The dependent variable is S4 in this regression. Note that this definition of savings is as follows: "S4≡Disposable Income-(Total Consumption- Durable Goods expenditure- Jewelry, Clocks and watches expenditure- health and education expenditures)" or simply "S4≡S3+ Health and Education expenditures".

(3) *S4* is savings level (fourth definition), *income_monthly* is household monthly income, *dum_hhsize_high* is dummy variable for large household size, *dum_hhsize_morethanaverage* is dummy variable for more than average household size, *dum_income_lessthanaverage* is dummy variable for households with income level less than sample average, *dum_famhead_f* is dummy variable for female family head, *dum_income_high* is dummy variable for high income level, *number_of_child* is number of children in the household, *dum_otherproperty1* is dummy variable for household having a detached dwelling, a flat, a summer house, a field, a plantation, a greenhouse, land, a shop, a hotel.

Tests for overidentifying restrictions, in fact, assess two distinct factors concurrently. Firstly, they examine whether the instruments are uncorrelated with the error term. Secondly, they assess the possibility of a mis-specified equation. Therefore, a noteworthy test statistic could indicate the presence of either an invalid instrument or an erroneously specified structural equation. Our estimation outcomes reveal insignificant test statistics, providing confirmation that there is neither an invalid instrument nor a situation of incorrectly specified structural equation.

Estimation results show that high household size (at least 3 standard deviations higher than the average household size which corresponds to household size higher than 5), more than average household size (household sizes which are more than 2.4), having annual disposable household income level less than the sample average (66,342 TL or 11,660 USD with 2019 prices), being female family head, number of children in the household have negative effect on the fourth definition of total household savings level (S4 definition).

In addition, high level of annual disposable income (households with annual disposable income levels higher than 229,180 TL or 40,281 USD with 2019 prices), and owning other properties in the form of a detached dwelling, a flat, a summer house, a field, a plantation, a greenhouse, land, a shop, a hotel have positive effect on the fourth definition of household savings level (S4).

According to the estimation results, the *marginal propensity to save (desired savings rate)* of Turkish households in 2019 for the fourth definition of savings (S4 definition) is found to be *44.1 percent* (GMM estimation is our basis). The 2SLS and LIML estimators give higher estimates which can result from the instrumental problems (51.9 and 56.2 percents respectively).

V.E. ACTUAL SAVING RATE OF HOUSEHOLDS IN TÜRKİYE

To calculate the actual saving rates of households in Türkiye for the period of 2009-2019 the cross-sectional data from the HBS conducted by the TurkStat is employed.

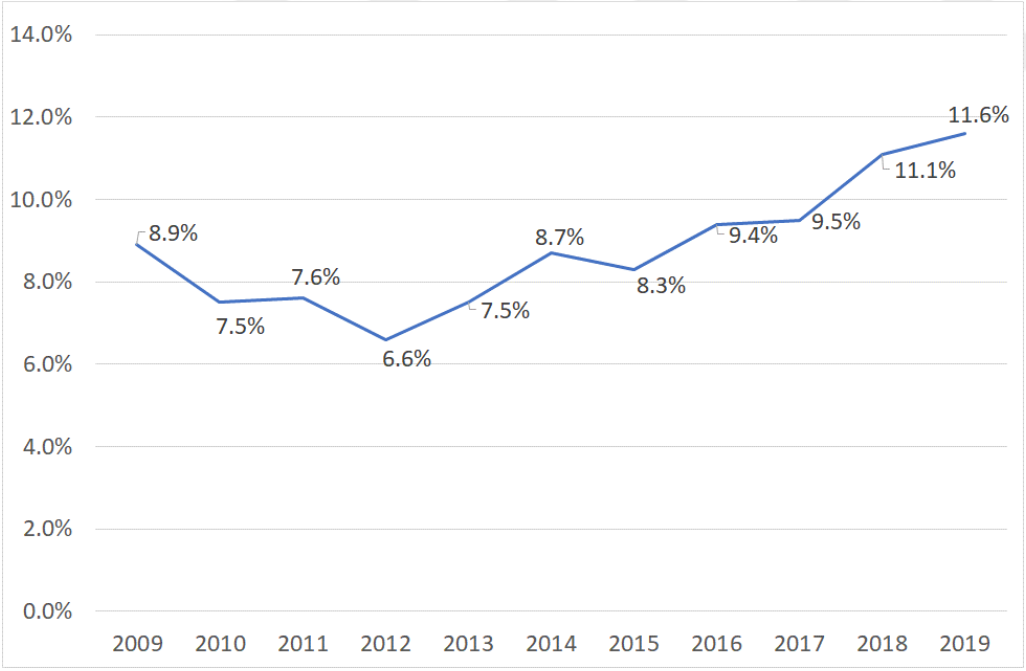
In the calculation the first definition of savings as "S1≡Disposable Income- Total Consumption" is adopted.

Table 51 Actual Savings Rate of Households in Türkiye (2009-2019)

Years	Actual Savings Rate (%)	Average Monthly Income (USD)	Average Monthly Saving (USD)
2009	8.9%	1153	102
2010	7.5%	1283	96
2011	7.6%	1337	95
2012	6.6%	1396	92
2013	7.5%	1419	106
2014	8.7%	1378	120
2015	8.3%	1150	95
2016	9.4%	1166	110
2017	9.5%	1083	102
2018	11.1%	980	109
2019	11.6%	931	108

Note: In the calculation of actual saving rate the first definition of saving as "S1≡Disposable Income-Total Consumption" is adopted.

Source: Author's own calculations.



Source: Author's own calculations.

Figure 23 Actual Household Saving Rate in Türkiye (2009-2019)

As can be seen in the figure, the actual household saving rate in Türkiye is below 10% before 2018 and increased to 11.6% in 2019. This shows an increasing trend saving rate although the level is still low.

V.F. DISCUSSION

Before starting to the discussion of our empirical findings, we need to clarify some points. The *actual saving rate* is also called the *ex-post saving rate* and calculated using the ex-post (actual) saving level which is the difference between income and consumption of the same period. Ex-post (actual) savings refers to the actual savings in the economy from the given level of income during the period of one year. This aspect of savings is considered in the calculation of *National Income*, hence, in a closed economy with no international capital flows, ex-post (actual) saving level is, by definition, equal to investment. On the other hand, *ex-ante saving* refers to the *desired saving* or *planned saving*. The amount of desired saving is given by *saving function* and the slope of this saving function is *MPS* or *desired saving rate*[62]. This is the saving intended to be made and, therefore, the *ex-ante (desired) saving* can be thought as the difference between consumption in one period and income in the preceding period due to the adaptive behavior of households since they expect their current income close to the one in the preceding period. Consequently, ex-ante (desired) saving might be lower or higher than investment (actual saving). If ex-ante (desired) saving falls short of investment (actual saving); income and the corresponding saving would go up during the ensuing periods until ex-ante (desired) saving, ex-post (actual) saving, and investment are all equal at equilibrium income. If ex-ante (desired) saving exceeds investment (actual saving); income, and with it saving, would decline during the ensuing periods until it had fallen to the equilibrium level (Spiegel, 1991, p.609).

Recall that in the previous sub-sections, the *actual saving rate*[63] is calculated as 11.6 percent and the *desired saving rate* is estimated as 14.7 percent for Turkish households

[62] We have estimated this saving function by GMM, 2SLS and LIML estimators in the previous sections.

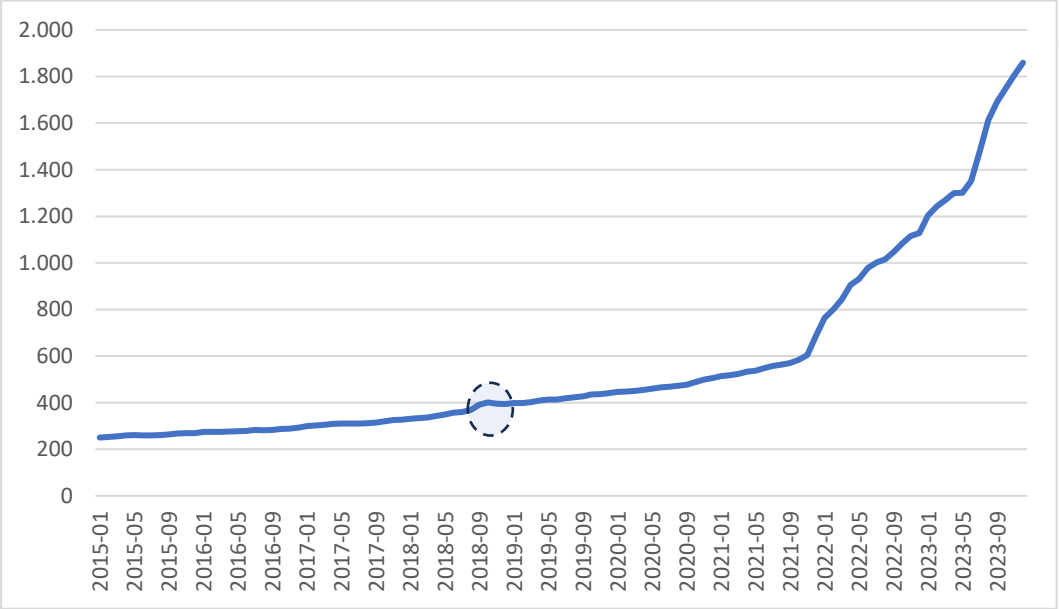
[63] Ex-post savings refers to the actual savings made in the economy during the period of one year.

in 2019. In other words, we have obtained the finding that *the desired saving rate is higher than the actual saving rate for Turkish households in 2019:*

$$Household\ Saving\ Rate_{Desired} > Household\ Saving\ Rate_{Actual}$$

This situation may happen in three ways: either desired saving rate has increased, or actual saving rate has decreased, or both has happened at the same time. Below we investigate the mechanisms of these channels.

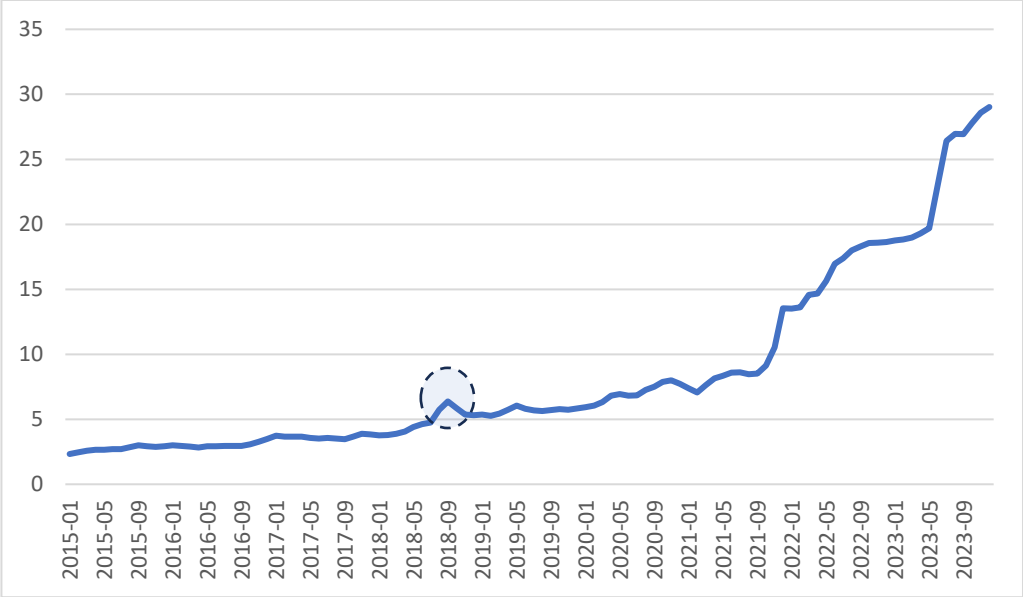
One explanation for desired household saving rates to be higher than actual household saving rate in Türkiye is by the *decrease in actual saving rates* of households. This channel can be described as follows: if some households find that they have had smaller incomes than they expected they would have realized savings (actual savings) are smaller than planned savings (desired savings). This is the situation seems to be happened in Türkiye in 2019. The rapid loss in purchasing power of households after 2018 (actually beginning from October 2018 and felt) due to high inflation figures can be the reason of the decline in actual saving rate of Turkish households.



Source: Author's own calculations from TurkStat.

Figure 24 Consumer Price Index (CPI) in Türkiye (2003=100)

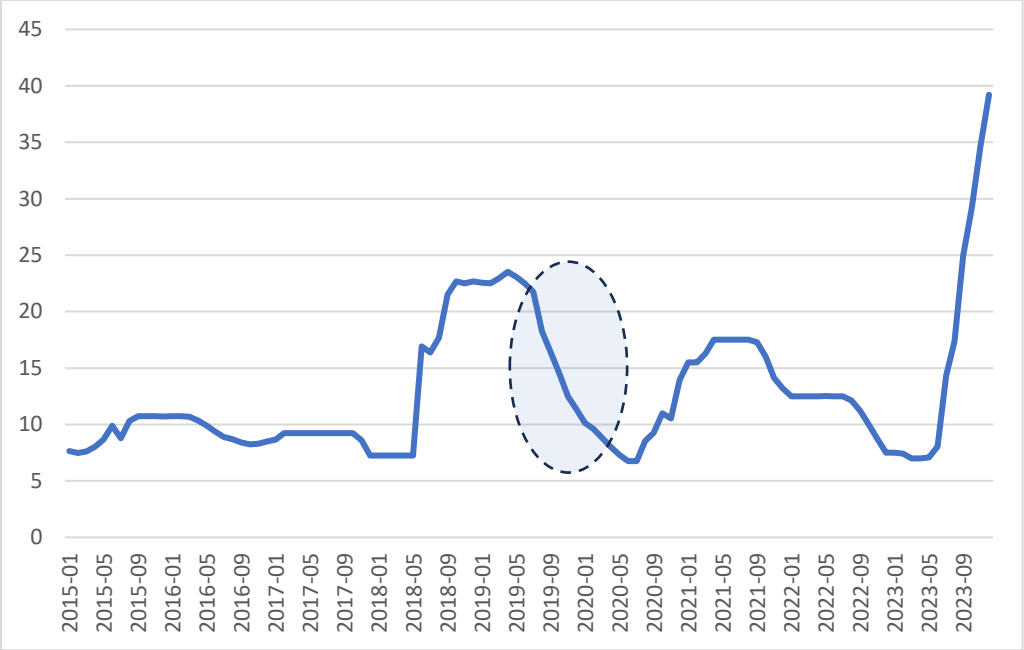
Another reason for the desired household saving rates to surpass the actual household saving rate in Türkiye could be attributed to an increase in the desired saving rates of households. The rapid surge in inflation and the significant depreciation of the TL in recent years may have prompted households in Türkiye to elevate their desired saving rates. Any augmentation in the desired saving rate would lead to a reduction in household expenditures. This decline in aggregate (household) spending results in a downward shift in the AD curve, and the multiplier effect causes the new real GDP to be lower than the initial level by a factor equal to the multiplier. It is plausible that this decreased GDP (income) level may not induce higher saving, as there exists a direct correlation between income and saving. While households initially intended to save more by increasing the proportion of their income saved, they now find themselves with less income and a diminished income pool to allocate. The larger fraction of a smaller pool may not exceed the previous smaller fraction of a larger income pool. This phenomenon is well-described by the economic concept known as the paradox of thrift. *Türkiye seems to be experienced the negative effects of a paradox of thrift* originated from the fast increase in expected inflation and high depreciation rate of TL beginning from the last quarter of 2018 onwards.



Source: Author's own calculations from CBRT.

Figure 25 USD Exchange Rate in Türkiye

The further decrease in interest rates in Türkiye might be tried to overcome and fix the detrimental impacts of this paradox of thrift, to some extent, which seems create a vicious cycle pattern in the economy.



Source: Author's own calculations from CBRT.

Figure 26 Overnight Simple Interest Rates (%) in Türkiye

Table below summarizes desired household saving rate estimates for different definitions of saving for the different estimators. There are some important changes in the estimates when we include other kinds of saving. When the non-conventional kinds of saving are considered, the differences in the saving rates increase substantially. Note also that the results for different estimators are very similar to each other except for the largest definition of saving (S4).

As for the narrower definition of savings (S1), desired saving rate is estimated as 14.7% for Türkiye and this figure is close to other estimates in the related literature. For example, Denizer and Wolf (1998) estimate saving rates of 24.8% for Bulgaria, 16.5% for Poland and 11.2% for Hungary. Kulikov et al. (2007) estimate saving rates between 5.6% and 15.1% for Estonia. Chamon and Prasad (2008) estimate saving rates between 14.3% and 22.4% for China from 1990 to 2005. For Türkiye, the similar

definition of saving rate is estimated from a range of 14.4% and 22.4% in Van Rijckeghem (2010), between 6.1% and 14.7% in Aktas et al. (2012), 11.0 % in Ceritoğlu (2012), between 21.1% and 26.4% in Ceritoğlu (2011), among others.

Table 52 Desired Household Saving Rate Estimates (2019)

Definition of Savings	GMM	2SLS	LIML
S1	*0.147*	0.146	0.146
S2	*0.285*	0.290	0.289
S3	*0.306*	0.307	0.307
S4	*0.441*	0.519	0.562

Notes:

(1) "S1≡Disposable Income-Total Consumption".

(2) "S2≡Disposable Income-(Total Consumption- Durable Goods Consumption)" or simply "S2≡S1+Durable Goods Consumption".

