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## Article

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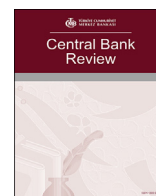
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# Not all credit is created equal: Mortgage vs non-mortgage debt and private saving rate in Turkey<sup>☆</sup>



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## ABSTRACT

The private saving rate in Turkey has decreased substantially since 2000. In this study, we investigate the determinants of the private saving rate in Turkey, with a special focus on the role of mortgage debt. We find a strong and robust negative effect of mortgage credit growth on private saving rate. Non-mortgage consumer credit growth also has a negative and robust effect on private saving rate, though its effect is smaller than that of mortgage credit. Business credit growth, on the other hand, has a positive impact on private saving rate. Our results provide strong support for the argument that the high growth rate of consumer credit is a primary reason for the recent decrease in private saving rate in Turkey. We also find that private saving rate displays strong persistence, and public saving rate partially crowds out private saving rate. In addition, per capita real income growth rate and macroeconomic uncertainty have positive impact on private saving rate.

## 1. Introduction

After the 2001 economic crisis, Turkey implemented a number of economic reforms and restructuring programs in order to stabilize the economy. Compared to the pre-crisis period, the Turkish economy is now much more stable, with a relatively low inflation level, lower real interest rates, and a substantially smaller public debt to GDP ratio. As the economy becomes relatively stable, we also observe significant decreases in the private saving rate (i.e. private saving/GDP). Fig. 1 depicts the private and public saving rates in Turkey from 1998Q4 to 2014Q2.

On the household side, a relatively more stable economy and better access to the credit market have enabled households to borrow more easily and at much lower interest rates. Hence consumer credit types displayed dramatic increases over this period (see Figs. 2 and 3). Though the current levels of household debt are still low as a share of GDP, the continuous upward trend indicates higher shares of GDP in the coming years.

The data in Figs. 1–3 suggest a rough correspondence between the rise in mortgage and non-mortgage debt and the decline in the private saving rate. However, there has been no formal statistical analysis of the link between changes in mortgage and non-mortgage borrowing and private saving in Turkey. Using quarterly saving data, this paper investigates the determinants of private saving rate in Turkey between 1998 and 2014, with a special emphasis on the effect of mortgage credit growth. The contribution of this study to the saving literature in Turkey is two-fold. The first contribution is that we analyze the impact of growth in mortgage credit on private saving rate. As mortgage credit became available at relatively low interest rates, both the flow and the stock of mortgage credit have increased since 2004. Although stock of mortgage credit as a percentage of GDP is still low (around 7 percent), at the current growth rate, the ratio of mortgage credit to GDP is expected to continue to rise. Hence, the impact of mortgage credit growth on saving rate could economically become even more significant in the future.

The second contribution of this paper is that we compare the magnitudes of the determinants of private saving rate for the pre-

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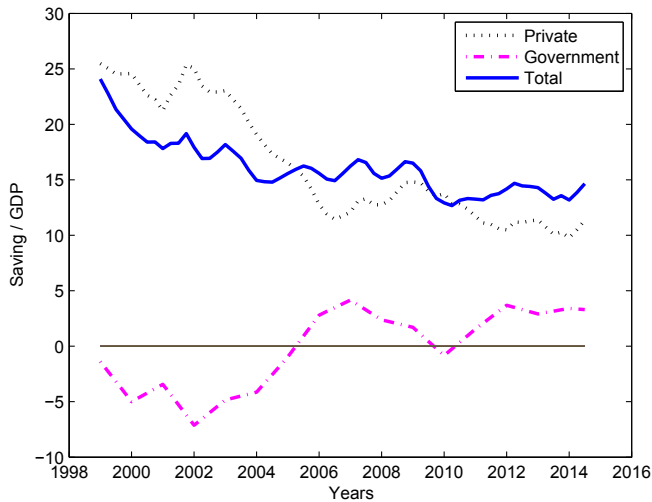


Fig. 1. Saving rates in Turkey (1999–2013), source: Ministry of Development of Turkey.

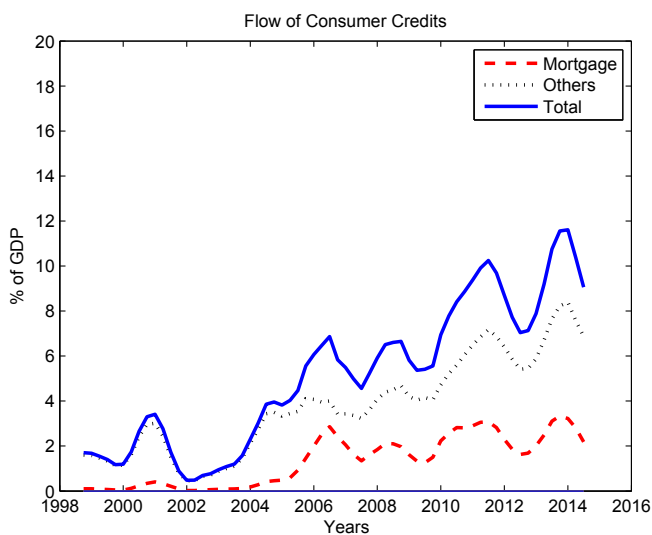


Fig. 2. New consumer credit types (1998Q4–2013Q3). Source: The Bank Association of Turkey. This picture shows the ratio of annual new consumer credit types to annual GDP at quarterly frequency.

