

## Empirical evidence for gender differences in Turkey

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**Abstract:** *Consumer attitude surveys classified as leading economic indicators aim at extracting information from respondents regarding their perceptions of economic outlook. A typical consumer confidence index includes questions designed to measure the changes in the past-current and current-future pairs of economic outlook perceptions of the participants as well as a question that examines the consumer's view on the current stage of economic activity. These surveys use equal amount of male and female participants. This paper checks the existence of perceptual difference of genders using CNBC-e consumer confidence index for Turkey. First, we calculate monthly consumer confidence indices for men and women for January 2003 – March 2011. Then, employing this data set, we use the recently developed frequency domain analysis of Breitung and Candelon (2006) and wavelet comovement analysis of Rua (2010) to assess whether these indices follow similar patterns before and after the recent global crisis in time and frequency domain. Our results show that women consistently diverge from men and seem to be on the pessimistic side-due probably to lower levels of wealth in terms of expectation formation. Moreover, this difference is increasing when purchasing durable goods is considered.*

**Key-words:** *gender difference, consumer confidence, emerging market, wavelet comovement analysis*

### 1. Introduction and motivation

Consumer manner measurements identified as important economic statistics which are obtained from participants' perceptions of economic outlook and give information on the current and future path of an economy. That kind of statistics is so important for experts, investors and business and financial press for their consumption or investment strategies depending. For this reason, we can see consumer confidence indices (CCI) in many countries to measure and distribute the latest position of consumer manners. The CCI is developed in the 1940s for the USA by Katona and then spread to the rest of the world and includes questions based on measuring the alterations in the past-current and current-future pairs of participants' perceptions and the consumer's view on the current stage of economic activity.

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These surveys use equal amount of male and female participants. The analysis shows the positive relationship between consumer optimism and the future path of consumption expenditures. Among others, Carroll *et al.* (1994), Bram and Ludvigson (1998), Hüfner and Schröder (2002) and Kwan and Cotsomitis (2006) advocate the relationship between alterations in consumer manners and personal consumption expenditures. This paper checks the existence of perceptual difference of genders using CNBC-e consumer confidence index for Turkey by using recently developed frequency domain methodology analysis of Breitung and Candelon (2006) and wavelet comovement analysis. First, we calculate monthly consumer confidence indices for men and women for January 2003 – March 2011. Our preliminary results show that women consistently diverge from men and seem to be on the pessimistic side-due probably to lower levels of wealth-whereas this difference is larger after the global economic and financial crisis-due probably to lower levels of purchasing power.

## **2. Literature Review**

Studies by Mishkin (1978), Throop (1991), Fuhrer (1993), Carroll et al. (1994), Nahuis (2000), Howrey (2001) and Ludvigson (2004) confirm the leading indicator features of expectations for economic variables such as consumer expenditures and economic growth. Hence, consumer manners have predictive ability for economic outlook because trends in aggregate demand or business cycles provide important information for policy makers and economic agents. However, some other studies reached contradictory results as they have included different economic and financial variables in their data set. One of these is by Jansen and Nahuis (2003) which examines the relationship between stock exchange and consumer confidence for 11 European countries and finds a strong positive correlation between stock returns and changes in consumer confidence. The result shows that stock returns cause consumer confidence at very short horizons of 2 weeks to 1 month. Moreover, Dominitz and Manski (2004) are critical about the methodology of confidence indices and suggest enlarging through some specific questions. They believe that ordinary people cannot correctly predict the general economic conditions. Hence, survey respondents cannot provide any extra information. Likewise, Van Oest and Franses (2008) suggest an alternative outlook for the interpretation of movements in consumer confidence and an applicable methodology to estimate the information of consumer confidence.

There have been a variety of studies questioning the importance of gender differences on several questions of interest such as the analysis of optimism vs. pessimism between genders (Dember et al., 1989; Scheier et al., 2001). One of these studies includes the possibility of gender difference in health related issues employing alternative data sets (Schraedley et al., 1999; Goldstein, 2006). Most

studies in this literature have used cross section data sets ignoring the dynamic aspect of expectations.

