

Alp, Esra; Seven, Unal

Article

The dynamics of household final consumption: The role of wealth channel

Central Bank Review (CBR)

Provided in Cooperation with:

Central Bank of The Republic of Turkey, Ankara

Suggested Citation: Alp, Esra; Seven, Unal (2019) : The dynamics of household final consumption: The role of wealth channel, Central Bank Review (CBR), ISSN 1303-0701, Elsevier, Amsterdam, Vol. 19, Iss. 1, pp. 21-32,
<https://doi.org/10.1016/j.cbrev.2019.03.002>

This Version is available at:

<https://hdl.handle.net/10419/217329>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

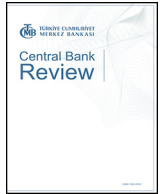
Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc-nd/4.0/>



The dynamics of household final consumption: The role of wealth channel

Esra Alp ^{a, *}, Ünal Seven ^b

^a University of Huddersfield, United Kingdom

^b Structural Economic Research Department, Central Bank of the Republic of Turkey, Ankara, 06050, Turkey

ARTICLE INFO

Article history:

Received 25 February 2019

Received in revised form

25 March 2019

Accepted 25 March 2019

Available online 3 April 2019

JEL classification:

E21

E52

E58

Keywords:

Consumption

Housing wealth

Financial wealth

Transmission channels

Variance decomposition

Impulse response

ABSTRACT

Exploring dynamics of household final consumption is an important concern for policy-makers. Turkey had witnessed various financial shocks and crises over the last two decades. These turbulent economic periods affected consumption behaviour and therefore, other macroeconomic variables. In this paper, we examine the linkage between household final consumption and wealth in Turkey, arising from equity and housing market channels over the period from 1998 Q1 to 2016 Q2. We employ ARDL and FMOLS models in order to analyse long-term relationship and then, variance decomposition and impulse response analysis are used for verifying the effects of shocks. The results suggest that income, credit and housing wealth are positively, interest rate and equity market wealth are negatively associated with consumption. Variance decomposition and impulse response analyses imply that interest rate driven shocks may cause to a decline in asset prices and so aggregate consumption through consumption-wealth channel. These evidences may be beneficial for policymakers to understand the role of interest rate and asset prices on the consumption-wealth channel in Turkey.

© 2019 Central Bank of The Republic of Turkey. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

According to the life cycle and permanent income hypothesis (Modigliani and Brumberg, 1954; Ando and Modigliani, 1963; Friedman, 1957), consumers configure the estimates of their ability to consume in the long-run and then set their current consumption to the convenient fraction of that estimate. As the life cycle model suggests, individuals plan to use both labour income and financial and non-financial assets for their lifetime consumption. Changes in the asset prices and wealth affect the expectation of future spending and necessitate a readjustment of current spending. Coskun et al. (2018) stated that when the prices of these assets change, although the labour income is still the same, an increase in wealth will occur; hence, individuals will revise their plans for their

lifetime consumption. This mechanism creates transmission channels that are effective on aggregate consumption. Changes in the macroeconomic conditions or economic policies may have an impact on asset prices, wealth levels, and consumption behaviour through these transmission channels. The primary objective of economic policy is to achieve economic growth which also depends on consumption. Therefore, it is crucial to analyse what determines consumption and which policy instrument is more effective in the case of shocks arising from various macroeconomic variables.

Consumption theory and empirical studies assert that household's consumption expenditure is mainly dependent on macroeconomic variables such as gross domestic product, consumer credits volume, interest rates, equity prices and house prices. This inference also leads some researchers (for example, Kishor, 2007; Koop et al., 2008; Hamburg et al., 2008) to associate consumption with financial and macroeconomic shocks arising from relevant instruments and assets. For instance, a shock arising from exchange rates, interest rates or equity prices may lead to lower consumption levels through the transmission channels such as wealth or interest rate which may cause a recession in the economy. Additionally,

* Corresponding author. Economics Department, Social Sciences Institute, Dokuz Eylül University, İzmir, 35160, Turkey.

E-mail addresses: eesraalp@gmail.com (E. Alp), unal.seven@tcmb.gov.tr (Ü. Seven).

Peer review under responsibility of the Central Bank of the Republic of Turkey.

monetary policy can influence aggregate demand by changing consumer spending through transmission channels such as wealth channel, credit channel, interest rate channel and exchange rate channel. But these transmission channels may be also the crux of economic risk. In this respect, [Apergis et al. \(2014\)](#) argue that while classic macroeconomic models are favourable to the importance of asset wealth in stimulating household spending, there is a concern that a slowdown of equity prices may lead to a decrease in consumption spending and subsequently to an economic recession.

A better understanding of the dynamics of consumption may be a guide for policymakers to know which macroeconomic variable is more related to consumption and thus, is more effective to drift consumption based on the fluctuations in its own value. In accordance with this purpose, we aim to investigate the linkage between household final consumption and wealth in Turkey, arising from equity and housing market channels over the period from 1998 Q1 to 2016 Q2. To explore the dynamics of household consumption, we employ Autoregressive Distributed Lag (ARDL) and Fully Modified Ordinary Least Square (FMOLS) methods. We also use variance decomposition and impulse response analyses in order to show the response of an endogenous variable over time to a given shock.

This paper contributes to the limited literature for Turkey in three ways. First, we specifically explore the roles of housing wealth and financial wealth in consumption by using house price and equity price indexes as proxies for housing wealth and financial wealth, respectively. Since the house price index of Turkey provided by the Central Bank of the Republic of Turkey (CBRT) is available only for the post-2010 period, we also extend the house price index series for the prior period by using construction cost index based on the calculation method of [Yalciner and Coskun \(2014\)](#). To our knowledge, this paper is the first to incorporate simultaneously housing wealth, equity market wealth and interest rate into the consumption function of Turkey. Second, after determining the relationship between consumption and selected macroeconomic variables such as income, wealth components, interest rate, consumer credits, we forecast the proportions of each independent variable in the variance of consumption and then, show impulse responses of consumption to a shock arising out of each independent variable. This method provides more broad results for future policy implications particularly in a period of high volatile exchange rates and interest rates. We finally point out how monetary policy instruments may be used effectively by taking into account the negative/positive feedbacks arising from the interactions in consumption-wealth channels.

The remainder of the paper is organized as follows. Theoretical background of consumption theory and both theoretical and empirical studies on consumption dynamics are presented in Section 2. Section 3 involves data and modelling strategies. Our empirical results are presented in Section 4. Finally, Section 5 concludes and discusses the results in consideration of monetary policy with some insights based on our further analysis.

2. Literature review

2.1. Theoretical background of consumption

Consumer behaviour shows an alteration depending on several factors such as; inflation rates, taxes, wage level, government policies, macroeconomic shocks and expectations over future prices and future income. There has been a long debate on the determinants of consumption behaviour since [Keynes \(1936\)](#) developed a model of consumption theory in his best-known “General Theory”. [Keynes \(1936\)](#) emphasized that there is not a nexus which unites decisions to abstain from present consumption with decisions to provide for future consumption; whereas the motives

which determine the latter are not linked in any simple way with the motives which determine the former. Keynes, theorized consumption as follows:

“When employment increases, aggregate real income is increased. The psychology of the community is such that when aggregate real income is increased aggregate consumption is increased, but not by so much as income.”

From this theory, some featured inferences can be summed up in the following statements: The relationship between the community's income and what it can be expected to spend on consumption will depend on the psychological characteristic of the community, which Keynes calls it as propensity to consume. Keynes defined the propensity to consume as the functional relationship between Y_w (a given level of income in terms of wage-units) and C_w (the expenditure on consumption out of that level of income). Hence, consumption function can be expressed as below:

$$C_w = (Y_w) \text{ or } C = W(Y_w) \quad (1)$$

As Keynes regarded the propensity to consume is a stable function so that, as a rule, the amount of aggregate consumption mainly depends on the amount of aggregate income (both measured in terms of wage-units) ([Keynes, 1936](#)). Keynes assumed that economy was generally in ordinary circumstances and changes in the propensity itself being treated as a secondary influence. After Keynes, [Duesenberry \(1949\)](#) suggested a new consumption theory called “relative income theory of consumption” and stated that current consumption is not influenced only by the current level of absolute and relative income but also by levels of consumption gained in the previous period. [Duesenberry \(1949\)](#) argued the theory of consumer behaviour that emphasizes the relative income of an individual rather than absolute income as a determinant of an individual's consumption. [Pigou \(1941\)](#) pointed out that there was a positive relationship between wealth and consumption. This was also entitled by [Patinkin \(1948\)](#) as the “Pigou effect” ([Ackley, 1951](#)).

