An Analysis of the Dynamics of Aggregate Consumption in the Turkish Economy (1987-2019)

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ABSTRACT

This thesis aims to investigate the long-run and short-run relationships between consumption expenditure and income from 1987 to 2019 in Turkey. We used the Dual Adjustment approach that models the dual co-movements of the different components of time series variables. Data is sourced from World Bank's database of World Development Indicators.

We found empirical evidence on the presence of common trend for consumption and income in Turkey. Additionally, we found a significant relation among the transitory components of income and consumption. Turkish data reveals evidence on singular adjustment and hence lends support to the Dynamic Keynesian Consumption Function.

Keywords: Income, Household Consumption Expenditure, Dual Adjustment, Cointegration, Turkey

ÖZ

Bu tez, 1987'den 2019'a kadar Türkiye'de tüketim harcamaları ile gelir arasındaki uzun ve kısa vadeli ilişkiyi incelemeyi amaçlamaktadır. Zaman serisi değişkenlerinin farklı bileşenlerinin ikili ortak hareketlerini modelleyen İkili Uyarlanma yaklaşımını kullandık. Veriler Dünya Bankası'nın veri tabanından alınmıştır.

Türkiye'de tüketim ve gelir için ortak bir eğilimin varlığına dair ampirik kanıtlar bulduk. Ek olarak, gelir ve tüketimin geçici bileşenleri arasında anlamlı bir ilişki bulduk. Türkiye verileri tekil uyarlanma ile uyumlu kanıtlar ortaya koymakta ve bu nedenle Dinamik Keynesyen Tüketim Fonksiyonunu desteklemektedir.

Anahtar Kelimeler: Gelir, Hanehalkı Tüketim Harcamaları, İkili Uyarlanma, Eşbütünleşme, Türkiye

DEDICATION

For Yiğit Eren

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LIST OF SYMBOLS AND ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AIH	Absolute Income Hypothesis
APC	Average Propensity to Consume
ARDL	Autoregressive Distributed Lag
CONS	Household Consumption Expenditure
DAH	Dual Adjustment Hypothesis
DP	Dominant Property
EG	Engle-Granger
GDP	Gross Domestic Product
HP	Hodrick-Prescott
INC	Disposable Income
LCH	Life Cycle Hypothesis
MPC	Marginal Propensity to Consume
OECD	The Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PIH	Permanent Income Hypothesis
SAH	Singular Adjustment Hypothesis
SPIH	Strong version of Permanent Income Hypothesis
RU	Ravn-Uhlig
VAR	Vector Autoregressive Model
WPIH	Weak version of Permanent Income Hypothesis
WDI	World Development Indicators

Chapter 1

INTRODUCTION

Consumption expenditures play a significant role in macroeconomic dynamics of economies. For instance, it is the most significant determinant of aggregate demand, which in turn, determines employment and national income. In this context, consumption is the main basis of overall economic activity in economy. This is valid for Turkey as well. Therefore, understanding the determinants of consumption can help us to better understand the dynamics of income, and hence the ways of boosting a country's economic growth, especially in the short-run.

In the related literature, several hypotheses on the drivers of the consumption function have been developed to describe consumption behaviour. Current disposable income, according to Keynes's (1936) Absolute Income Hypothesis, is the most important determinant of household consumption expenditures. According to Duesenberry's (1952) Relative Income Hypothesis, consumption is dependent not just on present disposable income, but also on income from previous periods. Consumption is a function of wealth in Modigliani and Brumberg's (1954) Lifetime Cycle Hypothesis. According to Friedman's (1957) Permanent Income Hypothesis, income is classified as either permanent or transitory, and household consumption is determined by permanent income. More specifically, Friedman claimed that consumption expenditure depends on long term expected income which he called “permanent income”. He argued that consumption during one period does not depend on the

income received in that particular period but life-cycle income or on the permanent part of the income. So, consumers spend part of their life or permanent income. Empirical studies show that while some of the individuals make consumption decisions according to current income, some of them make consumption decisions according to permanent income (see chapter 2). These findings show that some consumers act in accordance with the Keynesian view in the short run, and a certain part of consumption expenditures is explained by the permanent income hypothesis in the long run (Bilik and Kök, 2020).

Moreover, the empirical literature on the cointegration relationships between consumption and disposable income contains many studies. However, this literature does not reveal a clear answer about the existence and stability of the cointegration relationship between consumption and disposable income. For example, Altunöz (2014) could not find a cointegration between consumption (C) and personal disposable income (Y) using annual data from 1987 to 2012 for Turkey. Another recent study, Atalay (2018), provided support for the cointegration relationship between C and Y using annual data from 1962 to 2014 for Turkey. However, Slacalek (2004) states that there is little evidence of cointegration between consumption and disposable income for 26 countries over the period 1960-2000[1]. As emphasized by İsmihan (2019:1) "this "puzzle" could be solved easily by considering a dual structure of the co-moving variables within a suitable analytical framework."

To check for the econometrically meaningful relationships between the variables, the dual co-movements of the variables are modeled in the dual adjustment approach,

[1] It should be noted here that there are some differences between these studies in terms of model specification, type of data and the sample period.

which is an alternative to traditional cointegration method that requires single adjustment for the variables under consideration. The variables are divided into their permanent and transitory components in the dual adjustment approach, allowing them to be analyzed by establishing a dual model that allows the respective components to affect each other in different ways.[2] With this approach, for example, Friedman's claim[3] that the permanent components (permanent consumption and permanent income) affect each other, but the transitory components do not have a relationship with each other, has become testable (İsmihan, 2019).