2001 crisis period to that of the post-2001 crisis period. The Turkish economy has gone through substantial changes after the 2001 crisis; inflation rate and real interest rates are much lower, financial markets are deepening, economic uncertainty has improved, and households and firms have gained easier access to credit at more favorable terms. It is highly possible that households' and firms' saving behavior have also changed as a result of these changes in the economic environment following the 2001 crisis.

The results of this study reveal that new mortgage originations have sizable effect on private saving rate in Turkey. A 10 percentage point increase in the ratio of new mortgage originations to GDP decreases the private saving rate by 12 percentage points. This is a surprisingly large effect as it suggests that mortgage payments lead borrowers to deplete their savings at a rate higher than their mortgage payments. Our results also indicate that the effect of new mortgage originations becomes larger with financial deepening in the mortgage market (i.e. as the ratio of total mortgage debt to GDP increases). Non-mortgage consumer credit growth also has a negative and robust effect on private saving rate, though its effect is

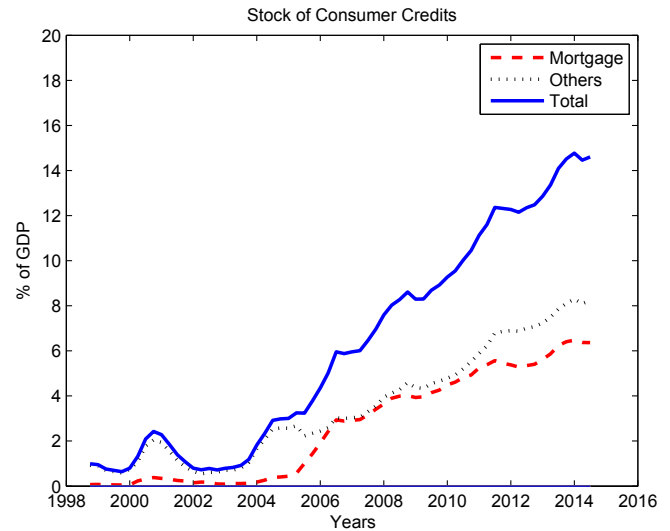


Fig. 3. Stock of consumer credit types (1998Q4–2013Q3). Source: The Bank Association of Turkey. This picture shows the ratio of annual new consumer credit types to annual GDP at quarterly frequency.

smaller than that of mortgage credit growth. A 10 percentage point increase in the ratio of new non-mortgage consumer credit originations to GDP leads to a decrease of 9.5 percentage points in private saving rate. We further find that while growth in mortgage and non-mortgage consumer credit originations has a strong negative effect on private saving rate, growth in business credit has a positive effect. A ten percentage point increase in the ratio of business credit flow to GDP ratio leads to a 1.8 percentage point increase in private saving rate. We also find that saving rate displays strong inertia and public saving rate has a robust partial crowding out effect on private saving rate. Improvement in terms of trade has a negative impact while income growth rate and macroeconomic uncertainty have a positive impact on private saving rate. Inspecting the effect of the improvements in the economy following the 2001 crisis, we find that the positive impact of business credit growth and the negative impact of non-mortgage consumer credit growth all become smaller while the negative impact of mortgage credit growth has increased. We also find that the positive impact of inertia has become smaller while the positive impact of income growth rate and the negative impact of public saving rate and terms of trade has become larger. It should be pointed out, though, that the changes in the coefficients are mostly minor.

The size and growth rate of mortgage debt is important for policy makers for a number of reasons. The primary reason is that housing constitutes a large share of the economy. The value of residential capital stock is typically larger than the value of business capital. In addition, housing is a significant component of household expenditure and household total wealth. Thus, through its impact on housing prices, mortgage debt will impact residential investment, household wealth and household consumption. As argued in [Campbell and Cocco \(2007\)](#), rising house prices will stimulate consumption by increasing households' perceived wealth and by relaxing borrowing constraints, with the impact on consumption being larger for older homeowners than for younger renters.<sup>2</sup>

<sup>2</sup> See [Leung \(2004\)](#) for a review of the literature on the interplay of housing markets and macroeconomy.

Given the significance of housing capital stock and housing expenditures for the economy, it is not surprising that economists and policy makers are concerned with the welfare implications of government policies that subsidize mortgage debt and provide financial incentives for home ownership. An early study by Gervais (2002), for instance, looks at the effects of the tax-deductibility of mortgage interest payments and tax exemption of imputed rents from home ownership. He finds that the tax-deductibility of mortgage interest and the failure to tax imputed rents from owner-occupied housing distort the rate of return on housing capital as compared to business capital, leading to an increase in the stock of housing capital and a decrease in the stock of business capital.

Mortgage debt is also important for monetary policy. As documented by Calza et al. (2013), the structure of housing finance affects the monetary transmission mechanism. They show, for instance, that the effect of monetary policy on residential investment and house prices is stronger in countries with more developed and more flexible mortgage markets. Thus, the size and growth rate of mortgage debt has implications for the current and future effectiveness of monetary policy.