In common with Keynesian approach, consumption theory evolved into more complex models in recent years. As following studies and contributions of economists in later years showed, the change in propensity to consume and its influencing factors such as interest rates, unemployment rates and expectations have an important role for understanding consumer behaviour and for both economic and financial policies. Two basic and quite similar modern consumption theories have been developed after Keynes. The first is Milton [Friedman's \(1957\)](#) “permanent income theory” and the latter is “life-cycle theory” by [Modigliani and Brumberg \(1954\)](#) and [Ando and Modigliani \(1963\)](#). They have a careful attention to microeconomic foundations. The life-cycle theory starts from an individual's lifetime consumption plan and develops from a macroeconomic theory of consumption and saving behaviour. According to the theory, individuals plan their consumption and saving behaviour with the aim of allocating their consumption ideally for their whole life. In this respect life-cycle theory helps to explain the Kuznets's puzzle¹ which was historically important in leading to the new theories of the consumption function. According to the life-cycle theory ([Dornbusch and Fischer, 1990](#)), consumption function can be written:

$$C = aWR + bY \quad (2)$$

¹ [Kuznets \(1946\)](#) use averages of data over long periods (10–30 years) and his empirical results suggests that there is a little variation in the ratio of consumption to income and there is no tendency for the average propensity to decline as disposable income rises. Kuznets' results conflict with the standard consumption theory when using long term averages ([Dornbusch and Fischer, 1990](#)).

where “ WR ” denotes real wealth, “ a ” is the marginal propensity to consume out of wealth, “ Y ” is labour income and “ b ” is the marginal propensity to consume out of labour income. Labour income differs from the income earned by other production factors, such as the rent earned by land or the profits earned by capital.

Campbell and Mankiw (1989) emphasized that the study of aggregate consumption behaviour was profoundly altered by the rational expectations revolution in macroeconomics. As a first example in Lucas's (1976) influential critique of econometric policy evaluation involved in consumption. Lucas argued that traditional consumption functions were not useful for evaluating the effects of alternative policies no matter how well they fit the data. According to Muellbauer (1994), the year 1978 proved to be a milestone for research on the aggregate consumption function. Two papers published in 1978 proved to be the key pointers for subsequent research. One was Davidson et al. (1978) and the other paper was Hall (1978).

Davidson et al. (1978) introduced the notion of an error correction model with lag structures, setting the scene for subsequent work on cointegration of non-stationary time series by Engle and Granger (1987). In their framework it is stated that the model does not claim to represent the “true” structural relationship since there are several important issues which have not been considered such as changes in income distribution and direct wealth effects. Hall (1978) showed that consumption must follow a first-order autoregressive process if the life cycle-permanent income (LC-PI) hypothesis is appropriate. According to Hall (1978), if the previous value of consumption incorporated all information about the well-being of consumers at that time, then lagged values of actual income should have no additional explanatory value once lagged consumption is included. Therefore, he tested his “random walk hypothesis” using consumer expenditure on non-durables and services in terms of per capita and quarterly levels. He found that the hypothesis is almost fully supported by the data. As a final test of the random walk hypothesis, the predictive power of lagged values of corporate stock prices was also tested by Hall (1978). However he found that stock market prices were statistically significant and the increased predictive capability was very small. Mankiw (1982) expanded Hall's (1978) framework to deal with consumer expenditure on durable goods by assuming that durable goods expenditure should follow a mixed autoregressive moving average process, ARMA(1, 1), but not AR(1) as it was in Hall's (1978) paper. His finding is inconsistent with Hall's (1978) version of the life cycle-permanent income hypothesis.

The theory of consumption have influenced economists, such as Pigou (1941), Keynes (1936), Duesenberry (1949), Friedman (1957), Ando and Modigliani (1963), Hall (1978) and Davidson et al. (1978), among others. Both theoreticians and empirical researchers attempted to explain the influencing factors of consumption, such as income, wealth, interest rate, capital gain and liquid assets. It is important to ascertain the determinants of consumption because any influences on consumption expenditure play a major role in the process of economic growth in every economy.

2.2. Related empirical literature

2.2.1. Wealth effects on consumption

The decline in the general level of prices will raise the real value of the community's stock of money and government bonds since the nominal value of these assets will not decrease. So the real value of the community's total assets will rise. This will diminish the need for additional saving and hence increase the fraction of any given level of real income that the community will wish to consume (Friedman, 1948). Based on fluctuations in general level of prices, community's financial and real assets such as housing assets will

increase in value. This increase of wealth will end up with a higher consumption depending on positive expectations about future inflation rates (Bootle, 1981) and intertemporal substitution of leisure and consumption.

The life-cycle theory also provides a channel for the equity market to affect consumption behaviour. The value of equities held by the public is part of wealth and is included in WR in Equation (2). When the value of equities is high (when the equity market is booming), WR is high and tends to increase consumption. The reverse occurs when the equity market is depressed. Equity market wealth affects household consumption directly through four transmission channels (Friedman, 1957; Ando and Modigliani, 1963; Modigliani and Brumberg, 1979; Ludwig and Slok, 2002) and indirectly through one (Romer, 1990): i) realized wealth effect, ii) unrealized wealth effect, iii) liquidity constraints effect, iv) stock option value effect and v) uncertainty effect.

While movements in financial wealth have been dominated by movements in equity market wealth, the single most important component of non-financial wealth in households' portfolios is housing wealth (Ludwig and Slok, 2002). There are five transmission channels that affect private consumption through housing wealth: i) realized wealth effect, ii) unrealized wealth effect, iii) budget constraints effect, iv) liquidity constraints effect and v) substitution effect. While there are several decomposition points explaining how equity market wealth effect and housing wealth effect differs², the view of two wealth components influence the private consumption received broad acceptance based on both theoretical and empirical studies (Modigliani and Brumberg, 1954; Friedman, 1957; Ando and Modigliani, 1963; Romer, 1990; Bertaut, 2002; Slacalek, 2009; Cooper and Dynan, 2016; Paiella and Pistaferri, 2017; Jawadi et al., 2015).

Fig. 1 demonstrates the studies on consumption theory which are classified by the main idea lies behind them. In this respect, while theoretical studies are grouped into two subjects, empirical studies are categorised first into two groups and one of them consists of three subtitles. Most of the empirical studies claim that wealth has a significant effect on consumption whether it is driven by equity market wealth or housing wealth. In contrast with several studies reveal similar results, there is only Kuznets's work (1946), broadly accepted, suggesting the opposite.

In reference to Modigliani and Brumberg (1954), Friedman (1957) and Ando and Modigliani (1963), wealth has an influence on consumption in theoretical base. By analysing the relationship between equity, house prices and consumer spending, Paiella (2009) suggested that the relationship between wealth and consumer spending appears to be strong, but there is some disagreement regarding its size and nature. Thus, relative sizes of the wealth effects are mixed (see, Ludwig and Slok, 2004). Guiso et al. (2006), Paiella (2007) and Sousa (2009) found evidence for the influence of equity market wealth which is higher than the housing wealth. The number of studies which found housing wealth more influential than equity market wealth are superior to others (Mehra, 2001; Case et al., 2001; Bertaut, 2002; Dvornak and Kohler, 2003; Benjamin et al., 2004; Belsky and Prakken, 2004; Iacoviello, 2004, among others).

2.2.2. Literature review on Turkish economy

Consumption function of Turkey has been addressed by several studies for different periods by using both macro-level data (e.g., Aşırım, 1996; Akçin and Alper, 1999; Özmen and Yavan, 1999; Özcan et al., 2003, among others) and micro-level data (e.g., Duygan,

² See Poterba, 2000; Case et al. (2001); Cooper and Dynan (2016), for further arguments on the reasons for differential effects of stock and housing wealth.