This study focuses on any difference between genders in terms of their responses to consumer confidence questions. Consumer confidence surveys serve several purposes to economic agents by categorizing respondents in gender, age, location and other characteristics. Optimism is measured through a base scale (usually 100) and it is easier to measure whether a gender is more optimistic or pessimistic than the other. Also, consumer confidence surveys have a time dimension. Thus, differences in gender responses in different intervals could signal changes in patterns of behavior among genders. Hence, consumer confidence is an important measure that tries to estimate the specific features of consumer sentiment by employing micro-level consumer survey data. Therefore, this paper examines whether there is a difference in terms of gender optimism/pessimism depending on economic and financial variables of interest over a certain period of time.

### **3. Data and methodology**

#### **3.1. Data**

Two well-known consumer confidence indices are the former CNBC-e Consumer Confidence Index (now Bloomberg HT CCI) and the CBRT-TURKSTAT Consumer Confidence Index which are announced on a monthly basis, in Turkey. The former is termed as CCI and we employ it as the micro-level data has been provided by the survey producer. The methodology for the CCI has been adopted from the Michigan University index of consumer sentiment with necessary changes made for Turkish households. The base period of CCI is set as January 2002 and the value of the index at this period is 100. The index has a point of scale ranging from 0 to 200. The database contains records of 15,000,000 individuals. The index is compiled of 720 surveys. The distribution of the surveys has these criteria:

- 70 percent is selected from Istanbul, Ankara and Izmir, 30 percent selected from other cities and big districts in Turkey.
- 60 percent is selected from 36-55 age group, 40 percent 18-35 age group.
- 50 percent is male and 50 percent is female.
- 50 percent of the total surveys are composed of new records.
- A minimum of 30 percent of new records belongs to individuals who had been successfully surveyed in the previous month.
- A maximum 20 percent of 704 completed surveys may be composed of additional respondents and these respondents are not called again in the next month.

- Last and one of the most important criteria is that respondents are not surveyed more than two times. This helps to minimize the biases in the answers of survey respondents.

The five questions of the survey are:

- 1) We would like to learn your current economic situation. Can you compare your (and your family's) current financial situation with last year?
- 2) What do you think your (and your family's) future financial situation will be in a year?
- 3) Can you compare your current expectations about Turkish economy with the previous month?
- 4) What do you think Turkish economy's situation will be in a year?

**The Answer Choices for these 4 questions are the same as; Better/Worse/Same/No Idea**

- 5) Do you think that the current period is a good time to buy durable consumer goods such as a TV set, a refrigerator and furniture or vehicles or residence?

**Answer Choices for this question is Good Time/Bad Time/No Idea**

After the answers for all the surveys are compiled, CCI is calculated according to following formula:

$$\text{index value} = \left( \frac{\text{Current period value}}{\text{Base period value}} \right) \times 100 \quad (1)$$

$$\text{Current period value for each question is being calculated as} = \left[ \left( \frac{\# \text{ of optimistic answer for the question} - \# \text{ of pesimistic answer for the question}}{704} \right) \times 100 \right] + 100 \quad (2)$$

The current period values of each question are summed up to obtain current period's value for the overall CCI. The index values for each question are announced as well as the announcement of sub-indices of consumer expectations index (questions 2 and 4) and propensity to consumer index (question 5).

Our data consists of Consumer Confidence Index for Women (**CCIW**), Consumer Confidence Index for Men (**CCIM**), Consumer Expectations Index for Women (**CEIW**), Consumer Expectations Index for Men (**CEIM**), Propensity to Consume Index for Women (**PCIW**) and Propensity to Consume Index for Men (**PCIM**). All the datasets are obtained from [www.ntvmsnbc.com](http://www.ntvmsnbc.com). The period is July 2002 – March 2011. All the data are in natural logarithms.

### 3.2. Methodology

This section is composed of two parts. In the first part, there is a short summary which explains the methodology of the analysis. In the second part, we present our empirical findings with short interpretations.

