WAVELET COMOVEMENT ANALYSIS BETWEEN TENDENCY SURVEYS AND ECONOMIC ACTIVITY IN TURKEY

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─Abstract ─
It is now common practice to measure economy-wide expectations so that additional information on the future path of economic variables like growth, unemployment and inflation could be extracted. The well-known methodology is to use tendency surveys, which cover producers and/or consumers. Following Yıldırım (2002), this paper is an attempt to assess whether there is any considerable pattern of comovement between selected macroeconomic variables (growth, unemployment and inflation) and tendency surveys (the Consumer Tendency Survey-CTS and Business Tendency Survey-BTS) in Turkey. Our originality is that we employ the wavelet comovement analysis, developed by Rua (2010), which is a strong methodological improvement combining the measures of comovement in time and frequency domain. We use monthly data to examine the period of January 2007 – March 2011 so that our analysis involves pre- and post- global financial and economic crisis. Our findings show that business tendency surveys exhibit significant comovement with industrial production and inflation in high and low frequency. On the other hand, consumer tendency surveys follow similar patterns with the change in inflation in high frequency especially during the global crisis period of 2009.

Key Words: *Consumer Tendency Survey, Business Tendency Survey, Industrial Production, Wavelet Comovement Analysis*
JEL Classification: C32; D12; E23

1. INTRODUCTION

Considering the latest changes in the world, identification of indicators leading/lagging basic macroeconomic variables plays an important role to observe the cycles in the economy. With this aim, apart from several indirect indicators, business and consumer surveys directly measure the response of economic agents.

Consumer confidence indices or consumer surveys have been widely used to forecast the consumer spending in many countries due to its direct linkage with consumption expenditures. Even though some studies, such as Mishkin (1978) and Bram and Ludvigson (1998) suggest that consumer confidence improve forecasts of consumer spending, other studies such as Lovell (1975) and Croushore (2005), indicates that the improvement in forecasting is insignificant or in some cases indices lead to a decrease in forecast performance.

Apart from the consumption expenditures, consumer surveys have been used to forecast other macroeconomic variables, especially growth, unemployment and inflation. To illustrate; Leeper (1992) find that consumer confidence index has an explanatory power to explain the changes in industrial production and unemployment, but the explanatory power disappears when real stock prices and interest rates are incorporated to the analysis. Indeed, another study by Lemmon and Portniaguina (2006) shows that sentiment component of the confidence index (Consumer Confidence Indices of The University of Michigan and the Conference Board) can be used to forecast returns on stocks primarily held by individuals over 1956-2002.

On the other hand, business tendency surveys directly measures the business climate of an economy. With this feature business surveys are mainly used to forecast the production (Hansson et al., 2005; Klein and Özmucur, 2010; Chindamo, 2010), but similar to consumer surveys business surveys are also tested to improve the forecasting power for other macroeconomic variables.

Revisiting the relationship between the surveys and macroeconomic variables, this paper is an attempt to assess whether there is any considerable pattern of comovement between selected macroeconomic variables (growth, unemployment and inflation) and tendency surveys (the Consumer Tendency Survey-CTS) and Business Tendency Survey-BTS) in Turkey. Our originality is that we employ the wavelet comovement analysis, developed by Rua (2010), which is a strong methodological improvement combining the measures of comovement in time and frequency domain. We use monthly data to examine the period of January 2007 – March 2011 so that our analysis involves pre- and post- global financial and

economic crisis. Our findings show that business tendency surveys exhibit significant comovement with unemployment in high frequency and significant comovement with growth in low frequency. On the other hand, consumer tendency surveys follow similar patterns with the change in inflation in high frequency especially during the global crisis period of 2009.

The paper is organized as follows: Part 2 presents a brief literature survey on the documented link between the surveys and selected macroeconomic variables (growth, unemployment and inflation). Then, Part 3 explains the data used and Part 4 gives information on the methodology. Part 5 discusses the empirical results and lastly, Part 6 concludes.

2. LITERATURE SURVEY

Several studies point out a relationship between consumer surveys and growth, employment and inflation. Leeper (1992) find that consumer confidence index has an explanatory power to explain the changes in industrial production and unemployment, but the explanatory power disappears when real stock prices and interest rates are incorporated to the analysis. In another study by Diron (2006) also shows that consumer confidence indicators improve the forecasts of GDP growth in the Euro Area. In an early paper by Mueller (1966) it is found out that the employment conditions have a significant impact on the Consumer Confidence Index prepared by the Survey Research Center of the University of Michigan over 1952-1964.