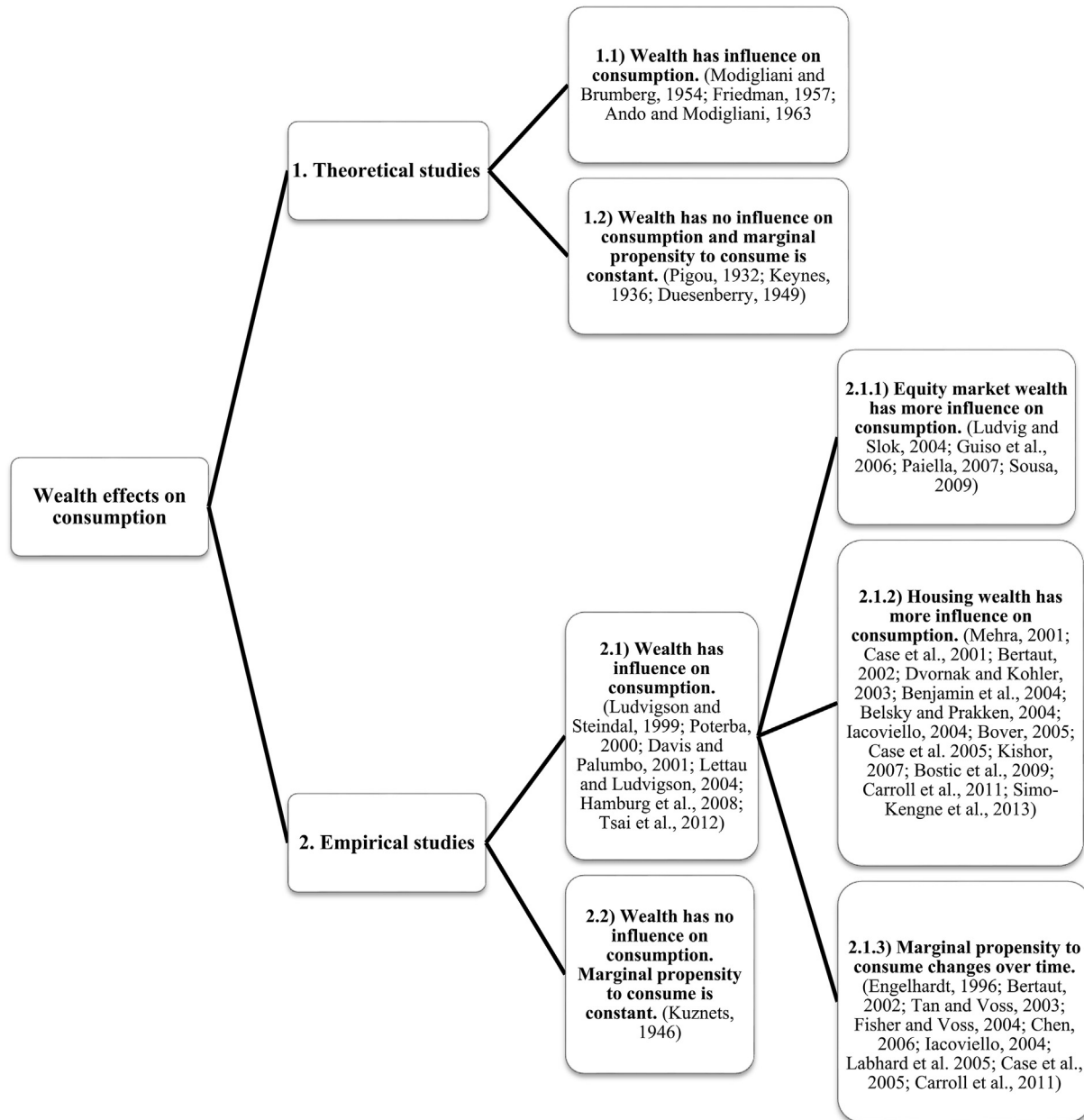


Fig. 1. Literature review of wealth effects on consumption (Chen, 2006, Davis and Palumbo, 2001, Engelhardt, 1996, Fisher and Voss, 2004, Labhard et al., 2005, Lettau and Ludvigson, 2004, Tan and Voss, 2003, Tsai et al., 2012).

2005; Duygan and Güner, 2007; Van Rijckeghem and Üçer, 2009; Yükseler and Türkan, 2008; Cilasun, 2009; Cilasun and Kirdar, 2015; Ceritoğlu, 2017, among others). Among these, it is worth to specifically point out the following selected studies. For example, Aşırım (1996) tested the Life-Cycle Permanent-Income theory for the period of 1987 Q1-1992 Q4 with three variables; total real consumption as dependent variable, gross national income and inflation as independent variables. The results indicate that consumers plan to spend in each quarter of the year, the same as they spent in the equivalent quarter of the previous year, modified by a proportion of the annual change in income.

Akçin and Alper (1999) explored whether Permanent Income theory is valid for Turkish economy. Their methodology is based on the Campbell and Mankiw (1989) approach. The findings of the study imply that approximately 40 percent of income goes to

individuals, who consume their current income. Thus, they concluded that empirical observations demonstrated convincing evidence against the validity of the Permanent Income theory. Moreover, Özmen and Yavan (1999) investigated the Rational Expectations Permanent Income Hypothesis (REPIH) based on the study of Hall (1978) for Turkey and the model results revealed that more than half of the consumers do not determine their consumption against the REPIH.

Akkoyunlu (2002), Aydede (2008) and Özer and Tang (2008) attempted to construct consumption function of Turkey by considering housing wealth using their own calculations due to lack of data. Their calculations for house price index to use as a proxy for housing wealth are based on different approaches. While the latest period in the studies ends in 2007, house price index, which is provided by Central Bank of Turkey, is available since 2010.

Sivri and Eryüzlü (2010) implemented the Hall's (1978) Rational Expectations-Life Cycle Permanent Income (RE-LCPI) hypothesis for food-drink expenditures, semi durable and nondurable consumption goods expenditures and service expenditures which are sub-items of private final consumption expenditures. The results of the study reject the RE-LCPI hypothesis for Turkish economy.

Cilasun and Kirdar (2015) investigated the life-cycle profiles of household consumption and its components by using the 2003 Turkish Household Budget Survey. Their findings reveal that consumption tracks income quite closely over the life-cycle, which contradicts the implication of the life-cycle model. However, they found that the adult-equivalent consumption profile is much flatter. Ceritoğlu (2003) estimated consumption function for Turkish economy and reached different results for different sub-periods. While consumption of households depend mostly on disposable income for the period of 1987–1995, the dependence of households to disposable income decreased substantially for the period of 1987–2002 due to financial deepening. As it is expressed in the study, the rise of real credit volume based on the financial deepening contributed to the decline of the level of liquidity constraints and enabled households to allocate their income across subsequent periods evenly. Ceritoğlu (2013) tested the REPIH for Turkish economy with an augmented version of hypothesis by using consumer confidence. Based on the econometric results, there is a positive and statistically significant relationship between the growth of consumption and expected income changes. Therefore, the strict version of the REPIH is rejected for the Turkish economy. Ceritoğlu (2017) also analysed the relationship between house prices and household consumption in Turkey by using the Turkish Statistical Institute (TurkStat) Household Budget Surveys (HBS) from 2003 to 2014. In the study, results suggest that house price changes have a positive and significant effect on the growth of cohort consumption. Moreover, it has been emphasised that the effect of house price changes is stronger for home-owners and it intensifies from young cohorts to old cohorts. Thus, findings are in favour of the wealth channel argument.

In addition to constructing consumption function for Turkey by using main variables based on the theory, there are a few attempts that employ different variables affecting consumption such as consumer credits and credit cards. The effect of loans on private consumption expenditures has been analysed by Demirezen (2015). In the study, contrary to LC-PI Hypothesis and Random Walk Hypothesis, it is concluded that loans are an important factor on private consumption expenditures and the effect of consumer loans on private consumption expenditures and growth is more than that of commercial loans. Altan and Göktürk (2007) reached notable results showing that consumption depends on credit cards rather than income.

3. Data and empirical model

3.1. Data description

The study primarily explores the dynamics of consumption over

the period of 1998 Q1 and 2016 Q2 in Turkey by utilizing several time series methods. The choice of data period is shaped by data availability concerns. The dataset covers household final consumption expenditure for consumption (C), gross domestic product for income (Y), household's consumer credits including credit cards for credit (CR), house price index for housing wealth (HW), nominal deposit rates for interest rates (IR) and Borsa Istanbul equity market price index for financial wealth (FW). Detailed information about data construction and data sources can be found in Table 1.

Consumption and income variables (in constant prices) are compiled from the TurkStat and the seasonal components of the series are removed. The data of financial wealth (which is proxied by equity market index), housing wealth and credit variables are made real by using quarterly consumer price index whereas interest rate is nominal. The CBRT provides data for housing price index starting from 2010 Q1. However, we extend the house price index series for the prior period, as the proxy of housing wealth, by combining actual house price index provided by the CBRT and construction cost index provided by the TurkStat. Our calculation of house price index is based on the study of Yalciner and Coskun (2014).

Variable selection of the study depends on the related literature. Equity price index has been selected as a proxy for financial wealth in reference to Ludvig and Slok (2004), Guiso et al. (2006), Paiella (2007) and Sousa (2009), among others. In addition to financial wealth, total wealth also involves non-financial wealth and it corresponds to housing wealth due to its proportion. In parallel with the related literature (e.g., Case et al., 2001; Bertaut, 2002; Dvornak and Kohler, 2003; Iacoviello, 2004; Ludvig and Slok, 2004; Case et al., 2005; Kishor, 2007; Carroll et al., 2011; Simo-Kengne et al., 2013, among others) we determine non-financial wealth as housing wealth and we use house price index as a proxy for housing wealth.

It has long been analysed in the literature that the effect of changes in both nominal and real interest rate on consumption are uncertain and mix. Gylfason (1981) stated that empirical research on the effects of interest rates on consumption has failed to establish a clear association, positive or negative, between consumption and interest rates. The results of Hamburger (1967) and Mishkin (1976) indicate a strong inverse relationship between nominal interest rates and consumer expenditures on durable goods. Wright (1967, 1969), Taylor (1971) and Heien (1972) used interest rates in nominal terms while Juster and Wachtel (1972), Juster and Taylor (1975), Blinder (1975) and Boskin (1978) used interest rates in real terms and they have all reported empirical evidence of an inverse relationship between consumption and interest rates. As it has been argued in Gylfason (1981), Houthakker and Taylor (1970), Weber (1970, 1975) have presented evidence of a positive relationship between interest rates in nominal terms and consumption. Although Springer (1975) measured interest rates in real terms, he reached the same results. On the other hand, Weber (1975) also concluded that inflation has no significant effect on aggregate consumption.

Campbell and Mankiw (1989) employed real interest rate in

Table 1
Data information and sources.