In this paper, we focus on another reason why policy makers should pay attention to the growth of mortgage debt. We study how mortgage debt affects private saving rate, and compare it with the effect of other credit types on private saving rate. Our key result is that new mortgage originations have a large negative impact on private saving rate. Non-mortgage consumer credit growth also has a sizable, but smaller, negative impact, while business credit growth contributes positively to private saving rate. This distinction between mortgage credit, non-mortgage consumer credit, and business credit is highly relevant for policy makers since today's saving rate will have implications for the future growth rate of the economy and policy makers have instruments (taxation, macro-prudential measures) that they can use to affect the growth rate of each credit type. This question has additional significance for countries with large current account deficits, including Turkey, because of the strong correlation between saving rate and current account deficit.

The rest of the paper is organized as follows. In the next section, we discuss the motivation for this paper and review the literature. In the third section, we discuss the possible determinants of private saving rate. We present the empirical analysis of the saving rate and the data for the analysis in the fourth section. The fifth section discusses the results and the last section concludes.

## 2. Motivation and literature review

The low saving rate in Turkey is not only an important obstacle for investment and economic growth but also an important cause of the large current account deficit. In the absence of a sufficiently high saving rate, investment and economic growth rely mainly on foreign capital. Foreign capital is highly volatile as it responds rapidly to changes in earning opportunities across countries, and foreign capital inflows today would eventually translate to bigger foreign capital outflows in the future. Thus, low capital formation and reliance on borrowing from abroad will have a negative effect on economic growth over time. Contrary to foreign capital inflows, funding investments through domestic saving results in more sustainable investment and economic growth.

Having a mortgage loan has important implications for personal saving decisions as it requires an initial deposit (i.e. down payment) to purchase a house and establishes monthly mortgage payments, and in return provides monthly accumulation of home equity. On the one hand, mortgage payments serve as a disciplining device for the borrower to save for these payments. It also induces young households to save for the initial down payment needed to obtain a

mortgage loan. On the other hand, a mortgage loan reduces the uncertainty about the biggest purchase that a typical household makes in their lifetime. In the absence of a mortgage loan, one needs to save for an uncertain purchase price at an uncertain purchase date that will likely take place years later in the future. With a mortgage loan, the purchase price and monthly payments are determined upfront. Thus, having a mortgage loan significantly reduces the uncertainty that an agent faces regarding how much to save each month in order to be able to buy a house. This reduced uncertainty could lead to a significant reduction in household savings.

A partial theoretical support of the current study can be found in Japelli and Pagano (1994) develop a simple overlapping-generations model to examine down payment constraints and saving rate and show that requiring larger down payments leads to significant increases in household savings. Their prediction is confirmed by their empirical findings, and by the empirical findings of a later study by Engelhardt (1996). The reason for their result is that larger down payments impose a constraint on how much households can borrow, and this leads to an increase in aggregate saving. They also show that increased aggregate saving in turn leads to a bigger economic growth. This conclusion is in contrast to the conclusion of earlier studies that capital market imperfections hinder, not accelerate, growth. According to Japelli and Pagano (1994), the source of the departure from the conclusion of the earlier studies is due to the fact that while earlier models focus on business credit, the focus in Japelli and Pagano (1994) is on the supply of credit to households. Indeed, our results confirm their explanation. We find that while mortgage and non-mortgage consumer credit growth has a negative impact on private saving rate, growth in business credit has a positive effect.

The determinants of private saving rate have been widely studied in the literature for both emerging and advanced countries. Loayza et al. (2000) use a large cross-country time series data to study saving rate variations among countries. The authors find that private saving rate is serially correlated and displays strong inertia. Furthermore, public saving rate does not crowd out private saving fully. Another empirical study on the determinants of private saving rate in 13 European countries by Hondroyannis (2006) finds that private saving rate is positively affected by dependency ratio (the number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64), government budget constraint, growth of real disposable income, real interest rate, and inflation, and negatively affected by liquidity constraint. Hondroyannis (2006) further finds that deregulation of the capital markets results in a decrease in the private saving rate while the existence of financial pressure on social security system leads to an increase in the private saving rate. Analyzing the possible determinants of private saving behavior of 21 industrial countries between 1971 and 1993, Masson et al. (1998) find that (1) public saving rate has a negative effect on private saving rate, (2) demographic variables are important determinants of private saving rate, and (3) the effects of income level, interest rate, inflation, terms of trade, and financial developments are mixed and not robust. Ferruci and Miralles (2007) focus on the empirical drivers of the variations in the saving patterns of 48 countries from 1980 to 2005. The results suggest that demographic factors and financial catching-up are the main drivers and that lead to decline in saving rates in emerging economies. They also report that public savings partially crowd out private savings. Another similar study on 15 OECD countries by Serres and Pelgrin (2003) over the period of 1970–2000 finds similar results. The authors document the partial crowding out effect of public savings on private savings, the positive effect of terms of trade and productivity growth, and the negative effect of dependency ratio and real interest rate.

