

# The Explanatory Power and the Forecast Performance of Consumer Confidence Indices for Private Consumption Growth in Turkey

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# THE EXPLANATORY POWER AND THE FORECAST PERFORMANCE OF CONSUMER CONFIDENCE INDICES FOR PRIVATE CONSUMPTION GROWTH IN TURKEY

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## Abstract

In this study, we assess empirically the relevance of consumer confidence indices (CCI) to future private consumption dynamics for Turkey in a sample period of 2002Q1 to 2014Q4. To this end, we first estimate models for total private consumption, durable and nondurable consumption growth with and without CCI and evaluate in-sample forecast powers. Next, we evaluate one-step-ahead out-of-sample forecast performances of these models from recursive OLS estimates. Finally, we test whether permanent income and precautionary savings hypotheses are capable of explaining our results on the link between consumer sentiment and future consumption expenditures. In our analyses we employ 4 different CCI series. These are overall index of CNBC-e Survey, overall index of TURKSTAT-CBRT Survey, Consumer Expectations Index (CEI) and Propensity to Consume Index (PCI) from CNBC-e Survey. Our results show that CCI have explanatory power on the future growth of both total consumption and its subcomponents. However, when other relevant variables such as real labour income, real stock price index and real interest rate are augmented to the models, CNBC-e and CEI for durable consumption, CEI and PCI for nondurable consumption are able to preserve their explanatory power on future consumption growth. On the other hand, CCI measures improve out-of-sample forecast performance for nondurable consumption growth. Finally, we find no evidence for either precautionary savings motive or permanent income hypothesis on the link between consumer sentiment and future private consumption changes.

**Keywords:** Consumer Confidence, Private Consumption, Forecasting

**JEL Classification:** C52, C53, D12, E21, E27

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## I. INTRODUCTION

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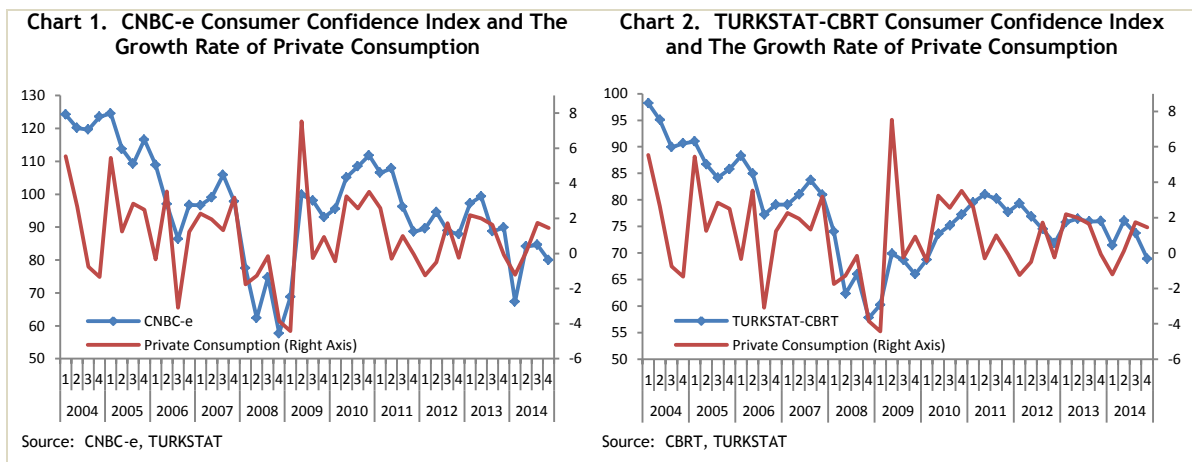
Consumption is the largest component of Gross Domestic Product (GDP) and one of the main components that drive economic activity in almost all countries. Therefore, having an idea on the level of consumption is quite important to understand the current economic outlook. However, data regarding real economic activity are published with a considerable time lag. Accordingly, timely data at higher frequencies become valuable to get an insight into recent/current economic situation and envisage the future economic activity. Consumer confidence indices are one of those timely indicators. They are closely followed by analysts, policy makers and forecasters as well as media because they are widely thought to be closely related to current consumption dynamics and also regarded as a tool to predict future consumption path. Contemporaneous relationship between consumer sentiment and consumption expenditures is not surprising from a theoretical point of view. Bad mood would restrict the spending of households. However, are we certain about the consumer sentiment's role on future expenditure growth?

After the pioneering study of Mueller (1963) for the United States (US) data, this question has been investigated several times by many scholars. Mueller proposes that consumer confidence indices may be useful in forecasting private consumption growth when included to the regressions along with the lagged values of consumption growth. Succeeding studies, mostly using the US data, tested the same argument by augmenting relevant variables to consumption growth such as real income growth, unemployment rate, real stock prices, interest rates (Mishkin, 1978; Leeper, 1992; Carroll et al., 1994; Bram and Ludvigson, 1998; Ludvigson, 2004). A common finding of these studies is that consumer confidence indices are capable of predicting future changes in consumption expenditures; however, this predictive power is reduced when other available indicators, mainly financial indicators, are employed. Some academics approach the same problem by utilizing real-time data, i.e. using the data available at the time of survey, rather than the historical data (Croushore, 2006; Lahiri et al., 2012). In such studies, there is no consensus on the forecast ability of consumer sentiment for consumption growth. Similar studies on the non-US data are mostly concentrated on European data. Among them, Golinelli and Parigi (2004), Dion (2006) and Dees and Brinca (2013) find that consumer confidence can be an important independent factor in predicting consumption spending in European countries. On the other hand, the number of studies on developing countries data is very limited. As an example, Pino et al. (2013) find only marginal effect of consumer confidence on consumption growth in Peru when other control variables are added.

The implication of consumer confidence indices' predictive power on future consumption growth for the validity of consumption theories is another issue to be examined in the literature. Carroll et al. (1994), Ludvigson (2004) and Lahiri et al. (2012) test whether their findings for the role of consumer sentiment on future consumption changes in the US can be explained by precautionary savings motive or permanent income hypothesis. They find no clear evidence for both with macro-level data. On the other hand, at the micro level, Souleles (2004) and Pino et al. (2013) find evidence to support precautionary savings motive for the US and Peru, respectively.

In this study we aim to address similar questions for Turkey. The private consumption data signals a close contemporaneous relationship with consumer confidence indicators (Chart 1

and 2).<sup>1</sup> We wonder whether consumer sentiment indicators can help predicting future consumption expenditures as well. To this end, at the first part of the study, we aim to measure explanatory and forecast power of consumer confidence indices on future private consumption growth through 3 questions: i) “Does consumer confidence provide information about future private consumption growth?” ii) “Does consumer confidence provide unique information about future private consumption growth?” iii) “Does consumer confidence improve out-of-sample forecasts of future private consumption growth?”. We perform our analysis for total private consumption and also durable and nondurable consumption measures to check if there are compositional differences. At the second part of the study, we check whether our results are in parallel with what permanent income hypothesis and precautionary savings motive would suggest for the link between consumer sentiment and future consumption growth.



In our analyses we use four different consumer sentiment indicators from two different consumer confidence surveys. One of the surveys is conducted by CNBC-e and the other by Turkish Statistical Institute (TURKSTAT) in collaboration with the Central Bank of the Republic of Turkey (CBRT). We use overall indices from both surveys (thereafter will be referred to as CNBC-e and CBRT, respectively) as well as Consumer Expectations Index (CEI) and Propensity to Consume Index (PCI) from the CNBC-e Survey. Since each of the indicators focuses on a different aspect of consumer sentiment, we aim to evaluate their role on predicting future consumption growth separately.

To our best knowledge, our study is the first one in Turkey to test empirically the role of consumer confidence on forecasting quarterly private consumption growth and assess the results from influential consumption theories’ perspectives. Previous studies focus more on finding either a long-term relationship between consumer confidence and macroeconomic variables or the determinants of consumer confidence. Çelik (2010) shows that movements in the consumer confidence indices are associated with changes in economic and financial variables like exchange rates, industrial production, and stock exchange index. Similarly, Kandır (2006), Görmüş and Güneş (2010), Çelik et al. (2010) specifically focus on the link between consumer confidence and financial variables. Ceritoğlu (2013) shows that household expectations have a direct role on their consumption and saving behaviour using Consumer Tendency Survey of CBRT and TURKSTAT. Moreover, he points out that expenditure on durables are more sensitive to changes in household expectations. None of these studies examine the issue for forecasting purposes and link future quarterly

<sup>1</sup> We relate consumer confidence to only private consumption because consumer confidence surveys are applied only to individuals.



consumption changes in GDP to the consumer confidence. Finally, our study will be a good contribution to the limited literature for developing countries.