Variable	Definition	Source	Construction
Consumption	Resident and non-resident households final consumption	TurkStat	Real, Log
Income	Gross Domestic Product (GDP)	TurkStat	Real, Log
Credit	Credits and credit cards by households	CBRT	Real, Log
Housing Wealth	Construction cost index and house price index combined series	TurkStat and CBRT	Real, Log
Interest rate	Deposit rate, Annual	IMF, International Financial Statistics	Nominal, Log
Financial Wealth	Equity market price index	World Bank	Real, Log

their empirical framework and according to the findings they claim that expected real interest rates are not associated with expected changes in consumption. As they point out, the predictable movements that we observe in consumption cannot be explained as a rational response to movements in real interest rates. It also means that if consumers are forward-looking they do not adjust their consumption growth in response to interest rates, so their inter-temporal elasticity of substitution in consumption must be close to zero. Their findings exhibit controversy over the results of Hall (1978, 1988). According to Springer (1977), the effects of nominal interest rates and inflation are different for different components of aggregate consumption and for different measures of the expected rate of inflation. Despite the fact that empirical studies accomplish mix results on the relationship between consumption and interest rate, we test our econometric model for both nominal and real³ interest rate and results do not show significant alteration in terms of coefficients but only in terms of significance levels.

3.2. Empirical strategy

The goal is to develop an empirical strategy that would enable us to estimate the dynamics of household consumption. The basic regression model that we aim to estimate is expressed in Equation (3), where $\ln C_t$ is the dependent variable and indicates the logarithm of household final consumption.

$$\ln C_t = \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 \ln CR_t + \alpha_3 \ln HW_t + \alpha_4 \ln IR_t + \alpha_5 \ln FW_t + \varepsilon_t \quad (3)$$

where Y_t is the quarterly Gross Domestic Product at time t , CR_t represents the total consumer credits and credit cards by households, HW_t is the house price index, IR_t is the interest rate for deposits and FW_t is the equity market price index. Finally, ε_t is the error term and \ln denotes the natural logarithm.

We expect a positive response of consumption to income, wealth components and credits but a negative response of consumption to interest rate. Higher interest rate leads to lower consumption in two ways: i) higher cost of borrowing and higher alternative cost of consumption and ii) lower asset prices and asset wealth. Ludwig and Sløk (2004) stated that wealth effects on consumption may differ from bank-based countries and market-based countries. They found that in bank-based countries the influence of equity market wealth on consumption is lower than those market-based countries. They also revealed uncertain and mix results about whether changes in housing or equity market wealth have a higher impact on consumption. Furthermore, Romer (1990) claimed that stock market crashes are more likely to lead to a postponement of durable consumption while the reduction of non-durable consumption might be of minor importance. Poterba (2000) also implied that changes in equity prices affect spending even by households that do not own equity because they affect consumer confidence or the uncertainty that consumers perceive about future economic conditions. Thus, uncertainty in equity markets may result a decline in consumption. Eventually, the expected sign for equity and housing wealth is positive but results may vary depending on the macro-economic condition.

For investigating the dynamics of consumption, we first analyse the stationary properties of the series by employing Dickey and Fuller (1979) (ADF) unit root test. We then investigate the long-run cointegration relationship between the variables by

employing the Bounds test approach proposed by Pesaran et al. (2001). The Bounds test approach has three main advantageous over the conventional cointegration models; (i) it can be used irrespective of the integration level of regressors, (ii) it is relatively more efficient in the case of small and finite sample data sizes (Narayan and Narayan, 2004) and (iii) by employing the Bounds test approach we obtain unbiased estimates of the long-run model (Harris and Sollis, 2003). After defining cointegration between the variables, we use the ARDL model in order to analyse the short- and long-run static spillover relationship between the variables. Fully Modified OLS (FMOLS) model developed by Phillips and Hansen (1990) is also used for robustness check, where FMOLS model is more robust for serial correlation, endogeneity and multicollinearity problems and superior for simple OLS model (Stock and Watson, 1993).

We also analyse the dynamic effects of the shocks on the endogenous variables using variance decompositions and impulse response functions. Variance decomposition is used to analyse the contribution of each structural impact on endogenous variables (measured with variance) and further evaluates the importance of different structural shocks. This method enables us to verify the evolution of dynamic behaviour given by the variables over time (Zhang et al., 2017). We construct a Vector Error Correction (VEC) model for variance decomposition and impulse response analyses. The VEC model has the advantage of explicitly allowing for feedback effects from consumption to explanatory variables that the single-equation approach cannot address. Moreover, it can also illustrate how the responses of consumption and those explanatory variables such as income or wealth vary according to the nature of the shocks on them (Shen et al., 2015).

4. Empirical results

We first investigate the stationary properties of the variables by employing the unit root test of ADF (1979). The results for the unit root tests are presented in Table 2. The ADF statistics suggest that all variables except equity price index are integrated of order one, namely $I(1)$, whereas equity price index is integrated of order zero, namely $I(0)$. Thus, the hypothesis that the time series contain a unit root is accepted for all variables except for equity price index.

After stationary check, we investigate the short- and long-run cointegration relationship between the variables by employing the Bounds test approach. We use the following equation in the Unrestricted Error Correction Model (UECM) form:

$$\Delta \ln C_t = \sum_{j=1}^{p-1} \gamma_j \Delta \ln C_{t-j} + \sum_{j=0}^{q-1} \delta_j \Delta \ln X_{t-j} + \varphi [\ln C_{t-1} - \{\beta_0 + \beta_1 \ln X_{t-1}\}] + \varepsilon_t \quad (4)$$

where C_t is household consumption, X represents a set of consumption determinants including income (Y), credit (CR), housing wealth (HW), deposit interest rate (IR) and financial wealth (FW), γ

Table 2
ADF (1979) unit root test results.

Series	Level		First Difference	
	t-Statistic	Prob.	t-Statistic	Prob.
$\ln C$	-2.278	0.440	-8.781***	0.000
$\ln Y$	-3.149	0.103	-6.414***	0.000
$\ln CR$	-2.796	0.204	-3.596***	0.008
$\ln HW$	-0.703	0.968	-7.641***	0.000
$\ln IR$	-2.612	0.276	-6.429***	0.000
$\ln FW$	-3.532	0.043**	-6.192***	0.000

Notes: *** and ** denote 5% and 1% significance level, respectively.

³ For a detailed analysis to compute real interest rate, see Fisher (1930).

Table 3
Cointegration test results (Dependent variable: $\Delta \ln C$).

K	F-Statistic	Critical value at 1% Significance Level	
		Bottom Bound	Upper Bound
5	5.482	3.373	4.717

Notes: “K” is the number of explanatory variables used in the analysis. Null hypothesis of the Bounds test is the no level relationship. Critical values are taken from Table C1.iii at Pesaran et al. (2001, p. 300).

and δ are the short-run coefficients related to consumption growth and its determinants, β are the long-run coefficients, φ is the speed of adjustment to the long-run relationship, ε is the error term and the subscript t represents time. In Equation (4), the terms with summation signs represent the error correction dynamics while the term in square brackets contains the long-run regression, which acts as a forcing equilibrium condition:

$$\ln C_t = \beta_0 + \beta_1 \ln X_t + \mu_t \text{ where } \mu_t \sim I(0). \quad (5)$$

The result of the Bounds test approach is presented in Table 3. The calculated F -statistic (5.482) exceeds the upper critical bound value (4.717) at 1 percent significance level. Therefore, Table 3 shows that there is a long-run relationship between the variables.⁴

After defining the cointegration relationship between the variables, we compute the static short- and long-run spillover coefficients between C , Y , CR , HW , IR and FW . Defining the maximum number of lags as three⁵ and employing Akaike Information Criterion (AIC) to find the optimal lag number, ARDL (3, 1, 0, 0, 3, 2) model is selected as the best fit model. The estimated coefficients and model diagnostics are presented in Table 4.

Regarding the estimated parameters, in the long-run, household consumption is positively related to gross domestic product, credits and credit cards by households and housing price index, and negatively related to equity market price index and deposit interest rate. The results show that 1% increase in GDP causes about 0.65% increase in household consumption in the long-run. Similarly, 1% increase in nominal deposit rate causes about 0.05% decrease in consumption. As can be seen from the first panel of Table 4, the short-run coefficients tell a similar story.

The consistency and efficiency of the estimates relies on several specification conditions. The first is that the regression residuals be serially uncorrelated. To verify whether the residuals from the model are serially uncorrelated, we run Serial Correlation LM Test. Since the null hypothesis of the test is that the residuals are serially uncorrelated, the F -statistic p -value of 0.572 (see, Table 4) indicates that we will fail to reject this null. We therefore conclude that the residuals are serially uncorrelated.

The second condition is the residual homoskedasticity. We run Heteroskedasticity Test of Breusch-Pagan-Godfrey in order to show whether residuals are homoskedastic. Since the null hypothesis of Heteroskedasticity Test of Breusch-Pagan-Godfrey is that the residuals are homoskedastic, the F -statistic p -value of 0.229 (see, Table 4) indicates that we will fail to reject this null even for a significance level of 10%. We therefore conclude that the residuals are homoskedastic at 10% significance.

The third condition refers to the existence of a long-run relationship, namely dynamic stability, and requires that the coefficient

Table 4
Estimated short- and long-run spillover coefficients.