This thesis aims to investigate the long run and short run relationships between consumption expenditure and income from 1987 to 2019 in Turkey. We used the Dual Adjustment approach that models the dual co-movements of the different components of time series variables. The Dual Adjustment method analyzes the dual movements of the variables' transitory and permanent components. In İsmihan's study, the notion of co-filtered [for example, Hodrick-Prescott (HP)] trend is presented, and a method is proposed in which the relationships between the series' permanent and transitory components are studied separately. With this method, several hypotheses like Friedman's argument that the permanent components (of consumption and income) impact each other but the transitory components are unrelated to each other is tested. The analysis of Turkey's household consumption expenditures using the Dual Adjustment approach is deemed to contribute to the empirical literature. In this perspective, this thesis also seeks to answer the following question: Is there any

[2] For detailed information, see İsmihan (2019)
[3] According to Friedman's PIH strong version of asserts that permanent consumption is determined by permanent income, whereas transitory consumption and transitory income are unrelated. (Friedman 1957).

evidence of dual adjustment consumption behaviour in Turkey's consumption behavior?

The rest of the study is organized as follows: The second chapter will provide information on consumption function theories and review of the empirical literature on the consumption function in Turkey. The empirical findings will be presented and discussed in the third chapter. The fourth chapter concludes the study.

Chapter 2

THEORETICAL BACKGROUND AND LITERATURE REVIEW

2.1 J. M. Keynes and the Consumption Function (Absolute Income Hypothesis)

The aggregate consumption function, initially developed by Keynes (1936) in his well-known book General Theory, has been an important research topic in macroeconomics and it has led to the development of many theoretical and empirical studies to date. Although Keynes based consumption behavior on psychological foundations in his General Theory, he made assumptions about the consumption function based on pure observations instead of statistical analysis (Mankiw 2015: 475).

According to Keynes, aggregate consumption is a positive but decreasing function of total income (Keynes 1936: 90-112). Keynesian consumption function and its basic assumptions can be stated as follows:

$C = C_0 + cY_D, \quad C_0 > 0, \quad 0 < c < 1,$

In the above equation, C is consumption, C_0 is autonomous consumption, Y_D is disposable income, and c is marginal propensity to consume.

• The main determinant of the current period consumption (C) of individuals is the real disposable income in the current period.

• MPC (c); the marginal propensity to consume refers to the increase in consumption due to the increase in disposable income.

MPC = dC/dY, 0<c<1

• APC; average propensity to consume, (the ratio of total consumption expenditure to disposable income) decreases as income increases in the short run and the average propensity to consume is greater than the marginal propensity to consume.

From the above-mentioned assumptions, the assumption that the average propensity to consume will decrease as income increases has been a matter of debate in the literature and has been criticized by many economists. Simon Kuznets's (1946) work is an example of a critique of this premise. His analysis included consumption statistics from the United States from 1869 to 1929 and according to his findings, Keynes' assumption is right in the short term but not in the long run (Kuznets 1946). Therefore, he refutes Keynes's assumption regarding APC by arguing that as income increases in the long run, the average propensity to consume remains constant and the MPC is the same for all households (Palley, 2008). Another criticism, according to A. Smithies, is that Keynes' assumption that average consumption will decrease as income increases is valid under the ceterus paribus assumption but APC can be decreasing, constant, or increasing when other variables are not constant. This is because consumption expenditures fluctuate as a result of factors such as affluence, standard of living, urbanization (Smithies, 1945).On the other hand, almost all empirical studies, which are cross-sectional or short-term time series, have reached findings that support Keynes's assumption about consumption (Alimi, 2013).

2.2 James Duesenberry's Relative Income Hypothesis

Based on research into household consumption behavior, James Duesenberry in his book *Income, Saving, and the Theory of Consumer Behavior* developed the theory of relative income. In his study, which includes both short run and long run analyses, he

claims that present consumption expenditures are influenced by the highest income in previous periods. He contends that consumption is determined not only by an individual's income but also by the relative income compared to the others. This in turn, led Duesenberry to argue that a phenomenon called as the "Demonstration Effect" plays a role in determining consumer expenditures (Duesenberry, 1952: 27).

This hypothesis challenges Keynes' assumption that consumption is determined only by current income, claiming that consumption is determined not only by current income but also by income at the previously obtained maximum level. For example, if everyone in the community's income is increasing at the same rate, their average income will remain constant even if total income rises (Sarı and Yıldırım 2021). Duesenberry contends that because income remains constant, a person will spend the same proportion of his income as he did prior to the increase in income. That is, despite an increase in overall income, the consumption-income ratio (APC) will remain constant. As a result, an individual with a higher income level will increase his consumption expenditures, but he will not desire to instantly reduce his consumption expenditures when his income level falls. For Duesenberry, this situation exemplifies the "Ratchet Effect" (Duesenberry, 1952: 110).

2.3 Franco Modigliani and the Life Cycle Hypothesis (LCH)

Under the guidance of Franco Modigliani, Albert Ando and Richard Brumberg studied the consumption function in the 1950s using Fisher's model[4] of consumer behavior under the new approach named as the Life Cycle Hypothesis (LCH). The LCH's main argument is consumer behavior, in which income changes systematically

[4] This model attempts to explain the constraints faced by consumers, the preferences they have, and how these constraints and preferences together determine their choices on consumption and saving in different time periods. (Mankiw, 2015: 480-490).

throughout people's lifetimes and saving allows consumers to shift income from times of high income to times of low income. Furthermore, the Modigliani's LCH attempted to analyze the long run course of the average propensity to consume, namely the consumption puzzle (Mankiw, 2015: 489-494). According to the hypothesis, how much consumers will consume is determined by their life expectancy and associated work expectation. In this sense, he divides the individual's life into several stages to analyze it. Rational individuals, at various stages of their life cycle; make positive saving when their income is high, and negative savings to maintain a standard consumption pattern in retirement years when their incomes decline and the economy shrinks (Sarı and Yıldırım, 2021 and Mankiw, 2003)

According to LCH, consumers make consumption decisions based on their lifetime income, not their current income. Thus, a person is considered to plan a spending pattern for the rest of their life based on expected salary. It is also assumed that each person maintains more or less the same level of smoothed consumption. A consumer spends the first years of high income saving and later years taking into account that income will decrease and savings will be consumed (for example, retirement). Accordingly, people take into account all their lifetime earnings and spend in such a way that their end-of-life savings are zero[5] (Yıldırım at al., 2013).