(3) "S3≡Disposable Income-(Total Consumption- Durable Goods expenditure- Jewelry, clocks and watches expenditure)" or simply "S3≡S2+Jewellery, clocks and watches expenditure".

(4) "S4≡Disposable Income-(Total Consumption- Durable Goods expenditure- Jewelry, Clocks and watches expenditure- health and education expenditures)" or simply "S4≡S3+ Health and Education expenditures".

Source: Author's own calculations.

Estimates derived from GMM, 2SLS, and LIML methodologies indicate a positive and statistically significant correlation between household savings levels and income across all savings definitions. This suggests that households with higher incomes exhibit a higher average propensity to save compared to those with lower incomes, aligning with previous research on the saving behavior of Türkiye's household sector. The positive relationship between income and savings may stem from the consideration of permanent income, supporting Friedman's (1957) permanent income hypothesis, or the use of current income, in line with the original Keynesian formulation by Keynes (1936), particularly in response to temporary income shocks. In both scenarios, policies aimed at increasing income levels emerge as a natural avenue for enhancing the private household saving rate in Türkiye.

Given the overall robust and consistent results from all three regression methods, we focus our discussion solely on the findings obtained from GMM estimations, specifically for the S1 definition of savings.

Besides, households with extremely high-income levels (income of households is at least 3 standard deviation higher than average) seem to have higher average propensity to save compared to other households.

In terms of household size, both dummies (which capture the effect of the number of average and at least 3 standard deviations larger than average) have significant negative impacts on savings, indicating that as the number of total individuals increases, the total savings decrease. It should be noted that there is also additional negative effect for households with extremely large size households (size of households is at least 3 standard deviation higher than average).

Similarly, the dummy for households with at least one child is significant with a negative coefficient, suggesting that children reduce the household total saving, holding everything else constant.

The effect of education on savings is examined with two different dummy variables. As expected, university graduation has a positive impact on household saving level. On the other hand, continuing education in any educational institution, maybe because of education expenditure, negatively affects savings.

The effect of female labor force participation on savings is also of importance from the both sociological and economic points of views. The results show strong evidence for a significantly positive impact of working women ratio on savings. Given the very low female labor force participation rate in Türkiye, there is large room to increase private saving rate of Türkiye via policies that help and encourage the female labor force participation.

On the other hand, households, whose head is female, save less. The potential reason of this negative relationship might be unintented conditions. In particular, the headship of the family may have been left to the woman not voluntarily but due to compulsory reasons such as divorce or death, and the woman who was not prepared for this situation may have been in a financially difficult situation.

Additionally, households, whose head is higher than 55 year olds, save significantly more. It is noteworthy that no such significant relationship is found for other age groups. Actually, this shows that households savings increase significantly only after the age of 55 in Türkiye.

Wealth effect is one of the important channel whose effect on saving has been widely analyzed both in theory and in practice. In this study, although it was aimed to create a wealth index specific to Türkiye in order to proxy the wealth effect, no meaningful result was achieved. Similarly, considering that the housing sector and housing prices in Türkiye are very important due to their share and change effects, it was considered to be used. But both variables could not be calculated due to limitations in the household budget survey. In this context, three different dummies were chosen to represent wealth.

Homeownership, especially in Türkiye, is an important indicator of the wealth level of the household, because mainly of two reasons. The one is the very large share of housing costs in total household budget, and the other is the positive contribution to household finances. Regarding the coefficient on the dummy for household having a flat, shop or a detached dwelling, there is evidence for a positive impact of homeownership on saving. Indeed, the empirical literature provides evidence in both directions. As noted in Van Rijckeghem (2010), it is difficult to justify the existence of a wealth effect for homeowners on theoretical grounds. However, it is proposed that in Türkiye, a wealth effect might indeed exist, potentially influenced by unique factors such as the opportunity to collaborate with construction companies for larger building projects, the presence of money illusion, and increased access to credit.

As another wealth proxy, private health insurance coverage may be argued. Acquiring private health insurance is anticipated to decrease precautionary savings as it mitigates the risk of health expenditures, specifically the likelihood of unforeseen out-of-pocket healthcare costs. (Ceritoğlu, 2012). The econometric results show that the relationship between household saving and private health insurance is significant and negative, providing support in favor of the precautionary saving hypothesis.

Lastly, the dummy variable for hot water availability in house has a significant negative effect on the household saving, holding everything else constant. Given the low level of average saving levels, noted in the above, the expenditures on this type of services may increase household consumption, hence decrease saving. This result in line with Van Rijckeghem (2010).

CHAPTER VI

CONCLUSION

This thesis had as its target the empirical investigation of determinants of Turkish private sector saving rate in both macro and micro framework.

First, in Chapter 1, domestic saving rate of Türkiye was compared with both developed and comparator developing countries and shown that Turkish saving rate has been low compared not only to the world and G20 economies average but also to the emerging market and developing economies average during 1980-2020 period. The saving rates of Türkiye and the emerging market and developing economies, which were at about 22 percent of GDP in 1999, differed drastically from 2000 onwards and reached, respectively 27 and 33 percent of GDP in 2020. In historical context, Türkiye's domestic saving rate rose from an average of 19 percent in the 1980s to 24 percent in the 1990s and then declined to 22 percent in the 2000s, and finally increased back to 24 percent in the 2010s. Private saving constituted, on average, 93 percent of total domestic saving during 1980-2020 in Türkiye. Moreover, according to TurkStat Institutional Sector Accounts, available from 2009 onwards, on average, 63 percent of private saving consisted of corporate saving during 2009-2020.

Next, in Chapter 2, in addition to the theoretical literature on savings, the empirical studies both on cross-country and on Türkiye are reviewed. The aim of giving this quite comprehensive background information was to identify the possible explanatory variables for Turkish case. From the summary of literature review, it was clear that none of relevant determinants is uniformly superior to all others, for all countries and at all times. Based on this, it was decided to consider all potential determinants whenever consistent data is available for Turkish case.

In Chapter 3, the empirical determinants of private saving rate were examined for Türkiye. The ARDL Bounds test cointegration equation estimated on newly and firstly constructed quarterly macro data for Türkiye over the period 1990-2020 specifies a long-run relationship between the private saving rate and its determinants, allowing for fast speed of convergence and some short-run dynamics. The choice of regressors is guided by theory, prior empirical work and data limitations. In this context, the coefficient of public saving rate is significantly negative, but contrary to previous empirical studies, it is robustly one both in long run and short run equations, implying not partial but full crowding out. This, however, should not be evaluated as holding of Ricardian equivalence, as the link between two could have been indirect and episode-specific, rather than reflecting private agents piercing the veil of intertemporal public finances. Besides, stringent theoretical assumptions, especially the absence of liquidity constraints, the absence of uncertainty regarding future government spending increase and the presence of a non-distortionary tax system, are not met in Türkiye. There might be three main reasons behind the complete offset in the case of Türkiye. First is the signal effect of public sector saving (generally proxied by primary balance of budget) to private agents. In particular, with Turkish experience of high and prolonged budget deficit and debt stock, implementing an expansionary fiscal policy that will lead to a decrease in public saving can create an expectation in private agents such that a stabilization program will be implemented, reduce private consumption, and hence increase private saving by exactly the same rate as the change in public saving. Similarly, keeping government budget deficit low, and hence public saving high also contributes to economic stability, and declining private saving by boosting household consumption. Second is the economic crisis environment of the Türkiye where households consume less and save more due to crisis while public saving may decrease due to decreased consumption and taxes collected from income and the implementation of social policies by the government. Third is the role and weight of public sector in Türkiye where considering the size of the public sector expenditure on health and education, the decrease in these public expenditures due to privatization of public enterprises and the increase in the number of private schools, universities and hospitals may have been accompanied by a corresponding increase in household consumption expenditure. The work of this chapter was important not only for

indicating the complete crowding out effects in the Turkish saving data but also for providing evidence for the different effects of private sector credits on saving. In particular, business credits to the corporations has a positive while consumption credits to the households has a negative impact on private saving rate. Additionally, since the real interest rate has a positive and statistically significant relation with private saving rate, the substitution effect outweighs income effect in Türkiye. Taken credit and interest rate effects together, it might be argued that the decline in the real interest rate may be associated with a shift in the supply of saving from households to corporations. Besides, it is found that stability confidence in the real sector make firms saved more. Moreover, it was also found that private sector investment rate and income growth rate had positive impact while domestic debt stock had negative impact on private saving rate. It is noteworthy to note that, signs of coefficients of public saving rate and domestic debt stock; signs of company credit, real sector stability confidence and private investment rates support each other. Lastly, since the Turkish economy has gone through substantial changes after the 2001 crisis, households' and firms' saving behavior have also changed as a result of these changes, indicated by significant dummy variable. Considering short run dynamics of this long run relationship, the error term of estimated model was tested for the stationarity and the error term was found stationary at 99 percent confidence level.

From both technical and policy perspective, it is crucial to investigate determinants of the sub-components of private saving, namely, corporate sector and household sector. Having analyzed the aggregate private saving dynamics and noted that effects of household credits and company credits on saving are different in Chapter 3, Chapter 4 investigated the firm level determinants of corporate savings by making cross-sectional regressions. Since the CBRT and ITMRT datasets, the two largest and detailed firm-level datasets on balance sheets in Türkiye, do not include information on dividend payments, corporate saving analysis was based on financial statements of listed companies on Borsa Istanbul. Unlike CBRT and ITMRT datasets, financial statements of listed firms are prepared not in line with Tax Procedure Law but IAS/IFRS and these are audited independently. In this chapter, the model with DK standard errors are used to check for robustness. The chosen model is estimated by

PCSE method. Apart from this technique, following estimators are also used: Difference and System GMM (Arellano and Bond, 1991; Blundell and Bond, 1998), Quasi-maximum likelihood linear dynamic panel data estimation (Hsiao et al., 2002), and bias corrected LSDV dynamic panel data estimator (Bruno, 2005). However, according to the model diagnostics, a two-way fixed effects PCSE panel FGLS is preferred. The results showed that corporate saving rate (saving to revenue ratio) significantly increases as operating profit margin increases. In line with international evidence, as firm size in terms of assets shrink, corporate saving rate increases indicating that smaller firms tend to save more out of their revenue than do larger companies. This, indeed, confirms anecdotal evidence that in Türkiye smaller firms are more financially constrained than larger ones. Also, financial leverage ratio (short and long run borrowings over total liabilities) has a negative impact on the saving rate. Similarly, trade payables ratio (short and long run trade payables over total liabilities) affects negatively corporate saving rate. Besides, indebtedness (defined as the share of total non-equity liabilities to total assets) significantly reduce the corporate saving rate, as expected. Related with comparative trade credits between firms (trade receivables and trade payables), the coefficient of trade receivables to trade payables ratio is negative and significant, with small magnitude and modest significance.

Additionally, there is negative relationship between foreign ownership rate and corporate saving rate. It is noteworthy that the estimation results show that administrative expense ratio to revenue has a positive impact on corporate saving rate, consistent with the argument that this type of expense creates productivity, which increases future value, and hence corporate saving rate in Türkiye. The coefficient for Tobin's q (the ratio of the market value of firm to the book value) is significant with negative coefficient showing that firms with higher Tobin's q prefer to rely less on savings as a source of finance. Lastly, the share of the net foreign exchange income (calculated from the income statements by subtracting foreign exchange loss from foreign exchange gain) of company's in its revenue is estimated to have a negative and significant impact on the corporate saving rate, which is consistent with dollarization arguments for corporate sector in Türkiye. On the other hand, although the control variable for the cash position (defined as the ratio of cash and cash equivalences to

total assets) is not statistically significant, it is not excluded from the model because of its role in the working capital, investment and hence growth of the Turkish firms.

Finally, in the last substantial chapter, Chapter 5, the profile of household saving was lay out. Due to endogeneity problem, in the estimation of saving rate of Turkish households, 2SLS, LIML and GMM estimations are carried out for 2019 household budget survey data. The results show that the desired saving rate is higher than the actual saving rate for Turkish households. Moreover, estimations based on GMM, 2SLS and LIML suggest that there is a positive and statistically significant relationship between household savings level and income for all definitions of savings, indicating that the average propensity to save is higher for the households with higher income then the lower ones. Besides, households with extremely high-income levels seem to have higher average propensity to save compared to other households. In terms of household size, as the number of total individuals increases, the total savings decrease. Similarly, children reduce the household total saving level in Turkish case. Also, regarding education, while university graduation has a positive impact on household saving level, continuing education in any educational institution negatively affects savings. One of the important findings related with women is the strong evidence for a significantly positive impact of female labor force participation rate on savings. Additionally, households, whose head is higher than 55 year olds, save significantly more. It is noteworthy that no such significant relationship is found for other age groups, implying that households savings increase significantly only after the age of 55 in Türkiye. Lastly, for the proxies of wealth; homeownership has positive impact, private health insurance and hot water availability have negative effect on saving level of households in Türkiye.

The study makes several contributions to the empirical literature of saving determinants in Türkiye. While doing this, the information which might have been lost in aggregation is used more efficiently by using more disaggregate (microeconomic) level data as well as macro level data. Most of the applied work to date, both on Türkiye and other countries, finds evidence of significant inverse relationship between private and public saving with a coefficient less than one in absolute value. Using

Turkish data, the analysis in Chapter 3 not only lends further support to the evidence of inverse relationship, but also surprisingly indicates that the coefficient is robustly equal to one in Türkiye. Additionally, widespread evidence that private credits will cause private savings to fall through the removal of borrowing restrictions differs in the disaggregation of credits in which household credits decrease the private saving rate while company credits increase the private saving rate, in the long-run. Moreover, stability confidence of real sector, proxied by real sector confidence index of CBRT, which is not found significant in most of the studies on Türkiye, is included in this study and is found to have a positive impact on private saving rate, consistent with the effect of company credits. Finally, in a developing country like Türkiye, where saving data is calculated annually, making long-term times series analysis difficult, especially due to GDP revisions, this analysis, with the new series, is, to our knowledge, the first study with long time period and quarterly data. We are aware of only two saving determinants studies on Türkiye that use quarterly data but with old saving series.

Similarly, to our knowledge, it is the first study with the longest time period in which firm savings are calculated on IAS/IFRS based financial statements instead of Tax Procedure Law based financial statements and examined on listed companies with a consistent data set that does not include inflation accounting adjustments. Moreover, the evidence for the foreign ownership rate effect on corporate saving rate is, to our knowledge, unique on this literature in Türkiye which is very valuable to offer policy options to increase corporate savings.

Furthermore, unlike most of the empirical research on household saving in Türkiye, in this thesis, the study of household saving rate focuses especially on the analysis of desired versus actual saving behaviors.

In order for Türkiye to achieve sustainable high growth rates, it is necessary but not sufficient to have sufficient internal resources without needing external resources to finance investments. Higher sustaining growth rates necessitate the investment to GDP ratio to increase further, ceteris paribus. From well-known Saving-Investment perspective, raising Türkiye’s investment rate requires higher domestic and/or foreign

savings to finance it. Foreign savings, excluding FDI inflows, are external fund and costly but domestic savings are internal fund and not costly. Direct cost of the external fund is the interest paid while indirect, and more important, cost is the macroeconomic imbalances generated by ample short term capital flows. Therefore, increasing domestic saving rate is vital for not only less volatile growth but higher growth in Türkiye.

The empirical findings presented here are very fruitful and encourage further research in a number of directions and could be basis for effective policy recommendations to increase private saving rate of Türkiye.

First of all, with unity offset between the public saving rate and private saving rate, there is no direct effect of public saving on private saving. However, a stable and predictable economic environment that increases private agents' confidence would help to open a room where private agents might not respond public policy changes exactly the same amount as the change in public saving. Moreover, more formal economy with less reliance on indirect taxes may generate extra public saving to contribute to domestic saving, ceteris paribus. Lastly, types of government expenditures should be examined specifically in which expenditures on health and education might impact private agents' consumption to decrease, and hence the private savings to increase. Furthermore, given the negative relation of domestic debt stock and positive relation of growth with private saving rate, the public policy should focus on removing the impediments to growth and decreasing the domestic debt stock.

Second, the evidence that private sector credits have different effects on private saving rate suggests that there is additional need for detailed research in this area, considering housing and vehicle credits. This would make micro-prudential policy offers more effective.

Third, considering the net positive effect of real interest rates on private saving rate, ensuring the continuity of positive real interest in financial instruments, especially deposits, will be beneficial both directly and also indirectly by attracting assets outside

the financial system into the financial sector. In this regard, real returns on TL based instruments are of special importance in Türkiye.

Fourth, the positive impact of real sector confidence index, in line with corporate credits is very tempting. In this regards, policies increasing real sector confidence should be pursued. Also, corporate credits should be prioritized.

Fifth, given that the major component of private savings is corporate sector savings and according to results primary determinant of this saving is the operating profit margin, there is room and opportunity for Türkiye to increase corporate savings focusing just on the operational parts of the income statements (indeed, revenues and cost items related with operations) without radical change in tax policy of corporates. This opportunity is valuable in the sense that there is potential without exploiting public resources, which is scarce in Türkiye.

Sixth, since private saving constitutes 93 percent of total domestic saving, and corporate saving constitutes 63 percent of total private saving in Türkiye, understanding the determinants of corporates' saving decisions is an important step in understanding the evolution of private, and hence domestic saving rate. In this context, data sets including dividend payments should be disseminated. Also, the quarterly publication of household and corporate accounts in the framework of national accounts would help researchers to make more detailed studies and government to pursue effective policies on savings.