Consumer surveys provide valuable information not only from the point of growth and employment, but also inflation expectations and uncertainty. Arnold and Lemmen (2006) consider the consumers' responses to the survey in order to test the change in inflation expectations and uncertainty in the Eurozone. The results show that there is not a fast convergence in inflation expectations among countries and inflation uncertainty is higher in countries where the ECB policy has less influence. Another study by Cristadoro et al. (2005) aims to find a new core inflation indicator for the euro area using a large monthly database of more than 400 series, including confidence indicators constructed by the European Commission survey data over 1987-2003. Bialowolski (2011) indicates that the consumer sentiment significantly affects the inflation expectations in Poland over 1997-2010. The forecasting inflation with ARIMA models imply that inflation expectations based on the survey data provide better in-sample forecasts of inflation, but the results are sensitive to the methodology as well as the time period considered.

Even though most studies on developed countries, namely the US, find a significant link between growth/inflation/unemployment and consumer confidence, some studies on other countries document controversial results on this relationship. Ramalho et al. (2011) analyzes the consumer confidence index of Portugal over 1987-2009 by a regression model. The results show that there is not a long-run, but a short-run relationship between the consumer confidence and selected variables. Indeed, the tests show that the main determinant of the consumer confidence is the electoral circumstances, denoted by dummies in the model. Another study by Lemmens et al. (2007) also indicates that the short-run fluctuations in consumer confidence are found to be largely country specific within the European Union even though these countries experience an ongoing unification from all aspects. Therefore, any kind of analysis on a country has to be adopted and interpreted separately, and consideration of other countries, such as Turkey, is necessary.

Similar to consumer surveys, business surveys have also been used for forecasting macroeconomic variables. Hansson et al. (2005) use Swedish Business Tendency Survey and GDP growth for Dynamic Factor Model based VAR Models over 1978-2001, and the results indicate that survey results have a significant explanatory power for growth. Another study by Klein and Özmucur (2010) test whether both consumer and business surveys improve forecasting performance by adding explanatory power to a model which is based on only past values of manufacturing growth. The results indicate that surveys, prepared by the European Commission Directorate-General for Economic Financial Affairs, improve the forecasting performance by adding explanatory power of a model based on only past values of manufacturing growth over 1991-2009. Chindamo (2010) considers sector-specific results and indicates that survey-based business performance indices produced by the Australian Industry Group with respect to 'official' Australian economic data are helpful to predict both current and future official economic data for the manufacturing sector whereas the results for the services and construction sector indices are mixed.

Kabundi (2004) analyzes the case of France based on the business surveys of the French statistics institute—Institut National de la Statistique et des Etudes Economiques (INSEE) over 1991-2003. The results show that the common component coincident index extracted from the business survey data by generalized dynamic factor model (GDFM) predicts economic growth with a relatively high degree of accuracy. Other studies on France (Cornec and Mikol, 2011; Darne, 2008) also support the use of French business survey data to nowcast GDP growth and its directional change. Abberger (2007) analyzes

whether the results of qualitative business surveys of the Ifo Institute are useful in assessing monthly year-by-year changes in the number of employed people in German economy over 1993-2004. The analysis based on different approaches (probit model, error correction model and nonparametric regression methods) refer that the employment expectations calculated from the survey serve as a leading indicator for actual employment.

Considering the relationship between the business surveys and inflation, a study by Claveria et al. (2006) indicates that the forecasts of the Producer Price Index (namely, industrial prices in fourteen EU countries and the euro area) based on the business survey outperform the other quantification methods and provide more accurate forecasts. On the other hand, another study by Kaaresvirta (2009) on China states that estimated models based on the business survey results of the People's Bank of China do not perform well to track jumps in actual inflation.

Considering the frequency analysis of previous studies, Howrey (2001) indicate that monthly information in the consumer confidence index improves the forecast referring the usefulness of high-frequency data. However, none of the other studies distinguish the wavelet comovement analysis as presented here.