We find that consumer confidence indices have explanatory power on the growth of both total private consumption and its subcomponents, i.e. durable and nondurable consumption. However, that power either vanishes or diminishes once we control for other economic and financial variables, which are thought to play a role on consumption growth. CNBC-e and CEI for durable consumption, CEI and PCI for nondurable consumption preserve their explanatory power on future consumption growth even after controlling for other available economic and financial indicators. Regarding consumer confidence indices' role on forecasting consumption growth, the findings are more or less similar. Once controlled for other variables, adding consumer confidence indices do not improve the out-of-sample forecast performance for total consumption and durable consumption growth in almost all cases. However, all indices improve out-of-sample forecast performance for nondurable consumption, albeit slightly. As for the implications of consumer confidence on consumption theories, we find that the role of consumer confidence on future consumption expenditures cannot be related to either precautionary savings motive or permanent income hypothesis.

The outline of the study is as follows: Section II introduces the data in detail. In section III, we run estimations to evaluate the significance of consumer confidence indices on future private consumption growth. In Section IV, we compare the out-of-sample forecast performance of the model specifications with and without consumer confidence indices, which are determined in the previous section for future total private, durable and nondurable consumption growth. In section V, we test the conformity of our results with what precautionary savings motive and permanent income hypothesis suggest for the link between consumer sentiment and future consumption growth. Section VI summarizes the findings, concludes and addresses future research.

## II. DATA

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Our data set covers the period 2002Q1 - 2014Q4. This is undoubtedly a smaller sample compared to the samples used in the studies on US and other advanced economies. However, this is the largest data set that can be prepared as there is no consumer confidence data for Turkey before 2002. We believe that our data set meets minimum requirements to achieve the intended analyses. Nevertheless, we apply General to Specific (GETS) methodology to determine our final model specifications as parsimonious as possible. In this way we aim to mitigate potential unfavourable effects of using shorter sample period on estimation results.

We employ private consumption as the dependent variable while consumer confidence, real stock prices, real interest rate and real labour income as independent variables. As measures of consumer sentiment, we benefit from the surveys of CNBC-e and TURKSTAT conducted in collaboration with CBRT. From these two surveys, we use four different indicators as measures of consumer sentiment. These are overall consumer confidence index values from CNBC-e and TURKSTAT-CBRT Surveys and Consumer's Expectations Index (CEI) and Propensity to Consume Index (PCI) from the CNBC-e survey.

CNBC-e is the first ever survey to measure consumer sentiment in Turkey at national level and has been conducted since January 2002. Its methodology is similar to the Michigan Index in the US. It consists of 5 questions:<sup>2</sup>

- i. Can you compare your (and your family's) current financial situation with last year?
- ii. What do you think your (and your family's) future financial situation will be in a year?
- iii. Can you compare your current expectations about Turkish economy with the previous month?
- iv. What do you think Turkish economy's situation will be in a year?
- v. Is current period a good time to buy durable consumer goods such as TV, refrigerator and furniture or vehicles or residence?

The first two questions assess the respondent's personal condition and expectations. The following two questions evaluate the expectations with regard to the overall economy. The fifth question measures current consumption tendency of consumers. The index is calculated according to the following formula:

$$\text{Index Value} = \frac{\text{Current Period Value}}{\text{Base Period Value}} * 100$$

$$\text{Current Period Value} = 100 + \frac{(\# \text{ of Optimistic Answers} - \# \text{ of Pessimistic Answers})}{\text{Total \# of Answers}} * 100$$

The current period's value calculated for January 2002 is fixed as the base period value. The index has a scale ranging from 0 to 200. Question 2 and 4 together form the CEI and the fifth question forms the PCI. The current period values of each question are equally-weighted to obtain current period's value for the overall index. Overall Index value is then calculated as the division of that current period value to the base period value.

The TURKSTAT-CBRT Survey aims to measure present situation assessments and future period expectations of consumers' on three headlines: Personal financial standing, general economic situation and expenditure and saving tendencies. Overall consumer confidence index is the average of separate diffusion indices for the following questions:

- i. Financial situation expectation of household over the next 12 months
- ii. General economic situation expectation over the next 12 months
- iii. Number of people unemployed expectation over the next 12 months
- iv. The probability of saving over the next 12 months

The balance is calculated as the difference between the percentages of positive and negative responses and 100 is added to this difference. The index is evaluated between 0 and 200. Value above (below) 100 is considered as a sign of optimistic (pessimistic) consumer sentiment.

The source of the quarterly private consumption data and its subcomponents<sup>3</sup> is the 1998-based GDP series published by TURKSTAT. Real labour income data is our own calculations

<sup>2</sup> Detailed information about the CNBC-e Survey can be retrieved from <http://www.ntv.com.tr/arsiv/id/24932332/>.

<sup>3</sup> TURKSTAT does not publish nondurable or durable consumption goods under 1998-based GDP data. However from private consumption data under COICOP classification, we are able to calculate approximate values for durable and non-durable consumption. We summed up 3 sub-items under private consumption to yield a proxy for durable consumption. These are furniture and household appliances, transport and communication and recreation and culture sub-items. The rest of the private consumption is considered as nondurable consumption.

from the Household Labour Force Survey of TURKSTAT. In fact, this data goes only back to 2005. We use real labour income data from 1987-based GDP series to extend the series back to 2002.<sup>4</sup> For real stock price index, we deflate nominal BIST 100 data from Borsa Istanbul by Consumer Price Index (2003=100) published by TURKSTAT. Finally, we calculate real interest rate by deflating nominal Treasury bond rate at the maturity of 2 years by 2-year-ahead inflation expectations. All monthly data are transformed into quarterly data by taking simple averages of the associated months. Consumption and real labour income data are seasonally adjusted.

### III. EMPIRICAL ANALYSIS

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In this section, we seek answers to the following two questions: i) “Does consumer confidence provide information about future private consumption growth?” ii) “Does consumer confidence provide unique information about future private consumption growth?” We carry out estimations first for total private consumption and later for durable and nondurable consumption.

Following the traditional sequence of analysis in the literature, we start by estimating a basic benchmark model where private consumption growth is regressed only on its own lags (Equation 1). Next, we add the lagged values of consumer confidence indices to this basic model (Equation 2). Here, we will compare in-sample forecast performance of the models with and without the lagged values of consumer confidence to check if there is any difference in explaining future consumption growth. Adjusted  $R^2$  is used as the statistical measure for comparison. If we find statistically significant coefficient estimates for consumer confidence indices and observe an increase in adjusted  $R^2$  after adding consumer confidence measure, then we conclude that consumer confidence provides information about future consumption growth.

$$(Eq\ 1.) \quad \Delta \log C_t = \alpha_0 + \sum_{i=1}^k \beta_i \Delta \log C_{t-i} + \varepsilon_t$$

$$(Eq\ 2.) \quad \Delta \log C_t = \alpha_0 + \sum_{i=1}^k \beta_i \Delta \log C_{t-i} + \sum_{i=1}^m \gamma_i CCI_{t-i} + \varepsilon_t$$

Next, we add other available indicators, which are thought to play a role on consumption growth, to address the second question. This way, we try to identify the distinctive information content of consumer confidence on future private consumption growth other than the information already contained in some other economic and financial indicators. To this end, we first determine a benchmark model containing the lags of additional control variables (Equation 3) and then we add the lagged values of consumer confidence indicators (Equation 4). We compare the diagnostics of these models and evaluate the extent of the change in adjusted  $R^2$ s. If confidence measures are statistically significant and there is an improvement in adjusted  $R^2$  after adding consumer confidence measures, then we conclude that consumer confidence provides **unique** information about future private consumption growth.