Seventh, as far as our knowledge, among the studies examining the determinants of corporate saving in Türkiye, there is no other study using foreign ownership rate as explanatory variable. It should be also noted that, although the results are not reported and discussed in this thesis, the free float rate was also tested as an independent variable to explain corporate saving rate of Borsa Istanbul listed firms. Regardless of the possible reasons, an increasing free float ratio indicates that the company is managed with a smaller amount of shares, showing financing needs of firm or controlling shareholders. Similar to foreign ownership ratio, free float rate was

estimated with significant negative impact on corporate saving. In this vein, as potential policy options for helping raise corporate saving, their negative impact on the corporate saving rate underlines the crucial importance of capital markets regulations to keep them at a reasonable level.

Eighth, as a further study, we think that an econometric analysis should be done to investigate macroeconomic determinants of the corporate and household sector saving rates in Türkiye using panel data tools. This analysis should be done via panel unit root and cointegration techniques. It is noteworthy that nonlinear structure of private savings should also be investigated using especially Threshold Auto Regressive type models.

Ninth, given positive impact of income level and female labor force participation rate on saving, taking the low level of participation rate of female into account, employment of women should be encouraged and prioritized to increase household, and hence private savings. Also, since there is one-to-one negative relationship between public and private savings, and university graduation positive affects household saving, public expenditures on education should be increased to raise private savings. Similarly, household saving increases significantly only after age of 55, and private health insurance decrease household saving. In this vein, public expenditures on health covering private insurance scope might increase total private saving because of both extending average lifetime and also eliminating private insurance necessity.

Lastly, considering the negative impact of household credits on private saving rate and the sensitivity of households to micro-prudential measures, consumption habits of households should also be examined and taken into account in policy recommendations in order to ensure the effectiveness of measures to increase private saving and to increase them permanently in the long term.

There is no doubt that in the near future more empirical work investigating these issues will appear in the literature.

These results have major implications for government policies that encourage saving through several public policies, such as mandatory and voluntary pension system. They also have implications for monetary and macroprudential policies that impact interest rates on company and consumer credit.

REFERENCES

Aghion, P., Comin, D., Howitt, P., and Tecu, I. (2009). When Does Domestic Saving Matter for Economic Growth?, *Harvard Business School BGIE Unit Working Paper*, No. 09-080.

Aktaş, A., Güner, D., Gürsel, S., and Uysal, G. (2012). Structural Determinants of Household Savings in Türkiye: 2003-2008, *Betam Working Paper Series*, No. 007.

Akyüz, Y. (1990). Financial System and Policies in Turkey in the 1980s, in *The Political Economy of Turkey: Debt, Adjustment and Sustainability,* ed. by Tosun Arıcanlı and Dani Rodrik. New York: St. Martin's Press, pp. 98-131.

Akyüz, Y. and Boratav, K. (2003). The Making of the Turkish Financial Crisis, *World Development*, 31(9), pp. 1549-1566.

Algan, Y. C. and Zylberberg, A. (2002). Public Employment and Labour Market Performance, *Economic Policy*, 17(34), pp. 7–65.

Altunç, Ö. F. and Şentürk, B. (2010). Türkiye'de özel yatırımlar ve kamu yatırımları arasındaki ilişkinin ampirik analizi: Sınır testi yaklaşımı. *Maliye Dergisi*, 158, pp. 531-546.

Altunöz, U. (2013). Kamu kesimi iç borçlanmasının özel yatırım harcamaları üzerinde etkisi: Türkiye örneği. *Uludağ Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, XXXII(2), pp. 25-53.

Anderson, T.W. and Rubin, H. (1950). The Asymptotic Properties of Estimates of the Parameters of a Single Equation in a Complete System of Stochastic Equation, *Annals of Mathematical Statistics*, 21(4), pp. 570-582.

Anderson, T. W. and Rubin, H. (1949). Estimation of the Parameters of a Single Equation in a Complete System of Stochastic Equations. *Annals of Mathematical Statistics*, 20(1), pp. 46-63.

Andrew, D.W.K. (2005). Cross-section Regression with Common Shocks. *Econometrica*, 73(5), pp.1551–1586.

Arellano, M. and Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies*, 58(2), pp. 277-298.

Athukorala, P. Ch. and Sen, K. (2004). The Determinants of Private Saving in India, *World Development*, 32(3), pp. 491–503.

Attanasio, O. P., Picci, L., and Scorcu, A. (1999). Saving, Growth and Investment: A Macroeconomic Analysis Using a Panel of Countries, *The Review of Economics and Statistics*, 82(2), pp. 182–211.

Auerbach, A. J. (1982). Issues in the Measurement and Determinants of Business Saving, *National Bureau of Economic Research Working Paper Series,* No. w1024.

Ayas, I. (2022). Türkiye'de dışlama etkisinin Fourier yaklaşımı ile analizi. *Hacettepe University Journal of Economics and Administrative Sciences*, 40(2), pp. 272-287.

Balassa, B. (1990). The Effects of Interest Rates on Savings in Developing Countries, *Banca Nazionale del Lavoro Quarterly Review*, 172, pp. 101-118.

Bandiera, O., Honohan, P., Schiantarelli, F., and Caprio, G. (2000). Does Financial Reform Raise or Reduce Saving?. Review of Economics and Statistics, 82(2), pp. 239-263.

Banerjee, A., J. Dolado, and R. Mestre (1998), *Journal of Time Series Analysis*, 19(3), pp. 267-283.

Banker, R. D., Huang, R., Natarajan, R., and Zhao, S. (2019) Market valuation of intangible asset: Evidence on sg&a expenditure, *The Accounting Review*, 94(6), pp. 61-90.

Banker, R. D., Huang, R., and Natarajan, R. (2011) Equity incentives and long-term value created by sg&a expenditure, *Social Science Electronic Publishing*, 28(3), pp. 794-830.

Başar, S., Polat, Ö., and Oltulular, S. (2011). Crowding out effect of government spending on private investments in Türkiye: A cointegration analysis. *Journal of the Institute of Social Science*, 1(8), pp. 11-20.

Başar, S., and Temurlenk, M. S. (2007). Investigating crowding-out effect of government spending for Türkiye: A structural VAR approach. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 21(2), pp. 95-104.

Bates, J., and Henderson, S., J. (1967) The Determinants of Corporate Saving in Small Private Companies in Britain, 1954-1956, *Journal of the Royal Statistical Society*, 130(2), pp. 207-224.

Bayoumi, T. (1993) Financial Deregulation and Household Saving, *The Economic Journal*, 103(421), pp. 1432-1443.

Bebczuk, R., and Cavallo, E. A. (2014). Is Business Saving Really None of Our Business, *Inter-American Development Bank*, 6554.

Beck N, Katz JN (1995). What to do (and not to do) with time-series cross-section data. American *Political Science Review*, 89(03), pp. 634–647.

Bernheim, B. D., Shleifer, A., and Summers, L. H. (1985). The Strategic Bequest Motive. *Journal of Political Economy*, 93(6), pp. 1045-1076.

Berry, A. (1985). On Trends in the Gap Between Rich and Poor in Less Developed Countries: Why We Know so Little, *Review of Income and Wealth*. 31(4), pp.337-354.

Bersales, S., Grace, L., and Mapa, D. S. (2006). Patterns and Determinants of Household Saving In the Philippines, *Technical Report to USAID/Philippines OEDG*.

Bilgili, F. (2003). Dynamic implications of fiscal policy: Crowding-out or crowding-in? *Middle East Technical University (METU-ERC) International Conference in Economics VII*, F5 Fiscal Policy, Public and Private Expenditures METU, September 8.

Blundell, R. and Bond, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models, *Journal of Econometrics*, 87(1), pp.115-143.

Boratav, K. (2005). *1980'li Yıllarda Türkiye'de Sosyal Sınıflar ve Bölüşüm*. İstanbul: İmge Kitabevi Yayınları.

Boratav, K., Bulutay, T., Ege, Y., Türel, O., Türeli, R. A., and Uygur, E. (2018). Yeni Ulusal Gelir Serileri Üzerine Gözlem ve Değerlendirmeler. *Ekonomi-Tek*, 7(2), 61-70.

Bozkuş, S., and Üçdoğruk, Ş. (2007). Hanehalkı Tasarruf Tercihleri-Türkiye Örneği-, *8. Türkiye Ekonometri ve İstatistik Kongresi*, İnönü Üniversitesi, Malatya.

Breitung, J. S. Kripfganz and Hayakawa, K. (2021). Bias-corrected method of moments estimators for dynamic panel data models, *Econometrics and Statistics*, 24, pp. 116-132.

Brown, M. B., and A. B. Forsythe. (1974). Robust tests for the equality of variances. *Journal of the American Statistical Association*, 69, pp.364–367.

Brown, R. L., Durbin J., Evans, J. M., (1975). Techniques for testing the constancy of regression relationships over time, *Journal of the Royal Statistical Society, Series B (Methodological)*, 37(2), pp.149-192.

Browning, M., and Lusardi, A. (1996). Household Saving: Micro Theories and Micro Facts. *Journal of Economic Literature*, 34(4), pp.1797–1855.

Bruno, G.S.F. (2005). Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. *Economics Letters*, 87(3), pp. 361-366.

Bruno, G. (2004). Estimation, inference and Monte Carlo analysis in dynamic panel data models with a small number of individuals. *Stata Journal*, 5(4), pp. 473-500.

Bosworth, B. P. (1993). Saving and Investment in a Global Economy. Brookings Institution Press.

Bun, M.J.G. and Carree, M.A. (2005). Bias-corrected estimation in dynamic panel data models, *Journal of Business & Economic Statistics*, 23(2), pp. 200–210.

Bun, M.J.G. and Windmeijer, F. (2010). The weak instrument problem of the system GMM estimator in dynamic panel data models, *Econometrics Journal*, 13(1), pp. 95–126.

Burkart, M. and Ellingsen, T. (2004). In-kind finance: a theory of trade credit, *American Economic Review*, 94(3), pp. 569–590.

Busch, G. and Wueger, M. (1981). Social security and saving: A critical mote on the Feldstein hypothesis, *Empirica-Austrian Economic Papers*. 8, pp. 223-240.

Carbo-Valverde, S., Rodriquez-Fernandez, F., and Gregory, F. U. (2016). Trade credit, the financial crisis and firms access to finance, *Journal of Money, Credit and Banking*, 48(1), pp. 113–143.

Carroll, C. D. and Summers, L. H. (1991). Consumption Growth Parallels Income Growth: Some New Evidence, NBER Chapters, in: National Saving and Economic Performance, pp. 305-348.

Carroll, C. D. and Weil, D. N. (1994). Saving and growth: a reinterpretation, *Carnegie-Rochester Conference Series on Public Policy*, Elsevier, 40(1), pp. 133-192.

Carroll, C. D. (2008). The Micro and Macroeconomics of Consumption: Some Thoughts On the Turkish Case, Presentation at Conference on Micro and Macro Saving Behavior, Istanbul.

Casey, E., and O'Toole, M., C. (2014). Bank-lending constraints, trade credit and alternative financing during the financial crisis: evidence from European SMEs, *Journal of Corporate Finance*, 27(C), pp. 173–193.

CBRT-Central Bank of Republic of Türkiye. (2023). *Elektronik Veri Dağıtım Sistemi,* Central Bank of Republic of Türkiye, Türkiye.

Celasun, O. (1999). The 1994 Currency Crisis in Turkey, *World Bank Policy Research Working Paper*, 1913.

Celasun, M. and Tansel, A. (1993). Distributional Effects and Saving-Investment Behaviour in a Liberalizing Economy: The Case of Turkey, *METU Studies in Development*, 20(3), pp.269-298.

Ceritoğlu, E. (2009). The Empirical Importance of Precautionary Saving in Türkiye, *University of Nottingham PhD Thesis.*

Ceritoğlu, E. and Eren, O. (2013). Türkiye'nin Nüfus ve Sosyal Yapısındaki Değişimlerin Hanehalkı Tasarrufları Üzerindeki Etkileri, Research Notes in Economics 1324, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Chamon, M. and Prasad, E. (2008). Why Are Saving Rates Of Urban Households In China Rising?. *National Bureau of Economic Research Paper No*. W14546.

Chen, P., Karabarbounis, L., and Neiman, B. (2017). The Global Rise of Corporate Saving, *FED Minneapolis Working Paper*, 736.

Cheung, Y.-W. and Lai, K. S. (1995). Lag Order and Critical Values of the Augmented Dickey-Fuller Test. *Journal of Business & Economic Statistics*, 13(3), pp. 277-280.

Chudik, A. and Pesaran, H. (2017). A Bias-Corrected Method of Moments Approach to Estimation of Dynamic Short-T Panels, *CESifo Working Paper*, No. 6688.

Cilasun, S. M. (2009). Income and, Consumption and Saving Behaviour of Turkish Households, *Doctoral Thesis*, Middle East Technical University, Department of Economics.

Cilasun, S. M. and Kırdar, M. G. (2009). Türkiye'de Hanehalklarının Gelir, Tüketim ve Tasarruf Davranışlarının Yatay Kesitlerle Bir Analizi, *İktisat İşletme ve Finans*, 24(280), pp. 9-46.

Cleland, A. S. and Bruno, A. V. (1996). The market value process: bridging customer and shareholder value, Wiley.

Collins, S.M. (1991). National Saving and Economic Performance, edited by B. Douglas Bernheim and John B. Shoven, *University of Chicago Press*, pp. 349-376.

Corbo, V. and Schmidt-Hebbel, K. (1991) Public Policies and Saving in Developing Countries, *Journal of Development Economics*, 36(1), pp. 89-115.

Cural, M., Eriçok, R. E., and Yılancı, V. (2012). Türkiye'de kamu yatırımlarının özel sektör yatırımları üzerindeki etkisi: 1970-2009. *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, 12(1), pp. 73-87.

Çaşkurlu, E. (2020). Mali dışlama etkisi: 1975 – 2016 dönemi Türkiye için ARDL sınır testi sınaması. *Üçüncü Se*ktör *Sosyal Ekonomi Dergisi*, 55(2), pp. 956-971.

Çelik, N. (2016). Yapısal kırılmalar altında kamu-özel kesim yatırım harcamaları ilişkisi. *Yönetim ve Ekonomi*, 23(3), pp. 653-669.

Çolak, Ö. F. and Öztürkler, H. (2012). Tasarrufun Belirleyicileri: Küresel Tasarruf Eğiliminde Değişim ve Türkiye'de Hanehalkı Tasarruf Eğiliminin Analizi. *Bankacılar*, 23(82), pp. 3-44.

Davidson, Russell and MacKinnon, James G. (2001). *Econometric Theory and Methods*, Oxford University Press, New York.

Dayal-Gulati, A. and Thimann, C. (1997). Saving in Southeast Asia and Latin America Compared: Searching for Policy Lessons. *IMF Working Paper* No. 97/110.

De Serres, A., and Pelgrin, F. (2003) The Decline in Private Saving Rates in the 1990s in OECD Countries: How Much Can Be Explained by Non-Wealth Determinants?, *OECD Economic Studies*, 36.

DeAngelo, H., DeAngelo, L., and Skinner, D. J. (2004). Are Dividends Disappearing? Dividend Concentration and the Consolidation of Earnings. *Journal of Financial Economics*, 72(3), pp. 425-456.

Deaton, A. (1989). Saving in Developing Countries: Theory and Review, *The World Bank.*

Deaton, A. (1991). Saving and Liquidity Constraints. *Econometrica.* 59(5), pp. 1221-1248.

Demir, F. (2017). Türkiye'de dışlama etkisi'nin incelenmesi: 1983-2013 dönemi için bir uygulama. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, 52, pp. 75-87.

Demircan, H. and Öz, S. (2017). Saving Behavior of Non-Financial Firms in Türkiye, Koc Universty-*TUSIAD Economic Research Forum Working Papers*, 1720.

Denizer, C. and Wolf, H. C. (2000). The Savings Collapse during the Transition in Eastern Europe, *World Bank Economic Review*, 14(3), pp. 445-455.

Denizer, C. and Wolf, H. C. (1998). Aggregate savings in the transition, *Savings Across the World Conference* (September 1989), Washington, DC: The World Bank.

Dhaene, G., Jochmans, K. (2016). Likelihood inference in an autoregression with fixed effects. *Econometric Theory*, 32(5), pp. 1178–1215.

Dickey, D. A. and Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series With a Unit Root. *Journal of the American Statistical Association*, 74, pp.427-431.

Driscoll, J. C., and A. C. Kraay. (1998). Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data. *Review of Economics and Statistics*, 80, pp.549–560.

Duesenberry, J. (1949). *Income, Saving, and the Theory of Consumer Behavior*, Harvard University Press, Cambridge.

Durbin, J. (1954). Errors in variables, *Review of the International Statistical Institute*, 22, pp. 23-32.

Durkaya, M. (2012). Türkiye'de kamu harcamaları ve özel tüketim ilişkisi. *Maliye Dergisi*, 163, pp. 118-129.

Dynan, E., K., Skinner, J., and Zeldes, S. P. (2000). Do the Rich Save More, *NBER Working Paper Series*, 7906.

Edwards, S. (1995). Why are Savings Rates So Different Across Countries: An International Comparative Analysis, *NBER Working Paper Series*, 5097.

Edwards, S. (1996). Why are Latin America's Savings Rates So Low? An International Comparative Analysis, *Journal of Development Economics*, 51(1), pp. 5-44.