[5] There are various criticisms of this assumption; for example, it assumes that people consume wealth in old age, but this often does not happen as many individuals want to pass on the inherited wealth to their children. Another criticism comes from behavioral economist like David Laibson. Criticizing the assumption that people are rational and forward-looking, he argues that many people have motivations to avoid planning. It is stated that people may currently lack self-control to reduce spending and save more for the future David Laibson (1997).

By including the variable of wealth in the model, Modigliani states that aggregate consumption depends on both wealth and income. That is, the consumption function is explained with the following concepts and equations (Mankiw, 2015: 490):

To achieve smooth consumption, resources are divided equally by the consumer over time:

$C = (W + RY)/T$

Where C = consumption, W = initial wealth, Y = annual income until Retirement (assuming constant), R = number of years until retirement, expressed as T = years of life.

Lifetime resources (= W + RY) and aggregate consumption depends on both wealth and income. That is, the consumption function is:

$C = \alpha W + \beta Y$

Here, α = marginal propensity to consume out of wealth, β = Marginal propensity to consume out of income.

2.4 Milton Friedman and the Permanent Income Hypothesis

Friedman's (1957) Permanent Income Hypothesis (PIH) of consumption[6], like the Modigliani's LCH, tried to study the long run trend of the average propensity to consume, i.e. the consumption puzzle[7] (Mankiw, 2015: 495). Friedman defines consumption as the sum of expenditures on non-durable goods and services with value in use, which can be measured by depreciation or interest cost, rather than expenditures on durable consumer goods (Friedman, 1957: 20). Consumption in this context comprises not only spending for the purchase of goods and services, but also long run investment or capital expenditures (Arslan, 2019). Potential consumers, according to

[6] Fisher's model of intertemporal choice underpins the perpetual income hypothesis.

[7] Friedman obtained findings in his study that a constant APC was observed, as Kuznets found. This result contradicts Keynes's assumption that as income increases, the average propensity to consume will decrease (Mankiw, 2015 p.495).

Friedman's PIH, make consuming decisions based not only on their current income, but also on their expected income in the future. As a result, the PIH asserts that permanent consumption is a function of permanent income, assuming that consumption is determined by people's expectations.

In the model, Friedman considers current income to be the sum of permanent and transitory income, and the equation is expressed as:

$Y = Y^P + Y^T$

Here, superscript T represents the cyclical (transitory) component and P represents the permanent component and Y stands for current income, Y^P permanent income, and Y^T transitory income[8].

Accordingly Friedman divided current consumption into permanent and transitory components, which he described as follows:

$C = C^P + C^T$

Here, C^P represents permanent consumption and C^T denotes transitory consumption.

Friedman rejects Keynes's view of the consumption function based on current income as the main determinants of consumption expenditures, instead dividing both consumption and income into permanent and transitory components.

According to this theory, consumers use savings and borrowings to smooth out consumption in response to transitory income changes. The consumption function, according to PIH, can be defined as follows (Mankiw, 2015: 495):

$C = \alpha Y^P$,

[8] Permanent income is the income a consumer expects to earn on an uninterrupted and average lifetime. Transitory income, bonuses, stock earnings, etc. as part of non-permanent income.

Here, α is a constant that measures the fraction of permanent income consumed.

According to Friedman, households dedicate a fixed percentage of their permanent income to consumption, with the transitory component of income having no effect on consumption (Sari and Yildirim, 2021). According to Friedman, the solution to the consumption puzzle was that consumption was dependent only on the permanent income of the consumer, thus adding a forward-looking dimension to the theory of consumption (Alimi, 2013). APC is based solely on the ratio of permanent income to current income. APC falls when current income temporarily rises above permanent income, and APC rises temporarily when current income falls below permanent income. If high-income households have a higher transitory income than low-income households, the APC is lower in high-income households. In the long run, the change in income is mainly due to the change in permanent income, which indicates a fixed or stable APC (Mankiw, 2015: 495).

$$APC = C/Y = \alpha\ YP/Y$$

2.5 Robert Hall and the Random Walk Hypothesis

The consumption theory of rational expectations is based on Robert E. Hall's 1978 "Random Walk Hypothesis."[9] In theory, it is assumed that changes in income have no effect on changes in consumption, and that future income expectations are set by rational behavior. The most fundamental reason for this is that people with rational expectations use all available information to generate the best future predictions. This assumption is known as the Random Walk Hypothesis of consumption, and changes or modifications in consumers' or buyers' consumption patterns are ideally based on

[9] Hall used Euler's equation to explain consumption and stated that the combination of the permanent income theory and rational expectations will show a random walk of consumption. The approach derived from the optimization behavior of the representative individual in the Random Walk model is called the "Euler equation approach'' (Hall, 1978).

random economic occurrences (Hall, 1978: 985-986). The combination of the Permanent Income Hypothesis and rational expectations is effective in determining the level of consumption. In this context, we can say that while individuals determine their consumption levels by using their permanent incomes but under rational expectations, only unexpected policy changes will affect their consumption levels (Mankiw, 2000-2003).