Variables	Coefficient	T-statistics
Short-Run Coefficients		
$\Delta(\ln C(-1))$	0.024	0.231
$\Delta(\ln C(-2))$	0.182	2.208**
$\Delta(\ln Y)$	0.702	8.299***
$\Delta(\ln CR)$	0.037	2.527**
$\Delta(\ln HW)$	0.068	3.485***
$\Delta(\ln IR)$	-0.041	-2.941***
$\Delta(\ln IR(-1))$	-0.051	-2.635**
$\Delta(\ln IR(-2))$	0.028	2.073**
$\Delta(\ln FW)$	-0.025	-2.374**
$\Delta(\ln FW(-1))$	0.023	2.213**
Error Correction Coefficient		
Phi	-0.752	-5.341***
Long-Run Coefficients		
$\ln Y$	0.645	13.517***
$\ln CR$	0.051	3.183***
$\ln HW$	0.092	4.463***
$\ln IR$	-0.044	-2.943***
$\ln FW$	-0.039	-3.901***
Constant	7.255	8.375***
Diagnostic Checks		
Breusch-Godfrey Serial Correlation LM Test: Prob. $F(2, 54) = 0.572$		
Heteroskedasticity Test of Breusch-Pagan-Godfrey: Prob. $F(14, 56) = 0.229$		
Stability Checks		
Cumsum Test Stable at 5% level		
Cumsum Square Test Stable at 5% level		

Notes: *, ** and *** denote 10%, 5% and 1% significance level, respectively. LM represents the Lagrange Multiplier test while Δ is the first difference operator. For Cumsum tests, see Brown et al. (1975).

Table 5
FMOLS results.

Variables	Coefficient	T-statistics
$\Delta(\ln Y)$	0.651	15.412***
$\Delta(\ln CR)$	0.039	4.506***
$\Delta(\ln HW)$	0.045	1.843*
$\Delta(\ln IR)$	-0.018	-2.841***
$\ln FW$	-0.004	-2.184**
Observations	72	
R-squared	0.623	
Adjusted R-squared	0.601	

Notes: * and *** denote 10% and 1% significance level, respectively.

on the error correction⁶ term should be negative and not lower than -1 . In the second panel of Table 4, we report the estimates for the error correction coefficient and its corresponding t -statistics. This coefficient falls within the dynamically stable range. This confirms the existence of the long-run relationship among the variables with their various significant lags. The coefficient of error correction term of -0.752 implies that deviation from the long-run growth rate in consumption is corrected by 75% by the following period.

We also use, as a robustness check, the FMOLS method developed by Phillips and Hansen (1990) in order to estimate the long-run relationships between the variables.⁷ Basically, the FMOLS model confirms the results of the ARDL model. According to the FMOLS model results (see Table 5), while income, housing wealth

⁴ If the calculated F -statistic is greater (less) than the upper (bottom) bound of the critical values, we reject (could not reject) the null hypothesis of no cointegration.

⁵ We could not expand the lag structure any further because we would run into problems of lack of degrees of freedom.

⁶ The error correction coefficient shows how quickly variables converge to equilibrium and it should have a statistically significant coefficient with a negative sign. According to Banerjee et al. (1998), the highly significant error correction term further confirms the existence of a stable long-run relationship.

⁷ Since Turkey experienced two economic crises during the analysed period (2001 economic crisis and 2008 global financial crisis), we included dummy variables for 2001 and 2008 in the regressions. However, the crisis dummies entered statistically insignificant in the regressions. Therefore, we excluded them.

Table 6
Variance decomposition of consumption.

Period	S.E.	lnC	lnY	lnCR	lnHW	lnIR	lnFW
1	0.016185	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.025876	70.70756	4.876562	5.181875	0.321057	15.69337	3.219585
3	0.032872	67.46722	4.038801	5.537642	0.811481	19.70796	2.436887
4	0.041468	58.69914	6.212639	6.257243	1.349749	25.64583	1.835400
5	0.047666	53.65466	8.036506	6.321377	2.890836	27.61297	1.483649
6	0.053737	47.75147	10.21495	6.552182	5.303398	28.77593	1.402076
7	0.058920	43.96567	12.03167	6.210161	6.877530	29.37841	1.536566
8	0.063841	41.11456	13.00151	5.778601	7.888145	30.54038	1.676807
9	0.067714	40.43905	13.48665	5.333528	7.976663	30.96766	1.796453
10	0.071282	40.73938	13.38985	4.937026	7.835421	31.42990	1.668421
11	0.074275	41.62544	13.06568	4.636212	7.653665	31.47669	1.542314
12	0.077193	42.37665	12.80937	4.400324	7.487345	31.49792	1.428391
16	0.088393	42.36444	12.81082	3.948577	8.152275	31.55307	1.170820
20	0.098729	42.30881	12.86322	3.592145	8.274868	31.91936	1.041591
28	0.116368	42.36048	12.86681	3.216209	8.529042	32.18036	0.847105
32	0.124230	42.42404	12.84980	3.095520	8.590863	32.25909	0.780697
40	0.138688	42.42870	12.85903	2.925418	8.697158	32.39318	0.696519

Notes: “S.E.” denotes standard errors.

and credit positively contributed to household final consumption, the effects of nominal interest rate and equity market wealth on consumption are negative.

Our further analysis characterizes the dynamic effects of the shocks on the endogenous variables. Both variance decompositions and impulse response functions are presented based on the VEC model thereafter. If the variables are non-stationary and the cointegration relationship exists, it is necessary to add the error correction term in Vector Autoregressive (VAR) model to build a VEC model. The VEC model is a VAR model containing cointegration constraints and used for modelling non-stationary series which have cointegration relationship (Zhang et al., 2017). Since our variables are nonstationary (see Table 2) and cointegrated (see Table 3), we use a VEC model, which has cointegration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run dynamics. By the Engle and Granger (1987) Representation Theorem, a VEC model has the following representation (Naka and Tufté, 1997):

$$\Delta Y_t = \mu + \delta T + \alpha \beta' Y_{t-1} + \sum_{s=1}^{p-1} \{T_s \Delta Y_{t-s}\} + \varepsilon_t \quad (6)$$

where Δ is the first difference operator, “Y” is an (n x 1) vector of variables, “ μ , δ ” are (n x 1) vectors of deterministic components, “T” is a time trend, “p” is the maximum lag length, “ T_s ” are (n x n) matrices, that indicate short term adjustments among variables and “ ε_t ” is an (n x 1) vector of residual.

We construct a VEC model to study the relations by variance decomposition to show the proportion of the movements in a series due to its own shocks versus shocks from other series. Moreover, impulse response functions represent the mechanisms through which shock spread over time. It reflects the variables behaviour in relation to itself and others included in the system, when the error suffers a structural shock in a specific time t , transferring itself to the future period $t + 1$, $t + 2$ and so on (Zhang et al., 2017).

Variance decompositions are also presented to show how essential a shock is in specifying the variations of variables in the VEC model by providing the proportion of the movement in one variable that is explained by the shock to another variable over time. In comparison with impulse response functions that illustrate the future direction of the variables following a shock, variance decompositions express the magnitude of the overall effects (Shen

et al., 2015). To understand the relative importance of endogenous variables, with a 10 year forecasting horizon, the variance decomposition in lnC of the VEC model by using the Cholesky decomposition method suggested by Sims (1980) is reported in Table 6.

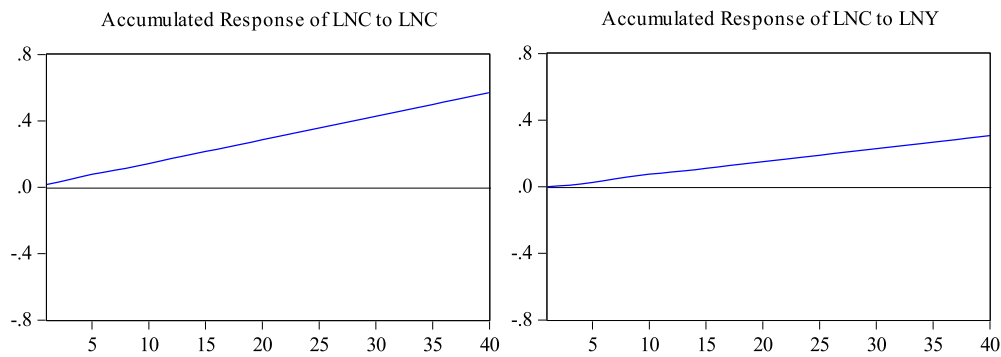
At the first period (quarter), consumption is determined by itself fully and in the short-run (first 4 quarters) shocks arising from consumption itself mostly influence its future level. In the short-run (at the end of 4th quarter), each of income and credit explains 6%, housing wealth explains about 1.3%, interest rate explains 25% and financial wealth explains 1.8% of the variance of consumption. In the long-run (10 years period), while the influences of shocks arising out of income, housing wealth and interest rate increase, the influences of shocks arising out of credit and financial wealth decrease. In both short and long-run, interest rate determines consumption remarkably as it can be seen from Table 6. The results show that a shock arising from house prices has a small impact in percent on consumption in the short-run. However, in the long-run, the proportion of housing wealth increases while credit shocks become less effective. Moreover, financial wealth has the lowest impact in percent on consumption in the long-run.

Fig. 2 shows the impulse responses⁸ of consumption to a unit standard deviation shock in the long-run (40 quarters/10 year). As shown in the figure, the responses of consumption to a unit standard deviation of financial and housing wealth shocks are significant at all forecasting horizons. This reconfirms our earlier results that consumption responds to movements in wealth; moreover, the response to housing wealth is greater than the response to financial wealth. This result is consistent with several studies. (e.g., Mehra, 2001; Case et al., 2001; Bertaut, 2002; Dvornak and Kohler, 2003; Benjamin et al., 2004; Belsky and Prakken, 2004; Iacoviello, 2004; Bover, 2005; Case et al., 2005; Kishor, 2007; Bostic et al., 2009; Carroll et al., 2011; Simo-Kengne et al., 2013, among others).