Eisfeldt, A. L. and Muir, T. (2014). Aggregate Issuance and Saving Waves, *NBER Working Paper Series*, 20442.

Engle, R. and Granger, C. (1987). Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55(2), pp. 251-276.

Erden, L. (2005). Public and private investment in a vector error correction model: Empirical evidence from Türkiye. *Hacettepe Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 23(1), pp. 17-27.

Erdem, B. P. (2017). Türkiye'de hanehalkı tasarruflarını etkileyen faktörler., T.C. Kalkınma Bakanlığı, Uzmanlık Tezi.

Erdoğdu, O.S. (2012). Özel Sektör Tasarruflarında Mali Politika Etkileri, *Türkiye Ekonomi Kurumu Tartışma Metni,* 111.

Ertan, G. (2004). Crowding Out Mechanism Ongoing in Türkiye, *Master's Thesis*, İzmir Ekonomi Üniversitesi, Sosyal Bilimler Enstitüsü.

Erol, T. (2003). Capital Structure and Output Pricing in a Developing Country. Economics Letters, 78(1), pp.109-115.

Fama, E. F. and French, K. R. (2001). Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay. *Journal of Financial Economics*, 60(1), pp. 3-43.

Feldstein, M. (1974). Social Security, Induced Retirement, and Aggregate Capital Accumulation, *Journal of Political Economy*, 82(5), pp. 905-926.

Feldstein, M. (1980). Social Security, Induced Retirement, and Aggregate Capital Accumulation: A Correction and Updating, *NBER Working Paper Series*, 579.

Feldstein, M. (1995). Social Security and Saving: New Time Series Evidence, *NBER Working Paper Series*, 5054.

Ferrando, A. and Mulier, K. (2013). Do firms use trade credit channel to manage growth?, *Journal of Banking &Finance*, 37(8), pp. 3035–3046.

Fletcher, K., Keller, C., Brooks, P. K., Lombardo, D., and Meier, A. (2007). Türkiye: Selected Issues, *International Monetary Fund, Washington, D.C.*

Friedman, M. (1957). *A Theory of Consumption Function*, Princeton University Press, Princeton.

Fuller, W. A. (1976). *Introduction to Statistical Time Series*, New York: John Wiley.

Fisher, I. (1930). *The Theory of Interest*, New York: MacMillan.

Fry, M., J. (1988). *Money, Interest, and Banking in Economic Development*. Baltimore, Md.: Johns Hopkins University Press.

Fry, M. J. (1995). *Financial Development in Asia: Some Analytical Issues*. Asian-Pacific Economic Literature, 9(1), pp. 40-57.

Garcia-Appendini, E. and Montoriol-Garriga, J. (2013). Firms as liquidity providers: evidence from the 2007–2008 financial crisis, *Journal of Financial Economics*, 109(1), pp. 272–291.

Gavin, M., Hausmann, R., Perotti, R., and Talvi, E. (1996). Managing Fiscal Policy in Latin America and the Caribbean: Volatiliy, Procyclicality, and Limited Creditworthiness, *Inter-American Development Bank Working Paper*, 326.

Gersovitz, M. (1988). Saving and Development. In H. Chenery and T. N. Srinivasan, eds., *Handbook of Development Economics*, (1), Amsterdam: Elsevier.

Girshick, M. A. and Haavelmo, T. (1947). Statistical Analysis of the Demand for Food: Examples of Simultaneous Estimation of Structural Equations. *Econometrica*, 15(2), pp. 79–110.

Gök, A. (2014). A Time Series Analysis of the Determinants of Private Savings in Türkiye, *Afro Eurasian Studies Journal*, 3(1), pp. 5–25.

Graham, J. W. (1987). International Differences in Saving Rates and the Life Cycle Hypothesis. European Economic Review, 31, pp. 1509-1529.

Gregory, A. W. and Hansen, B. (1996a). Residual-Based Tests for Cointegration in Models with Regime Shifts, *Journal of Econometrics* 70(1), pp. 99-126.

Gregory, A. W. and Hansen, B. (1996b). Tests for Cointegration in Models with Regime and Trend Shifts, *Oxford Bulletin of Economics and Statistics* 58(3), pp. 555-60.

Grigoli, F., Schmidt-Hebbel, K., and Herman, A. (2014). World Saving, *IMF Working Paper*, WP/14/204.

Grigoli, F. and Herman, A., and Schmidt-Hebbel, K. (2018). Saving in the World, *World Development*, Elsevier, 104(C), pp. 257-270.

Gross, D., and Souleles, N. (2002). Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data, *Quarterly Journal of Economics*, 117(1), pp. 149-185.

Haque, N. U., Pesaran, M. H., and Sharma, S. (1999). Neglected Heterogeneity and Dynamics in Cross-Country Savings Regressions, IMF Working Paper No: 99/128.

Hall, R. E. (1978). Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence. *Journal of Political Economy*, 86(6), pp. 971-987.

Hansen, B. E. (1992). Tests for parameter instability in regressions with I(1) processes. *Journal of Business and Economic Statistics*, 10(3), pp. 321–335.

Hansen, L. P. (1982). Large sample properties of generalized method of moment estimators. *Econometrica*, 50(4), 1029-1054.

Hausman, J.A. (1978). Specification tests in econometrics, *Econometrica*, 46(6), pp.1251-1271.

Harrigan, F. (1995). How Much do we Know About Private Savings in Southeast Asia?, Unpublished, Manila: Asian Development Bank.

Hayek, F.A. (1932). A Note on the Development of the Doctrine of "Forced Saving", *Quarterly Journal of Economics*, 47(1).

Hayek, F.A. (1941). *The Pure Theory of Capital*, London: Rouutledge and K. Paul.

Hayakawa, K. and Pesaran, M.H. (2015). Robust standard errors in transformed likelihood estimation of dynamic panel data models, *Journal of Econometrics*, 188(1), pp. 111–134.

Hevia, C. (2010). Saving in Turkey: An International Comparison, Macroeconomics and Growth-DRG, *Background Study for the CEM Report of WB.*

Higgins, M. and Williamson, J. G. (1996). Asian Demography and Foreign Capital Dependence. NBER Working Paper, 5560.

Holtz-Eakin, D., Newey, W., and Rosen, H.S. (1988). Estimating vector autoregressions with panel data, *Econometrica*, 56(6), pp. 1371–1395.

Hoechle, D. (2007). Robust Standard Errors for Panel Regressions with Cross-Sectional Dependence. *The Stata Journal*, 7, pp. 281-312.

Horioka, C. Y. (2007). The Determinants of Household Saving in China: A Dynamic Panel Analysis of Provincial Data, *Federal Reserve Bank of San Francisco Working Paper Series.*

Horioka, C. T. and Terada-Hagiwara, A. (2014). Corporate Cash Holding in Asia, *Asian Economic Journal*, 28(4), pp. 323-345.

Hsiao, C., M. Pesaran, H., and Tahmiscioglu, A. K. (2002). Maximum likelihood estimation of fixed effects dynamic panel data models covering short time periods. *Journal of Econometrics*, 109(1), pp. 107-150.

Hurd, M. D. (1990). Research on the Elderly: Economic Status, Retirement, and Consumption and Saving, *Journal of Economic Literature*, 28(2), pp. 565-637.

Hüfner, F. and Koske, I. (2010). Explaining Household Saving Rates in G7 Countries: Implications for Germany, *OECD Economics Department Working Papers, No. 754, OECD Publishing.*

IMF (1995). *World Economic Outlook*, May 1995.

IMF (2005). *World Economic Outlook*, October 2005.

IMF (2006). *World Economic Outlook*, April 2006.

IMF (2007). IMF Country Report: Turkey, *IMF Country Report* No. 7/364.

IMF (2010). IMF Country Report: Turkey, *IMF Country Report* No. 10/278.

IMF (2012). IMF Country Report: Turkey, *IMF Country Report* No. 12/338.

IMF (2021). IMF Country Report: Turkey, *IMF Country Report* No. 21/110.

IMF (2023). *World Economic Outlook Database*, IMF.

Inoue, A. and G. Solon. (2006). A Portmanteau test for serially correlated errors in fixed effects models. *Econometric Theory*, 22(5), pp.835-851.

Johansson, S. (1996). Private Saving in Indonesia, Unpublished, Washington: IMF.

Iyidiker, H. and Özuğurlu, Y. (2001). Türkiye'de Kamu İç Borçlanmasının Reel Kesim Üzerindeki Etkileri. *16. Maliye Sempozyumu*.

Judson, R.A. and Owen, A.L. (1999). Estimating dynamic panel data models: a guide for macroeconomists. *Economics Letters*, 65(1), pp. 9–15.

Kalem, A. (2015). Türkiye'deki Kamu Yatırımlarının Özel Sektör Yatırımlarına Etkisinin İncelenmesi. T.C. Kalkınma Bakanlığı, *Uzmanlık Tezi*, Yayın No:2922

Kapetanios, G. (2003). Unit Root Testing Against the Alternative Hypothesis of up to m Structural Breaks, *SSRN Electronic Journal*, doi:10.2139/ssrn.358322

Kapetanios, G. (2005). Unit-root testing against the alternative hypothesis of up to m structural breaks. *Journal of Time Series Analysis*, 26(1), pp. 123-133.

Kaytancı, U. B. (2017). Türkiye'de kamu harcamalarının dışlayıcılık ve tamamlayıcılık etkilerinin araştırılması. *Aksaray Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 9(3), pp. 1-14.

Kesbiç, C. Y., Dündar, Ö., and Devrim, A. (2016). Kamu yatırımlarının özel sektör yatırımlarını dışlama etkisi: Türkiye Örneği. *Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi Dergisi*, 31(2), pp. 59-94.

Kesbiç, C. Y. and Bakımlı, E. (2004). Hazine borçlanmalarının özel kesime aktarılabilecek fonlar üzerindeki etkisi: Türkiye için bir analiz. *Finans-Politik & Ekonomik Yorumlar*, 41(486), pp. 34-54.

Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money*. London: MacMillan.

Kiviet, J.F. (1995). On bias, inconsistency, and efficiency of various estimators in dynamic panel data models, *Journal of Econometrics*, 68(1), pp. 53–78.

Korkmaz, T. and Başaran, Ü. (2009). İMKB'de İşlem Gören Otomotiv ve Otomotiv Yan Sanayi İşletmelerinin Sermaye Yapısı Kararlarını Etkileyen Faktörler: Panel Veri Analizi, *İktisat İşletme ve Finans*, 24(277), pp. 29-60.

Koskela, E. and Viren, M. (1983). Social Security and Household Saving in an International Cross Section. *American Economic Review*, 73(1), pp. 212-217.

Kotlikoff, L. J. and Avia, S. (1981). The Family as an Incomplete annuities Market. *Journal of Political Economy*, 89(2), 372-391.

Kulikov, D., Paabut, A., and Staehr, K. (2007). Factors Affecting Household Saving Behaviour in Estonia, *Kroon and Economy*.

Kulikov D., Paabut, A., and Staehr, K. (2007). A Microeconometric Analysis of Household Saving in Estonia: Income, Wealth and Financial Exposure, *Eesti Pank Working Paper*, No. 8.

Kuştepeli, Y. (2005). Effectiveness of fiscal spending: crowding out and/or crowding in? *Yönetim ve Ekonomi*, 2(1), pp. 185-92.

Kuznets, S. (1946). National Product Since 1869, *National Bureau of Economic Research*, New York.

Lahiri, A. (1989). Dynamics of Asian Savings: The Role of Growth and Age Structure. IMF Economic Review. 36, pp. 228–261.

Laibson, D. (1997). Golden Eggs and Hyperbolic Discounting, *Quarterly Journal of Economics*, 112(2), pp. 443-478.

Leland, H. E. (1968). Saving and Uncertainty: The Precautionary Demand for Saving, *Quarterly Journal of Economics*, 82(3), pp. 465-473.

Levene, H. (1960). Robust tests for equality of variances. In *Contributions to Probability and Statistics: Essays in Honor of Harold Hotelling*, ed. I. Olkin, S. G. Ghurye, W. Hoeffding, W. G. Madow, and H. B. Mann, pp. 278–292. Menlo Park, CA: Stanford University Press.

Loayza, N., Lopez, H., Schmidt-Hebbel, K., and Serven, L. (1998). The World Saving Data Base, *Cambridge University Press*, pp. 6-32.

Loayza, N., Schmidt-Hebbel, K., and Serven, L. (2000a). Saving in Developing Countries: An Overview, *The World Bank Economic Review*, 14(3), pp. 393-414.

Loayza, N., Schmidt-Hebbel, K., and Serven, L. (2000b). What Drives Private Saving Across The World?, *Review of Economics and Statistics.*

Loayza, N. and Shankar, R. (1998). Private Saving in India, *The World Bank Economiv Review,* 14(3), pp. 571-594.

Lusardi, A., Skinner, J., and Venti, S. (2001). Saving puzzles and saving policies in the United States. *Oxford Review of Economic Policy*, 17(1), pp. 95-115.

Malley, J. and Moutos, T. (1996). Does Government Employment "Crowd-out" Private Employment? Evidence from Sweden, *Scandinavian Journal of Economics*, 98(2), pp. 289-302.

Mangır, F. and Ertuğrul, H.M. (2012). Sermaye Hareketliliği, Tasarruf ve Yatırım İlişkisi: Türkiye Örneği, *İktisat İşletme ve Finans*, 27(317) pp. 61-87.

Masson, P. I., Bayoumi, T., and Samiei, H. (1998). International Evidence on the Determinants of Private Saving. *The World Bank Economic Review*, 12(3), pp. 483-501.

Matur, E.P., Sabuncu, A., and Bahçeci, S. (2012). Determinants of Private Savings and Interaction Between Public and Private Savings in Türkiye, *Topics in Middle Eastern and North African Economies*, 14, pp. 102-125.

Mauro, P., Horton, M. A., and Kumar, M. S. (2009). The State of Public Finances: A Cross-Country Fiscal Monitor, *IMF Staff Position Notes 2009/021*, International Monetary Fund.

McGuinness, G., Hogana, T., and Powell, R. (2018) European trade credit use and SME survival, *Journal of Corporate Finance*, 49, pp. 81-103.

Mitra, Pritha (2006). "Has Government Investment Crowded Out Private Investment in India?," *American Economic Review*, 96(2), pp. 337-341.

Modigliani, F. and Brumberg, R. (1954). Utility Analysis and The Consumption Function: An Interpretation Of Cross-Section Data, inside Kenneth K. Kurihara, Post-Keynesian Economics, Rutgers University Press, New Jersey.

Modigliani, F. (1970). The Life-Cycle Hypothesis and Intercountry Differences in the Saving Ratio. In W. A. Eltis, M. F. G. Scott, & J. N. Wolfe (Eds.), Introduction, Growth, and Trade: Essays in Honour of Sir Roy Harrod (pp. 197-225). Oxford: Oxford University Press.

Moundigbaye, M., Rea, W. S., and Reed, W. R. (2018). Which panel data estimator should I use? A corrigendum and extension. *Economics - The Open-Access, Open-Assessment E-Journal (2007-2020)*, Kiel Institute for the World Economy (IfW Kiel), 12, pp. 1-31.

MTF (2023). *Domestic Debt Stock Data*, Ministry of Treasury and Finance, Ankara.

Nickell, S. (1981). Biases in Dynamic Models with Fixed Effects. *Econometrica*, 49(6), pp. 1417-1426.

Obstfeld, M. and Rogoff, K. (2000). The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?, *National Bureau of Economic Research Macroeconomics Annual*, 15, pp. 339-412..

Oduncu, A. (2012). Determinants of Precautionary Savings: Elasticity of Intertemporal Substitution vs. Risk Aversion, *CBRT Working Paper*, 12/27, Central Bank of the Republic of Türkiye.

OECD (2007). Corporate Saving and Investment: Recent Trend and Prospects, *OECD Economic Outlook* 82: Special Chapter.

OECD (2010). OECD Economic Surveys: Turkey 2010, OECD Publishing, Paris.

OECD (2012). OECD Economic Surveys: Turkey 2012, OECD Publishing, Paris.

OECD (2016). Household savings, in *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics*, OECD Publishing, Paris.

OECD (2021). OECD Economic Surveys: Turkey 2021, OECD Publishing, Paris.

OECD (2023). OECD Economic Surveys: Turkey 2023, OECD Publishing, Paris.

Ogaki, M., Ostry, J., and Reinhart, C. (1996). Saving Behavior in Low-and Middle-Income Developing Countries: A Comparison. IMF Staff Papers, 43(1), pp. 38-71.

Ostry, J. and Levy, J. (1995). Household Saving in France: Stochastic Income and Financial Deregulation, IMF Staff Papers, 42(2), pp. 375-397.

Özatay, F. (2016). Turkey's Distressing Dance with Capital Flows, *Emerging Markets Finance and Trade*, 52(2), pp. 336-350.

Özatay, F. (2000). The 1994 Currency Crisis in Turkey, *The Journal of Economic Policy Reform* (formerly *The Journal of Policy Reform*), 3(4), pp. 327-352.

Özcan, B. and Peker, A. (2018). Özel Tasarrufun Belirleyenleri: Türkiye Örneği, *Fırat Üniversitesi Sosyal Bilimler Dergisi*, 28/2, pp. 1797-197.

Özcan, K.M. and Günay, A. (2012). Türkiye'de Özel Tasarrufları Belirleyen Unsurlar, *Türkiye Ekonomi Kurumu Tartışma Metni,* 109.