2.6 David Laibson and the Pull of Instant Gratification

David Laibson, a leading figure in behavioral economics, while analyzing consumption stated that, real human behaviors are far from rational are effective in consuming decisions. In this context, behavioral economists attempted, in contrast to traditional consumption theories, to explain individuals' saving and consumption expenditures based on human nature. Individuals, in particular, may display time inconsistency and end up conserving less than they would want due to a strong desire for immediate gratification (Mankiw, 2015: 500).

2.7 Selective Review of Empirical Findings on Consumption Function in Turkey

In their recent research, Sari and Yildirim (2021) argued that the evolution of private consumption expenditures in the Turkish economy over the years (quarterly data between 2000:Q3 and 2020:Q2) is the relationship between the macroeconomic variables GDP, interest rates, public expenditures, exchange rate, inflation rate and wealth. In the empirical study, it was concluded that 1% increases in GDP within the framework of ARDL Bounds approach increased private consumption expenditures by 0.61%. The authors concluded that the inflation variable represent the effects of uncertainty affects private consumption expenditures negatively and public expenditures affect private consumption expenditures negatively. As a result of their

research, they animed that the partial Ricardian equivalence is valid in the Turkish economy.

Sağlam (2014) tested the validity of the Keynesian consumption function in the Turkish economy by applying the Least Squares Method with the annual real income data of the 1982-2003 period in his empirical study. It was stated that the relationship between consumption expenditures and income variables was positive and strong, and that increases in real income would increase real consumption expenditures in the sample period or a decrease in real income would decrease real consumption expenditures. The author concluded that the Turkish consumption function for the sample period confirms the Keynesian consumption function.

In the study of Yıldırım (2015), taking into account the changes in the credit regime for the Turkish economy, the total consumption function; analyzed the short run dynamics between consumption and macroeconomic variables with quarterly data from 1987:Q1 to 2013:Q4: He analyzed these periods as two sub-periods: 1987:Q1-2003:Q1 and 2003:Q1- 2013:Q4 (quarterly). The author calls the first period as the tight credit regime and the second period as the loose credit regime. Regression result with integrated variables show that in the long run consumption expenditures are clearly dependent on income in the first period, while the dependence of consumption expenditures on income decreases in the second period. While the coefficients of the loan variable were statistically insignificant in the first period, they were statistically significant in the second period. In the analysis, the Single Break cointegration test developed by Gregory and Hansen (1996) was applied considering the transformation in the Turkish economy. The author tests the integration relationship based on three different models in his analysis. In all three models, it is concluded that the variables

are cointegrated in the long run. As a result of the empirical findings, it was concluded that the changes in the conditions of access to credit affect both the coefficients in the total consumption function and the short run dynamics between consumption and macroeconomic variables. And as a result of the analysis of the author, it is stated that the hypersensitivity of consumption to income decreases in case of increased access to credit, and the link between consumption and financial variables increases.

Yamak et al. (2019) examined consumption expenditures in the Turkish economy during the period 2004:Q1-2018Q3 together with the consumer confidence index in addition to macroeconomic variables (real GDP, interest rate, inflation). The authors created two different models to determine the effect of the consumer confidence index on the consumption function. In the first model, the consumption function was explained with income, inflation and interest rate variables, while in the second model, in addition to the relevant variables, the consumer confidence index was added as an explanatory variable. The models were analyzed with the ARDL approach with the relevant data set. It is shown that there is a long run relationship between the related variables. And a positive relationships was found between consumer expectations and consumption expenditures in the long run. According to another finding of the study, the increase in interest and inflation causes a decrease in consumption expenditures in the long run. However, the coefficient of the interest rate variable in both models was found to be statistically insignificant. As a result, the authors concluded that the consumption expenditure of the households in the Turkish economy is sensitive to consumer expectations.

Pehlivan and Utkulu (2007) analyzed Turkey's consumption function within the framework of the Life Cycle-Permanent Income Hypothesis. Geweke, Porter-Hudak

Piecewise Cointegration Approach was applied in econometric analysis. Quarterly data covering the period 1987-2006 were used in the research. The authors applied the Piecewise cointegration test instead of the traditional cointegration test, and as a result of the piecewise cointegration test, it was found that the cointegration relationship between the series had long run memory characteristics. It is shown that there is a positive relationship between income and private final consumption in the long run, and a negative relationship between treasury bill interest rates and private final consumption expenditures. According to another finding of the study, there is a significant relationship between private final consumption expenditures and income and wealth in the long run. That is, consumption is determined by income and wealth.

In his study, Yiğit (2020) analyzed the course of the marginal consumption trend over the years in Turkey, using the Keynesian Absolute Income Hypothesis and using the data of the disposable income and consumption variables covering the period 2006Q1-2019Q4. The author used the Dynamic Ordinary Least Squares (DOLS) method to estimate the marginal propensity to consume. And in this direction, for the 27 sub-periods between the periods of 2006-2019, the marginal consumption tendency was estimated using the 27 estimation DOLS method. As a result of the applied econometric analysis, the author determined that the marginal propensity to consume decreased from the first period to the last period. And he identified a structural break, stating that this decrease is not in the trend, but in the level of the marginal propensity to consume. As a result of this determination, the author applied the Lee Strazicich LM unit root test to test the structural break. As a result of the test, it was concluded that the marginal propensity to consume series has a unit root with structural break.

Altunöz (2014) examined the relationships between income and consumption for Turkey by applying cointegration analysis with 1987-2012 period data. According to the analysis findings, it was stated that the two variables did not act together and did not affect each other in the long run.