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<sup>4</sup> Since 1998-based GDP data is not available from income side, we could not use it as the main indicator for the real income.



$$(Eq 3.) \quad \Delta \log C_t = \alpha_0 + \sum_{i=1}^k \beta_i \Delta \log C_{t-i} + \sum_{i=1}^n \delta_i S_{t-i} + \varepsilon_t$$

$$(Eq 4.) \quad \Delta \log C_t = \alpha_0 + \sum_{i=1}^k \beta_i \Delta \log C_{t-i} + \sum_{i=1}^n \delta_i S_{t-i} + \sum_{i=1}^m \gamma_i CCI_{t-i} + \varepsilon_t$$

The set of the additional explanatory variables shows variation across studies. However, common practice is to add financial variables and an indicator for real income changes. Following some of the studies in the literature such as Bram and Ludvigson (1998), Ludvigson (2004), Croushore (2006) and Lahiri et al. (2012) we include the change in the logarithm of real stock prices, the growth rate of real labour income and the first difference of real interest rate<sup>5</sup>, which are represented as the vector “S” in Equations 3 and 4.<sup>6</sup> In addition, Turkish government exerted temporary tax reductions for durable goods, particularly for automobiles and home appliances, in 2009Q2 to mitigate the impact of global financial crisis on the Turkish economy. For this reason, a dummy variable for that quarter is also included in regressions for durable consumption and total consumption growth.

Before proceeding to estimation results, two issues need clarification. First, in initial model specifications, we follow the literature and add each variable up to four lags. However, since we do not have a long enough data to keep all four lags of each variable, we eliminate statistically insignificant lags of each variable by applying the general to specific (GETS) method. Therefore, m, n and k values in the equations from 1 to 4 vary across each final model specification. The second issue is related to the transformation of consumer confidence indices. Most of the studies in the literature prefer using levels as measure of consumer confidence. Croushore (2006) tests whether using changes instead of levels affect the overall results for US consumption forecasts, but he finds no improvement. Nevertheless, we report the results with both types in our estimations.<sup>7</sup>

### III.1. Estimations for Total Private Consumption Growth:

Initial estimation results show that own lagged values of total private consumption growth are jointly statistically insignificant in explaining its current value (Table A1 in Appendix). By GETS methodology we look for a more parsimonious model in which any of the lags is statistically significant. However, we cannot find such a model. This implies that quarterly growth of total private consumption in Turkey is not autoregressive, which is in contrast to the European and US private consumption data. Next, we add consumer confidence indices

<sup>5</sup> In fact, most of the studies on US data include nominal interest rate rather than real interest rate. One explanation may be that the change in real interest rate and nominal interest rate display a similar pattern thanks to more predictable and stable low inflation. Another explanation may be that nominal interest rate, rather than the real one, better reflects the liquidity constraints faced by the consumer (Throop, 1992). The change in real interest rate and nominal interest rate in Turkey follows a similar pattern only after 2007. Due to higher inflation period before 2007, two indicators have different patterns. Since we deal with deflated macroeconomic indicators, we preferred using real interest rate.

<sup>6</sup> One may suggest using exchange rate changes as an additional variable since exchange rate movements seem to be negatively correlated with consumer confidence in Turkey, especially recently. We think that the most of the information exchange rate movements contain for consumption growth are taken into account in our analysis through the financial indicators we already use, specifically real stock exchange index. There is a high negative correlation between real stock exchange growth and exchange rate growth in Turkey throughout our sample. Therefore, we do not think that we suffer from an omitted variable problem by excluding exchange rate changes from our model specifications.

<sup>7</sup> We performed ADF test to determine the order of integration of the variables. All the variables except CNBC-e, CBRT and CEI are found to be I(1). To be on the safe side, we performed cointegration tests to every specification to be estimated but cointegration is rejected in almost all cases. Therefore, we cannot specify the models with levels of the variables other than consumer confidence measures. As for the consumer confidence indicators, PCI is found to be I(1) and might necessitate to be differenced to be stationary. However, since the rejection of the stationarity of PCI is close to 10% significance level, we think that using PCI in levels will not create a big problem in assessing the estimation results.

to this benchmark framework. Since auto regressive components are not statistically significant total private consumption growth is regressed only on the first four lags of consumer confidence indicators (Table A2 and A3 in Appendix). In all cases we find that not all 4 lags are statistically significant in explaining private consumption growth, yet adding up to 2 lags is found optimal by GETS. Results of the parsimonious models are presented in Table 1. Consumer confidence indicators in level terms have more explanatory power than consumer confidence indicators in change terms. Looking at adjusted R<sup>2</sup>'s, CEI has the most explanatory power across consumer sentiment measures in level terms, whereas CNBC-e has the highest explanatory power across consumer sentiment measures in difference terms.

Table 1. Total Private Consumption Growth Estimation Results with Consumer Confidence Indices

	CNBC-e	CEI	PCI	CBRT	Δ(CNBC-e)	Δ(CEI)	Δ(PCI)	Δ(CBRT)
CCI (-1)	0.00084*** (4.24)	0.0011*** (4.76)	0.00065*** (3.34)	0.0022** (2.68)	0.00094*** (2.75)	0.00097** (2.24)	0.00061*** (3.31)	0.0017* (1.94)
CCI (-2)	-	-	-0.00053** (-2.58)	-0.00153* (-1.81)	-	-	-	-
Dummy 2009Q2	0.087*** (14.61)	0.092*** (14.01)	0.048*** (6.91)	0.073*** (6.94)	0.0513*** (8.88)	0.050*** (7.05)	0.045*** (6.91)	0.061*** (14.05)
Constant	-0.0727*** (-3.78)	-0.0894*** (-4.28)	-0.0037 (-0.34)	-0.046 (-1.15)	0.011*** (3.49)	0.011*** (3.40)	0.011*** (3.51)	0.00793*** (2.46)
Obs.	51	51	50	42	50	50	50	42
R <sup>2</sup>	0.413	0.469	0.308	0.342	0.316	0.277	0.283	0.287
Adj. R <sup>2</sup>	0.389	0.447	0.263	0.291	0.287	0.246	0.253	0.251
RMSE	0.0191	0.0182	0.0212	0.0192	0.0208	0.0214	0.0213	0.0198

Dependent variable is the total private consumption growth for all equations and CCI denotes the consumer confidence index denoted at the top of each column. Δ denotes change in the variable. t-statistics in parentheses: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Next, we augment the change in the logarithm of real stock price index, the growth of real labour income and the change in real interest rate into the estimations. Here our aim is to investigate whether consumer confidence still has explanatory power on future private consumption growth aside from other financial and economic variables. If it does, we can conclude that consumer confidence has **unique** information content on future private consumption growth.

Table 2. Total Private Consumption Growth Estimation Results with Consumer Confidence and Additional Variables