Özcan, K.M., Günay, A., and Ertaç, S. (2003). Determinants of Private Saving Behavior in Türkiye, *Applied Economics*, 35(12), pp. 1405-1416.

Özcan, K.M., Günay, A., and Ertaç, S. (2012). Macro and Socioeconomic Determinants of Turkish Private Savings, Journal of Economic Cooperation and Development, 33(2), pp. 93-130.

Özlale, Ü. (2012). Eğitim ve Sağlık Politikalarının Tasarruf Üzerindeki Etkileri*, Türkiye Ekonomi Kurumu Tartışma Metni,* 112.

Özlale, Ü. and Karakurt, A. (2012). Türkiye'de Tasarruf Açığının Nedenleri ve Kapatılması İçin Politika Önerileri, *Bankacılar*, 23(83), pp. 1-33.

Özlü, P. and Yalçın, C. (2010). The Trade Credit Channel of Monetary Policy Transmission: Evidence from Non-financial Firms in Türkiye, *CBRT Working Paper*, 10/16, Central Bank of the Republic of Türkiye.

Özmen, E. (1998). Is Currency Seigniorage Exogenous for Inflation Tax in Turkey?, *Applied Economics*, 30(4), pp. 545-552.

Özmen, E. and Yalçın, C. (2007). Küresel Finansal Riskler Karşısında Türkiye'de Reel Sektörün Finansal Yapısı ve Borç Dolarizasyonu. *İktisat İşletme ve Finans,* 22(258), pp. 5-39.

Özmen, E., Şahinöz, S., and Yalçın, C. (2012). Profitability, Saving and Investment of Non-Financial Firms in Türkiye, *CBRT Working Paper*, 12/14, Central Bank of the Republic of Türkiye.

Paiva, C. and Jahan, S. (2003). An Empirical Study of Private Saving in Brazil, *Brazilian Journal of Political Economy*, 23(1), pp. 124-137.

Park, J. Y. (1992). Canonical Cointegrating Regressions, *Econometrica*, 60(1), pp. 119-143.

Parks, Richard. (1967). Efficient Estimation of a System of Regression Equations When Disturbances Are Both Serially and Contemporaneously Correlated. *Journal of the American Statistical Association*, 62(318), pp. 500-509.

Pesaran, M. H. (2004). General Diagnostic Tests for Cross Section Dependence in Panels, *IZA Discussion Paper* No. 1240.

Pesaran, M. H. (2006). Estimation and inference in large heterogeneous panels with a multifactor error structure, *Econometrica*, 74(4), pp. 967-1012.

Pesaran, M. H. and Pesaran, B. (1997). *Working with Microfit 4.0: Interactive Econometric Analysis*, Oxford, Oxford University Press.

Pesaran, M. H. and Shin, Y. (1997). An autoregressive distributed lag modelling approach to cointegration analysis. In Econometrics and Economics Theory in the 20th Century, The Regular Frisch Centennial Symposium, Strom S., Cambridge University Press, Cambridge.

Pesaran, M. H. and Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In: Strom, S., Ed., Chapter 11 in Econometrics and Economic Theory in the 20th Century the Ragnar Frisch Centennial Symposium, Cambridge University Press, Cambridge, pp. 371-413.

Pesaran, M. H., Shin, Y., and Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), pp. 289-326.

Petersen, M. and Rajan, G. R. (1994). The benefits of lending relationships: evidence from small business data, *The Journal of Finance*, 49(1), pp. 3–37.

Petersen, M. and Rajan, G. R. (1995). The effect of credit market competition on lending relationships, *The Quarterly Journal of Economics*, 110(2), pp. 407–443.

Phillips, P. C. B. and Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I(1) processes, *Review of Economic Studies*, 57(1), pp. 99-125.

Phillips, P. C. B. and Ouliaris, S. (1990). Asymptotic properties of residual based tests for cointegration. *Econometrica*, 58(1), pp. 165-193.

Pigou, A. C. (1943). The Classical Stationary State. *Economic Journal*, 53(212), pp. 343-351.

Pitoňáková, R. (2018). Private Sector Savings, *DANUBE: Law, Economics and Social Issues Review*, 9(1), pp. 1–17.

Poi, B. P. (2006). Jackknife instrumental variables estimation in Stata. *Stata Journal*, StataCorp LP, 6(3), pp.364-376.

PSB (2014). Onuncu Kalkınma Planı 2014-2018 *Yurtiçi Tasarruflar Özel İhtisas Komisyonu Raporu*, Presidency of Strategy and Budget, Ankara.

PSB (2018). On Birinci Kalkınma Planı 2019-2023 *Tüketim ve Tasarruf Eğilimleri Özel İhtisas Komisyonu Raporu*, Presidency of Strategy and Budget, Ankara.

PSB (2023). *Main Economic Indicators*, Presidency of Strategy and Budget, Ankara.

Ramsey, J. B. (1969). Tests for specification errors in classical linear least-squares regression analysis, *Journal of the Royal Statistical Society Series B*, 31, pp. 350–371.

Ramsey, F. P. (1928). A Mathematical Theory of Saving. *The Economic Journal*, 38(152), pp. 543-559.

Rodrik, D. (2000). Institutions for High-Quality Growth: What They Are and How to Acquire Them, *NBER Working Paper Series*, 7540.

Roodman, D. (2009). A Note on the Theme of Too Many Instruments, *Oxford Bulletin of Economics and Statistics*, 71(1), pp. 135-158.

Sachs, J. D. and Larrain, F. B. (1993). *Macroeconomics in The Global Economy*, Prentice Hall, INC., New Jersey.

Sancak, E. and Demirci, N. (2012). Ulusal Tasarruflar ve Türkiye'de Sürdürülebilir Büyüme İçin Tasarrufların Önemi, *Ekonomik ve Sosyal Araştırmalar Dergisi*, 8(2), pp. 159-198.

Sargan, J. (1958). The estimation of economic relationships using instrumental variables. *Econometrica*, 26(3), pp. 393–415.

Schmidt-Hebbel, K., Serven, L., and Solimano, A. (1996). Saving and Investment: Paradigms, Puzzles, Policies, *The World Bank Research Observer*, 11(1), pp. 87-117.

Schmidt-Hebbel, K. and Serven, L. (1997). Saving Across The World: Puzzles and Policies, *The World Bank Discussion Paper,* 354.

Spiegel, H. W. (1991). *The Growth of Economic Thought*, Third Edition, Durham, Duke University Press.

Stata (2023). *Stata User's Guide: Release 18*, Stata Corp., NY.

Stock, J. H. and Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher order integrated systems, *Econometrica*, 61(4), pp. 783-820.

Stock, J. H., Yogo, M., and Wright, J. H. (2002). A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments. *Journal of Business and Economic Statistics*. 20(4), pp. 518 -529.

Şengür, M. and Taban, S. (2016). Türkiye'de hanehalkı tasarruflarının gelir dışındaki belirleyicileri, *Optimum Ekonomi ve Yönetim Bilimleri Dergisi*, 3(1), pp. 29-53.

Şimşek, M. (2003). Kamu harcamalarının özel yatırımlara etkileri: 1970-2001. *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 4(2), pp. 1-20

Tarla, E. G. and Temiz, M. (2020). Türkiye'de kamu harcamaları ve özel yatırım ilişkisi açısından dışlama etkisinin analizi. *Akademik Yaklaşımlar Dergisi*, 11(2), pp. 110-126.

Turan, E. (2003). Capital Structure and Output Pricing in a Developing Country, *Economic Letters*, 78(1), pp. 109-115.

TurkStat (2023). *National Income Statistics, Institutional Sector Accounts*, TurkStat, Ankara.

Tülümce, S. Y. and Buyrukoğlu, S. (2013). Türkiye'de kamu ve özel yatırımlar arasındaki ilişkinin ampirik analizi: Dışlama etkisi (1980-2010). *Mali Çözüm*, pp. 59-77.

Türel, O. (2003). Lectures Notes of Econ 460 Turkish Economy, Middle East Technical University, Department of Economics, Ankara.

Uygur, E. (2012). Türkiye'de Tasarrufların Seyri ve Etkileyen Bazı Unsurlar, *Türkiye Ekonomi Kurumu Tartışma Metni,* 108.

Uysal, D. and Mucuk, M. (2003). Crowding-out (Dışlama) etkisi: Türkiye örneği (1975-2000). *Selçuk Üniversitesi İİBF Sosyal ve Ekonomik Araştırmalar Dergisi*, 5, pp. 159-172.

Van Rijckeghem, C. (2010). Determinants of Private Saving in Türkiye: an Update, *Working Papers* 2010/04, Boğaziçi University, Department of Economics.

Van Rijckeghem, C. and Üçer, M. (2009). The Evolution and Determinants of the Turkish Private Saving Rate: What Lessons for Policy?, *TÜSİAD-T/2008-12/478.*

Verbeek, M. (2017). *A Guide to Modern Econometrics*. NY.

Wan, J. (2011). Bubbly Saving, Fukuoka University, Japon, *Center for Advanced Economic Study (CAES) Working Paper Series*, WP-2011-010.

Wong, B. and Tang, K. K. (2010). The Ageing, Longevity and Crowding Out Effects on Private and Public Savings, *CAMA Working Papers 2010-12*, Centre for Applied Macroeconomic Analysis, Crawford School of Public Policy, The Australian National University.

Wonnacott, P. (1978). *Macroeconomics*, University of Maryland, United States.

WB (1993). The East Asian Miracle, Economic Growth and Public Policy. World Bank.

WB (2008). Turkey Country Economic Memorandum (CEM). Report No: 39194-TR. World Bank.

WB (2011). Turkey Country Economic Memorandum (CEM). Report No: 66301-TR. World Bank.

WB (2014). Turkey Public Finance Review. Report No: 85104-TR. World Bank.

WB (2017). Turkey's GDP Revision: Understanding the Sources of Changes, *Focus Note*, World Bank.

Wu, D. (1974). Alternative tests of independence between stochastic regressors and disturbances: Finite sample results. *Econometrica*, 42(3), pp.529-546.

Wursten, J. (2018). Testing for serial correlation in fixed-effects panel models. *Stata Journal*, 18(1), pp.76-100.

Yarba, İ. (2019). Hidden Reserves as an Alternative Channel of Firm Finance in a Major Developing Econom, *CBRT Working Paper,* 19/36, Central Bank of the Republic of Türkiye.

Yarba, İ. (2021). Corporate Indebtedness and Investment: Micro Evidence of an Inverted U-Shape, *CBRT Working Paper,* 21/31, Central Bank of the Republic of Türkiye.

Yarba, İ. and Yassa, A. D. (2021). Does Stock Market Listing Boost or Impede Corporate Investment?, *CBRT Working Paper,* 21/12, Central Bank of the Republic of Türkiye.

Yavaş, A. and Tunç, C. (2016). Not all credit is created equal: Mortgage vs non-mortgage debt and private saving rate in Türkiye, *Central Bank Review*, 16(1), pp. 25-32.

Yavuz, N. Ç. (2001). Türkiye'de kamu yatırım harcamalarının özel sektör yatırım harcamalarını dışlama etkisi üzerine ekonometrik bir analiz (1990-1 / 2000-IV). *Kamu-İş*, 6(2), pp. 47-64.

Yavuz, N. Ç. (2005). Türkiye'de kamu harcamalarının özel sektör yatırım harcamalarını dışlama etkisinin testi (1980-2003). *Marmara Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 20(1), pp. 269-284.

Yeldan, E. (2001). *Küreselleşme Sürecinde Türkiye Ekonomisi: Bölüşüm, Birikim, Büyüme*, Istanbul: Iletişim Yayınları.

Yentürk, N. (2003). *Körlerin Yürüyüşü: Türkiye Ekonomisi ve 1990 Sonrası Krizler*, İstanbul: Bilgi Üniversitesi Yayınları.

Yentürk, N., Ulengin, B. and Çimenoğlu, A. (2009). An analysis of the interaction among savings, investments and growth in Turkey, *Applied Economics*, 41(6), pp. 739-751.

Yeşiltaş, S. (2009). Financing Constraints and Investment: The Case of Turkish Manufacturing Firms, *Master's Thesis,* Bilkent University, Department of Economics.

Yılmazer, T. (2010). The Profile and Determinants of Household Savings in Türkiye, *Background Study for the CEM Report for the World Bank.*

Yükseler, Z. (2008). Yeni Milli Gelir Serisi ve Analizi, *Türkiye Ekonomi Kurumu Tartışma Metni,* 2008/11.

Yükseler, Z. and Türkan, E. (2008). Türkiye'de Hanehalkı: İşgücü, Gelir, Harcama ve Yoksulluk Açısından Analizi, *TÜSİAD-T/2008-03/455.*

Yükseler, Z. (2013). Yatırım-Tasarruf Dengesi Türkiye Uygulaması ve Sorunlar, *TCMB Yayınları, 2013/03.*

Yükseler, Z. (2017). 2009 Referans Yıllı Yeni Milli Gelir Serisi ve Analizi. https://www.researchgate.net/publication/313419893. (DOI-10.13140/RG.2.2.24781.84967).

Zivot, E. and Andrews, W.K. (1992). Further evidence on the great crash, the oil-price shock, and the unit root hypothesis. *Journal of Business and Economic Statistics*, 10(3), pp. 251-270.

APPENDICES

A1. CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Dikmen, Aytaç

EDUCATION

Degree	Institution	Year of Graduation
MS	Department of Economics, METU	2007
BS	Department of Economics, METU	2003

WORK EXPERIENCE

Year	Place	Enrollment
March, 2006-	Capital Markets Board, Türkiye	Assistant Expert, Expert, Deputy Head of Corporate Finance Department, Advisor
December, 2004-March, 2006	Undersecretary of Treasury, Türkiye	Assistant Expert
March, 2004-December, 2006	Ziraat Bank Inc., Türkiye	Assistant Inspector

A2. TURKISH SUMMARY / TÜRKÇE ÖZET

Tasarruf, basitçe gelir ile tüketim arasındaki fark olarak tanımlansa da kavramsal olarak bugünkü tüketimin ileri bir tarihe ertelenmesi anlamına gelir ve ertelenen tüketim olarak kabul edilir. Tasarruf, hiç şüphesiz ekonomide en çok tartışılan kavramlardan biridir. Bunun en önemli iki nedeninden biri, yatırım ve büyüme ile ilişkili olarak tasarrufların, sermaye birikiminin ve/veya büyümenin kaynağı olarak farklı teorilerde yer almasıdır. İkinci neden ise günümüzün tüketim ve tasarruf kararlarının eşzamanlı olarak alınması ve zamanlar arası bir çerçevede dinamik olarak bağlantılı olmasıdır.

Bu tez, Türkiye'de yurt içi tasarrufların yapısını uygulamalı ekonometri ile inceleyen üç bağımsız makaleden oluşmaktadır. Tezin amacı, Türkiye'de özel tasarrufların belirleyicilerini kurumsal ve hanehalkı tasarruflarının alt bileşenleri çerçevesinde makro ve mikro düzeyde ampirik olarak incelemektir.

Yurtiçi tasarrufların belirleyici faktörlerinin ve özel tasarrufları teşvik etmeye yönelik politika alanlarının gerek akademik araştırmaların gerekse siyasi tartışmaların gündeminde olan Türkiye'de, tarihsel olarak yurtiçi tasarrufların daha yüksek yatırımlara kıyasla finansmanda yetersiz kalmasının, genişleyen cari işlemler açığının sürdürülmesi için yabancı tasarrufları gerektirmesiyle, büyümenin sürdürülebilirliği için yurtiçi tasarrufların artırılması büyük önem taşımaktadır.

Türk ekonomisinin genel kabul görmüş özelliklerinden biri, yurt içi tasarruf oranlarının hem diğer benzer ülkelere hem de uzun vadeli ortalama yatırım oranlarına göre tarihsel olarak düşük düzeyde olmasıdır. IMF'nin WEO veri tabanı verilerine göre, 1980-2020 yılları arasında Türkiye'nin yatırım oranı gayri safi yurt içi hasılanın (GSYİH) ortalama yüzde 25'i civarında gerçekleşmiştir. Bu, GSYİH'nın yüzde 22'si düzeyinde olan tasarruf oranından daha yüksektir.

Ayrıca, Türkiye'nin ulusal tasarruf oranı, yalnızca 1987, 1988, 1998 ve 2018 yılları hariç, 1980'den 2020'ye kadar olan tüm dönemde toplam dünya tasarruf oranının altındadır. Ek olarak, yükselen piyasa ve gelişmekte olan ekonomilerle karşılaştırıldığında; 1982, 1986, 1987, 1988, 1989, 1992 ve 1998 yılları hariç Türkiye'nin tasarruf oranı nispeten düşüktür. 2000 yılından sonra farkın daha da açıldığını da vurgulamakta fayda vardır.

Türkiye, son on yılda tüm G20 ülkeleri arasında tasarruflarda ikinci en yüksek büyümeyi yaşamıştır. Ayrıca hem son kırk yılda, hem de on yılda tasarruf oranlarını artıran sadece dört ülke vardır ve bunlar arasında son on yılda en yüksek artışı Türkiye yaşamıştır.

1978-1980 döneminde ciddi bir borç ve ödemeler dengesi krizi yaşayan Türkiye, 1980'li yıllara askeri yönetim altında makroekonomik istikrar ve liberalleşme programıyla başlamıştır.