Atalay (2018) tested the validity of the Absolute Income Hypothesis with data sets covering the period 1962 – 2004 for the Turkish economy. For the year 1989, a dummy variable was used, which shows the year the restrictions on capital movements were lifted. The final consumption expenditure variable was used to determine consumption expenditures and the GDP variable was used to determine income. In the econometric analysis, cointegration test and short run error correction analysis were applied. As a result of the cointegration analysis, it was concluded that consumption expenditures and income variables are cointegrated in the long run. The author showed that a 1% increase in GDP in Turkey leads to an increase of 0.74% in the value of consumption expenditures. In addition, the author states that the marginal consumption tendency is 0.74 and this value indicates that the consumption habits of individuals living in Turkey are high. As a result of the short-term error correction model test, which is another analysis, it was concluded that the causality relationship between the mentioned variables was established correctly. The author stated that there was a structural break in the consumption level in the Turkish economy after 1989. As a result of the empirical findings, the author showed that the expenditure pattern of individuals living in Turkey are compatible with the absolute income hypothesis.

Tarı and Çalışkan (2005) experimentally studied household consumption habits in rural and urban Kocaeli region in 2003. The cross section data derived from the authors' household consumption expenditures survey were employed in the

econometric test. In the estimate, the Least Squares approach was applied. The authors came to the conclusion that Keynes' Absolute Income Hypothesis best describes household consumption behaviour in Kocaeli province. According to this finding, disposable income is the most important factor influencing consumer expenditures in Kocaeli.

Arı and Özcan (2015) analyzed whether the income-consumption ratio is stationarity, with annual data covering the 1955-2015 period in Turkey. In the econometric analysis, Zivot and Andrews (1992), Lumsdaine and Papell (1997), Lee and Strazicich (2003,2004), Kapetanios et al. (2005) structural break unit root tests and Kapetanios et al. (2003) nonlinear CSR unit root test was used. According to the empirical analysis conducted by the authors, the APC for Turkey does not converge to a constant in the long run. Furthermore, it was suggested that political shocks have long run implications on household spending and saving behaviour. As a result of the findings, the Keynesian Absolute Income Hypothesis is validated for Turkey, and authors claimed that fiscal policy is more successful than monetary policy.

Kaya (2018) examined the Turkish economy using the FMOLS approach using quarterly data from 1998 to 2016. The aim of the research, which was conducted within the context of the lifetime income hypothesis, was to dissect the influence of interest rates and income on consumption expenditures. The author argued that the outcomes of the research confirm the Life Cycle Income Hypothesis and that consumption is determined by income and wealth. Furthermore, the above mentioned variables were determined to be statistically significant.

Baktemur (2021) used panel data analysis to evaluate the cointegration relationships between income and consumption, which separated developing nations into two groups (upper middle income and lower middle income). According to the conclusions of the analysis, the asserts that income and consumption are cointegrated in emerging nations in the long run. The elasticity coefficients were computed in the context of this conclusion. According to the findings, a 1% increase in income induces a 1.04 percent rise in consumption for the upper middle income group and a 0.97 percent increase in consumption for the lower middle income group.

Arslan (2019) used VAR and Granger Causality tests to examine the changes in consumption expenditures with income, interest, and unemployment. The econometric analysis spans the years 2003Q1 through 2018Q4. In his study, the author compares Turkey to countries in the European Union. According to the author, the income variable alone is insufficient to explain the change in consumer expenditures in Turkey and the European Union countries according to the VAR approach used. He also asserts that the unemployment variable is a significant macroeconomic variable that explains fluctuations in consumer spending.

Unat (2018) used the Quantile Regression approach to examine the link between data sets covering the 2005 and 2016 period for the Turkish economy and household consumption expenditures and incomes in his study, which includes the variables and theories that affect consumption expenditures. According to the empirical study, households in the low spending group have a low consumption tendency, however for all other slices of the quantile regression, the consumption trend increases from the lowest to the highest. Furthermore, his analysis claims that the marginal consumption propensity for each quantile has a consistent structure across time.

In their recent studies, Akın and Dağlıoğlu (2021) examined the relationship between Turkey's share of household consumption expenditures in income and the USD exchange rate, household loans, per capita income, and consumer confidence index; they analysed quarterly data sets covering the period 2004:Q1-2019Q3 using the Fourier Approach. The empirical research revealed a negative link between the USD exchange rate, household loans, and consumption expenditures. It is stated that there is a positive association between per capita income, the consumer confidence index, and consumption expenditures. According to another result, there is a causal relationship between consumption expenditures in both the short and long run and the USD exchange rate, household loans, per capita national income and the consumer confidence index.

Bilik and Kök (2020) analyzed the income-consumption relationships for EU countries and countries in the negotiation process with a data set that does not cover the period of 2000-2017. GMM method on different models was used in the analysis. Their findings supported the permanent income hypothesis.

Slacalek (2004) in his study analyzes the existence of a cointegration between consumption, labor income and wealth by using the cointegration approach for 26 OECD countries. The author stated that the cointegration relationships between consumption and disposable income trends to exist in countries where stationary saving rates (Australia and Portugal). There is no cointegration relationships between consumption and disposable income for Turkey.

Chapter 3

MODEL, METHODOLOGY AND EMPRICAL RESULTS

3.1 Model

In this study, our model is based on the Dual consumption function within the domain of the 'dual adjustment approach'[10] developed by İsmihan (2019).