### 3.3. Frequency Domain Analysis

The Granger causality tests show whether the past variety in  $x$  ( $y$ ) have an effect on current variety in  $y$  ( $x$ ). However, these test results can supply results on causality over all frequencies. Besides, studies such as Yıldırım and Taştan (2009) show that the significance and/or direction of the Granger causality can change after adopting the causality test in frequency domain. By using a Fourier transformation to VAR ( $p$ ) model for  $x$  and  $y$  series, the Geweke's measure of linear feedback from  $y$  to  $x$  at frequency  $\omega$  is defined as :

$$M_{y \rightarrow x}(\omega) = \log \left[ \frac{2\pi f_x(\omega)}{|\psi_{11}(e^{-i\omega})|^2} \right] = \log \left| 1 + \frac{|\psi_{12}(e^{-i\omega})|^2}{|\psi_{11}(e^{-i\omega})|^2} \right| \quad (3)$$

If  $|\psi_{12}(e^{-i\omega})|^2 = 0$  then the Geweke's measure will be zero, then  $y$  will not Granger cause  $x$  at frequency  $\omega$ . Breitung and Candelon (2006) present this test by reformulating the relationship between  $x$  and  $y$  in VAR equation:

$$x_t = \alpha_1 x_{t-1} + \dots + \alpha_p x_{t-p} + \beta_1 y_{t-1} + \dots + \beta_p y_{t-p} + \varepsilon_{1t} \quad (4)$$

The null hypothesis tested by Geweke,  $M_{y \rightarrow x}(\omega) = 0$  corresponds to the null hypothesis of  $H_0 : R(\omega)\beta = 0$  where  $\beta$  is the vector of the coefficients of  $y$  and.

$$R(\omega) = \begin{bmatrix} \cos(\omega) \cos(2\omega) \dots \cos(p\omega) \\ \sin(\omega) \sin(2\omega) \dots \sin(p\omega) \end{bmatrix} \quad (5)$$

Breitung and Candelon (2006) simplify the Geweke's null hypothesis so that a usual F-statistics can be used to test causality in frequency domain. Therefore, this study uses Breitung and Candelon (2006) version of Geweke (1982). The frequency domain measure of causality is presented through a scale plot as there are two dimensions involved. The horizontal axis refers to frequency while vertical axis

refers to test statistics. There are three frequencies which are low frequency (a year or longer), medium frequency (6 months-a year) and high frequency (less than 6 months). The causality test can be determined according to test statistics and critical values on 0.05 and 0.1. Secondly, the wavelet-based measure of comovement is presented through a contour plot as there are three dimensions involved. The horizontal axis refers to time while the vertical axis refers to frequency. To ease interpretation, the frequency is converted to time units (years).

### 3.4. Wavelet comovement analysis

The well-known Fourier transform involves the projection of a series onto an orthonormal set of trigonometric components (see, for example, Priestley (1981)). In particular, it uses sine and cosine base functions that have infinite energy (do not fade away) and finite power (do not change over time). Hence, the Fourier transform does not allow for any time dependence of the signal and therefore cannot provide any information about the time evolution of its spectral characteristics. To circumvent such limitation it has been suggested the so-called short-time or windowed Fourier transform. It consists of applying a short-time window to the signal and performing the Fourier transform within this window as it slides across all the data. A caveat of the windowed Fourier transform is that the window width and thus the time resolution is constant for all frequencies. When a wide range of frequencies is involved, the fixed time window tends to contain a large number of high frequency cycles and a few low frequency cycles which results in an overrepresentation of high frequency components and an underrepresentation of the low frequency components. Hence, as the signal is examined under a fixed time–frequency window with constant intervals in the time and frequency domains, the windowed Fourier transform does not allow an adequate resolution for all frequencies. In contrast, the wavelet transform uses local base functions that can be stretched and translated with a flexible resolution in both frequency and time. In the case of the wavelet transform, the time resolution is intrinsically adjusted to the frequency with the window width narrowing when focusing on high frequencies while widening when assessing low frequencies. As it enables a more flexible approach in time series analysis, wavelet analysis is seen as a refinement of Fourier analysis. Mathematically, the wavelet transform decomposes a time series in terms of some elementary functions,  $\psi_{\tau,s}(t)$ , which are derived from a time-localized mother wavelet  $\psi(t)$  by translation and dilation (see, for example, Percival and Walden (2000)). Wavelets have finite energy and compact support, that is, they grow and decay in a limited time period and are defined as

$$\Psi_{\tau,s}(t) = \frac{1}{\sqrt{s}} \psi\left(\frac{t-\tau}{s}\right) \quad (6)$$

where  $s$  is the time position (translation parameter),  $s$  is the scale (dilation parameter), which is related with the frequency, and  $\frac{1}{\sqrt{s}}$  is a normalization factor

to ensure that wavelet transforms are comparable across scales and time series. The scale for the wavelet-based measure is increasing darkness corresponds to an increasing value and mimics the height in a surface plot. Hence, by inspecting the contour plot one can identify both frequency bands (in the vertical axis) and time intervals (in the horizontal axis) where the series move together and assess if the strength of the comovement changes across frequencies.