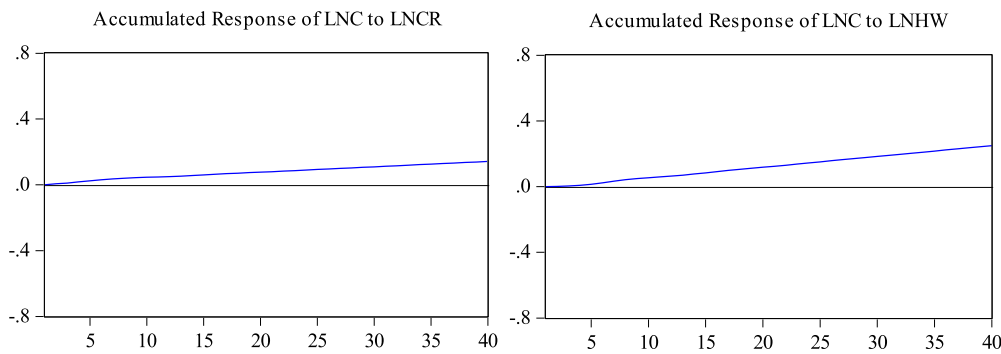
On the other hand, consumption responses negatively to financial wealth. As it is pointed out by Ludvigson and Steindel (1998), movements in the equity market today appear to influence today's consumption growth, not tomorrow's. Thus, changes in wealth in this quarter do not signify remarkable changes in consumption one or more quarters later. When uncertainty about the trend and impact relationship is added to the difficulties related with wealth-based forecasts of the next quarter's consumption growth, it's difficult to make inferences about movements in

⁸ The short-run estimates of impulse responses are available upon request.

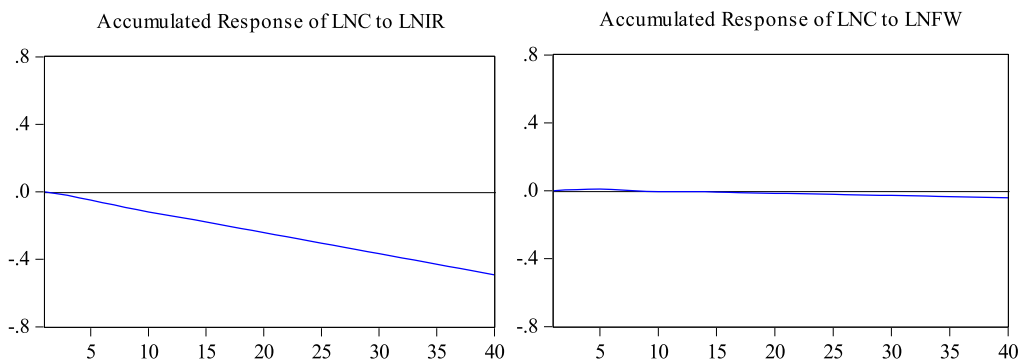
Accumulated Response to Cholesky One S.D. Innovations



Accumulated Response to Cholesky One S.D. Innovations



Accumulated Response to Cholesky One S.D. Innovations

**Notes:** “LN” denotes the natural logarithm.**Fig. 2.** Impulse responses of consumption in the long-run.

consumption based on movements in the equity market. While financial wealth based on equity market investment is a current investment, housing wealth depends on long term investment. Short term gains may not lead to a growth in consumption. According to the results in Ludwig and Sløk (2004), the elasticity of consumption spending to changes in equity prices is larger for economies with market-based financial systems than for economies with bank-based financial systems. Noting that Turkey is more likely to be classified as a bank-based economy rather than a market-based economy, this may explain the low influence of financial wealth on consumption.

Another inference from impulse response analysis is that consumption responses negatively to interest rate. Our result is contrary to Hansen (1996), Campbell and Mankiw (1989). However, in

parallel to our results, Hamburger (1967), Mishkin (1976), Wright (1967, 1969), Taylor (1971), Heien (1972), Juster and Wachtel (1972), Juster and Taylor (1975), Blinder (1975), Boskin (1978), MacDonald et al. (2011), Kerdraïn (2011) and Jaramillo and Chailloux (2015) found negative response of consumption to interest rate. Contrary to the findings of Demirezen (2015) and Altan and Göktürk (2007), our results imply that credit is not the predominant factor that determines consumption but mostly income (GDP) and housing wealth. As it can be seen from the Fig. 2, income, housing wealth and interest rate are more effective on consumption than financial wealth in the long-run. Consequently, consumption is more sensitive to the changes/shocks in consumption itself, interest rate, income and housing wealth than credits and financial wealth in the case of Turkey. The results of the long-run

estimates of impulse responses are consistent with the ARDL and FMOLS results.

5. Discussion and concluding remarks

Changes in the macroeconomic conditions or economic policies may have an impact on asset prices, wealth levels and consumption behaviour through the transmission channels. The primary objective of the economic policy is to sustain economic growth and it substantially depends on the aggregate consumption. Therefore, it is crucial to analyse what determines the consumption and which policy instrument is more effective when a shock occurs in macroeconomic variables. Furthermore, the relations among variables may be also direct or indirect and it may require a broader analysis to define the channels with the intention of reducing the uncertainty in the economy.

The linkage between consumption and wealth channels has not been addressed adequately in the empirical literature for Turkey. Thus, we attempt to explore the dynamics of the consumption behaviour from the perspective of wealth channels over the period of 1998 Q1 and 2016 Q2. Furthermore, we forecast the level of sensitivity of the consumption to the shocks arising from its determinants. We finally ask whether monetary policy instruments are being used effectively by taken into account the negative/positive feedbacks arising from the interactions in consumption-wealth channels. For this purpose, we analyse the long-run relationship among consumption, income, credits, house prices, interest rates and equity prices. The main contribution of this study is that, to the best of our knowledge, this paper is the first to apply variance decomposition and impulse response analyses to the consumption-wealth channel for Turkey. This is an important step because decomposing the variance allows us to analyse which channel is more effective on consumption so, which policy instrument may be more effective and how it affects consumption in the short-run and also in the long-run. We also simultaneously incorporate housing wealth, equity market wealth and interest rate in the consumption function of Turkey for the first time. Moreover, the effect of credits and credit cards on consumption is also considered in the study.

The results of the ARDL model suggest that consumption is positively associated with income, credits and house prices. On the other hand, interest rates and equity prices are negatively related with consumption in the long-run. FMOLS model also confirms the results of the ARDL model. These outcomes imply that the policies pursuing low interest rates and high average income and overall credit volumes, also involving housing credits, may have positive impacts on consumption in the long-term. Moreover, ARDL and FMOLS models suggest that GDP has the highest impact on consumption and equity market index has the lowest impact in percent. We observe similar results in the impulse response analysis.

In terms of wealth effect, we find that housing wealth and consumption have a positive relationship. However, the results also suggest that financial wealth, namely equity market index, and consumption have a negative relationship. Although literature reveals that increasing uncertainty in equity markets may cause to a decline in consumption (Poterba, 2000; Romer, 1990), our model result is contrary to mainstream theoretical/empirical expectations. We may speculate that this unexpected result may be related to high level of foreign stock ownership ratio in Borsa Istanbul (beside our model specification) possibly resulting a decline in domestic consumption during positive wealth effect periods due to mostly tax-free wealth transfers (cash outflows) to non-residents in the form of capital gain and dividend payments.

The findings of this study offer several dimensions for the future

researches. For example, shocks may be considered as transitory or permanent and the direct effect of the short term interest rate on consumption may be calculated by shutting-off the wealth channel following the methodology in Bernanke et al. (1997) and Sims and Zha (1999). Hence, results may reveal more explanatory insights and provide more specific policy suggestions. Moreover, equity market and consumption linkage may be analysed by using micro data in different sub-periods specifically taking into account the impacts of financial shocks and equity market wealth transfers.

Acknowledgements

We would like to thank to Dr. Cevriye Aysoy and anonymous referees for their valuable comments and suggestions.