	No CCI	CNBC-e	CEI	PCI	CBRT	Δ(CNBC-e)	Δ(CEI)	Δ(PCI)	Δ(CBRT)
Labour Inc. Gr. (-1)	0.006*** (3.29)	0.007*** (3.83)	0.006*** (3.54)	0.006*** (3.40)	0.007** (2.55)	0.006*** (2.99)	0.006*** (2.93)	0.006*** (3.35)	0.005 (1.65)
Labour Inc. Gr. (-4)	0.003* (2.02)	0.004* (1.77)	0.004 (1.64)	0.003* (1.89)	0.002 (0.70)	0.003 (1.60)	0.003 (1.47)	0.003* (1.90)	0.0006 (0.30)
Δ(log(Stock)) (-1)	0.052*** (3.57)	0.034* (1.73)	0.035* (1.86)	0.054*** (2.81)	0.114*** (4.30)	0.030 (1.63)	0.033* (1.81)	0.051*** (2.81)	0.107*** (5.10)
Δ(log(Stock)) (-3)	0.051** (2.41)	0.085*** (3.18)	0.074*** (2.86)	0.073*** (2.89)	0.089*** (3.62)	0.077*** (3.03)	0.069*** (3.17)	0.068** (2.71)	0.076*** (3.64)
Δ(Real Int.) (-1)	-0.005*** (-4.06)	-0.0047*** (-3.99)	-0.0047*** (-3.98)	-0.0043*** (-3.69)	0.00049 (0.18)	-0.004*** (-3.77)	-0.005*** (-3.77)	-0.004*** (-3.30)	0.00187 (0.58)
Δ(Real Int.) (-3)	0.002** (2.15)	0.002** (2.61)	0.002*** (2.81)	0.002** (2.21)	0.006*** (2.83)	0.002** (2.48)	0.002*** (2.77)	0.002** (2.14)	0.005*** (2.92)
CCI (-1)	-	0.0004 (1.20)	0.0005 (1.48)	0.0001 (0.51)	-0.001 (-1.23)	0.0005 (1.52)	0.0005 (1.64)	0.0001 (0.66)	-0.0005 (-0.65)
CCI (-2)	-	-0.0003 (-1.16)	-0.0004 (-1.20)	-0.00007 (-0.29)	0.0008 (0.96)	0.0002 (0.93)	0.0002 (0.62)	0.00007 (0.56)	0.0005 (0.93)
CCI (-3)	-	-0.0004 (-1.62)	-0.0003 (-0.89)	-0.0003 (-1.31)	-0.0014 (-1.56)	-0.00018 (-0.58)	-0.00004 (-0.11)	-0.0002 (-1.13)	-0.001 (-1.42)
CCI (-4)	-	0.0001 (0.44)	0.00003 (0.08)	0.0001 (1.01)	0.0011 (1.36)	-0.00007 (-0.35)	0.000013 (0.05)	-0.00012 (-0.91)	0.0003 (0.32)
Dummy 2009Q2	0.086*** (9.66)	0.085*** (8.34)	0.083*** (7.45)	0.089*** (8.47)	0.118*** (6.20)	0.088*** (9.02)	0.085*** (8.52)	0.087*** (8.28)	0.126*** (6.91)
Constant	-0.0055 (-1.60)	0.0147 (0.68)	0.0047 (0.24)	0.0045 (0.37)	0.0426 (0.90)	-0.0055 (-1.60)	0.0147 (0.68)	0.0047 (0.24)	0.0045 (0.37)
Obs.	47	47	47	47	40	47	47	47	39
R <sup>2</sup>	0.704	0.737	0.725	0.728	0.742	0.730	0.724	0.726	0.706
Adj. R <sup>2</sup>	0.651	0.648	0.639	0.643	0.641	0.646	0.637	0.640	0.586
RMSE	0.0139	0.0140	0.0141	0.0141	0.0138	0.0140	0.0142	0.0141	0.0143

Dependent variable is the total private consumption growth for all equations. CCI denotes the consumer confidence index written at the top of each column. Δ denotes change in the variable. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Table 2 reports estimation results after including other control variables. The first column is the most parsimonious benchmark model maintained by GETS methodology. Other columns show the estimation results after augmenting consumer confidence measures up to four lags to the benchmark model. When we add consumer confidence, regardless of the type and the definition, we do not find any single or joint significance for consumer confidence indices. In addition, the increments in adjusted  $R^2$ 's in all cases are negative. Therefore, we conclude that consumer confidence indices do not contain unique information for total private consumption growth.

### III.2. Estimations for Durable and Nondurable Consumption:

We think that subcomponents of total private consumption may display different characteristics and aggregation might have hindered the role of consumer sentiment on future private consumption growth. For this reason, we repeat the above analysis for both durable and nondurable consumption to check the existence of compositional differences.

Estimation results for durable consumption show that as in total private consumption growth regressions, own lags of durable consumption growth have no explanatory power on its current growth rate (Table A1 in Appendix), whereas consumer confidence indices do have (Table A4 in Appendix). Except for PCI, changes in consumer confidence indicators have less explanatory power than consumer confidence indicators in level terms. In addition, CEI in level terms has the highest explanatory power among all confidence measures. On the other hand, once we control for the other indicators, CNBC-e and CEI indicators both in level and change terms have still explanatory power on durable consumption growth (Table A5 and A6 in Appendix). The increment in adjusted  $R^2$  is the highest for CNBC-e, however the margins are not huge. Therefore we can conclude that contrary to the results of total private consumption growth, some consumer confidence measures provide unique information about future durable consumption growth. It is interesting that although PCI is an indicator intended to measure durable consumption propensity, it does not provide extra information for future durable consumption growth. This shows that the responses to PCI question is formed by current financial conditions, which is thought to affect current durable consumption. On the other hand, the statistical significance of CEI, which is an indicator for expectations for the future, is in parallel with the findings of Ceritoğlu (2013).

Our findings for nondurable consumption growth show that it has an autoregressive structure (Table A1 in Appendix). Therefore, unlike total private and durable consumption growth, basic benchmark model for nondurable consumption growth contains autoregressive terms of order two. When we add consumer confidence to this basic benchmark, we again find that consumer confidence improves explanatory power (Table A7 in Appendix). Here, again consumer confidence indices in level terms perform better than differenced indices. Among four consumer sentiment measures, CNBC-e increases the explanatory power the most. After controlling for other explanatory variables, we find that CNBC-e in level terms and PCI in both terms still provide extra information on nondurable consumption growth, while the gain is the highest for PCI in level terms (Table A8 and A9 in Appendix). This is an interesting finding, since by definition this question is not intended to measure the tendency to consume nondurable goods.

#### IV. OUT-OF-SAMPLE FORECAST PERFORMANCE

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In this section, we compare out-of-sample forecast performance of the models with and without consumer confidence, whose final specifications were obtained in the previous section. To achieve this, we carry out recursive one-step ahead forecast in an expanding window. As Hansen and Timmermann (2012) discuss, there is no standard way of splitting the sample period for the initial parameter estimation and the number of out-of-sample forecasts in the literature. Our approach is to choose the initial estimation sample to have the minimum possible length and use the remaining sample for forecast evaluation. This corresponds to using the first 40 observations for the initial estimation and then use the last 12 observations for forecast evaluation. As a measure of forecast accuracy we compare Root Mean Squared Forecast Errors (RMSFE) for each model. If RMSFE of equations with consumer confidence index is lower (higher) than that of equation without consumer confidence index, i.e. relative RMSFE takes value lower (higher) than 1, we conclude that consumer confidence measures improve (deteriorate) forecasting future consumption growth.<sup>8</sup>

Before proceeding to forecast performance evaluation, it is noteworthy to mention the discussion on using revised or real-time data. Consumption data is subject to revisions throughout the GDP data release periods. Most of the studies in the literature benefit from revised (or historical) consumption data in their analyses. However, Ludvigson (2004), Croushore (2006) and Lahiri et al. (2012) argue that one should employ real-time data to assess forecasting performance of consumer confidence indices for consumption, since it is the data set available to a forecaster at the time of the forecast. They claim that if data revisions are large and systematic, empirical results using the final version of the data could give biased results. Against this background, we test whether the magnitude of the revisions to private consumption data is statistically significant in Turkey. Test result indicates that the revisions are small and statistically insignificant. Hence, we do not need to employ real-time data in our analysis.

Table 3, 4 and 5 below show RMSFEs calculated for each specification for total private consumption, durable consumption and nondurable consumption, respectively. Left half of the tables show RMSFEs calculated from models which do not include additional explanatory variables, while right half of the tables show RMSFEs calculated from the models with additional explanatory variables. If relative RMSFE takes value less than 1, it points to an improvement in out-of-sample forecast performance of the corresponding model compared to the benchmark model. Like in the previous section we distinguish the results with respect to the type and the definition of consumer confidence.

According to the left panel of Table 3, when not controlled for other explanatory variables, there is an improvement in the out-of-sample forecast performance when consumer confidence measures in either change terms or in level terms except CNBC-e in level terms are used. On the other hand, as depicted in the right hand side of the table, when controlled for economic and financial variables we cannot observe the same performance gain, with only exception: CBRT in change terms.

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<sup>8</sup> In the literature, it is a common practice to test the differences between RMSFEs formally by utilizing Diebold-Mariano test (DM test, Diebold and Mariano (1995)). However DM-test is valid under some assumptions and particularly does not perform well in small samples and should not be used when competing models are nested (Diebold, 2013). Since our forecast range does not meet the sample size requirement, we do not formally test statistical significance of differences between RMSFEs. We only report relative RMSFEs as the measure of comparison.