#### 4. Results and discussions

Figure 1 includes the frequency domain analysis and wavelet comovement analysis between Consumer Confidence Index for Women (**CCIW**) and Consumer Confidence Index for Men (**CCIM**). At low frequencies (a year or longer) women cause men and at medium and high frequencies (less than a year) men cause women. There is positive comovement at 6 months or more whereas there is negative comovement in shorter horizons. In economic theory, this means women are more decisive about the short-run picture of the economy whereas men dominate the long-run. Moreover, the genders' consumer sentiment levels are similar in the long-run. Thus, fluctuations occur only in the short run between the two genders, which is probably due to the absorption of information.

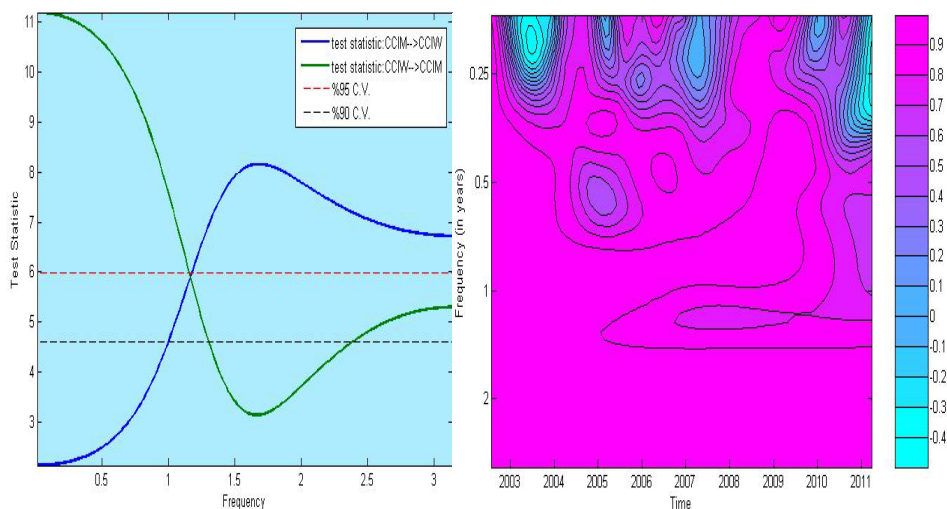


Fig. 1. Granger Causality in Frequency Domain (Left) and Wavelet Comovement (Right) for CCIW and CCIM

Figure 2 has the frequency domain and wavelet comovement analysis between Consumer Expectations Index for Women (**CEIW**) and Consumer Expectations Index for Men (**CEIM**), respectively. At low frequencies (a year or longer) women cause men and at medium and high frequencies (less than a year) men cause women. There is positive comovement at 6 months or more whereas there is negative comovement in shorter horizons. Expectations also differ for genders men are impatient and concerned for the short run whereas women focus on the long-term.