References

- Ackley, G., 1951. The wealth-saving relationship. *J. Political Econ.* 59 (2), 154–161.
- Akçin, O., Alper, C.E., 1999. Aggregate consumption and permanent income: an empirical investigation for Turkey. *METU Stud. Dev.* 26 (1–2), 1–23.
- Akkoyunlu, S., 2002. Modelling consumers' expenditure in Turkey, 1962–1994. In: School of Economics, Seminar Series 2005. University of Cape Town. <http://www.commerce.uct.ac.za/Economics/Seminars>.
- Altan, M., Gökçürk, İ.E., 2007. Türkiye'de Kredi Kartlarının Toplam Özel Nihai Tüketim Harcamalarına Etkisi: Bir Çoklu Regresyon Analizi. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi* 18, 25–47.
- Ando, A., Modigliani, F., 1963. The life cycle hypothesis of saving: aggregate implications and tests. *Am. Econ. Rev.* 53, 55–84.
- Apergis, N., Simo-Kengne, B., Gupta, R., 2014. The long-run relationship between consumption, house prices and stock prices in South Africa: evidence from provincial-level data. *J. Real Estate Lit.* 22, 83–99.
- Aşırım, O., 1996. Alternative Theories of Consumption and an Application to the Turkish Economy. Central Bank of the Republic of Turkey.
- Aydede, Y., 2008. Aggregate consumption function and public social security: the first time-series study for a developing country, Turkey. *Appl. Econ.* 40 (14), 1807–1826.
- Banerjee, A., Dolado, J., Mestre, R., 1998. Error-correction mechanism tests for cointegration in a single-equation framework. *J. Time Ser. Anal.* 19 (3), 267–283.
- Belsky, E., Prakken, J., 2004. Housing Wealth Effects: Housing's Impact on Wealth Accumulation, Wealth Distribution and Consumer Spending. National Center for Real Estate Research Report W04-13. Harvard University, Boston.
- Benjamin, J.D., Chinloy, P., Donald, G.J., 2004. Real estate versus financial wealth in consumption. *J. Real Estate Finance Econ.* 29, 341–354.
- Bernanke, B.S., Gertler, M., Watson, M., 1997. Systematic monetary policy and the effects of oil price shocks. *Brook. Pap. Econ. Act.* 1, 91–142.
- Bertaut, C., 2002. Equity Prices, Household Wealth, and Consumption Growth in Foreign Industrial Countries: Wealth Effects in the 1990s. IFDP Working Paper 724. Federal Reserve Board, Washington.
- Blinder, A.S., 1975. Distribution effects and the aggregate consumption function. *J. Political Econ.* 83, 447–475.
- Bootle, R., 1981. How important is it to defeat inflation—the evidence. *Three Banks Rev.* 132, 23–47.
- Boskin, M.J., 1978. Taxation, saving and the rate of interest. *J. Political Econ.* 86 (2), 3–27.
- Bostic, R., Gabriel, S., Painter, G., 2009. Housing wealth, financial wealth, and consumption: new evidence from micro data. *Reg. Sci. Urban Econ.* 39 (1), 79–89.
- Bover, O., 2005. Wealth Effects on Consumption: Microeconomic Estimates from the Spanish Survey of Household Finances (No. 0522).
- Brown, R.L., Durbin, J., Evans, J.M., 1975. Techniques for testing the constancy of regression relationships over time. *J. R. Stat. Soc. Ser. B* 37 (2), 149–163.
- Campbell, J.Y., Mankiw, N.G., 1989. Consumption, income and interest rates: reinterpreting the time series evidence. NBER working paper series, working paper No. 2924. NBER Macroecon. Annu. 4, 185–216.
- Carroll, C.D., Misuzu, O., Slacalek, J., 2011. How large are housing and financial wealth effects? A new approach. *J. Money Credit Bank.* 43, 55–79.
- Case, K.E., Quigley, J.M., Shiller, R.J., 2001. Comparing Wealth Effects: the Stock Market versus the Housing Market. National Bureau of Economic Research Working Paper No. 8606. NBER, Cambridge.
- Case, K.E., Quigley, J.M., Shiller, R.J., 2005. Comparing wealth effects: the stock market versus the housing market. *Adv. Macroecon.* 5 <https://doi.org/10.2202/1534-6013.1235>.
- Ceritoğlu, E., 2003. Consumption, Income and Liquidity Constraints: the Case of Turkish Economy. Master of Science Thesis submitted to the Department of Economics of Graduate School of Social Sciences (Ankara: Middle East Technical University).
- Ceritoğlu, E., 2013. Household Expectations and Household Consumption Expenditures: the Case of Turkey. Central Bank of the Republic of Turkey working paper: 13/10.
- Ceritoğlu, E., 2017. The effect of house price changes on cohort consumption in Turkey. *Cent. Bank Rev.* 17 (3), 99–110.