1987'de parlamenter demokrasinin yeniden tesis edilmesinin ardından makroekonomik dengesizlikler yeniden ortaya çıkmıştır. 1980'lerin sonlarında, özel yatırımları engellemeden kamu açıklarının finansmanını sağlamak için sermaye hesaplarının liberalizasyonu getirilmiştir. Bu, tüm döviz kontrollerinin kaldırılmasını, sermaye hesabının tamamen serbestleştirilmesini ve faiz oranlarının merkez bankası tarafından izlenmesini içermektedir (Türel, 2003), (Akyüz ve Boratav, 2003).

1990'lı yıllarda kamu borçlarının maliyeti enflasyon oranının üzerinde, ortalama yüzde 30 düzeyinde gerçekleşmiştir (Akyüz ve Boratav, 2003). Bu durum borçların hızla artmasına, para ikamesinin hızlanmasına ve kırılgan bir bankacılık sisteminin ortaya çıkmasına neden olmuştur. Özatay'ın (2000) belirttiği gibi, reel faiz oranlarının reel ekonomik büyümeyi aştığı ve dengeleyici bir faiz dışı fazlanın olmadığı durumlarda iç borç finansmanı sürdürülememektedir. 1991-1993 döneminde, yüksek reel faiz oranları ve aşırı kısa borç vadeleri koşullarında, 1993 yılı sonunda kamu açığının finansman mekanizması değişmiş, kısa vadeli iç borç ihaleleri iptal edilmiş ve Hazine büyük ölçüde Türkiye Cumhuriyet Merkez Bankası (TCMB) kaynaklarına

güvenmeye başlamıştır. Bu politika değişikliği 1994'te döviz krizine yol açmıştır (1994 yılının ilk çeyreğinde Türk lirası ABD doları karşısında neredeyse yüzde 70 oranında değer kaybetmiş, TCMB bir gecede uluslararası rezervlerinin yarısından fazlasını kaybetmiştir. Faiz oranları kriz öncesi yüzde 70 civarındaki istikrarlı seviyesinden yüzde 700'e yükselmiş, ekonomik büyüme yüzde 6 oranında gerilemiştir. 1994 krizinin ardından IMF ile yapılan çeşitli istikrar girişimlerine rağmen, 1990'lı yıllar boyunca siyasi belirsizlik nedeniyle ekonomik koşullar istikrarsız bir özellik göstermiştir.

2000'li yıllarda, 2000-01 bankacılık krizi sonrasında, genel olarak kamu açığının ve kamu borcunun azaltılmasını amaçlayan 2001 sonrası istikrar programı "Güçlü Türkiye Ekonomisine Geçiş" politikaları nedeniyle enflasyon hedeflemeli para politikası çerçevesi yeniden yapılandırılmıştır. Sermayesi güçlendirilmiş bankacılık sektörü, düşen faiz oranları ve enflasyonun etkisiyle Türkiye, yıllık ortalama yüzde 7'ye yakın büyüme oranıyla güçlü ve kesintisiz bir büyüme yakalamış ve tüketici enflasyonu 2002-07 döneminde yüzde 68 seviyesinden yüzde 8 civarına gerilemiştir. İyileşen büyüme beklentileri ve bol miktarda yabancı likidite, büyümeyi hızlandıran ve cari açığı genişleten dış sermaye akışlarına yol açmıştır (IMF, 2010).

Türkiye 2010'lu yıllara parasal tarafta dikkat çekici bir politika değişikliğiyle başlamıştır. Kısa vadeli güçlü sermaye girişleri, liranın değer kazanması, rekabet gücünün zayıflaması, yurt içi kredi büyümesini teşvik etmesi, enflasyonist baskılar yaratması ve ithalatın artmasıyla karşı karşıya kalan TCMB, 2010 yılının sonlarından bu yana döviz kuru gelişmelerine ve kredilere daha fazla ağırlık veren ve tek faiz oranı yerine çok çeşitli araçların kullanıldığı yeni politika çerçevesini uygulamaya koymuştur. Türkiye ekonomisi 2010'lu yıllarda yılda ortalama yüzde 5,5'e yakın büyüme oranıyla hızla büyümüştür. 2018 yılı yaz aylarında, belirsiz küresel ekonomik ortam, Türkiye'nin özellikle 2011'den bu yana istikrarlı bir şekilde artan ve 2018'de GSYİH'nın yüzde 54'üne ulaşan dış borcundaki kırılganlıklarla birleşince lirada satış ve sermaye çıkışlarına yol açmıştır. Türkiye'de yurt içi tasarruf verileri Strateji ve Bütçe Başkanlığı (PSB-eski Kalkınma Bakanlığı ve Devlet Planlama Teşkilatı)

tarafından ekonominin genel dengesinin hazırlanması kapsamında, özel sektör ve kamu sektörü ayrımında, sadece yıllık bazda üretilmektedir.

1980-2020 dönemi yurtiçi tasarruf verilerine bakıldığında; özel tasarruflardaki artışın kamu tasarruflarındaki azalmaya karşılık geldiği görülmektedir. 1980'li yılların ilk yarısında ortalama yüzde 14,4 olan yurt içi tasarruf oranı, özellikle yurt içi mali piyasaların liberalleşmeye başladığı ve faiz oranlarının serbestleştirilmeye başlandığı 1984-1988 döneminde, özel tasarruf oranında görülen yaklaşık yüzde 160'lık artışında etkisiyle 1988'de yüzde 29,1'e ulaşmıştır. Bu oran son kırk yılın en yüksek oranıdır. 1989-1998 döneminde ortalama yüzde 24,4 civarında seyreden yurt içi tasarruf oranı, 1999-2002 döneminde yüzde 21,2'de sabit kalmıştır. Daha sonra 2003 yılında yüzde 19,9 olan yurt içi tasarruf oranı, 2009'daki geçici düşüş dışında istikrarlı bir şekilde artarak 2018'de yüzde 27,7'ye ulaşmıştır. Benzer şekilde 2019'daki geçici düşüşün ardından artış devam ederek 2020'de yüzde 26,8'e ulaşmıştır. 2002-2006 dönemindeki kamu tasarruf artışından kaynaklanan artış hariç, son kırk yılda yurt içi tasarruf oranındaki artış her zaman özel tasarruftan kaynaklanmıştır.

Ayrıca, Türkiye tasarruf oranlarının ayrıştırılması ilginç ve alışılmadık bir durum ortaya çıkarmaktadır. Özellikle 1984 sonrasında Türkiye'nin yurt içi tasarrufunu oluşturan iki bileşen birbiriyle güçlü bir negatif korelasyon içerisinde hareket etmiştir.

Türkiye İstatistik Kurumu (TÜİK) Kurumsal Sektör Hesaplarına göre 2009-2020 döneminde özel sektör tasarruflarının büyük çoğunluğunun reel sektör tasarruflarından kaynaklandığı görülmektedir. Hanehalkı tasarruflarının toplam özel sektör tasarrufları içindeki payının 2009-2020 döneminin tamamında yüzde 50'nin altında olması dikkat çekmektedir. Ek olarak, kurumsal tasarruflar 2017 ile 2020 arasında ciddi bir artış göstererek 2017'de GSYİH'nin yüzde 13,3'ünden 2020'de yüzde 20,5'ine çıkmıştır.

Mevcut çalışmalardan duyulan bazı memnuniyetsizliklerden kaynaklanan motivasyonla, bu çalışma, mevcut literatürü üç yönde genişletmeyi umarak, Türkiye'de tasarruf davranışının belirleyicileri hakkındaki sınırlı literatüre katkı sağlamayı amaçlamaktadır. Öncelikle bilgilerimize göre Uygur (2012), Yentürk ve

ark. (2009) ve Yavaş ve Tunç (2016)'un eski serilerle yaptığı çalışmalar dışında, Türkiye tasarruf dinamikleri üzerine bugüne kadar yapılan tüm ampirik çalışmalarda yıllık veriler kullanılmış ve özellikle Kalkınma Bakanlığı tarafından üretilen eski tasarruf serileri kullanılmıştır. Buna karşılık, bu çalışma hem TÜİK'in hem de PSB'nin yeni (güncellenmiş) serilerini kullanmaktadır ve 1990 yılından başlamaktadır. Ayrıca bu çalışma, PSB'nin (ve Kalkınma Bakanlığının) yıllık verilerinden üçer aylık olarak oluşturulan en uzun verilerle makro analiz yapan ilk çalışmadır.

İkincisi, yukarıda da belirttiğimiz gibi hem makro hem de mikro düzeydeki verileri dikkate alan kapsamlı bir çalışmadır. Bu bağlamda, karlılığı tasarruf yerine temsil eden çoğu araştırmadan farklı olarak firma düzeyinde analiz, doğrudan Borsa İstanbul'da işlem gören firmaların mali tablolarından derlenen firma tasarruf verileriyle yapılmaktadır. Ayrıca ampirik literatürün çoğundan farklı olarak, enflasyon muhasebesi uygulamasında tutarsızlığı önlemek amacıyla 2003 ve 2004 yılları örneklem döneminin dışında tutulmuştur.

Üçüncüsü, özel tasarruf oranı ile kamu tasarruf oranı ilişkisinin üniter katsayı ile güçlü bir şekilde negatif bulunması, Türkiye için ilk ve benzersiz bir bulgudur. Ayrıca tüketici kredileri özel tasarruf oranını negatif yönde, işletme kredileri ise pozitif yönde etkilemektedir. Son olarak, Türkiye'ye ilişkin ampirik literatürde pek rastlanmayan bir durum olan reel sektör güven endeksi de özel tasarruf oranının belirleyicilerinden biri olarak karşımıza çıkmaktadır.

Türkiye'de Özel Sektör Tasarruflarının Belirleyicilerinin Makroekonomik Analizi: ARDL Sınır Testi Analizi

Ekonometrik uygulamaların yapıldığı ilk bölüm olan tezin üçüncü bölümünde; özel tasarruf oranının ampirik belirleyicileri Türkiye için incelenmiştir.

Türkiye için 1990-2020 dönemi için yeni ve ilk defa oluşturulan üç aylık makro veriler üzerinden tahmin edilen ARDL Sınır testi eşbütünleşme denklemi, özel tasarruf oranı ile belirleyicileri arasında uzun vadeli bir ilişki belirlemekte ve yakınsama hızının yüksek olmasına ve bazı kısa vadeli dinamiklere izin vermektedir.

Kamu tasarruflarının GSYİH'ye oranı katsayısı -1,0323 olarak tahmin edilmiştir; bu, özel tasarrufların kamu tasarrufları tarafından tamamen dışlandığını ortaya koymaktadır, çünkü bu katsayının -1 olduğuna dair boş hipotezi, t istatistiği -0,887 olduğu için reddedilmemiştir ve karşılık gelen olasılık puanı 0,377'dir. Sonuçlar, Türkiye için 1990-2020 döneminde uzun vadede özel tasarrufların kamu tasarrufları tarafından tamamen dışlanmasının öngörüldüğünü göstermektedir.

Hata terimi katsayısının beklendiği gibi negatif ve istatistiksel olarak anlamlı olduğu görülmektedir. İstatiksel olarak anlamlı hata terimi katsayısı, özel tasarruf oranının değişen faktörlere gecikmeyle karşılık verdiğini, uzun ve kısa dönem özel sektör tasarruf farklarının yaklaşık yüzde 53'ünün bir çeyrek içinde düzeltildiğini göstermektedir. Benzer şekilde, uzun vadeli ve kısa vadeli özel sektör tasarruf oranları arasındaki farkın yüzde 99'unun (neredeyse tam düzeltme olarak düşünülebilir) yaklaşık 8,6 çeyrek veya yaklaşık 26 ay içinde eski haline döneceği anlaşılmaktadır.

Kamu tasarruflarının GSYİH'ye oranındaki değişimin katsayısı -0,9991 olarak tahmin edilmiştir; bu, özel tasarrufun kamu tasarrufu tarafından tamamen dışlandığını ortaya koymaktadır, çünkü bu katsayının -1 olduğuna dair boş hipotezi, t istatistiği 0,1216 olduğu için reddedilmiştir ve karşılık gelen olasılık puanı 0,9035'tir. Sonuçlar, Türkiye için 1990-2020 döneminde kısa vadede de özel tasarrufların kamu tasarrufları tarafından tamamen dışlanacağının tahmin edildiğini göstermektedir.

Tezin bir diğer önemli bulgusu ise özel sektör güven endeksinin öneminin ortaya konulmasıdır. Model tahmin sonuçlarına göre, reel sektörün güveni ile özel sektör tasarrufları arasında aynı yönlü ilişki vardır. Ayrıca, uzun dönem denge denkleminden reel sektör güven endeksi çıkarıldığında model testleri kötüleşmektedir.

Bu bölümün çalışması, yalnızca Türkiye tasarruf verilerindeki tam dışlama etkilerini göstermesi açısından değil, aynı zamanda özel sektör kredilerinin tasarruf üzerindeki farklı etkilerine ilişkin kanıt sağlaması açısından da önemlidir. Özellikle şirketlere verilen işletme kredileri özel tasarruf oranı üzerinde olumlu, hanehalkına verilen tüketim kredileri ise olumsuz etki yapmaktadır. Ayrıca Türkiye'de reel faiz oranı ile

özel tasarruf oranı arasında pozitif ve istatistiksel olarak anlamlı bir ilişki olduğu için ikame etkisi gelir etkisinden daha ağır basmaktadır. Kredi ve faiz oranı etkileri birlikte ele alındığında, reel faiz oranındaki düşüşün tasarruf arzının hanehalkından şirketlere doğru kaymasıyla ilişkili olabileceği ileri sürülebilir.

Diğer yandan, reel sektöre duyulan istikrar güveninin firmaların daha fazla tasarruf etmesini sağladığı tespit edilmiştir. Ayrıca özel sektör yatırım oranı ve gelir artış oranının pozitif, iç borç stokunun ise özel tasarruf oranını negatif etkilediği tespit edilmiştir. Kamu tasarruf oranı ve iç borç stoku katsayılarının işaretleri ile firma kredileri, reel sektör istikrar güveni ve özel yatırım oranları birbirini desteklemektedir. Son olarak, 2001 krizi sonrasında Türkiye ekonomisinde önemli değişimler yaşanması nedeniyle hanehalkı ve firmaların tasarruf davranışlarının da bu değişimlerin bir sonucu olarak değiştiği, anlamlı kukla değişkenle gösterilmiştir. Bu uzun dönemli ilişkinin kısa dönem dinamikleri dikkate alınarak tahmin edilen modelin hata terimi durağanlık açısından test edilmiş ve hata teriminin yüzde 99 güven düzeyinde durağan olduğu görülmüştür.

Türkiye'de Firma Tasarruflarının Dinamikleri: Firma Seviyesinde Panel Verisi Analizi

Özel tasarrufun alt bileşenleri olan firma ve hanehalkı sektörleri tasarruflarının belirleyicilerinin araştırılması hem teknik açıdan hem de politika açısından büyük önem taşımaktadır. Üçüncü bölümde toplam özel sektör tasarruf dinamiklerini analiz edildikten sonra ve hanehalkı kredileri ile firma kredilerinin tasarruf üzerindeki etkilerinin farklı olduğu anlaşıldıktan sonra, dördüncü bölümde yatay kesit regresyonlar yaparak kurumsal tasarrufların firma düzeyindeki belirleyicileri araştırılmıştır.

Analize konu firmaların finansal durum tabloları, gelir tabloları, nakit akım tabloları ve özkaynak tabloları incelendiğinde, özetle; 2010-2020 döneminde, nakit ve nakit benzerleri, stoklar ve ticari alacakların toplam varlıklar içindeki payının nispeten sabit olduğu görülmektedir. Öte yandan finansal yatırımlardaki düşüş dikkat çekici bulunmuştur. Finansal yatırımlar şirketlerin zor durumda kaldıklarında satabilecekleri

ve likidite yaratabilecekleri önemli kalemlerdir. Bu kalemdeki azalma ise yüzde 50'ye yakın seviyelerdedir. Ayrıca 2010-2020 döneminde şirketlerin diğer yatırım kalemleri arasında maddi olmayan varlıkların payı artarken maddi duran varlıkların payı azalmaktadır.

Firmaların yükümlülüklerine dair veriler incelendiğinde ise, özetle; 2010-2020 döneminde, şirketlerin bilançolarının pasif kompozisyonunda önemli değişiklikler olduğu görülmektedir. En önemli nokta ise borçların payının yüzde 50 oranında artmasıdır. Firmaların varlıklarının finansmanında banka kredilerinin ağırlığı artmaktadır. Bu konuda bir diğer önemli nokta ise, varlıkların finansmanında banka kredilerinin ağırlığı artarken, özkaynakların payının azalma eğilimi göstermesidir. Ayrıca bir diğer finansman türü olan ticari borçların payı da dönem genelinde azalış göstermektedir. Borsada işlem gören şirketler için bankalardan borçlanmaların payının artması ve ticari borçların payının azalması beklenen bir sonuçken, özsermaye payındaki düşüş bu şirketler için beklenmedik bir sonuçtur. Özlü ve Yalçın'ın (2010) belirttiği gibi ticari borçların şirket bilançoları içindeki payının Türkiye'de diğer ülkelere göre çok daha fazla olduğunu da belirtmek gerekmektedir. Son olarak, Türkiye'de finansal sistem dışında bir fonlama yöntemi olan diğer borçlar büyüklüğünün (ortaklara ve diğer ilişkili taraflara borçlar) firmaların toplam yükümlülüklerinin yaklaşık yüzde 2'sini oluşturduğu dikkat çekmektedir.