The following mathematical model is generally utilized in the analysis of the relationship between consumption and income under the assumption of singular adjustment (as we shall explain below) within the context of the traditional consumption function:

$$CONSt = \beta_0 + \beta_1 INCt \quad (1)$$

CONS: Household Consumption Expenditure

INC: Disposable Income

For the analysis of the relationship between consumption and income under the dual adjustment approach, a dual equation model is used to discriminate between the alternative hypotheses. The mathematical model is as follows:

$$CONSt^P = \beta_0 + \beta_1 INCt^P \quad (2)$$

$$CONSt^T = \beta_2 INCt^T \quad (3)$$

Here, the superscript T represents the cyclical (transitory) component and P represents the permanent component.

[10] With the dual adjustment approach, the variables are separated into permanent and transitory components and analyzed by establishing dual models that allows the different components to affect each other in different ways. See İsmihan (2019) for more information.

The impact of permanent income on permanent consumption is represented by coefficient β_1 in the first model. The impact of transitory income on transitory consumption is represented by the β_2 coefficient in the second model. According to the dual adjustment approach, standard cointegration analysis such as Engle-Granger, necessitate the singular adjustment, coefficients of permanent components and transitory components coefficients are the same ($\beta_1 = \beta_2$) and hence this creates restrictive assumption. However, this claim can be tested (İsmihan 2019). It can be tested by using the Dual Adjustment Hypothesis (DAH) and Singular Adjustment Hypothesis (SAH) developed by Ismihan (2019). In the SAH, the transitory and permanent components are associated with the same slope parameters ($\beta_1 = \beta_2$). In contrast the marginal propensity to consume from permanent income and transitory income are different in DAH. The presence of SAH can be tested using a simple t-test. It should also be noted that the SAH can also be called the *Dynamic Keynesian Consumption Function*, in which the weak version of PIH (i.e. presence of common HP trend, see below) is also embedded. However, if the transitory components are not significantly related (i.e. $\beta_2=0$), then we can conclude that the strong version of PIH (SPIH) holds.

3.2 Data and Method

As noted earlier, in this study the dual relationship between Turkey's consumption and income in the 1987-2019 period is examined. The data used were obtained from the World Bank's World Development Indicators (WDI). Since the data set utilized has no household consumption expenditures prior 1987, our sample starts from that year.

When analyzing the dual relationship between consumption and income, the associated variables will be separated into permanent and cyclical components and

studied using Ismihan's dual adjustment method (2019). For permanent and cyclical components, the existence of singular adjestment ($\beta_1 = \beta_2$) or dual adjustment ($\beta_1 \neq \beta_2$) will be checked in the dual model to be utilized in the study. Based on the dual adjustment method, we also hope to find evidence of the existence of a shared (e.g. HP) trend for income and consumption in Turkey.

Before applying the dual adjustment approach, Augmented Dickey Fuller (ADF), unit-root test which is one of the popular unit root tests used in the time series analysis of the data of the variables, will be applied. The traditional Engle-Granger cointegration analysis will be applied to compare the findings obtained from the dual adjustment approach. Since the Engle-Granger analysis yields biased estimation results, the Engle-Yoo 3-stage estimation method, in which unbiased estimators are obtained, will also be applied (Enders 2015).

3.3 Dual Adjustment Approach

According to İsmihan's (2019) method the dual components of a time series variables can be analyzed by using the Dual Adjustment Approach by separating the permanent and cyclical (transitory) components. In doing so, alternative hypotheses can also be tested. According to this approach, which is an alternative way to a traditional cointegration test, such as the Engle Granger approach the dual co-movements of the variables are analyzed the suggested way. The idea of common (filtered) trend (for example, Co-HP trend) was developed to describe a pair of non-stationary variables, allowing the variables to be decomposed before the econometric analysis stage. It is stated that the common Hodrick Prescott (HP) trend[11] i.e. the common HP (Co-HP)

[11] See Mills, (2003) for a comprehensive review.

concept allows to test the series that are stationary around the common trend and the existence of such relationship (Ismihan, 2019).

In a simple traditional econometric model;

$$Yt = \beta_0 + \beta_1 Xt + ut \quad (4)$$

Here, Yt and Xt are non-stationary variables and ut is the is the disturbance term. Y is the dependent variable and X is the independent variable.

By separating the X and Y series into their constituent parts:

$$Yt \equiv Yt^P + Yt^T$$

$$Xt \equiv Xt^P + Xt^T \quad (5)$$

Here, the superscript T denotes the cyclical (transitory) and P denotes the permanent component, and it is assumed that the permanent and transitory components of each series are independent or unrelated.

Separation of X and Y variables into their dual components can be done by using HP (Hodrick-Prescott) filtering method as in Ismihan's study.

By using the idea of ‘‘dominant property (DP)’’, which is at the core of the Common HP trend concept, we can consider the following set-up:

$$Yt = \beta_0 + \beta_1 Xt^P + Yt^T$$

$$Xt \equiv Xt^P + Xt^T \quad (6)$$

Here Xt^P is the HP trend and dominant factor of X and, Yt^T and Xt^T represents cyclical components and are stationary in level and also do not have dominant property[12].

[12] The ‘‘dominant property (DP)’’ notion is used to assess the common HP concept of trend, which is used within the scope of the Dual Adjustment method. If a time series includes more than one feature,

Furthermore, if the transitory components have a different relationship than the permanent components, we can speak about "dual adjustment".

The claim of common HP trend ($Yt^P = \beta_0 + \beta_1 Xt^P$) can be tested within the framework of the dual adjustment approach as follows. First of all it should be noted that the following relation holds in the long run:

$$Yt = \beta_0 + \beta_1 Xt^P \quad (7)$$

In the first stage, the following econometric model is estimated to test the claim:

$$Yt = \beta_0 + \beta_1 Xt^P + ut \quad (8)$$

In the second stage, the regression similar to the Engle-Granger approach is estimated as test regression.

$$\Delta ut = \rho u_{t-1} + e_t \quad (9)$$

Here, where ρ stands for the correlation between ut and u_{t-1} and e_t is the white noise disturbance term.