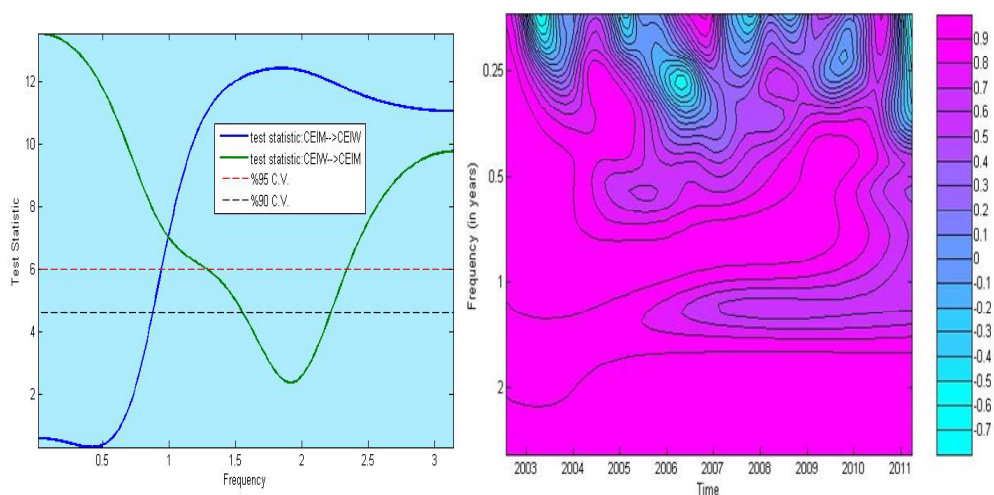


Fig.2. *Granger Causality in Frequency Domain (Left) and Wavelet Comovement (Right) for CEIW and CEIM*

Figure 3 displays the frequency domain and wavelet comovement analysis between Propensity to Consume Index for Women (**PCIW**) and Propensity to Consume Index for Men (**PCIM**), respectively. At low frequencies (a year or longer) and at medium and high frequencies (less than a year), men cause women. There is positive comovement at 9 months or more whereas there is negative comovement in shorter horizons. The propensity to consumer index is derived from the willingness of individuals to buy durable goods, real estate or autos. Women lack the financial resources to complete such transactions as men have more wealth and spending power. Moreover, there is only a statistically significant relationship between the two genders in the longer terms. Hence, it is possible that men decide on the purchase of these durable goods transactions due to their economic power and being involved in the labor force much more than women.



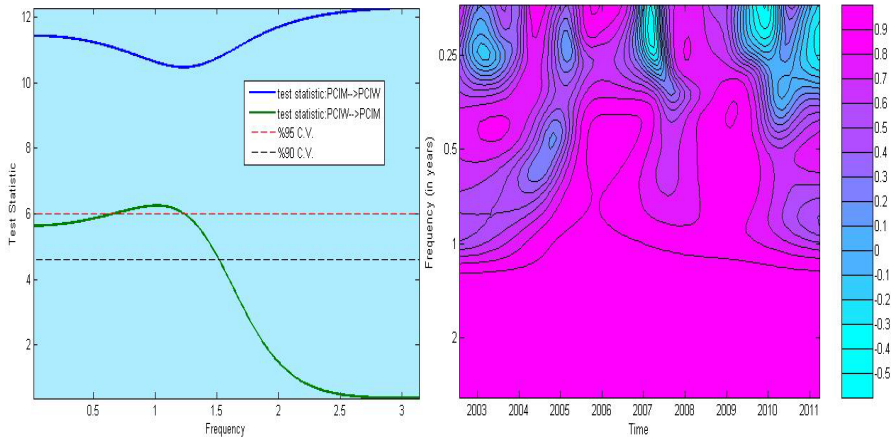


Fig. 3. Granger Causality in Frequency Domain (Left) and Wavelet Comovement (Right) for PCIW and PCIM

Figure 4 involves the frequency domain and wavelet comovement analysis between Propensity to Consume Index for Women (**PCIW**) and Consumer Expectations Index for Women (**CEIW**), respectively. At low frequencies (a year or longer) and at medium and high frequencies (less than a year) PCI women cause CEI women. There is positive comovement at 1 year or more whereas there is negative comovement in shorter horizons. Hence, women could only realize their expectations in a longer horizon. The purchasing powers of women are rather limited but still are stronger than their expectation formation. This is probably due to the funds obtained only in the longer term needed to purchase such durable assets. Hence, women have pessimistic expectations about purchasing and lag behind the actual pattern of their consumption. This probably is the result of such a long period of time in the job market where women have participated almost at the half rate compared to men. So, expectations are caused by actual results.