Türkiye'de firma bilançolarına dair en büyük iki veri seti olan TCMB ve Sanayi ve Teknoloji Bakanlığı (STB) Girişimci veri setlerinde firmaların dağıttıkları kar paylarına dair veri olmadığından dolayı, çalışmanın bu bölümündeki tahminlerde Borsa İstanbul'da işlem gören şirketlerin mali tabloları temel alınmıştır. Borsada işlem gören firmaların mali tabloları, TCMB ve STB veri setlerinden farklı olarak Vergi Usul Kanunu'na göre değil, Uluslararası Muhasebe Standartları/Uluslararası Finansal Raporlama Standartlarına göre hazırlanmakta ve bağımsız olarak denetlenmektedir. Ayrıca, bu bölümde sağlamlığın kontrol edilmesi için Driscoll-Kraay (DK) standart hatalarına sahip model kullanılmıştır. Seçilen model panel düzeltmeli standart hata (PCSE) yöntemiyle tahmin edilmiştir. Bu tekniğin dışında, Fark ve Sistem GMM (Arellano ve Bond, 1991; Blundell ve Bond, 1998), Yarı-maksimum olabilirlik

doğrusal dinamik panel veri tahmini (Hsiao, Pesaran ve Tahmiscioğlu, 2002) ve Önyargı düzeltilmiş LSDV dinamik panel veri tahmincisi (Bruno, 2005) modelleri de kullanılmıştır. Ancak model teşhislerine göre iki yönlü sabit etkili PCSE panel FGLS tercih edilmiştir.

Bu bölümdeki çalışmada Borsa İstanbul'da işlem gören ve mali tabloları Kamuyu Aydınlatma Platformu üzerinden kamuya açıklanan şirketlerin 2010-2019 yılları arasındaki verileri kullanılmıştır. 2010-2019 yılları arasında Borsa İstanbul'dan kot dışına atılan şirketler tüm geçmiş kalemleriyle birlikte veri setinden çıkarılmıştır. Ayrıca, finansal tabloların her bir kalemine ilişkin veriler, ilgili şirketin 2010-2019 döneminde borsada işlem görmesi durumunda alınmıştır. Ancak 2020 yılında Borsa İstanbul'a kote olan şirketler çıkarılmıştır. Tasarruf oranı, dağıtılmayan karın gelirlere (hasılata) oranı olan bağımlı değişken olduğundan, ilgili şirketin ilgili yıla ait gelir verisi olmaması durumunda bu yıla ilişkin tüm veriler silinmiştir. Son olarak finansal şirketler (bankalar, aracı kurumlar, sigorta şirketleri, finansal kiralama ve faktoring şirketleri), yatırım şirketleri (girişim sermayesi ve özel sermaye, menkul kıymetler, gayrimenkul) ve faaliyet konusu futbol başta olmak üzere spor olan şirketler kapsam dışında tutulmuştur. Bu kapsamda veri seti, Borsa İstanbul'da işlem gören 327 şirketten ve 2010-2019 yıllarını kapsayan 2.761 gözlemden oluşmaktadır. Zaman boyutu 10 olduğundan panel zaman serisi testleri (panel birim kök ve eşbütünleşme analizi) yapılmasına gerek görülmemiştir. Bunun nedeni ise bu testler asimptotik olduğundan dolayı uygulanamayacak olmaları veya uygulansa dahi sınırlı zaman serisi gözlemleri nedeniyle çok düşük güce sahip olmasıdır.

Sonuçlar, firmaların kar marjı arttıkça kurumsal tasarruf oranının (tasarruf/gelir oranı) önemli ölçüde arttığını göstermektedir. Uluslararası kanıtlarla uyumlu olarak, varlıklar toplamı açısından firma büyüklüğü küçüldükçe, kurumsal tasarruf oranı artmakta; bu da küçük firmaların büyük şirketlere göre gelirlerinden daha fazla tasarruf yapma eğiliminde olduklarını göstermektedir. Bu aslında Türkiye'deki küçük firmaların büyük firmalara göre mali açıdan daha kısıtlı olduğuna dair anekdot niteliğindeki kanıtları doğrulamaktadır. Ayrıca finansal kaldıraç oranının (kısa ve uzun vadeli borçlanmaların toplam yükümlülüklere oranı) tasarruf oranı üzerinde olumsuz etkisi

bulunmaktadır. Benzer şekilde ticari borçların oranı (kısa ve uzun vadeli ticari borçların toplam yükümlülüklere oranı) firma tasarruf oranını olumsuz yönde etkilemektedir. Ayrıca borçlanma (toplam özsermaye dışı yükümlülüklerin toplam aktifler içindeki payı olarak tanımlanıyor) beklendiği gibi firma tasarruf oranını önemli ölçüde düşürmektedir. Firmalar arasındaki karşılaştırmalı ticari kredilere (ticari alacaklar ve ticari borçlar) ilişkin olarak, ticari alacakların ticari borçlara oranı katsayısı negatif ve anlamlı, küçük büyüklükte ve orta düzeyde anlamlıdır.

Tobin q oranına (firmanın piyasa değerinin defter değerine oranı) ilişkin olarak, tahmin edilen katsayıyı iki güç belirleyebilmektedir. Bir şirketin piyasa değeri defter değerine göre arttığında, şirket öncelikle kar dağıtımını azaltmak ve yeni yatırım fırsatlarını finanse etmek için iç fonlarını artırmak isteyebilir. Diğer taraftan, şirketin dış finansmana (banka kredileri ve/veya ikincil halka arz olarak ödenmiş sermaye artırımı) erişim şansı daha fazladır, bu da yatırımın finansmanı için iç fon ihtiyacını azaltmaktadır. Ancak Türk Borsası gibi nispeten sığ bir hisse senedi piyasasında şirketin piyasa değerindeki artış, şirketin değerinden ve yatırım potansiyelinden tamamen bağımsız olarak gerçekleşmiş olabilir. Tüm bu faktörlerin bir sonucu olarak karışık sonuçlar beklenmelidir. Çalışmanın model sonuçlarına göre Tobin q değişkeni regresyonda negatif ve anlamlı bir katsayıya sahiptir. Defter değerine kıyasla şirket piyasa değeri arttıkça firma tasarruf oranının azalması, yüksek Tobin q'sunun firmaların hızlı büyümesiyle ve dolayısıyla daha fazla dış fon kullanan ve dağıtılmamış karlara daha az ihtiyaç duyan mali açıdan daha az kısıtlı firmalarla ilişkili olduğu argümanıyla tutarlıdır. Bu nedenle, Tobin q değeri yüksek olan firmalar, finansman kaynağı olarak tasarruflara daha az güvenmeyi tercih etmektedir.

Son olarak, idari giderler firmanın faaliyet giderlerinin önemli kısımlarından birini oluşturmaktadır. Banker ve ark. (2019) ve Cleland ve Bruno (1996) belirtildiğ üzere, amortisman bu gider türüne dahildir. Eğitim ücreti ve personel eğitim fonu giderleri firmanın insan kaynağını geliştiren ve firmaya uzun vadeli değer katan harcama kalemleridir. Banker ve ark. (2011), idari giderlerin yalnızca kaynak-girdi gideri olarak değil aynı zamanda firmanın uzun vadeli karı için optimal bir yatırım olarak da görülebileceğini savunmaktadır. Ancak idari giderlerin acentelik sorunlarının vücut

bulmuş hali olabileceği yönünde görüşler de bulunmaktadır. Tüm bu tartışmalar kapsamında, Türkiye için bir kanıt teşkil edecek şekilde bağımsız değişken olarak idari giderin gelirin (hasılatın) yüzdesi olarak dahil edildiği modele yer verilmiştir. Tahmin sonuçları, yönetim giderlerinin gelirlere (hasılata) oranının firma tasarruf oranı üzerinde olumlu bir etkiye sahip olduğunu göstermektedir. Bu bulgu, Türkiye'de bu tür harcamaların üretkenliğe yol açtığını, bunun da gelecekteki değeri ve dolayısıyla firma tasarruf oranını artırdığını göstermektedir.

Bu bölümde tahmin edilen modelden elde edilen bulgular ayrıca, nakit pozisyonu (nakit ve nakit benzerlerinin toplam varlıklara oranı olarak tanımlanan) katsayısının, firma tasarrufların bağımlı değişken olarak kullanıldığı regresyon için negatif ancak anlamsız olduğunu göstermektedir. Nakit pozisyonu hem nakit kar dağıtımı hem de işletme sermayesi açısından oldukça önemlidir. Ayrıca yatırım kararları da bu pozisyona bağlıdır. Bu bağlamda, nakit pozisyonu ne kadar yüksek olursa, kâr dağıtım kolaylığı da o kadar fazla olur ve dağıtılmayan karı artırma isteği de o kadar az olur; bunların tümü tasarrufların azalmasına neden olur. Verbeek'in (2017) de haklı olarak işaret ettiği gibi, bir değişkenin etkisinin önemsiz olması halinde dahi o değişkenin bilgi veren bir yönü olduğundan regresyona dahil edilebilmelidir. Dolayısıyla daha önce de belirtildiği gibi nakit pozisyonu önemli bir kontrol değişkeni olduğundan anlamlı olmasa bile modele dahil edilmiştir. Öte yandan, anlamsızlık, verilerde görülen değişkenliğin olmamasından veya örneğe özgü sorunlardan da kaynaklanabilmektedir.

Türkiye'de Hanehalkı Tasarruflarının Mikroekonomik Belirleyicileri: Hanehalkı Seviyesinde Yatay Kesit Analizi

Hanehalkı tasarrufları, sermaye yatırımını desteklemek için kullanılan, uzun vadeli ekonomik büyümenin şekillenmesinde önemli bir rol oynayan ve dolayısıyla ülkelerin ekonomik performansını ve bireylerin refah düzeyini etkileyen ana yurt içi fon kaynağı olarak tanımlanabilir (OECD, 2016).

Hanehalkı tasarrufunun birkaç farklı tanımı vardır (Lusardi ve diğerleri, 2001) ve sonuçlar, dikkate alınan tasarrufun ölçümüne bağlı olarak oldukça farklı

olabilmektedir. Bu nedenle hanehalkı tasarruflarını ölçmek için dört farklı tanım (S1, S2, S3 ve S4) kullanılmıştır.

Hanehalkı tasarrufunun ilk tanımı (S1) en yaygın tanım olup, hanelerin aylık toplam harcanabilir geliri ile aylık toplam harcamaları arasındaki fark olarak tanımlanmaktadır.

Hanehalkı tasarrufuna ilişkin ikinci tanım (S2) dayanıklı tüketim mallarını dikkate almaktadır. Dayanıklı mallar genellikle en az üç yıllık bir ömre sahip olarak tanımlanır. Sonuç olarak, hane halkının dayanıklı mallara yaptığı harcamalar bir tür tasarruf olarak değerlendirilmektedir; çünkü harcamaların bir kısmı aslında gelecekteki tüketim faydalarını artırmayı amaçlayan bir yatırım kararıdır. Tasarrufun ikinci tanımı, tasarrufun birinci tanımına hane halkının dayanıklı tüketim malları harcamalarını eklemektedir.

Hanehalkı tasarrufuna ilişkin üçüncü tanım (S3) takı, saat ve kol saatlerini de kapsamaktadır. Türkiye'de birçok hanehalkı tasarruflarını altın şeklinde tuttuğundan, Türkiye'de altın tasarruf aracı olarak yaygın bir şekilde kullanılmaktadır. Ne yazık ki hane halkının altın harcamalarına ilişkin doğrudan bir veri bulunmamaktadır. Ancak, TÜİK Hanehalkı Bütçe Araştırması hanelerin mücevher, saat ve saat harcamalarına ilişkin veriler toplamaktadır. Bu düşünceden hareketle, tasarrufun bu tanımında takı, saat ve saat harcamalarının hanehalkı tüketim tanımlarına dahil edilmemesine karar verilmiştir. Üçüncü tasarruf tanımı, yukarıdaki nedenlerden dolayı tasarrufun ikinci tanımına hanehalkının mücevher, saat ve saat harcamalarını da eklemektedir.

Hanehalkı tasarrufuna ilişkin dördüncü tanım (S4) sağlık ve eğitim harcamalarını dikkate almaktadır. Sağlık ve eğitim harcamalarını beşeri sermayeye yapılan yatırımlar, sigorta satın alımlarını ise tasarruf ve dayanıklı mal tüketimi olarak değerlendirebiliriz. Bu tasarruf tanımı, hanelerin sağlık ve eğitim harcamalarını tasarrufun üçüncü tanımına dahil etmektedir. Bir diğer ifadeyle, bu tanımda dayanıklı tüketim malları, mücevherat, saat ve saat tüketiminin yanı sıra sağlık ve eğitim tüketimini de toplam tüketimin dışında tutulmaktadır.

Tasarruf, yatırım ve sermaye birikimi üzerindeki etkisiyle (ters nedensellik durumu) geliri etkilediğinden, istenilen (arzu edilen-hedeflenen) tasarruf oranının tahmini, bir endejenlik (içsellik) problemini (hata terimiyle eş zamanlı korelasyonu) içermektedir. Endojenliğin (içselliğin) bir diğer nedeni ise gelir değişkenindeki ölçüm hatasıdır. Çünkü bir regresyonun bağımsız değişkeninde ölçüm hatasının bulunması endojenlik (içsellik) sorununa yol açmaktadır.

Bu bölümdeki çalışmada, tasarruf oranı tahmininde ters nedensellikten kaynaklanan endojenlik (içsellik) sorununu çözmek için İki Aşamalı En Küçük Kareler tahmincisi (2SLS), Genelleştirilmiş Momentler Yöntemi (GMM) tahmincisi ve Sınırlı Bilgi Maksimum Olabilirlik (LIML) tahmincisi kullanılmıştır.

Çalışmanın detay sonuçlarına geçmeden, 2019 yılında Türk haneleri için fiili tasarruf oranının yüzde 11,6, istenen tasarruf oranın ise yüzde 14,7 olarak tahmin edildiğinin belirtilmesinde yarar vardır. Dolayısıyla, Türk hanehalkının gerçekleşen (fiili) tasarruf oranları, istenen (arzu edilen) tasarruf oranından düşük bulunmuştur.

Bu durum üç şekilde gerçekleşebilir: Ya istenen tasarruf oranı artmıştır, ya fiili tasarruf oranı azalmıştır, ya da her ikisi de aynı anda gerçekleşmiştir.

Türkiye'de istenen hanehalkı tasarruf oranlarının fiili hanehalkı tasarruf oranından yüksek olmasının bir açıklaması da hanehalklarının fiili tasarruf oranlarının azalmasıdır. Bu kanal şu şekilde açıklanabilir: Eğer bazı haneler beklediklerinden daha az gelire sahip olduklarını tespit ederlerse, fiili (gerçek) tasarrufların planlanan tasarruflardan (arzulanan tasarruflardan) daha küçük olduğunu fark etmiş olacaklardır. 2019 yılında Türkiye'de de durum böyle görünmektedir. 2018'den sonra (aslında Ekim 2018'den itibaren başlayan ve hissedilen) yüksek enflasyon rakamları nedeniyle hanehalkının satın alma gücündeki hızlı kayıp, Türkiye'nin fiili tasarruf oranındaki düşüşün nedeni olabilir.

Türkiye'de istenen hanehalkı tasarruf oranlarının gerçek hanehalkı tasarruf oranının üzerinde çıkmasının bir diğer nedeni de hanelerin istenen tasarruf oranlarındaki artışla

ilgili olabilir. Enflasyonun hızlı yükselişi ve Türk lirasının son yıllardaki ciddi değer kaybı, Türkiye'deki hane halkını arzu ettikleri tasarruf oranlarını yükseltmeye yöneltmiş olabilir. İstenilen tasarruf oranındaki herhangi bir artış, hane halkı harcamalarında bir azalmaya yol açacaktır. Toplam (hane halkı) harcamalarındaki bu düşüş, toplam talep (AD) eğrisinde aşağı doğru bir kaymaya neden olur ve çarpan etkisi, yeni reel GSYİH'nın çarpana eşit bir faktör kadar başlangıç seviyesinden daha düşük olmasına neden olur. Gelir ve tasarruf arasında doğrudan bir korelasyon olduğundan, bu azalan GSYİH (gelir) düzeyinin daha yüksek tasarruflara yol açmaması muhtemeldir. Hanehalkı başlangıçta tasarruf ettikleri gelirin oranını artırarak daha fazla tasarruf etmeyi amaçlasa da, artık kendilerini daha az gelirle ve tahsis edilecek gelir havuzunun azalmasıyla karşı karşıya bulunmaktadır. Daha küçük bir havuzun daha büyük kısmı, daha büyük bir gelir havuzunun önceki daha küçük kısmını aşamaz. Bu olgu, tasarruf paradoksu olarak bilinen ekonomik kavram tarafından çok iyi tanımlanmaktadır. Türkiye, 2018 yılının son çeyreğinden itibaren beklenen enflasyonun hızlı yükselişi ve Türk lirasının yüksek değer kaybından kaynaklanan tasarruf paradoksunun olumsuz etkilerini yaşamış olabileceği değerlendirilmektedir.