The residuals from the first step's equation estimate are used in the test equation. The rejection of the null hypothesis that the residuals are not stationary shows the presence of a common (HP) trend (Ismihan, 2019).

The Dual Adjustment approach also allows for short run relationships, and the model coefficients are estimated using the OLS method:

$$Yt^T = \beta_2 Xt^T \quad (10)$$

β_2 in the equation represent the relationship of the transitory (cyclical) components. If the coefficient of the permanent components equals the coefficient of the transitory

the dominant feature will determine this variable's relationship with other variables as well as its compatibility in the necessary models and equations. See Ismihan (2019) for more information.

components ($\beta_1 = \beta_2$), the relationship is called "singular adjustment," otherwise it is ($\beta_1 \neq \beta_2$) called "dual adjustment"(İsmihan 2019).

3.4 Empirical Results

In this section, the dual relationship between Turkey's consumption and income in the 1987-2019 period is examined. As noted earlier, relevant data were from the World Development Indicators (WDI). The consumption expenditures represents the sum of the spending by households and non-profit organizations serving the households. We used GDP as a proxy for disposable income because disposable income data was not available.

The Augmented Dickey Fuller unit root test is used to test the stationarity of time series. Because spurious regression problem might arise when working with non-stationary time series, it is critical to assess the stationarity of these series in time series investigations in order to obtain valid results from the econometric analysis (Newbold and Granger, 1974).

Figures 1 and 2 show the time plots of GDP and consumption expenditure. Although visual detection gives information about the nature (e.g. non-stationarity) of the series, it is of greater importance to perform the stationarity tests since a clear result cannot be obtained from visual investigation.

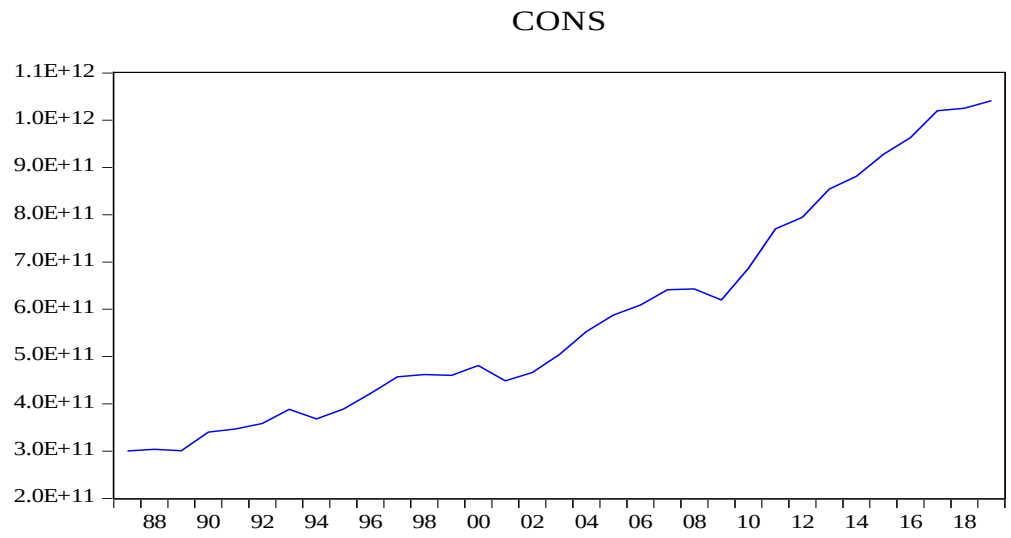

Figure 1: The Evolution of Household Consumption Expenditure over Time

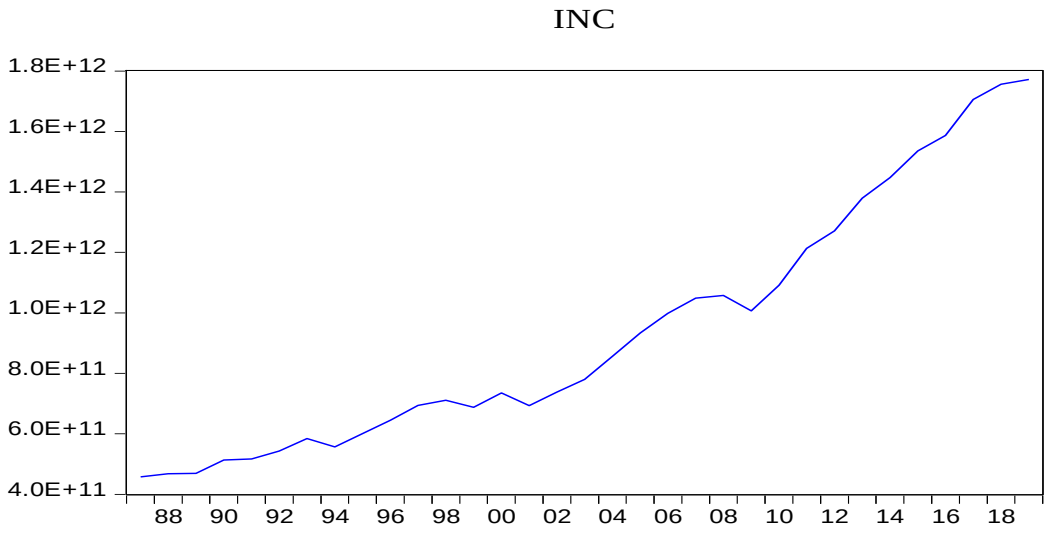

Figure 2: The evolution of GDP over Time

The variables are not stationary at the level, as seen in Table 1. That is, the variables' integration degrees are all one. Given that both series are non-stationary and integrated of the same order, the presence of a long run equilibrium relationship between them should be investigated. In addition to the dual adjustment approach, our analysis incorporate classic Engle Granger cointegration analysis as a benchmark.