**Table 3. RMSFEs for Various Forecast Models for Total Private Consumption**

	Without any Additional Explanatory Variable				With Additional Explanatory Variables			
	Consumer Confidence in Level Terms		Consumer Confidence in Difference Terms		Consumer Confidence in Level Terms		Consumer Confidence in Difference Terms	
	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE
No CCI	0.0134	1.000	0.0134	1.000	0.014	1.000	0.014	1.000
CNBC-e	0.0142	1.062	0.0119	0.892	0.016	1.110	0.016	1.107
CEI	0.0129	0.964	0.0115	0.863	0.015	1.041	0.015	1.023
PCI	0.0131	0.982	0.0115	0.858	0.018	1.224	0.017	1.172
CBRT	0.0132	0.985	0.0123	0.919	0.015	1.022	0.014	0.951

The benchmark model for the left half of the panel is the one consumption growth is regressed only on constant and dummy variable for 2009Q2. The benchmark model for the right half of the panel is the one presented in the first column of Table 2.

Table 4 shows the forecast performance evaluation for durable consumption growth. Similar to total private consumption growth, once durable consumption is explained by other economic and financial variables, adding consumer confidence into the analysis do not improve the out-of-sample forecasts, unless we use CEI as the consumer sentiment measure. On the other hand, Table 5 tells a different story for nondurable consumption growth. In both cases adding consumer confidence measures into the analysis improve the out-of-sample forecasting performance, albeit slightly.

**Table 4. RMSFEs for Various Forecast Models for Durable Consumption**

	Without any Additional Explanatory Variable				With Additional Explanatory Variables			
	Consumer Confidence in Level Terms		Consumer Confidence in Difference Terms		Consumer Confidence in Level Terms		Consumer Confidence in Difference Terms	
	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE
No CCI	0.0325	1.000	0.0325	1.000	0.032	1.000	0.032	1.000
CNBC-e	0.0352	1.082	0.0289	0.889	0.033	1.040	0.032	1.004
CEI	0.0331	1.020	0.0302	0.930	0.032	1.001	0.031	0.982
PCI	0.0313	0.963	0.0290	0.894	0.035	1.092	0.035	1.121
CBRT	0.0332	1.023	0.0315	0.971	0.034	1.072	0.034	1.077

The benchmark model for the left half of the panel is the one durable consumption growth is regressed only on constant and dummy variable for 2009Q2. The benchmark model for the right half of the panel is the one presented in the first column of Table A5 in the Appendix.

**Table 5. RMSFEs for Various Forecast Models for Nondurable Consumption**

	Without any Additional Explanatory Variable				With Additional Explanatory Variables			
	With Levels of Consumer Confidence		With Changes of Consumer Confidence		With Levels of Consumer Confidence		With Changes of Consumer Confidence	
	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE	RMSFE	Relative RMSFE
No CCI	0.0121	1.000	0.0121	1.000	0.013	1.000	0.013	1.000
CNBC-e	0.0105	0.867	0.0106	0.878	0.012	0.936	0.012	0.979
CEI	0.0115	0.951	0.0110	0.903	0.012	0.980	0.012	0.959
PCI	0.0106	0.873	0.0099	0.814	0.011	0.880	0.012	0.914
CBRT	0.0119	0.979	0.0117	0.968	0.012	0.950	0.012	0.907

The benchmark model for the left half of the panel is the one presented in the last column of Table A1 in the Appendix. The benchmark model for the right half of the panel is the one presented in the first column of Table A8 in the Appendix.

## V. CONSUMER CONFIDENCE AND CONSUMPTION THEORIES

In this section, we investigate whether there is a link between the predictive power of consumer confidence indices on future private consumption growth and what influential consumption theories suggest. Previous studies like Carroll et.al (1994), Souleles (2004), Ludvigson (2004), Lahiri et al. (2012) and Pino et al. (2013) examine whether precautionary savings motive or permanent income hypothesis (PIH) are capable of explaining their results. While none of them could find an evidence to support the validity of permanent income hypothesis in explaining predictive power of consumer confidence on future consumption changes, only Souleles (2004) and Pino et al. (2013) confirmed the existence of precautionary savings motive for the US and Peru, respectively.



From a simple precautionary savings motive perspective, if we consider consumer confidence as a measure of uncertainty, a negative shock to consumer confidence in the previous period would mean increasing level of uncertainty and more precautionary savings at the same period. As a result, consumption level will fall with the rising uncertainty. Accordingly, in the subsequent period, consumption growth rate will be higher because consumption level in the previous period is lower than it would have been in the absence of negative confidence shock (Carroll et al, 1994). However, as depicted in the estimation tables in previous sections, we rather find a positive relationship between consumer sentiment in the previous period and consumption growth today in almost all estimations. Therefore, we cannot interpret the role of consumer sentiment on predicting future consumption by a simple precautionary savings motive perspective.

Apart from the precautionary savings motive, PIH may be another option to explain the role of consumer confidence on predicting future consumption growth. Recall that, consumption can only change as a consequence of unexpected changes in permanent income according to PIH. Therefore, if PIH holds, consumer sentiment can influence future consumption expenditures only indirectly through its predictive power on future real labour income (Lahiri et al, 2012). Ludvigson (2004) tests the possibility of that channel by regressing labour income growth on its own lags and the lags of consumer confidence measures. She shows that the lags of consumer confidence is jointly statistically significant and has predictive power for labour income growth. When we repeat the same exercise for Turkey, we reach the same conclusion, except PCI is taken as the measure of consumer sentiment (Table A10 in Appendix).

However, showing the predictive power of consumer sentiment on labour income growth does not confirm that consumer sentiment affects future consumption growth only indirectly as PIH states. Carroll et al. (1994), Ludvigson (2004) and Lahiri et al. (2012) apply a two-step procedure to solve out this issue. In the first step, labour income growth is regressed on the lagged values of consumption and the other available indicators we utilized in the previous sections. Later, in the second step, consumption growth is regressed on predicted value of labour income growth from the first step and the lagged values of consumer sentiment measures. If consumer sentiment measures are found statistically significant in the second step, it implies that consumer sentiment has also direct effects on future consumption growth, which contradicts PIH.

Below we present the results of this two-step analysis for durable and nondurable consumption with the consumer sentiment measures which have been found to provide unique information for the said consumption indicators in the previous sections. Recall that for total private consumption we find that consumer sentiment provides no marginal information for future total private consumption expenditures. For this reason, we don't run regressions for total private consumption in this section.

Table 6 shows that up to 2 lags of consumer confidence measures are statistically significant in explaining consumption growth. Therefore, we find that consumer confidence affects consumption not only through its indirect effects on real labour income growth, but also directly. It implies that permanent income hypothesis is not sufficient to explain the predictive power of consumer sentiment measures on consumption in Turkey. Thus, our finding confirms the finding of Ceritoğlu (2013), who reject the validity of PIH for Turkish consumption data.

Table 6. Consumption Growth Estimation Results for Testing Permanent Income Hypothesis

	Durable Consumption		NonDurable Consumption	
	CNBC-e	CEI	CNBC-e	PCI
Predicted Labour Income Growth	0.0106* (1.91)	0.00793 (1.40)	0.00336* (1.91)	0.00324** (2.20)
CCI(-1)	0.00132** (2.26)	0.00168** (2.44)	0.000362* (1.94)	0.0003*** (2.76)
CCI(-2)	-0.000363 (-0.58)	-0.000184 (-0.26)	-0.000373* (-1.93)	-0.00035** (-2.34)
CCI(-3)	-0.000315 (-0.53)	-0.00026 (-0.38)	0.000276 (1.49)	0.0002 (1.35)
CCI(-4)	-0.0000775 (-0.15)	0.000086 (0.15)	-0.00013 (-0.81)	-0.00007 (-0.63)
2009Q2 Dummy	0.215*** (5.27)	0.230*** (5.58)	-	-
Constant	-0.0588 (-1.29)	-0.117** (-2.16)	-0.00861 (-0.63)	-0.00459 (-0.58)
Obs.	47	47	47	47
R <sup>2</sup>	0.553	0.574	0.336	0.337
Adj. R <sup>2</sup>	0.486	0.510	0.255	0.256
RMSE	0.0360	0.0351	0.0115	0.0115

Dependent variable for each model specification is written at the top of each column. CCI denotes the consumer confidence index written at the top of each column. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

## VI. CONCLUSION

This study aims to identify the role of consumer confidence indices on explaining and forecasting consumption growth in Turkey. In this context, we provide answers to 3 questions: i) “Does consumer confidence provide information about future private consumption growth?” ii) “Does consumer confidence provide unique information about future private consumption growth?” and iii) “Does consumer confidence improve out-of-sample forecasts of future private consumption growth? In answering these questions, we employ four different measures of consumer sentiment: overall consumer confidence indices of CNBC-e and CBRT Surveys, and Consumer Expectations Index (CEI) and Propensity to Consume Index (PCI) from CNBC-e Survey. In addition, we check whether our results are compatible with what permanent income hypothesis and precautionary savings motives suggest for consumer sentiment’s role on future consumption changes in Turkey.