There are also a number of studies that focus on the determinants of private saving rate for individual countries. Examples include Horioka and Wan (2007) China, Aron and Muelbauer (2000) for South Africa, Paiva and Jahan (2003) for Brazil, Athukorala and Sen (2004) for India, Ang (2011) for Malaysia, Harris et al. (2002) for Austria, and Yavas and Tunc (2014) for the USA. The findings of these studies generally suggest a positive impact on private saving rate for lagged saving rates, income level, growth rate of income, inflation, and interest rate, and a negative impact for public savings and financial liberalization. With the exception of Yavas and Tunc (2014), none of the earlier studies consider the impact of mortgage debt on private saving rate. Similar to the current study, Yavas and Tunc (2014) report strong and robust negative impact of an increase in mortgage payments on private saving rate in the US. The magnitude of the impact, however, is smaller for the US than it is for Turkey.

The determinants of private saving rate in Turkey have also been studied in the literature. Using both macro and micro data, Rijckeghem (2010) performs a comprehensive study of savings in Turkey. The results of the study suggest that the decrease in the saving rate in Turkey between 1988 and 2009 is due to fiscal consolidation, increases in credit availability, and reduction in uncertainty in the economy. In another study, Ozcan et al. (2010) use annual data from the 1968–1994 period to investigate the determinants of private saving rate in Turkey. The findings of that study indicate that private saving rate displays strong inertia, public saving rate partially crowds out private saving rate, and income level, real interest rate, and inflation rate have a positive contribution to private saving rate. A very similar study for the time period 1980–2008 by Matur et al. (2012) report similar results to those of Ozcan et al. (2010). Aktas et al. (2012) use Households Budget Surveys micro data to analyze the determinants of household saving decisions. Their study finds that (1) as female labor participation increases, the saving rate increases, (2) education and savings are positively correlated, (3) a decrease in the fertility rate leads to an increase in the saving rate, and (4) household saving rate increases with age.

### 3. Determinants of private saving rate

In this section, we provide a brief discussion of the variables we use and their expected relationship with saving rate. The potential determinants of saving rate have been outlined by earlier theoretical and empirical studies in the literature. These determinants include lagged saving rate, income growth rate, public (government) saving rate, macroeconomic uncertainty, interest rate, and terms of trade. In addition to these determinants, the current study takes into account a number of mortgage and non-mortgage debt related variables. These variables include new mortgage origination as a percentage of GDP, new non-mortgage credit origination as a percentage of GDP, the outstanding mortgage debt as a percentage of GDP, and flow of business credit as a percentage of GDP.

This study focuses primarily on the effects of mortgage credit growth on saving rate. Therefore, the effect of the new mortgage origination/GDP ratio is of particular importance. However, the effect is not clear because it can work through different channels. On the one hand, an increase in new mortgage credit obtained by households would lead to the accumulation of more equity in their houses, and equity in the house is a form of saving. On the other hand, new mortgage credit could lead households to reduce their saving in other forms. In addition, as stated earlier, access to a mortgage loan significantly reduces the uncertainty about how much one needs to save each month to own a house. Uncertainty is one of the main motivators of saving, and this reduced uncertainty

can significantly reduce saving rate. As a result, one could argue that the effect of mortgage payments on private saving rate is ambiguous.

The effect of income growth on saving rate is not clear because of the opposite forces of life-cycle hypothesis and permanent income hypothesis. According to life-cycle hypothesis, saving rate would increase when growth rate of income increases. In response to income growth, in order to smooth consumption, young households would increase their savings while older households would decrease their savings. However, the increase in savings of young households is expected to be higher than the dissavings of older households. Therefore, the life-cycle hypothesis suggests a net positive effect of income growth rate on saving rate. On the other hand, according to permanent income hypothesis, an increase in income growth rate implies higher anticipated future income, which encourages households to consume more and save less today. Because of these opposite forces the net effect of income growth is an empirical question.

The effect of public saving rate on private saving rate is expected to be negative because of both theoretical underpinnings and empirical findings. According to Ricardian theory, an increase in public saving rate has exact negative impact on private saving rate. This is because households recognize that government dissaving (saving) today means more (less) taxes in the future, and households increase (reduce) their savings today by the exact amount they need to pay for future taxes. The empirical studies have confirmed the crowding out effect of public saving rate on private saving rate while the effect is found to be significantly less than one. Therefore, we expect to find a strong but partial crowding out effect of public saving rate on private saving rate in Turkey.

When macroeconomic uncertainties increase, households increase their savings in order to hedge against risks generated by such uncertainties. There are different tools to measure macroeconomic uncertainty, including interest rate volatility, exchange rate volatility, and inflation rate. For our analysis of saving rate in Turkey, we use EMBI Index as a proxy for macroeconomic uncertainties. EMBI (J.P. Morgan's Emerging Market Bond Index) is a dollar-denominated index of sovereign bonds issued by a group of emerging market countries. We believe that this index is a better and broader measure of macroeconomic uncertainty for Turkey than interest rate volatility, exchange rate volatility, or inflation rate.

Previous empirical studies with annual data have found that saving rate shows strong inertia. Saving rate could display inertia due to many reasons, including consumption smoothing and consumption habits. Since we are using quarterly data, we expect to find even stronger inertia in saving rate than the previous studies.