Table 1: Unit Root Tests

Variables	ADF Test Level Without Trend	Level With Trend	First Difference Without Trend	Results
CONS	1.67096[a] (0.9994)[b]	-1.271796 (0.8769)	-2.997000 (0.0040)*	**I (1)**
INC	2.404715 (0.9999)	-0.918448 (0.9414)	-2.659887 (0.0096)*	**I (1)**

[a] Indicates the t-statistic and [b] p-values.
At the 1 percentage and 5 percentage significance level, an asterisk (*) indicates that the null hypothesis of unit root is rejected (MacKinnon, 1996). Optimal lag length is determined by SIC (max lag = 8).

Table 2 contains the findings of the Engle-Granger cointegration test as well as the results of all Co-HP tests used. The Engle-Granger (EG) method indicated no cointegration relationship at the 5% significance level. In other words, it is found that predicted long run relationship is 'spurious'. However, using the Co-trending analysis, it is shown that these variables have a meaningful long run relationships. That is, the Co-Trending tests concluded that the variables have a long run relationship at the 5% level, irrespective of the smoothing parameter used to separate the variables into permanent and cyclical components[13]. This lend support to the weak form of PIH (WPIH). Table 2 shows that the β_0 and β_1 values are extremely comparable to the results obtained for different lambda values and by EG analysis.

The t test in Table 2 will be used to test whether the permanent and transitory components are equal to each other, in other words, to test whether the variables have

[13] In line with İsmihan (2019), the λ of Co-HP trend analysis are provided for the four different smoothing parameters; namely, λ HP, λ RU, λ OL and λ OU.

dual or singular adjustment. In all analyses, the null hypothesis asserting that the permanent and transitory coefficients of the INC variable are equal is rejected at the 1% level. As a result of these tests, it is concluded that there is no dual adjustment. Furthermore, the null hypothesis of no Co-HP trend is rejected with four values of lambda, demonstrating that $CONSt - (\beta_0 + \beta_1 INCt^p)$ is stationary, confirming the WPIH for Turkey. When the transitory components are taken into account, the null hypothesis of $\beta_2 = 0$ for the four values of is rejected, which implies that SPIH is not supported by Turkish data. Finally, the obtained result supports the Keynesian consumption function. Considering all these results, we can conclude that the Dynamic Keynesian Consumption Function is valid for Turkey. This result is broadly in line with the existing literature on Turkey (see chapter 2).

Table 2: EG and Co-HP Trend Tests

	(EG) Cointegration	**Co-Trend (HP)**			
		λHP	**λRU**	**λOL**	**λOU**
β0 (s.e)*	5.25E+10	5.50E+10	5.38E+10	5.50E+10	5.50E+10
	(5.38E+09)	(3.95E+09)	(7.57E+09)	(3.95E+09)	(3.95E+09)
β1 (s.e)	0.569485	0.575701	0.572571	0.575701	0.575701
	(0.005252)	(0.009321)	(0.007646)	(0.009321)	(0.009321)
EG/Co-HP**	-3.172490	-3.989686	-3.938399	-3.682495	-3.954229
β2 (Adj. s.e)***	-	0.560980	0.590314	0.593920	0.582445
		(0.036239)	(0.033440)	(0.034037)	(0.032638)
Singular Adj. Test	-	[0.286846]****	[0.530592]	[0.620149]	[0.317207]
Lambda	-	100	6.25	5	10
Akaike info Criterion		50.57517	50.25413	50.20804	50.3458
Schwarz criterion		50.66587	50.34483	50.29875	50.43651

*s.e = standard errors.

**EG and Co-HP tests. Critical values of EG tests (MacKinnon, 1991).

***Newey-West[14] standard errors (s.e.). ****P-values for the simple t-test for the null hypothesis of singular adjustment.

HP=Hodrick-Prescott (Lambda=100), RU=Ravn-Uhlig (Lambda=6.25) and OL=(Lambda=5) and OU= (Lambda= 10)

[14] We calculate standard errors (std. Error) with the Newey West method in case there are autocorrelation and heteroscedasticity problems in the short-term (transitory components) analysis, and the findings are given in Table 2.

Chapter 4

CONCLUSION

This study aims to examine the dynamic relationship between consumption expenditures and income from 1987 to 2019 in Turkey. As an alternative to the traditional cointegration analysis, the dual adjustment approach, which models the co-movements of time series variables, is used investigate consumption and income dynamics in Turkey.

Between 1987 and 2019 there was no cointegration relationship between household consumption expenditures and GDP in Turkey at the 5% level, that is, it was concluded that the estimated long run relationship was spurious. However, it is shown that there is a long run relationship between these variables when we consider an alternative trend (e.g. HP) by using the Dual Adjustment Approach. Furthermore, the Turkish consumption behaviour reveals "singular adjustment".

As a consequence of these empirical findings, the Dynamic Keynesian Consumption Function seems to be valid for Turkey. This means that the Keynesian consumption function reflects the dynamics of consumer behavior in Turkey and household consumption can be increased as a result of an increase in current disposable income. Additionally it implies that an increase in government spending may promote economic growth in short run.

This study focused only on the relationship between consumption and income, and other macroeconomic variables were not included in the model. In this respect, our study has important limitation.

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