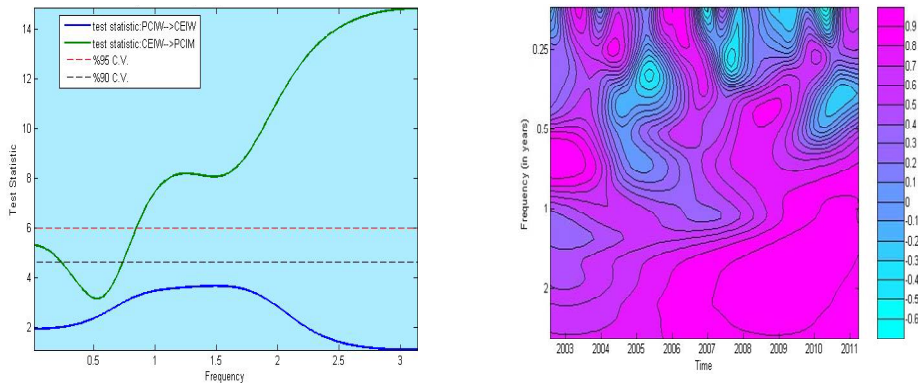


Fig. 4. Granger Causality in Frequency Domain (Left) and Wavelet Comovement (Right) for PCIW and CEIW

Figure 5 includes the frequency domain and wavelet comovement analysis between Propensity to Consume Index for Men (**PCIM**) and Consumer Expectations Index for Men (**CEIM**), respectively. At low frequencies (a year or longer) and at medium and high frequencies (less than a year) CEI men cause PCI men. There is positive comovement at 6 months or more whereas there is negative comovement in shorter horizons. The findings for men are opposite of women because men have the purchasing power and (wealth) to buy the durable goods. So, their expectations cause their transactions. Moreover, these usually occur at shorter terms compared to women. This is further evidence that men dominate women in terms of confidence and purchasing power.

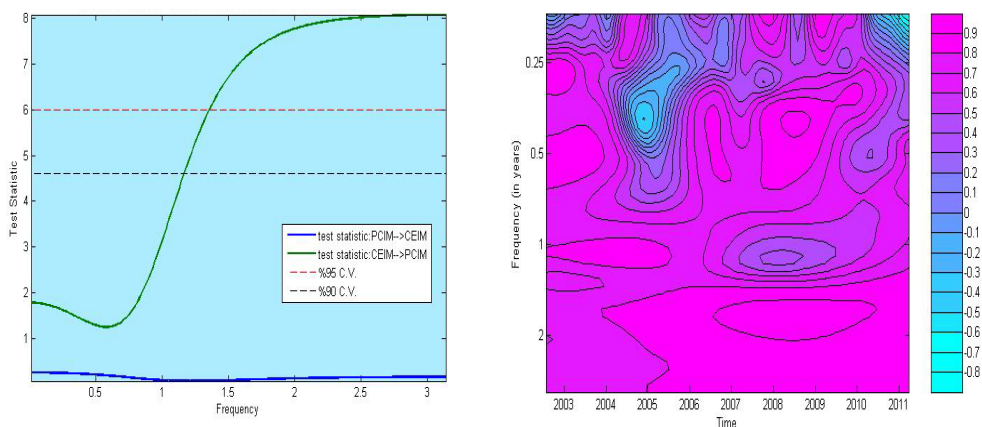


Fig. 5. *Granger Causality in Frequency Domain (Left) and Wavelet Comovement (Right) for PCIM and CEIM*

## 5. Conclusions

This study is an attempt to enhance the consumer confidence literature by shifting the focus from the information content of consumer confidence to the criteria content of consumer confidence. Among others, the foremost criterion for any consumer confidence index is the equal number of respondents from the two genders. Hence, we choose to examine whether there is a gender difference in consumer confidence data. Moreover, this is done for an emerging economy, Turkey. The empirical results show that there is comovement between women and men in low frequencies and the purchasing power of men dominate the consumption behavior of women. Our contribution is three-fold. First, while most of the previous studies analyze the expectations-consumption channel for developed countries, we examine the dynamic nature of expectations-production channel in an emerging

market which experiments business cycles at shorter horizons with respect to an industrialized economy. Secondly, we calculate frequency domain and wavelet comovement measure for the forecasting and power of the CCI at different forecasting horizons. Last, our empirical findings show that variations in consumer confidence mainly concentrate over seasonal frequencies. However, we see that women are not very straightforward in terms of expectations versus consumption. It is obvious that there exists causality between women and men in consumer confidence terms at low frequencies with the direction from women to men. For further research, the consumer confidence indices for women and men should be analyzed in detail through the addition of several different economic and financial variables into the research pattern.

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