Similar to the growth rate of income, the effect of real interest rate on saving rate is not clear. On the one hand, an increase in the interest rate could encourage households to sacrifice today's consumption and increase savings because of higher return on saving (substitution effect). On the other hand, with a higher real return households could reduce their savings while still achieving any given income target (income effect). Therefore, the net effect is not clear and depends on which effect outweighs the other. Indeed, earlier studies have found mixed results on the effect of real interest rate on private saving rate.

Financial deepening is another factor that can affect the savings of households, as it makes it easier for households to have access to credit markets. In such environments, households do not have a strong incentive to save for precautionary motives and for purchases of big-ticket items. We use the ratio of total mortgage debt to GDP as a proxy for the level of financial deepening.

We also use non-mortgage consumer loans (car loans and other consumer loans) and business loans in order to analyze how



**Table 1**

Definitions and data sources of the variables used in the analysis.

Variable	Definition	Source
Saving rate	National Saving/GDP	Ministry of Development, our own calculations
Public saving rate	Public saving/GDP	Ministry of Development, our own calculations
Private saving rate	Private saving/GDP	Ministry of Development, our own calculations
Growth rate of per capita real income	Growth rate of per capita real income	Central Bank of Turkey, TurkStat, Our own calculations
EMBI	J.P Morgan emerging market bond index	Bloomberg
Interest rate	Quarterly-averaged interbank overnight interest rate	Borsa Istanbul
Terms of trade	Terms of trade	Turkstat
New mortgage credit	New mortgage originations/GDP	The Banking Association of Turkey
Total mortgage debt	Outstanding mortgage debt/GDP	The Banking Association of Turkey
New non-mortgage consumer credit	New non-mortgage credit originations/GDP	The Banking Association of Turkey
Flow of business credit	Flow of business credit/GDP	Central Bank of Turkey

mortgage credit might differ from other types of credit. Mortgage credit is different than other consumer credit types because part of the mortgage credit goes into equity accumulation (home equity). However, this accumulated equity could also be used as collateral to obtain additional credit for consumption, and this could possibly offset the wealth accumulated in the house. As non-mortgage consumer loans are purely for consumption purposes, we expect large and negative effect of non-mortgage credit on private saving rate. Business loans, on the other hand, may contribute to the firms' saving rate. A recent study by [Eisfeldt and Muir \(2014\)](#), for instance, finds positive correlation between business credit and aggregate saving.<sup>3</sup>

Finally, we use terms of trade to test the prediction that positive terms of trade shocks have positive effect on saving rate through its positive effect on both wealth and income.

#### 4. Empirical analysis

##### 4.1. Data

[Table 1](#) displays variable definitions and data sources. We use quarterly data in this analysis. The official national saving rate is published at annual frequency by the Ministry of Development of Turkey. In order to have the saving data at quarterly frequency, we use the method used by the ministry as well:

$$S_t = GDP_t + X_t - M_t + NFI_t - NFT_t - C_t^p - C_t^g. \quad (1)$$

where  $S_t$  is the national saving rate at time  $t$ ,  $X$  and  $M$  are exports and imports,  $NFI$  and  $NFT$  are net factor income and net factor transfers, and  $C^p$  and  $C^g$  are private sector and government consumption, respectively. Next, in order to obtain private saving rate, we need to subtract public (government) saving rate from national saving rate  $S$ . We use linear interpolation to generate quarterly public saving rate from annual public saving rate. Then, we take the difference between national saving rate and public saving rate to obtain the private saving rate.

Quarterly data on new mortgage originations, new non-mortgage consumer credit originations, and outstanding mortgage debt of households are provided by the Turkish Banking

<sup>3</sup> The importance of differentiating between business credit and consumer credit has already been documented in the literature. These two credit types have been shown to have different effects on economic growth ([Beck et al. \(2012\)](#)), on net exports ([Buyukkarabacak and Krause \(2009\)](#)), and on banking crisis ([Buyukkarabacak and Valev \(2010\)](#)). Though not the main focus of the paper, the current study also contributes to this growing literature that differentiates between consumer and business credit.

<sup>4</sup> Due to lack of data for the entire study period, credit card data is not included in the non-mortgage consumer credit data.

**Table 2**

Augmented Dickey–Fuller test.

Variable	Constant	Constant & Trend
Public saving rate	0.41	0.27
Private saving rate	0.49	0.78
Growth rate of per capita real income	0.08*	0.13
EMBI	0.33	0.43
Interest rate	0.01*	0.00***
Terms of trade	0.04**	0.00***
New non-mortgage consumer credit	0.91	0.07
Total mortgage debt	0.92	0.33
New mortgage credit	0.70	0.57
Flow of business credit	0.79	0.59

(\*), (\*\*), and (\*\*\*) indicate statistical significance at 10%, 5%, and 1% level, respectively.

Association.<sup>4</sup> The flow of business credit is provided by the Central Bank of Turkey and is defined as the annual change in the outstanding bank loans provided by domestic and foreign banks to non-financial corporations. The interest rate is the quarterly-averaged interbank overnight interest rate and is obtained from Borsa Istanbul. We had to calculate the growth rate of per capita real income at quarterly frequency since this data is not available at quarterly frequency. To do this, we first convert annual population data to quarterly frequency using linear interpolation. Then, we divide real GDP to the population and calculate the growth rate of per capita real income at quarterly frequency.