We have shown that consumer confidence indices have explanatory power on the future growth of both total private consumption and its subcomponents, i.e. durable and nondurable consumption. However once other economic and financial variables, which are thought to play role on consumption growth, are augmented to the models, this power either decreases or vanishes. CNBC-e and CEI from CNBC-e Survey for durable consumption growth and CNBC-e and PCI for nondurable consumption growth maintain their explanatory power even after controlling for other indicators. Therefore, one can conclude that consumer confidence may provide unique information for consumption growth depending on which definition of consumer sentiment is used. Moreover, our results regarding consumer confidence indices’ role on improving out-of-sample forecasting power do not differentiate significantly from the results of in-sample estimations, although there are some minor differences. Finally, our results do not support the implications of permanent income hypothesis and precautionary savings motive for the role of consumer sentiment on future consumption growth. Our findings are in accordance with most of the studies in the literature, which signifies that specifically the financial variables embeds most of the information consumer confidence provides for future consumption growth.

Even though the methodology we employed and our findings are not new for US or advanced economies; we believe that they are still worthy for developing countries

literature. The data unavailability is for sure the main reason for the developing economies literature to lag behind the world literature. In this regard, we believe that with the current set of data our research is a good starting point for Turkish literature to grow on this issue. As more consumer sentiment data will be accumulated, the opportunities to study further topics will increase. For instance, other time-series estimation methods like VAR may be utilized rather than the single-equation methods. This would enable researchers to incorporate simultaneous relations between the variables and allows identifying the dynamics of an impact of a confidence shock to other macroeconomic variables (Leeper, 1992; Dees and Brinca, 2013). Further research could also investigate the existence of confidence channel, which aims to identify the spillover effects of shocks in international economies to domestic economies through deteriorated consumer confidence (Avery and Zemsky, 1998; Dees and Brinca, 2013). On the other hand, threshold analysis would be beneficial to understand how large the confidence shock needs to be to bring extra information beyond other available indicators. Finally, it is possible that the movements in consumer confidence may not be fully explained by economic and financial variables (Fuhrer, 1993). Further studies may investigate in detail the other factors that influence consumer confidence, such as psychological factors or political environment (Ramalho et al., 2011).

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## VIII. APPENDIX

**Table A1. Simple Benchmark Regressions on Consumption Aggregates**

	Total Private Consumption	Durable Consumption	Nondurable Consumption	Nondurable Consumption
AR (-1)	0.141 (0.84)	0.236 (1.36)	-0.157 (-1.29)	-0.206* (-1.65)
AR (-2)	0.183 (1.38)	0.099 (0.70)	0.274** (2.67)	0.226** (2.14)
AR (-3)	0.029 (0.23)	0.114 (0.88)	0.106 (0.65)	-
AR (-4)	0.065 (0.43)	0.0807 (0.68)	-0.147 (-0.97)	-
Dummy 2009Q2	0.083*** (5.02)	0.234*** (6.28)	-	-
Constant	0.0037 (0.68)	0.00103 (0.11)	0.0079** (2.61)	0.0086*** (3.51)
Obs.	47	47	47	49
R <sup>2</sup>	0.205	0.354	0.134	0.119
Adj. R <sup>2</sup>	0.108	0.276	0.052	0.081
RMSE	0.0222	0.0427	0.0129	0.0134

Dependent variable for each equation is written on top of each column. AR denotes the lag of the dependent variable. t statistics in parentheses, \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A2. Total Private Consumption Growth Regressions with Consumer Confidence Indicators in Level Terms**

	CNBC-e	CEI	PCI	CBRT
CCI (-1)	0.00123*** (3.89)	0.00138*** (4.22)	0.0006*** (3.00)	0.00221*** (2.81)
CCI (-2)	-0.0005 (-1.47)	-0.00048 (-1.29)	-0.00047 (-1.57)	-0.001 (-0.67)
CCI (-3)	-0.00003 (-0.10)	0.00004 (0.14)	0.0001 (0.45)	0.0003 (0.28)
CCI (-4)	-0.00005 (-0.22)	0.00008 (0.30)	-0.0002 (-1.09)	-0.0004 (-0.63)
Dummy 2009Q2	0.075*** (7.53)	0.0838*** (7.46)	0.044*** (5.06)	0.078*** (5.24)
Constant	-0.0523* (-2.02)	-0.081*** (-2.94)	0.0045 (0.32)	-0.072* (-1.75)
Obs.	48	48	48	40
R <sup>2</sup>	0.471	0.495	0.328	0.391
Adj. R <sup>2</sup>	0.408	0.435	0.248	0.302
RMSE	0.0192	0.0187	0.0216	0.0192

Dependent variable is the total consumption growth for all equations. CCI denotes the consumer confidence index written at the top of each column. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A3. Total Consumption Growth Regressions with Consumer Confidence Indicators in Difference Terms**

	Δ(CNBC-e)	Δ(CEI)	Δ(PCI)	Δ(CBRT)
CCI (-1)	0.00085** (2.56)	0.00088** (2.13)	0.00053** (2.67)	0.00154* (1.74)
CCI (-2)	0.00045* (1.70)	0.0004 (1.12)	0.00012 (0.69)	0.00065 (0.53)
CCI (-3)	0.00046 (1.39)	0.00048 (1.12)	0.00023 (1.40)	0.00083 (0.87)
CCI (-4)	0.00021 (0.66)	0.00022 (0.51)	-0.00011 (-0.56)	0.0003 (0.28)
Dummy 2009Q2	0.0583*** (8.96)	0.0549*** (5.84)	0.0437*** (6.44)	0.0664*** (3.15)
Constant	0.00987*** (3.33)	0.00992*** (3.19)	0.0103*** (3.54)	0.00805** (2.64)
Obs.	47	47	47	39
R <sup>2</sup>	0.363	0.306	0.339	0.342
Adj. R <sup>2</sup>	0.285	0.221	0.258	0.242
RMSE	0.0199	0.0208	0.0203	0.0193

Dependent variable is the total consumption growth for all equations. CCI denotes the consumer confidence index written at the top of each column. Δ denotes change in the variable. t-statistics in parentheses, \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A4. Durable Consumption Growth Estimation Results Regressions with Consumer Confidence Indicators**

	CNBC-e	CEI	PCI	CBRT	Δ(CNBC-e)	Δ(CEI)	Δ(PCI)	Δ(CBRT)
CCI (-1)	0.0014*** (3.57)	0.002*** (5.23)	0.001*** (2.70)	0.0043*** (2.72)	0.0014** (2.25)	0.0013* (1.75)	0.001*** (2.69)	0.0035* (1.92)
CCI (-2)	-	-	-0.00092** (-2.30)	-0.00313* (-1.84)	-	-	-	-
Dummy 2009Q2	0.226*** (18.60)	0.237*** (22.19)	0.159*** (12.21)	0.203*** (9.23)	0.169*** (17.44)	0.168*** (14.43)	0.157*** (13.01)	0.182*** (21.73)
Constant	-0.125*** (-3.28)	-0.167*** (-4.91)	0.00209 (0.10)	-0.0850 (-1.02)	0.0125** (2.17)	0.0126** (2.12)	0.0129** (2.25)	0.00599 (0.97)
Obs.	51	51	50	42	50	50	50	42
R <sup>2</sup>	0.475	0.556	0.386	0.471	0.379	0.348	0.382	0.437
Adj. R <sup>2</sup>	0.453	0.538	0.346	0.429	0.353	0.320	0.356	0.408
RMSE	0.0361	0.0332	0.0398	0.0374	0.0396	0.0406	0.0395	0.0381