- Chen, J., 2006. Re-evaluating the association between housing wealth and aggregate consumption: new evidence from Sweden. *J. Hous. Econ.* 15 (4), 321–348.
- Cilasun, S.M., 2009. Income and, Consumption and Saving Behavior of Turkish Household. Unpublished doctoral dissertation. Middle East Technical University.
- Cilasun, S.M., Kirdar, M.G., 2015. Durable and nondurable consumption, health and education expenditures over the life-cycle in Turkey. *METU Stud. Dev.* 42 (2), 247.
- Cooper, D., Dynan, K., 2016. Wealth effects and macroeconomic dynamics. *J. Econ. Surv.* 30 (1), 34–55.
- Coskun, Y., Sencer, A.B., Morri, G., Alp, E., 2018. Wealth effects on household final consumption: stock and housing market channels. *Int. J. Financ. Stud.* 6 (2), 57.
- Davidson, J., Hendry, D.F., Srba, F., Yeo, S., 1978. Econometric modelling of the aggregate time series relationship between consumer's expenditure and income in the UK. *Econ. J.* 88, 661–692.
- Davis, M.A., Palumbo, M.G., 2001. A Primer on the Economics and Time Series Econometrics of Wealth Effects." Federal Reserve Board, Finance and Economics Discussion Paper No. 2001-09. Federal Reserve Board, Washington.
- Demirezen, Ö., 2015. Türkiye'de Kredilerin Özel Tüketim Harcamalarına Etkisi. Ministry of Development of the Republic of Turkey. Planning Expertise Thesis. Publication No: 2941.
- Dickey, D.A., Fuller, W.A., 1979. Distribution of the estimators for autoregressive time series with a unit root. *J. Am. Stat. Assoc.* 74 (366a), 427–431.
- Dornbusch, R., Fischer, S., 1990. *Macroeconomics*, fifth ed. McGraw-Hill College, New York.
- Duesenberry, J.S., 1949. *Income, Saving and the Theory of Consumer Behavior*. Harvard University Press, Cambridge.
- Duygan, B., 2005. Aggregate Shocks, Idiosyncratic Risk, and Durable Goods Purchases: Evidence from Turkey's 1994 Financial Crisis. EUI Finance and Consumption Program Working Paper.
- Duygan, B., Güner, N., 2007. Income and consumption inequality in Turkey: what role does education play? In: Altuğ, S., Filiztekin, A. (Eds.), *The Turkish Economy: the Real Economy, Corporate Governance and Reform and Stabilization Policy*. Routledge Studies in Middle Eastern Studies, pp. 63–91.
- Dvornak, N., Kohler, M., 2003. Housing Wealth, Stock Market Wealth and Consumption: A Panel Analysis for Australia. Research Discussion Paper, No. 2003-07. Economic Research Department, Reserve Bank of Australia, Sydney.
- Engelhardt, G.V., 1996. House prices and home owner saving behavior. *Reg. Sci. Urban Econ.* 26, 313–336.
- Engle, R.F., Granger, C.W., 1987. Cointegration and error correction: representation, estimation, and testing. *Econometrica: J. Econom. Soc.* 251–276.
- Fisher, I., 1930. *The Theory of Interest*. Macmillan, New York, pp. 399–451, 1930.
- Fisher, L.A., Voss, G.M., 2004. Consumption, wealth and expected stock returns in Australia. *Econ. Rec.* 80 (251), 359–372.
- Friedman, M., 1948. A monetary and fiscal framework for economic stability. *Am. Econ. Rev.* 38, 245–264.
- Friedman, M., 1957. *A Theory of the Consumption Function*. National Bureau of Economic Research, General Series, No. 63. Princeton University Press, Princeton.
- Guiso, L., Paiella, M., Visco, I., 2006. Do Capital Gains Affect Consumption? Estimates of Wealth Effects from Italian Households' Behavior. Long-Run Growth and Short-Run Stabilization: Essays in Memory of Albert Ando. Edward Elgar, Cheltenham, pp. 46–82.
- Gylfason, T., 1981. Interest rates, inflation, and the aggregate consumption function. *Rev. Econ. Stat.* 233–245.
- Hall, R.E., 1978. Stochastic implications of the life cycle-permanent income hypothesis: theory and evidence. *J. Political Econ.* 86 (6), 971–987.
- Hall, R.E., 1988. Intertemporal substitution in consumption. *J. Political Econ.* 96, 339–357.
- Hamburg, B., Hoffmann, M., Keller, J., 2008. Consumption, wealth and business cycles in Germany. *Empir. Econ.* 34 (3), 451–476.
- Hamburger, M.J., 1967. Interest rates and the demand for consumer durable goods. *Am. Econ. Rev.* 57, 1131–1153.
- Hansen, H.J., 1996. The Impact of Interest Rates on Private Consumption in Germany. Discussion Paper 3/96. Deutsche Bundesbank, Frankfurt.
- Harris, R., Sollis, R., 2003. *Applied Time Series Modelling and Forecasting*. Wiley, Chichester, ISBN 9780470844434.
- Heien, D.M., 1972. Demographic effects and the multiperiod consumption function. *J. Political Econ.* 80, 125–138.
- Houthakker, H.S., Taylor, L.D., 1970. *Consumer Demand in the United States: Analyses and Projections*, second ed. Harvard University Press, Cambridge.
- Iacoviello, M., 2004. Consumption, house prices, and collateral constraints: a structural econometric analysis. *J. Hous. Econ.* 13 (4), 304–320.
- Jaramillo, L., Chailloux, A., 2015. It's not all fiscal: effects of income, fiscal policy, and wealth on private consumption (No. 15-112). International Monetary Fund.
- Jawadi, F., Soparnot, R., Sousa, R.M., 2015. Assessing financial and housing wealth effects through the lens of a nonlinear framework. *Res. Int. Bus. Finance* 39, 840–850.
- Juster, F.T., Taylor, L.D., 1975. Towards a theory of saving behavior. *Am. Econ. Rev.* 65, 203–209.
- Juster, F.T., Wachtel, P., 1972. A note on inflation and the saving rate. *Brook. Pap. Econ. Act.* 3, 765–778.
- Kerdrain, C., 2011. How Important Is Wealth for Explaining Household Consumption over the Recent Crisis? An Empirical Study for the United States, Japan and the Euro Area (No. 869). OECD Publishing.
- Keynes, J.M., 1936. *The General Theory of Employment, Interest and Money*. Macmillan, London.
- Kishor, N.K., 2007. Does consumption respond more to housing wealth than to financial market wealth? If so, why? *J. Real Estate Finance Econ.* 35 (4), 427–448.
- Koop, G., Potter, S.M., Strachan, R.W., 2008. Re-Examining the consumption–wealth relationship: the role of model uncertainty. *J. Money Credit Bank.* 40 (2–3), 341–367.
- Kuznets, S., 1946. *National Product since 1869*. National Bureau of Economic Research, Princeton University Press, New York.
- Labhard, V., Sterne, G., Young, C., 2005. The Wealth Effects on Consumption in Industrialized Countries. Bank of England Working Papers, No. 275. Bank of England, London.
- Lettau, M., Ludvigson, S.C., 2004. Understanding trend and cycle in asset values: Re-evaluating the wealth effect on consumption. *Am. Econ. Rev.* 94, 276–299.
- Lucas Jr., R.E., 1976. Econometric policy evaluation: a critique. In: *Carnegie-Rochester Conference Series on Public Policy*, vol. 1. North-Holland, pp. 19–46.
- Ludvigson, S., Steindel, C., 1998. How important is the stock market effect on consumption? FRBNY Econom. Pol. Rev. 5, 29–51.
- Ludwig, A., Sløk, T., 2002. The Impact of Changes in Stock Prices and House Prices and House Prices on Consumption in OECD Countries. Working Paper WP/02/1. IMF, Washington.
- Ludwig, A., Sløk, T., 2004. The relationship between stock prices, house prices and consumption in OECD countries. *Top. Macroecon.* 4, 1–24.
- MacDonald, G., Mullineux, A., Sensarma, R., 2011. Asymmetric effects of interest rate changes: the role of the consumption-wealth channel. *Appl. Econ.* 43 (16), 1991–2001.
- Mankiw, N.G., 1982. Hall's consumption hypothesis and durable goods. *J. Monet. Econ.* 10 (3), 417–425.
- Mehra, Y.P., 2001. The wealth effect in empirical life-cycle aggregate consumption equations. *Econom. Q.* 87, 45–67.
- Mishkin, F.S., 1976. Illiquidity, consumer durable expenditure, and monetary policy. *Am. Econ. Rev.* 66, 642–654.
- Modigliani, F., Brumberg, R., 1954. Utility analysis and the consumption function: an interpretation of cross-section data. In: Kurihara, K.K. (Ed.), *Post-keynesian Economics*. Rutgers University Press, New Brunswick, pp. 388–436.
- Modigliani, F., Brumberg, R., 1979. Utility analysis and the consumption function: an attempt at integration. In: Abel, A. (Ed.), *The Collected Papers of Franco Modigliani*. MIT Press, Cambridge, p. 2.
- Muellbauer, J., 1994. The assessment: consumer expenditure. *Oxf. Rev. Econ. Pol.* 10 (2), 1–41.
- Naka, A., Tuft, D., 1997. Examining impulse response functions in cointegrated systems. *Appl. Econ.* 29 (12), 1593–1603.
- Narayan, S., Narayan, P.K., 2004. Determinants of demand for Fiji's exports: an empirical investigation. *Develop. Econ.* 42 (1), 95–112.
- Özcan, K.M., Günay, A., Ertay, S., 2003. Determinants of private savings behavior in Turkey". *Appl. Econ.* 35, 1405–1416.
- Özer, Y.B., Tang, K.K., 2008. An Empirical Analysis of Financial and Housing Wealth Effects on Consumption in Turkey. University of Queensland.
- Özmen, E., Yavan, Z.A., 1999. Aggregate Consumption in Turkey: an Empirical Investigation. METU ERC Working Paper no: 99/22.
- Paiella, M., Pistaferri, L., 2017. Decomposing the wealth effect on consumption. *Rev. Econ. Stat.* 99 (4), 710–721.
- Paiella, M., 2007. Does wealth affect consumption? Evidence for Italy. *J. Macroecon.* 29, 189–205.
- Paiella, M., 2009. The stock market, housing and consumer spending: a survey of the evidence on wealth effects. *J. Econ. Surv.* 23, 947–973.
- Patinkin, D., 1948. Price flexibility and full employment. *Am. Econ. Rev.* XXXVIII, 534–564.
- Pesaran, M.H., Shin, Y., Smith, R.J., 2001. Bounds testing approaches to the analysis of level relationships. *J. Appl. Econ.* 16 (3), 289–326.
- Phillips, P.C.B., Hansen, B.E., 1990. Statistical inference in instrumental variable regression with I(1) processes. *Rev. Econ. Stud.* 57 (1), 99–125.
- Pigou, A.C., 1941. *Employment and Equilibrium*. Macmillan Co, London, pp. 96–130.
- Poterba, J.M., 2000. Stock market wealth and consumption. *J. Econ. Perspect.* 14, 99–118.
- Romer, C.D., 1990. The great crash and the onset of the great depression. *Q. J. Econ.* 105, 597–624.
- Shen, X., Holmes, M.J., Lim, S., 2015. Wealth effects and consumption: a panel VAR approach. *Int. Rev. Appl. Econ.* 29 (2), 221–237.
- Simo-Kengne, B.D., Gupta, R., Bittencourt, M., 2013. The impact of house prices on consumption in South Africa: evidence from provincial-level panel VARs. *Hous. Stud.* 28, 1133–1154. <https://doi.org/10.1080/02673037.2013.804492>.
- Sims, C.A., 1980. Macroeconomics and reality. *Econometrica* 48, 1–48.
- Sims, C.A., Zha, T., 1999. Error bands for impulse responses. *Econometrica* 67, 1113–1155.
- Sivri, U., Eryüzü, Ö.G.H., 2010. Rasyonel Beklentiler-Yaşam Boyu sürekli Gelir Hipotezinin Testi. *Ekonometri ve İstatistik e-Dergisi* 11, 90–99.
- Slacalek, J., 2009. What drive personal consumption? The role of housing and financial wealth. *B. E. J. Macroecon.* 9 <https://doi.org/10.2202/1935-1690.1555>.
- Sousa, R.M., 2009. Wealth Effects on Consumption Evidence from the Euro Area. Working Paper No. 1050. European Central Bank, Frankfurt.
- Springer, W.L., 1977. Consumer Spending and the Rate of Inflation. *The Review of Economics and Statistics*, pp. 299–306.
- Springer, W.L., 1975. Did the 1968 surcharge really work? *Am. Econ. Rev.* 65 (4),

- 644–659.
- Stock, J.H., Watson, M.W., 1993. A simple estimator of cointegrating vectors in higher order integrated systems. *Econometrica: J. Econom. Soc.* 783–820.
- Tan, A., Voss, G., 2003. Consumption and wealth in Australia. *Econ. Rec.* 79 (244), 39–56.
- Taylor, L.D., 1971. Saving out of different Types of in- come. *Brook. Pap. Econ. Act.* 2, 383–415.
- Tsai, I.C., Lee, C.F., Chiang, M.C., 2012. The asymmetric wealth effect in the US housing and stock markets: evidence from the threshold cointegration model. *J. Real Estate Finance Econ.* 45 (4), 1005–1020.
- Van Rijckeghem, C., Üçer, M., 2009. The Evolution and Determinants of the Turkish Private Saving Rate: what Lessons for Policy? Koç University-TÜSİAD Economic Research Forum.
- Weber, W.E., 1975. Interest rates, inflation, and consumer expenditures. *Am. Econ. Rev.* 65 (5), 843–858.
- Weber, W.E., 1970. The effect of interest rates on aggregate consumption. *Am. Econ. Rev.* 60 (4), 591–600.
- Wright, C., 1969. Saving and the Rate of Interest' in AC Harberger and MJ Bailey. *The Taxation of Income from Capital*. Brookings Institution, Washington.
- Wright, C., 1967. Some evidence on the interest elasticity of consumption. *Am. Econ. Rev.* 57 (4), 850–855.
- Yalciner, K., Coskun, Y., 2014. Conditions of mortgage market development: a critical Emprical review for Turkey. *İktisat İşletme ve Finans* 29 (340), 27–68.
- Yükseler, Z., Türkan, E., 2008. "Türkiye'de Hanehalkı: İşgücü, Gelir, Harcama ve Yoksulluk Açısından Analizi". TÜSİAD-T/2008-03/455.
- Zhang, C., Zhou, K., Yang, S., Shao, Z., 2017. Exploring the transformation and upgrading of China's economy using electricity consumption data: a VAR–VEC based model. *Phys. Stat. Mech. Appl.* 473, 144–155.