We apply the Augmented Dickey–Fuller test to examine the stationarity of the data and report the results in [Table 2](#). The results indicate that only growth rate of per capita real income, interest rate, and terms of trade are stationary while the rest of the variables are non-stationary. Hence, we take the first difference of the non-stationary variables to remove the non-stationarity.

##### 4.2. Econometric analysis

In this section we present two models we use study the determinants of private saving rate in Turkey. The first model includes the variables that have been used in earlier studies. In the second model, we incorporate variables related to mortgage and non-mortgage debt.

###### Model1

$$\Delta PS_t = \beta_1 \Delta PS_{t-1} + \beta_2 Y_t^g + \beta_3 \Delta EMBI_t + \beta_4 INT_t + \beta_5 ToT_t + \beta_6 \Delta GS_t + \varepsilon_t. \quad (2)$$

###### Model2

**Table 3**  
Determinants of private saving rate in Turkey.

	1999–2013			2002–2013		
Lagged private saving rate	0.794*** (0.0943)	0.477*** (0.0930)	0.366*** (0.0834)	0.794*** (0.115)	0.363*** (0.0922)	0.229** (0.0916)
Growth rate of per capita real income	0.0856* (0.0491)	0.0584 (0.0390)	0.0746 (0.0451)	0.0803 (0.0503)	0.0451 (0.0328)	0.0942** (0.0432)
EMBI	0.412*** (0.0837)	0.348*** (0.0670)	0.224*** (0.0629)	0.380*** (0.135)	0.273*** (0.0883)	0.265*** (0.0842)
Interest rate	−0.0565 (0.0517)	−0.0901** (0.0412)	−0.0607 (0.0382)	−0.0566 (0.0578)	−0.103*** (0.0378)	−0.0573 (0.0388)
Terms of trade	0.00659 (0.0367)	0.00324 (0.0290)	−0.0372 (0.0267)	−0.0359 (0.0598)	−0.0986** (0.0394)	−0.0936** (0.0366)
Public saving rate	−0.229 (0.143)	−0.325*** (0.114)	−0.391*** (0.113)	−0.232 (0.171)	−0.447*** (0.113)	−0.622*** (0.129)
New mortgage credit		−1.104*** (0.194)	−1.153*** (0.219)		−1.340*** (0.171)	−1.275*** (0.198)
Total mortgage debt			0.103 (0.378)			0.168 (0.333)
New non-mortgage consumer credit			−0.955*** (0.210)			−0.938*** (0.254)
Flow of business credit			0.180*** (0.0538)			0.129** (0.0588)
NMC×TMD interaction			−0.422 (0.256)			−0.447* (0.222)
Observations	58	58	58	49	49	49
R-squared	0.858	0.913	0.943	0.861	0.943	0.960

(\*), (\*\*), and (\*\*\*) indicate statistical significance at 10%, 5%, and 1% level, respectively.

$$\begin{aligned}\Delta PS_t = & \beta_1 \Delta PS_{t-1} + \beta_2 Y_t^g + \beta_3 \Delta EMBI_t + \beta_4 INT_t + \beta_5 ToT_t \\ & + \beta_6 \Delta GS_t + \beta_7 \Delta MC_t^f + \beta_8 \Delta MC_t^s + \beta_{10} \Delta MDTD_t \\ & + \beta_{11} \Delta NMC_t + \beta_{12} \Delta BC_t + \beta_{13} \Delta MC_t^f * \Delta MDTD_t + \varepsilon_t \quad (3)\end{aligned}$$

where  $PS_t$  is the private saving rate at time (quarter)  $t$  and  $\Delta$  is annual difference operator. We denote the growth rate of per capita real income by  $Y_t^g$ , Emerging Markets Bond Index by  $EMBI_t$ , real interest rate by  $INT_t$ , terms of trade by  $ToT_t$ , and public saving rate by  $GS_t$ . In the second model where mortgage and non-mortgage debt related variables are included, we denote the ratio of new mortgage originations to GDP by  $MC_t^f$ , the ratio of outstanding mortgage debt of households to GDP by  $MC_t^s$ , the ratio of new non-mortgage credit originations to GDP by  $NMC_t$ , and the ratio of flow of business credit to GDP by  $BC_t$ . The final variables,  $\Delta MC_t^f * \Delta MDTD_t$ , is an interaction variable and captures how the effect of new mortgage originations changes with the level of financial deepening captured by the ratio of outstanding total mortgage debt to GDP.

## 5. Results

The results of the econometric analysis are reported in Table 3. The first three columns report the results for the whole sample (i.e. for the 1999Q1–2014Q2 period) and the last three columns report the results for the subsample of post-2001 crisis period (i.e. 2002Q1–2014Q2 period). The results of the first model, in which we exclude mortgage and non-mortgage debt related variables, are reported in the first and fourth columns for the whole sample and the subsample, respectively. The second and fifth columns include only the ratio of new mortgage originations to GDP. In the third and sixth columns, we add the variables that capture new mortgage originations, total stock of mortgage debt, new non-mortgage consumer credit originations, business credit, and the interaction of new mortgage originations and total stock of mortgage debt.