Dependent variable is the durable consumption growth for all equations. CCI denotes the consumer confidence index written at the top of each column. Δ denotes change in the variable. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A5. Durable Consumption Growth Estimation Results with Additional Variables and Consumer Confidence Indices**

	No CCI	CNBC-e	CEI	PCI	CBRT	Δ(CNBC-e)	Δ(CEI)	Δ(PCI)	Δ(CBRT)
Labor Inc. Gr. (-1)	0.015*** (5.01)	0.015*** (5.63)	0.014*** (5.45)	0.016*** (4.85)	0.014*** (3.15)	0.016*** (5.74)	0.016*** (5.53)	0.016*** (5.32)	0.016*** (3.60)
Labor Inc. Gr. (-3)	-0.006** (-2.61)	-0.0076*** (-3.42)	-0.009*** (-3.79)	-0.0065** (-2.55)	-0.0086** (-2.72)	-0.0077*** (-3.24)	-0.0078*** (-3.10)	-0.0079*** (-3.04)	-0.0089** (-2.39)
Δ(log(Stock)) (-3)	0.141*** (3.50)	0.182*** (3.65)	0.153*** (3.35)	0.169*** (3.78)	0.162*** (3.57)	0.189*** (3.83)	0.176*** (4.13)	0.158*** (3.78)	0.175*** (4.49)
Δ(Real Int.) (-1)	-0.0127*** (-5.99)	-0.0101*** (-5.15)	-0.009*** (-4.34)	-0.012*** (-5.23)	-0.0091* (-1.83)	-0.01*** (-5.08)	-0.0101*** (-5.16)	-0.0106*** (-4.36)	-0.0101** (-2.17)
Δ(Real Int.) (-3)	0.0075*** (4.95)	0.0084*** (4.29)	0.008*** (4.10)	0.008*** (4.96)	0.011*** (3.07)	0.008*** (4.01)	0.008*** (4.07)	0.0075*** (4.67)	0.012*** (3.51)
CCI (-1)	-	0.0011** (2.29)	0.0013*** (3.31)	0.00028 (0.88)	0.0019 (1.42)	0.00093* (1.88)	0.0009* (1.93)	0.00037 (1.13)	0.0014 (1.23)
CCI (-2)	-	-0.00103* (-1.81)	-0.00095 (-1.65)	-0.00058 (-1.31)	-0.0016 (-0.81)	-0.00006 (-0.13)	-0.00008 (-0.17)	-0.000246 (-0.73)	-0.00028 (-0.18)
CCI (-3)	-	-0.00032 (-0.47)	-0.00002 (-0.03)	0.0001 (0.22)	0.00025 (0.10)	-0.0005 (-0.89)	-0.0004 (-0.60)	-0.00015 (-0.56)	-0.00008 (-0.00)
CCI (-4)	-	0.00051 (1.14)	0.00058 (1.23)	0.00001 (0.04)	-0.0001 (-0.06)	0.00007 (0.17)	0.0002 (0.44)	0.00003 (0.12)	-0.000015 (-0.01)
Dummy 2009Q2	0.212*** (12.77)	0.221*** (10.46)	0.230*** (10.59)	0.205*** (10.63)	0.221*** (6.04)	0.224*** (9.59)	0.222*** (8.81)	0.212*** (9.47)	0.220*** (5.45)
Constant	-0.0067 (-1.12)	-0.024 (-0.69)	-0.077** (-2.13)	0.016 (0.80)	-0.0365 (-0.56)	-0.0058 (-0.90)	-0.0056 (-0.88)	-0.0057 (-1.00)	-0.0045 (-0.55)
Obs.	48	48	48	48	40	47	47	47	39
R <sup>2</sup>	0.744	0.785	0.793	0.767	0.752	0.782	0.775	0.763	0.741
Adj. R <sup>2</sup>	0.707	0.727	0.737	0.705	0.666	0.722	0.712	0.697	0.648
RMSE	0.0271	0.0262	0.0257	0.0272	0.0282	0.0265	0.0269	0.0276	0.0288

Dependent variable is the durable consumption growth for all equations. CCI denotes the consumer confidence index written at the top of each column. Δ denotes change in the variable. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A6. Durable Consumption Growth Estimation Results with Additional Variables and Consumer Confidence Indices**

	No CCI	CNBC-e	CEI	Δ(CNBC-e)	Δ(CEI)
Labor Inc. Gr. (-1)	0.015*** (5.01)	0.0145*** (5.38)	0.0122*** (4.77)	0.0152*** (5.45)	0.0155*** (5.48)
Labor Inc. Gr. (-3)	-0.006** (-2.61)	-0.00674*** (-3.21)	-0.00666*** (-3.18)	-0.00666*** (-3.05)	-0.00666*** (-2.89)
Δ(log(Stock)) (-3)	0.141*** (3.50)	0.168*** (3.26)	0.124*** (3.13)	0.175*** (3.84)	0.173*** (3.92)
Δ(Real Int.) (-1)	-0.0127*** (-5.99)	-0.0091*** (-4.40)	-0.00966*** (-3.86)	-0.00944*** (-5.22)	-0.0101*** (-5.22)
Δ(Real Int.) (-3)	0.0075*** (4.95)	0.009*** (5.02)	0.00736*** (4.47)	0.00902*** (5.20)	0.0088*** (5.01)
CCI (-1)	-	0.00118** (2.62)	0.00085*** (2.75)	0.0011** (2.48)	0.0011** (2.48)
CCI (-2)	-	-0.001** (-2.06)	-	-	-
Dummy 2009Q2	0.212*** (12.77)	0.216*** (12.17)	0.228*** (12.89)	0.213*** (14.74)	0.211*** (14.00)
Constant	-0.00674 (-1.12)	-0.0171 (-0.53)	-0.0765*** (-2.80)	-0.00408 (-0.72)	-0.00488 (-0.87)
Obs.	48	48	48	48	48
R <sup>2</sup>	0.744	0.779	0.769	0.778	0.771
Adj. R <sup>2</sup>	0.707	0.733	0.729	0.739	0.732
RMSE	0.0271	0.0259	0.0261	0.0256	0.0260

Dependent variable is the durable consumption growth for all equations. CCI denotes the consumer confidence index written at the top of each column. Δ denotes change in the variable. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A7. Nondurable Consumption Growth Estimation Results with Consumer Confidence Indicators**

	No CCI	CNBC-e	CEI	PCI	CBRT	$\Delta$ (CNBC-e)	$\Delta$ (CEI)	$\Delta$ (PCI)	$\Delta$ (CBRT)
AR (-1)	-0.206* (-1.65)	-0.525*** (-4.64)	-0.454*** (-3.58)	-0.353*** (-2.88)	-0.321* (-1.93)	-0.150 (-1.33)	-0.138 (-1.17)	-0.236** (-2.04)	-0.212 (-1.64)
AR (-2)	0.226** (2.14)	-0.0413 (-0.37)	0.0125 (0.11)	0.175 (1.15)	0.163 (0.98)	0.296** (2.24)	0.284** (2.16)	0.289** (2.30)	0.270** (2.03)
CCI (-1)	-	0.00057*** (5.48)	0.0006*** (4.59)	0.00044*** (4.61)	0.0015** (2.58)	0.00055*** (3.04)	0.000567*** (2.58)	0.0004*** (4.12)	0.00116** (2.21)
CCI (-2)	-	-	-	-0.0003*** (-2.93)	-0.0011** (-2.14)	-	-	-	-
Constant	0.0086*** (3.51)	-0.042*** (-4.52)	-0.041*** (-3.69)	-0.0038 (-0.66)	-0.0215 (-1.00)	0.0076*** (3.23)	0.0076*** (3.15)	0.0087*** (3.72)	0.0083*** (3.30)
Obs.	49	49	49	49	42	49	49	49	42
R <sup>2</sup>	0.119	0.436	0.379	0.394	0.219	0.324	0.279	0.337	0.173
Adj. R <sup>2</sup>	0.0805	0.398	0.338	0.339	0.135	0.279	0.231	0.292	0.107
RMSE	0.0134	0.0108	0.0114	0.0114	0.0121	0.0119	0.0123	0.0118	0.0123
F-Stat	4.522	14.41	9.417	9.292	3.799	6.189	6.273	7.020	4.508