GMM, 2SLS ve LIML metodolojilerinden elde edilen tahminler, tüm tasarruf tanımlarında hane halkı tasarruf düzeyleri ile gelir arasında pozitif ve istatistiksel olarak anlamlı bir korelasyon olduğunu göstermektedir. Bu durum, daha yüksek gelirli hanelerin, daha düşük gelirlilere kıyasla daha yüksek ortalama tasarruf eğilimi sergilediğini ortaya koymaktadır; bu da Türkiye'deki hanehalkı sektörünün tasarruf davranışına ilişkin daha önce yapılan araştırmalarla uyumludur. Gelir ve tasarruflar arasındaki pozitif ilişki, Friedman'ın (1957) kalıcı gelir hipotezini destekleyen kalıcı gelirin dikkate alınmasından veya Keynes'in (1936) orijinal Keynesyen formülasyonuna uygun olarak, özellikle geçici gelire yanıt olarak cari gelirin kullanılmasından kaynaklanabilir.

Ayrıca, aşırı yüksek gelir düzeyine sahip hanelerin (hanehalklarının geliri ortalamanın en az 3 standart sapma üzerindedir) diğer hanelere kıyasla ortalama tasarruf eğiliminin daha yüksek olduğu görülmektedir.

Hanehalkı büyüklüğü açısından, her iki kukla değişken de (ortalama sayının etkisini ve ortalamadan en az 3 standart sapmanın büyüklüğünü yakalayan) tasarruflar üzerinde önemli olumsuz etkilere sahiptir; bu da toplam birey sayısı arttıkça toplam tasarrufların azaldığını göstermektedir. Aşırı büyük hane halkı büyüklüğüne sahip haneler için de ek bir olumsuz etkinin bulunduğunu belirtmek gerekir (hane halkı büyüklüğü ortalamanın en az 3 standart sapma üzerindedir).

Benzer şekilde, en az bir çocuğu olan haneler için kukla değişken negatif bir katsayı ile anlamlıdır; bu da çocukların hanedeki toplam tasarrufları azalttığını, diğer her şeyi sabit tuttuğunu göstermektedir.

Eğitimin tasarruflara etkisi iki farklı kukla değişkenle incelenmektedir. Beklenildiği gibi üniversite mezuniyetinin hane halkı tasarruf düzeyi üzerinde olumlu etkisi vardır. Öte yandan herhangi bir eğitim kurumunda eğitime devam edilmesi, belki de eğitim harcamaları nedeniyle, tasarrufları olumsuz etkilemektedir.

Kadınların işgücüne katılımının tasarruflara etkisi hem sosyolojik hem de ekonomik açıdan da önem taşımaktadır. Sonuçlar, çalışan kadın oranının tasarruflar üzerindeki önemli ölçüde olumlu etkisine dair güçlü kanıtlar göstermektedir. Türkiye'de kadınların işgücüne katılım oranının çok düşük olduğu göz önüne alındığında, kadınların işgücüne katılımına yardımcı olacak ve teşvik edecek politikalar yoluyla Türkiye'nin özel tasarruf oranının artırılması için geniş bir alan bulunmaktadır.

Öte yandan hanehalkı reisi kadın olan haneler daha az tasarruf etmektedir. Bu olumsuz ilişkinin potansiyel nedeni istenmeyen koşullar olabilir. Özellikle ailenin reisliği kadının kendi isteğiyle değil boşanma, ölüm gibi zorunlu sebeplerle kadına bırakılmış olabilir ve bu duruma hazırlıklı olmayan kadın maddi açıdan zor durumda kalmış olabilir.

Zenginliğin (refahın) tasarruf üzerindeki etkisi hem teoride hem de pratikte geniş çapta incelenen önemli kanallardan biridir. Bu çalışmada zenginlik etkisini temsil etmek amacıyla Türkiye'ye özel bir zenginlik endeksi oluşturulması amaçlanmışsa da

anlamlı bir sonuç elde edilememiştir. Benzer şekilde Türkiye'de konut sektörünün ve konut fiyatlarının payı ve değişim etkileri nedeniyle çok önemli olduğu göz önünde bulundurularak kullanılması uygun görülmüştür. Ancak hanehalkı bütçe anketindeki sınırlamalar nedeniyle her iki değişken de hesaplanamamıştır. Bu bağlamda zenginliği temsil edecek üç farklı kukla değişken seçilmiştir. Ev sahibi olmak, özellikle Türkiye'de, temel olarak iki nedenden dolayı hane halkının refah düzeyinin önemli bir göstergesidir. Biri konut maliyetlerinin toplam hane bütçesi içindeki payının çok büyük olması, diğeri ise hane halkı finansmanına olumlu katkı sağlamasıdır. Daire, dükkan veya müstakil konuta sahip hane halkı için kukla değişken katsayısına ilişkin olarak, ev sahipliğinin tasarruf üzerinde olumlu bir etkisi olduğuna dair kanıtlar bulunmaktadır. Aslında ampirik literatür her iki yönde de kanıt sunmaktadır. Van Rijckeghem'de (2010) belirtildiği gibi, ev sahipleri için zenginlik etkisinin varlığını teorik temelde haklı çıkarmak zordur. Ancak Türkiye'de, daha büyük inşaat projeleri için inşaat şirketleriyle işbirliği yapma fırsatı, para yanılsamasının varlığı ve krediye erişimin artması gibi Türkiye'ye özgü faktörlerin potansiyel olarak etkilediği bir zenginlik etkisinin gerçekten de var olabileceği öne sürülmektedir. Başka bir zenginlik göstergesi olarak özel sağlık sigortası kapsamı tartışılmıştır. Özel sağlık sigortası yaptırmanın, sağlık harcamaları riskini, özellikle de öngörülemeyen cepten sağlık harcaması olasılığını azalttığı için ihtiyati tasarrufları azaltması beklenmektedir (Ceritoğlu, 2012). Bu tez kapsamında yapılan tahminlerden elde edilen ekonometrik sonuçlar, hanehalkı tasarrufu ile özel sağlık sigortası arasındaki ilişkinin anlamlı ve negatif olduğunu göstererek ihtiyati tasarruf hipotezini desteklemektedir. Son olarak, diğer tüm faktörler sabit iken, evde sıcak su mevcudiyeti kukla değişkeni hane halkı tasarrufu üzerinde önemli bir olumsuz etkiye sahiptir. Yukarıda belirtilen ortalama tasarruf düzeylerinin düşüklüğü göz önüne alındığında, bu tür hizmetlere yapılan harcamalar hane halkı tüketimini artırabilir, dolayısıyla tasarrufları azaltabilir. Bu sonuç Van Rijckeghem (2010) ile uyumludur.

Sonuç ve Politika Önerileri

Tez, Türkiye'deki özel sektör tasarruf oranlarının belirleyicilerine ilişkin ampirik literatüre çeşitli katkılar sağlamaktadır. Bunu yaparken makro düzeydeki verilerin yanı sıra daha çok ayrıştırılmış (mikroekonomik) düzeydeki veriler kullanılarak

toplulaştırmada kaybolabilecek bilgiler daha verimli kullanılmıştır. Bugüne kadar hem Türkiye'de hem de diğer ülkelerde uygulanan çalışmaların çoğu, özel ve kamu tasarrufları arasında mutlak değer olarak birden küçük bir katsayı ile anlamlı ters ilişkiye dair kanıtlar bulmaktadır. Tez kapsamında yapılan modeller (Bölüm Üç), Türkiye verilerini kullanarak sadece ters ilişkinin kanıtlarını desteklemekle kalmamakta, aynı zamanda şaşırtıcı bir şekilde katsayının Türkiye'de bire güçlü bir şekilde eşit olduğunu da göstermektedir. Ayrıca, uzun vadede, özel kredilerin borçlanma kısıtlamalarının kaldırılmasıyla özel tasarrufların azalmasına yol açacağına dair yaygın kanıtlar, hanehalkı kredilerinin özel tasarruf oranını düşürdüğü, şirket kredilerinin ise özel tasarruf oranını artırdığı kredilerin ayrıştırılmasında farklılık göstermektedir. Ayrıca, Türkiye üzerine yapılan çalışmaların çoğunda anlamlı bulunmayan TCMB reel sektör güven endeksi ile temsil edilen reel sektörün istikrar güveni de bu çalışmaya dahil edilmiş ve özel tasarruf oranı üzerinde pozitif etkiye sahip olduğu tespit edilmiştir. Bu sonuç, firma kredilerinin tasarruflar üzerindeki pozitif etkisi ile uyumludur. Son olarak, Türkiye gibi tasarruf verilerinin yıllık olarak hesaplandığı gelişmekte olan bir ülkede, özellikle GSYİH revizyonları nedeniyle uzun dönemli zaman serisi analizini zorlaştıran bu analiz, yeni seriyle, bildiğimiz kadarıyla, uzun dönemli ve çeyreklik veri ile yapılan ilk zaman serisi çalışmasıdır (Tezde anlatıldığı şekilde veri üretme yolu kullanılarak). Türkiye'de üç aylık verileri kullanan ancak eski tasarruf serilerini kullanan sadece iki tasarruf belirleyicisi çalışmasının olduğunu bilinmekle birlikte, bunların her ikisinde dahi bu tezde kullanılan veri üretme metodolojisi kullanılmamıştır.

Benzer şekilde, bilgimize göre, firma tasarruflarının Vergi Usul Kanunu bazlı mali tablolar yerine Uluslararası Muhasebe Standartları/Uluslararası Finansal Raporlama Standartları bazlı mali tablolar üzerinden hesaplandığı ve Borsa İstanbul'da işlem gören şirketler üzerinde tutarlı bir veri seti ile incelendiği en uzun süreli ilk çalışmadır. Ayrıca, bu çalışma enflasyon muhasebesi düzeltmelerini dikkate almaktadır. Önemle belirtilmelidir ki, yabancı sahiplik oranının kurumsal tasarruf oranı üzerindeki etkisine ilişkin kanıtlar, bildiğimiz kadarıyla Türkiye'deki bu literatürde ilktir ve özel sektör tasarruflarını artırmaya yönelik politika seçenekleri sunmak açısından oldukça değerlidir.

Burada sunulan ampirik bulgular çeşitli yönlerde daha fazla ileri araştırma yapılmasını teşvik edici nitelikte olup, Türkiye'nin özel tasarruf oranını artırmaya yönelik etkili politika önerilerine temel teşkil edebilmektedir.

Öncelikle kamu tasarruf oranı ile özel tasarruf oranı arasında tam bir negatif bir denge ilişkisi olduğundan kamu tasarruflarının özel tasarruflar üzerinde doğrudan bir etkisi yoktur. Bununla birlikte, özel sektör ekonomik birimlerin (firmalar ve hanehalkları) güvenini artıran istikrarlı ve öngörülebilir bir ekonomik ortam, özel birimlerin kamu tasarrufundaki değişimle tam olarak aynı miktardaki kamu politikası değişikliklerine yanıt veremeyebileceği bir imkanın açılmasına yardımcı olacaktır. Ayrıca, dolaylı vergilere daha az bağımlı olan daha kayıtlı bir ekonomi, diğer koşullar göz önüne alındığında, yurt içi tasarrufa katkıda bulunacak ve ekstra kamu tasarrufu oluşturabilecektir. Son olarak, sağlık ve eğitim harcamalarının özel kuruluşların tüketiminin azalmasına ve dolayısıyla özel tasarrufların artmasına neden olabileceği kamu harcama türleri özellikle incelenmelidir. Ayrıca, iç borç stokunun negatif, büyümenin ise özel tasarruf oranıyla pozitif ilişkisi göz önüne alındığında, kamu politikasının büyümenin önündeki engelleri kaldırmaya ve iç borç stokunu azaltmaya odaklanması gerekmektedir.

İkincisi, özel sektör kredilerinin özel tasarruf oranı üzerinde farklı etkileri olduğuna dair bulgular, konut ve taşıt kredileri de dikkate alınarak bu alanda daha detaylı araştırmalara ihtiyaç duyulduğunu ortaya koymaktadır. Bu, mikro ihtiyati politika tekliflerini daha etkili hale getirecektir.

Üçüncüsü, reel faiz oranlarının özel tasarruf oranı üzerindeki net pozitif etkisi dikkate alındığında, başta mevduat olmak üzere finansal araçlarda pozitif reel faizin devamlılığının sağlanması, finansal sistem dışındaki varlıkların finansal sektöre çekilmesi açısından hem doğrudan hem de dolaylı olarak faydalı olacaktır.

Dördüncüsü, reel sektör güven endeksinin kurumsal krediler doğrultusundaki olumlu etkisi oldukça caziptir. Bu bağlamda reel sektörün güvenini artırıcı politikaların izlenmesi gerekmektedir. Ayrıca kurumsal kredilere öncelik verilmesi gerekmektedir.

Beşincisi, özel tasarrufların ana bileşeninin reel sektör tasarrufları olduğu ve sonuçlara göre bu tasarrufun temel belirleyicisinin faaliyet kar marjı olduğu göz önüne alındığında, Türkiye'nin firma tasarruflarını gelir tablolarının sadece esas faaliyet kısımlarına odaklanarak artırması için imkan ve fırsat olduğu düşünülmektedir (faaliyetlerle ilgili gelirler ve maliyet kalemleri). Bu fırsat, Türkiye'de kıt olan kamu kaynakları kullanılmadan da tasarrufların artırılması için potansiyelin var olması açısından değerlidir.

Altıncısı, Türkiye'de özel tasarruflar toplam yurt içi tasarrufun yüzde 93'ünü, firma tasarrufları ise toplam özel tasarrufun yüzde 63'ünü oluşturduğundan, şirketlerin tasarruf kararlarının belirleyicilerini anlamak, özel tasarruf oranının, dolayısıyla yurt içi tasarruf oranının evrimini anlamada önemli bir adımdır. Bu bağlamda temettü ödemelerini içeren veri setlerinin yaygınlaştırılması gerekmektedir. Ayrıca ulusal hesaplar çerçevesinde hanehalkı ve firma hesaplarının üç ayda bir yayımlanması, araştırmacıların daha detaylı çalışmalar yapmasına ve politika yapıcıların tasarruf konusunda etkin politikalar izlemesine yardımcı olacaktır.

Yedinci olarak, bildiğimiz kadarıyla Türkiye'de firma tasarruflarının belirleyicilerini inceleyen çalışmalar arasında yabancı sahiplik oranını açıklayıcı değişken olarak kullanan başka bir çalışmaya rastlanmamıştır. Şunu da belirtmek gerekir ki, her ne kadar sonuçlar bu tezde rapor edilmemiş ve tartışılmamış olsa da, halka açıklık oranı da Borsa İstanbul'da işlem gören firmaların kurumsal tasarruf oranını açıklayan bağımsız bir değişken olarak test edilmiştir.

Olası nedenler ne olursa olsun halka açıklık oranının artması, şirketin daha az payla yönetildiğini, firma veya hakim ortakların finansman ihtiyaçlarını gösterdiğini göstermektedir. Yabancı sahiplik oranına benzer şekilde halka açıklık oranının da firma tasarrufları üzerinde önemli olumsuz etki yaratacağı tahmin edilmektedir. Bu bağlamda, kurumsal tasarrufların artırılmasına yardımcı olabilecek potansiyel politika seçenekleri olarak bunların kurumsal tasarruf oranları üzerindeki olumsuz etkileri, sermaye piyasası düzenlemelerinin bunların makul düzeyde tutulmasının önemini vurgulamaktadır.

Sekizinci olarak, ileri bir çalışma olarak, Türkiye'de şirketler ve hane halkı tasarruf oranlarının makroekonomik belirleyicilerini panel veri araçları kullanarak araştırmak için ekonometrik bir analiz yapılması gerektiği düşülmektedir. Bu analiz panel birim kök ve eşbütünleşme teknikleri kullanılarak yapılmalıdır. Özel tasarrufların doğrusal olmayan yapısının da özellikle TAR (Threshold Autoregressive) tipi modeller kullanılarak incelenmesi gerektiğine dikkat çekilmektedir.

Dokuzuncusu, gelir düzeyinin ve kadınların işgücüne katılım oranının tasarruf üzerindeki olumlu etkisi göz önüne alındığında, kadınların işgücüne katılım oranının düşüklüğü dikkate alındığında, hane halkı ve dolayısıyla özel tasarrufları artırmak için kadın istihdamının teşvik edilmesi ve önceliklendirilmesi gerekmektedir. Ayrıca kamu ve özel tasarruflar arasında bire bir negatif ilişki olduğu ve üniversite mezuniyetinin hanehalkı tasarrufunu olumlu etkilediği göz önüne alındığında, özel tasarrufları artırmak için kamu eğitim harcamalarının artırılması gerekmektedir. Benzer şekilde hane halkı tasarrufları ancak 55 yaş sonrasında önemli ölçüde artmakta, özel sağlık sigortası ise hane halkı tasarruflarını azaltmaktadır. Bu doğrultuda, özel sigorta kapsamını kapsayan sağlık alanındaki kamu harcamaları, hem ortalama ömrü uzatması hem de özel sigorta zorunluluğunu ortadan kaldırması nedeniyle toplam özel tasarrufları artırabilecektir.

Son olarak, hanehalkı kredilerinin özel tasarruf oranı üzerindeki olumsuz etkisi ve hanehalkının mikro ihtiyati tedbirlere duyarlılığı göz önüne alındığında, özel sektör tasarrufunu uzun vadede kalıcı olarak artırmaya yönelik tedbirlerin etkinliğinin sağlanması için hanehalkının tüketim alışkanlıklarının da incelenerek politika önerilerinde dikkate alınması gerekmektedir.

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