In the absence of mortgage and non-mortgage debt related variables, columns 1 and 4 indicate that lagged saving rate and

macroeconomic uncertainty are the main determinants of private saving rate in Turkey for both sample periods. Private saving rate shows strong persistence (inertia) with the coefficient close to 0.80 in both samples. This is in line with the results of Loayza et al. (2000) and Ozcan et al. (2010). This implies that if all changes in these variables were permanent, the long run effect of determinants of private saving rate is 4.85 times larger than its short run effect in both sample periods.

The private sector tends to save more in times of high macroeconomic uncertainty. An increase in EMBI index by 100 bases points induces the private sector to raise saving rate by about 40 bases points in both sample periods. The effect of real interest rate is statistically insignificant, suggesting that substitution and income effects offset each other. Finally, the results indicate that public saving rate has no statistically significant impact on private saving rate in the initial analysis.

Next, we include the ratio of new mortgage originations to GDP as an additional variable in the second and fifth columns of Table 3. The statistically significant coefficient on new mortgage originations indicates that a 10 percentage point increase in new mortgage credit-to-GDP ratio decreases private saving rate by 11 percentage points and 13.4 percentage points for the 1999–2014 and 2002–2014 periods, respectively. This result indicates that the effect of new mortgage credit on private saving rate is highly substantial and the effect has become larger after the 2001 crisis.

A recent study by Yavas and Tunc (2014) on the role of mortgage payments on saving rate in the US has also shown a substantially high negative impact of mortgage payments on both personal and private saving rates. The study shows increasing mortgage debt payments to GDP ratio by 10 percentage point leads to a 9.1 percentage point contraction in the personal saving rate and 12.4 percentage point contraction in the private saving rate. The results obtained for the US are in line with the result of our current study for Turkey and, indeed, indicate that the negative and substantial impact of the mortgage debt on saving rate is not a unique phenomenon for Turkey.

It is worth noting that new mortgage originations have led to changes in the explanatory power of other variables. The effect of

**Table 4**

Determinants of private saving rate in Turkey – GMM estimation.

	1999–2013			2002–2013		
Lagged private saving rate	0.774*** (0.0782)	0.386*** (0.0790)	0.322*** (0.0742)	0.792*** (0.103)	0.297*** (0.0731)	0.216*** (0.0637)
Growth rate of per capita real income	0.0904 (0.0582)	0.0296 (0.0389)	0.0672 (0.0438)	0.0947 (0.0592)	0.0326 (0.0351)	0.0768* (0.0403)
EMBI	0.423*** (0.0513)	0.392*** (0.0505)	0.264*** (0.0698)	0.370*** (0.112)	0.307*** (0.0709)	0.243*** (0.0643)
Interest rate	−0.0625* (0.0333)	−0.0778** (0.0349)	−0.0894*** (0.0330)	−0.0711** (0.0350)	−0.0885** (0.0383)	−0.0666* (0.0353)
Terms of trade	0.0173 (0.0213)	0.0136 (0.0259)	−0.0295 (0.0263)	−0.0220 (0.0502)	−0.0921*** (0.0342)	−0.100*** (0.0277)
Public saving rate	−0.222 (0.142)	−0.319*** (0.0980)	−0.365*** (0.0969)	−0.234 (0.187)	−0.457*** (0.104)	−0.586*** (0.0905)
New mortgage credit		−1.254*** (0.153)	−1.204*** (0.210)		−1.478*** (0.152)	−1.370*** (0.184)
Total mortgage debt			0.0984 (0.341)			0.204 (0.274)
New non-mortgage consumer credit			−0.861*** (0.220)			−0.848*** (0.185)
Flow of business credit			0.129*** (0.0459)			0.107** (0.0465)
NMC×TMD interaction			−0.362* (0.189)			−0.399** (0.163)
<i>J</i> – Test	0	0	0	0	0	0
Observations	58	58	58	49	49	49

(\*), (\*\*), and (\*\*\*) indicate statistical significance at 10%, 5%, and 1% level, respectively.

public saving rate has increased and become statistically significant. An increase in the public saving rate by 10 percentage point led to a decline in the private saving rate by about 3.25 percentage points in the full sample period and 4.47 percentage points in the subsample period. As the magnitudes of these declines are smaller than the increase in the public saving rate, the full Ricardian Equivalence does not hold.<sup>5</sup> Furthermore, the persistence of saving rate has decreased by almost half and the effect of macroeconomic uncertainty has also decreased by a considerable amount. This latter decrease is in line with the hypothesis that the mortgage system reduces the uncertainty that households face regarding how much to save for the purchase of a house. Therefore, the effect of macroeconomic uncertainty on the private saving rate decreases when households have access to mortgage credit.

In the third and the sixth columns, we include additional debt related variables that we consider important in analyzing the determinants of private saving rate in Turkey. These variables are total mortgage debt-to-GDP ratio, new non-mortgage consumer credit originations-to-GDP ratio, flow of business credit-to-GDP ratio, and the interaction of new mortgage originations and total mortgage debt. The results indicate that, when we include these determinants, the effect of new mortgage originations slightly increases in both sample periods. A 10 percentage point increase in the new mortgage originations-to-GDP ratio decreases private saving rate by 11.5 percentage points in the full sample period and 12.7 percentage points in the sub-sample period. As the coefficients are statistically significant and large, we find strong support for the argument that an important reason for the recent decrease in the private saving rate in Turkey is the high growth rate of mortgage credit.