3. DATA

Our data consists of business tendency survey variable (BTS) as real sector confidence index, business tendency survey question 28 which asks the general conditions in the industry compared to the previous month (BTSQ), consumer confidence index of the Central Bank of the Republic of Turkey (CBRT) and Turk-Stat (CBCCI), consumer confidence index of CNBC-e (CCI), industrial production index (IP), inflation (CPI) and unemployment (UN). BTS, BTSQ, CBCCI are obtained from the CBRT, IP, CPI and UN are obtained from Turk-Stat and CCI is obtained from www.ntvmsnbc.com. The period is January 2007 – March 2011. All the data are in natural logarithms except the unemployment rate.

4. METHODOLOGY

We use wavelet comovement analysis in frequency domain developed by Rua (2010). This technique is seemingly superior to all the other comovement analysis as shown by Rua (2010).[1] The importance of this technique lies in the fact that it brings together the time dimension analysis and frequency dimension. Hence, comevement is observed through wavelets which form in frequency over a specified time interval. The only setback is there is not a test which measures the

[1] To conserve space, we do not explain the methodology in detail.

significances of the correlation coefficient in the analysis. Hence, we assume that any coefficient over 0.75 denotes statistical significance.

5. EMPIRICAL RESULTS

The correlation coefficient for the wavelet comovement analysis is given on the right hand side of each figure.

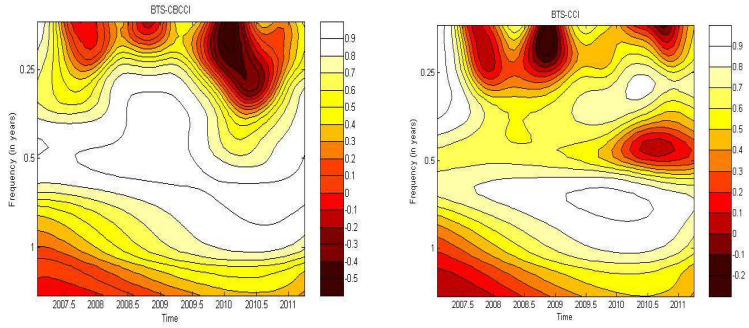
Our findings show that business tendency survey shows significant correlation with consumer confidence and industrial production in low and high frequency whereas this relationship is rather weak for unemployment and inflation. On the other hand, consumer confidence has significant comovement with industrial production in low frequency. Moreover, the global crisis affects the relationship between business tendency survey and inflation and industrial production. This is only true for industrial production in consumer confidence.