Dependent variable is the nondurable consumption growth for all equations. AR denotes the lag of the dependent variable. CCI denotes the consumer confidence index written at the top of each column.  $\Delta$  denotes change in the variable. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A8. Nondurable Consumption Growth Estimation Results with Additional Variables and Consumer Confidence Indices**

	No CCI	CNBC-e	CEI	PCI	CBRT	$\Delta$ (CNBC-e)	$\Delta$ (CEI)	$\Delta$ (PCI)	$\Delta$ (CBRT)
AR (-1)	-0.407*** (-3.91)	-0.454*** (-3.60)	-0.421*** (-3.36)	-0.503*** (-4.00)	-0.479*** (-2.98)	-0.398*** (-3.34)	-0.380*** (-3.17)	-0.454*** (-3.94)	-0.418** (-2.65)
Labor Inc. Gr. (-1)	0.0023* (1.91)	0.00159 (1.23)	0.00153 (1.10)	0.00244** (2.17)	0.00274* (1.85)	0.00254* (2.02)	0.0024** (2.03)	0.0027** (2.31)	0.00243 (1.60)
Labor Inc. Gr. (-2)	0.00234** (2.10)	0.00200 (1.34)	0.00170 (1.13)	0.00269** (2.15)	0.00289* (1.84)	0.00253** (2.06)	0.00211* (1.76)	0.0027** (2.31)	0.0036*** (3.81)
$\Delta$ (log(Stock)) (-1)	0.0602*** (5.79)	0.0381** (2.54)	0.0494*** (3.32)	0.0372** (2.67)	0.0536*** (3.76)	0.0470*** (3.26)	0.0558*** (4.15)	0.0341** (2.59)	0.049*** (3.77)
$\Delta$ (log(Stock)) (-2)	-0.0207* (-1.72)	-0.0185 (-1.08)	-0.0108 (-0.58)	-0.0195 (-1.21)	0.00318 (0.17)	-0.0112 (-0.59)	-0.00469 (-0.23)	-0.0039 (-0.27)	-0.00393 (-0.21)
CCI (-1)	-	0.00036* (1.71)	0.00024 (1.02)	0.00027** (2.68)	0.000167 (0.32)	0.00014 (0.78)	0.000022 (0.12)	0.00024** (2.39)	0.00033 (0.64)
CCI (-2)	-	-0.000096 (-0.42)	-0.000200 (-0.85)	-0.000126 (-0.75)	-0.0011 (-1.41)	0.000021 (0.12)	-0.00019 (-0.84)	0.000025 (0.24)	-0.00073 (-1.36)
CCI (-3)	-	-0.000022 (-0.16)	0.000124 (0.71)	-0.00006 (-0.52)	0.00058 (0.93)	0.000029 (0.20)	-0.000047 (-0.25)	0.00004 (0.56)	-0.00012 (-0.31)
CCI (-4)	-	-0.000006 (-0.04)	0.000067 (0.39)	0.0000006 (0.01)	0.00026 (0.56)	-0.000076 (-0.56)	-0.00013 (-0.85)	-0.000082 (-0.98)	-0.00071 (-1.43)
Constant	0.00659*** (2.97)	-0.0146 (-0.92)	-0.0124 (-0.69)	-0.00184 (-0.26)	0.0102 (0.46)	0.00562** (2.35)	0.00564** (2.48)	0.006*** (2.98)	0.00347 (1.43)
Obs.	49	48	48	48	40	47	47	47	39
R <sup>2</sup>	0.525	0.561	0.548	0.591	0.503	0.539	0.546	0.593	0.531
Adj. R <sup>2</sup>	0.470	0.457	0.441	0.494	0.354	0.427	0.435	0.494	0.386
RMSE	0.0102	0.0103	0.0105	0.00996	0.0107	0.0101	0.00999	0.00945	0.00992
F-Stat	21.53	13.24	9.859	11.37	5.000	12.03	10.73	13.08	6.434

Dependent variable is the nondurable consumption growth for all equations. AR denotes the lag of the dependent variable. CCI denotes the consumer confidence index written at the top of each column.  $\Delta$  denotes change in the variable. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A9. Nondurable Consumption Growth Estimation Results with Additional Variables and Consumer Confidence Indices**

	No CCI	CNBC-e	PCI	$\Delta$ (PCI)
AR (-1)	-0.407*** (-3.91)	-0.447*** (-4.07)	-0.497*** (-4.11)	-0.476*** (-4.12)
Labor Inc. Gr. (-1)	0.00228* (1.91)	0.00148 (1.19)	0.00234** (2.16)	0.00239** (2.10)
Labor Inc. Gr. (-2)	0.00234** (2.10)	0.00172 (1.44)	0.00254** (2.19)	0.00275** (2.42)
$\Delta$ (log(Stock)) (-1)	0.0602*** (5.79)	0.0436*** (3.61)	0.0376*** (3.00)	0.0420*** (3.26)
$\Delta$ (log(Stock)) (-2)	-0.0207* (-1.72)	-0.0219** (-2.06)	-0.0149 (-1.24)	-0.00915 (-0.72)
CCI(-1)	-	0.000269* (1.77)	0.000276*** (2.95)	0.000237** (2.49)
CCI(-2)	-	-	-0.000192* (-1.83)	-
Constant	0.00659*** (2.97)	-0.0175 (-1.34)	-0.00244 (-0.44)	0.00702*** (3.38)
Obs.	49	49	49	49
R <sup>2</sup>	0.525	0.565	0.594	0.568
Adj. R <sup>2</sup>	0.470	0.503	0.525	0.506
RMSE	0.0102	0.00986	0.00963	0.00982
F-Stat	21.53	21.60	15.70	18.80

Dependent variable is the nondurable consumption growth for all equations. AR denotes the lag of the dependent variable. CCI denotes the consumer confidence index written at the top of each column.  $\Delta$  denotes change in the variable. t-statistics in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

	<b>No CCI</b>	<b>CNBC-e</b>	<b>CEI</b>	<b>PCI</b>	<b>CBRT</b>
<b>AR (-1)</b>	0.165 (0.80)	-0.135 (-0.66)	-0.196 (-1.03)	0.106 (0.46)	-0.109 (-0.58)
<b>AR (-2)</b>	0.290* (1.83)	0.207 (1.17)	0.139 (0.79)	0.315* (1.95)	0.320** (2.32)
<b>AR (-3)</b>	0.0706 (0.42)	0.171 (1.21)	0.131 (0.88)	0.118 (0.68)	0.0381 (0.31)
<b>AR (-4)</b>	-0.164 (-1.24)	-0.0235 (-0.17)	-0.0517 (-0.40)	-0.100 (-0.75)	-0.0936 (-0.76)
<b>CCI(-1)</b>	-	0.063*** (3.27)	0.075*** (3.59)	0.0246* (1.86)	0.176*** (4.26)
<b>CCI(-2)</b>	-	-0.0046 (-0.19)	0.00229 (0.10)	-0.0191 (-1.03)	-0.061 (-0.64)
<b>CCI(-3)</b>	-	-0.0148 (-0.77)	-0.00464 (-0.22)	-0.00286 (-0.15)	0.0315 (0.42)
<b>CCI(-4)</b>	-	-0.00813 (-0.38)	-0.00202 (-0.10)	0.000345 (0.02)	-0.0848 (-1.50)
<b>Constant</b>	0.792** (2.27)	-2.488 (-1.40)	-5.039** (-2.28)	0.373 (0.45)	-3.685 (-1.49)
<b>Obs.</b>	47	47	47	47	40
<b>R<sup>2</sup></b>	0.144	0.344	0.398	0.210	0.501
<b>Adj. R<sup>2</sup></b>	0.0622	0.206	0.271	0.0435	0.372
<b>RMSE</b>	1.477	1.360	1.303	1.492	1.142
<b>F-Stat</b>	-	0,007	0,0013	0,4791	0,0018

Dependent variable is the real labour income growth for all equations. AR denotes the lag of the dependent variable. CCI denotes the consumer confidence index written at the top of each column. F-Stat denotes the probability of rejecting the null of joint significance of CCI coefficients. t-statistics in parentheses \* p<0.1, \*\* . p<0.05, \*\*\* p<0.01

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