The effect of mortgage credit on saving rate works through different channels. One channel could be that the existence of the

mortgage system reduces uncertainty about how much households need to save to own a house. The reduced uncertainty encourages households to save less. Given that purchasing a house is the biggest investment of a typical household, we expect the impact of this channel to be very significant. Another channel could be that regular mortgage payments lead to home equity accumulation, which is a form of saving. However, the accumulation of home equity could also encourages households to obtain home equity loans and lines of credit, thus reducing the impact of this second channel.

Still another channel of mortgage credit on saving rate is through its effect on consumption of durable goods. When a household uses mortgage credit to buy a new house, it should also buy durable consumption goods such as furniture, home appliances, and other big-ticket items before moving in. The share of durable consumption goods within total consumption in Turkey over the 1998Q4–2014Q2 period has increased from 9.36% to 11.61%, with the highest share of 12.14% reached in 2012Q1. Furthermore, the correlation between this share with the new mortgage credit to GDP ratio is 0.88. Therefore, the substantially high effect of new mortgage credit on private saving rate can be partially attributed to the purchase of durable consumption goods triggered by new home purchases through mortgage credit.<sup>6</sup>

As shown in Figs. 2 and 3, the mortgage system is relatively new in Turkey with the stock of mortgage debt-to-GDP ratio being less than 10 percent. However, if the current upward trend continues as the mortgage system becomes widespread in the country, the negative effect of mortgage credit on the private saving rate would require more attention. In fact, the interaction variable coefficient indicates that mortgage credit growth will have a larger negative impact on the private saving rate as the total mortgage debt to GDP ratio grows. A recent study by Ekinci et al. (2015) shows that acceleration in credit growth at early stages of financial development might cause a larger deterioration in the national savings and

<sup>5</sup> Agarwal et al. (2007) offer interesting empirical evidence for partial crowding out effect of government saving/spending. The authors find that, following the 2001 federal income tax rebates in the US, the average consumer used about 60% of the rebate to pay down credit card debt (saving) and used the remaining 40% for spending.

<sup>6</sup> The share of houses sold with mortgage credit are about 40% of total houses sold in Turkey between 2010 and 2014. (Source: Turkstat).



current account balance and suggests that monetary policy and macro-prudential measures might be more effective at early stages of financial deepening.

We also see from columns 3 and 6 that non-mortgage consumer credit originations have a negative impact on private saving rate. Non-mortgage consumer credit is different than mortgage credit because part of the mortgage credit is used for home equity accumulation, which can itself be considered saving whereas non-mortgage consumer credit is used for consumption purposes. What is interesting is that new mortgage credit originations have a larger negative impact on private saving rate than new non-mortgage consumer credit originations. We attribute this to the fact that mortgage credit reduces uncertainty about the biggest investment of a typical household.

Finally, business credit has positive impact on private saving rate as a 10 percentage point increase in the flow of business credit-to-GDP ratio increases private saving rate by 1.8 and 1.3 percentage points for the two sample periods, respectively. Ejsfeldt and Muir (2014) point out the reason for the positive impact of business credit on private saving by showing that firms use part of their business credit to smooth investment and to avoid repeatedly paying the fixed cost of obtaining external financing. The clear distinction between the consequences of growth in mortgage and non-mortgage consumer credit versus business credit for saving rate has an obvious policy implication. If policy makers can induce banks to ration consumer credit while making more credit available to firms, saving rate, hence capital accumulation and future growth, will be boosted.

As a robustness check for possible endogeneity between private saving rate and mortgage credit, we repeat the analysis using the generalized method of moments (GMM) estimation. The results are reported in Table 4. The signs and the magnitudes of the coefficient of all variables across different specifications are similar to those in Table 3, hence will not be repeated here. The similarity between Tables 3 and 4 confirms that our results are robust to possible endogeneity between saving rate and mortgage credit.

## 6. Conclusion

Over the last decade, mortgage credit in Turkey has increased substantially while private saving rate has decreased dramatically. The purpose of this study is to offer the first empirical test of the effect of the growth in mortgage debt on private saving rate in Turkey. In addition, we investigate how the impact of mortgage debt on private saving rate compares with that of non-mortgage consumer credit and with business credit.

The results indicate quite large and robust negative effect of mortgage credit growth on private saving rate. Furthermore, we find that the negative impact of mortgage credit growth becomes larger as the stock of total mortgage debt grows. Growth in non-mortgage consumer credit has relatively smaller but still strong and robust negative effect on private saving rate. Business credit growth, however, has a positive impact on private saving rate. We also find that private saving rate displays strong persistence, public saving rate partially crowds out private saving rate, and macro-economic uncertainty has positive impact on private saving rate.

These results have major implications for government policies that encourage home ownership through mortgage subsidies. They also have implications for monetary and macroprudential policies that impact interest rates on mortgage and non-mortgage credit.

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