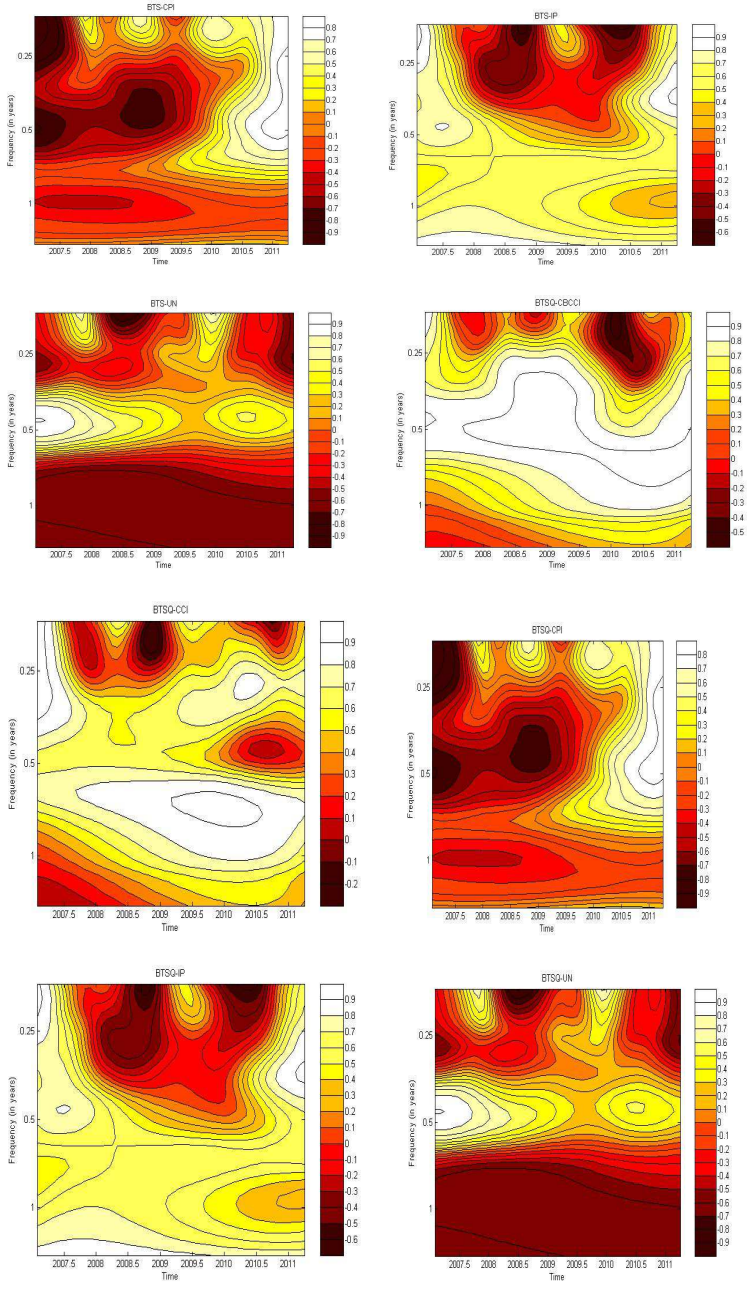
6. CONCLUSION

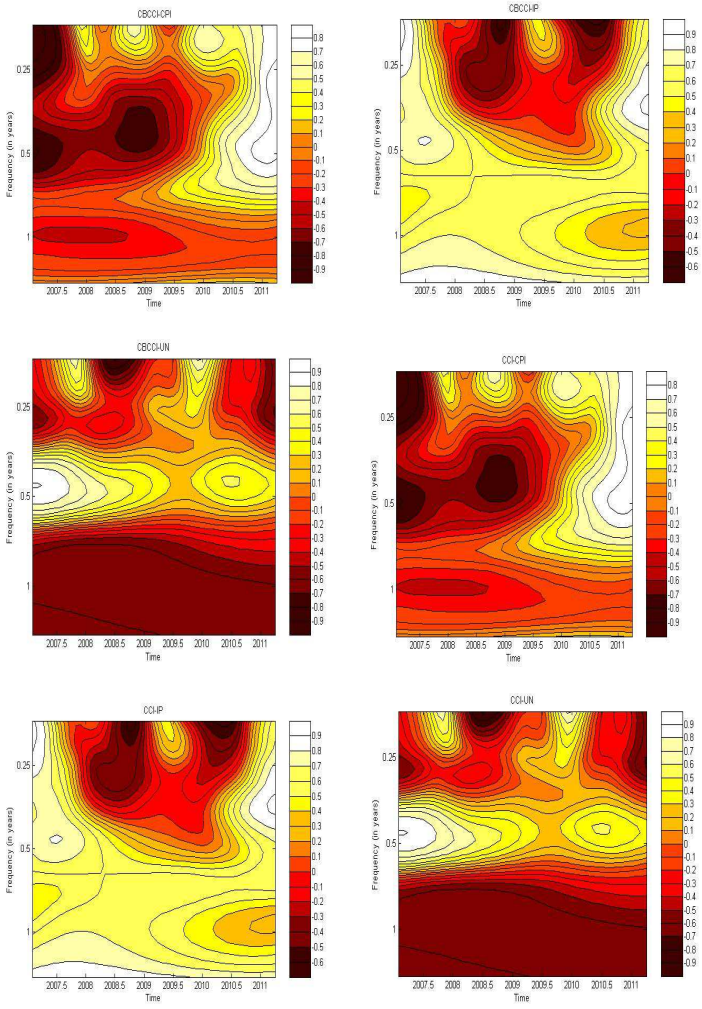
This paper is an attempt to show that measures of expectations such as business tendency and consumer confidence surveys have demonstrated significant feedback during the global crisis in Turkey. This is observed through the analysis of wavelet comovement between these indices and other macroeconomic variables such as inflation, industrial production and unemployment.

We believe that the importance of surveys measuring expectations have increased more than ever through the global crisis due to their fast response to changing patterns in the economy. Moreover, as these indices have the power of nowcasting significant research should be directed towards the detailed analysis of such indices.

Figure-1: Comovement Analysis




BTS-CPI
BTS-IP
BTS-UN
BTSQ-CBCCI
BTSQ-CCI
BTSQ-CPI
BTSQ-IP
BTSQ-UN
Frequency (in years)
Time



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