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SOSYAL BİLİMLER ENSTİTÜSÜ

İKTİSAT ANA BİLİM DALI

İKTİSAT (İNGİLİZCE) BİLİM DALI

THE PREDICTING ABILITY OF PRELIMINARY AND FINAL CONSUMER CONFIDENCE INDICES

Masters Thesis

İLKİN İLKE YEGEK

İstanbul, 2023

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Advisor: PROF. SADULLAH ÇELİK

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ÖZET

ÖN VE NİHAİ TÜKETİCİ GÜVEN ENDEKSLERİNİN ÖNGÖRÜ GÜCÜ

Tüketici güven endeksleri, gelecekteki ekonomik görünümle yakından ilişkili olduğu varsayılan güncel göstergelerdir. Bu endeksler sırasıyla ön ve nihai sonuçlar olarak hem ay ortasında hem de ay sonunda yayınlanır. Bununla birlikte, ön endekslerin güvenilirliği ve öngörü yeteneğine genellikle gereken önem verilmemektedir. Bu tez, ekonomik değişkenler ile tüketici güveni arasındaki ilişkiyi hem ön hem de nihai verileri kullanarak incelemektedir. Analiz, gelişmekte olan Türkiye ekonomisi için Nisan 2010-Ocak 2023 dönemini kapsamaktadır. Bu çalışmada tüketici güven endeksi ile döviz kuru, işsizlik, borsa endeksi ve para arzı gibi finansal ve ekonomik değişkenler arasındaki ilişki, frekans alanı Granger nedensellik yöntemi ve dalgacık ortak hareket analizi kullanılarak incelenmiştir. Sonuçlar, işsizlik dışında tüm değişkenlerin hem ön hem de nihai tüketici güven endeksleri ile uzun vadeli nedenselliğe sahip olduğunu göstermektedir. Daha kısa vadede ise döviz kuru ve ön güven arasında bir nedensellik görülürken, borsa endeksi ile tüketici güven endeksinin her iki versiyonu arasında da tüm dönemlerde nedensellik gözlenmektedir. Endeksler kendi aralarında yüksek düzeyde nedensellik göstermektedir. Akabinde dalgacık ortak hareket analizinde tüketici güveni ile döviz kuru arasında hem kısa hem de uzun vadede negatif birlikte hareket gözlemliyoruz. Buna karşılık, kısa ve orta vadede borsa endeksi ile tüketici güveni arasında pozitif, para arzı ile tüketici güveni arasında ise negatif ortak hareket görülmektedir. Genel olarak, bu çalışma, ekonominin durumunu değerlendirmede tüketici güveninin önemini ve tüketici davranışına ilişkin etkili içgörüler sağlama becerisini vurgulamaktadır. Ayrıca ampirik bulgular, ekonomik eğilimleri tahmin etmede ve tüketici duyarlılığındaki değişiklikleri tahmin etmede ön yayınların yararlılığını göstermektedir.

Anahtar Kelimeler: Tüketici güveni, gelişen ülkeler, finansal piyasa değişkenleri, tahmin gücü.

ABSTRACT

THE PREDICTING ABILTY OF PRELIMINARY AND FINAL CONSUMER CONFIDENCE INDICES IN TURKEY

Consumer confidence indices are timely indicators that are assumed to be closely related to the future economic outlook and are typically announced in both the mid-month and end-month periods as preliminary and final results, respectively. However, the reliability and predictive ability of the preliminary releases are often underestimated. This thesis investigates the relationship between economic variables and consumer confidence, using both preliminary and final data. The analysis covers the period from April 2010 to January 2023 for the emerging economy of Turkey. In this study, we examine the relationship between the consumer confidence index and financial and economic variables, such as exchange rate, unemployment, stock exchange index, and money supply, using the frequency domain Granger causality method and wavelet comovement analysis. The results indicate that all variables have long-term causality with both the preliminary and final consumer confidence indices, except for unemployment. In the shorter term, the exchange rate causes preliminary confidence, while causality is observed between the stock exchange index and both versions of the consumer confidence index in all periods. The indices show a high level of causality among themselves. Subsequently, in the wavelet comovement analysis, we observe a negative comovement between consumer confidence and the exchange rate in both the short and long terms. Conversely, in the short and medium terms, positive comovement is observed between the stock exchange index and consumer sentiment, whereas negative comovement emerges between money supply and consumer confidence. Overall, this study highlights the importance of consumer confidence in assessing the state of the economy and its ability to provide effective insights into consumer behavior. Moreover, the empirical findings demonstrate the usefulness of preliminary releases in predicting economic trends and anticipating changes in consumer sentiment.

Keywords: Consumer confidence, emerging market, financial market variables, predictive ability.

PREFACE

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İstanbul, 2023

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LIST OF ABBREVIATIONS

BHT	Bloomberg HT
BHT CCI	Bloomberg HT Consumer Confidence Index
BIST100	Borsa Istanbul 100 Index
CBCCI	Conference Board Consumer Confidence Index
CBRT	Central Bank of Republic Of Turkey
CCI	Consumer Confidence Index
CCIF	Final Consumer Confidence Index
CCIP	Preliminary Consumer Confidence Index
DOLLAR	Exchange Rate of Dollar
EU	European Union
GARC-M	Generalized Autoregressive Conditional Heteroskedasticity-Mean
ARDL-ECM	Autoregressive Distributed Lag-Error Correction Model

GDP	Gross Domestic Product
GNP	Gross National Product
ICS	Index of Consumer Sentiment
MCSI	Michigan Consumer Sentiment Index
MS	Money Supply
OLS	Ordinary Least Squares
SEI	Stock Exchange Index
SRC	Survey Research Center
S&P500	Standard & Poor's 500
TCB	The Conference Board
TURKSTAT	Turkish Statistical Institute
UN	Unemployment
US	United States
VAR	Vector Autoregression

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1. INTRODUCTION

Sentiment is associated with expectations. One of the important topics that Behavioral Economics focuses on is consumer confidence, which has been empirically measured and used in studies through various works conducted by George Katona from the 1950s to the 1980s. In early theoretical studies, it was observed that many factors related to human behavior could have an impact on economic outcomes. Therefore, the studies demonstrated the potential influence of consumers' decisions to purchase homes or vehicles on the faster growth or recession of economies, and consumers play a more significant role in short-term economic fluctuations than governments and investors. According to these studies, the value of the consumer confidence indices can vary depending on the answers given to the consumer confidence index questions related to consumer spending and economic conditions. In addition, various factors, such as job opportunities, the state of goods and services markets, the financial market, and political and social indicators have been highlighted as underlying determinants that affect consumer behavior. Consumer confidence indices are timely indicators that are assumed to be closely related to the future economic outlook. Several studies have concentrated on the consumer confidence index and its predictive ability. As a set of statistical measures, consumer sentiment surveys aim to provide information on expectations and future economic conditions. Therefore, the functions of the index have grown in importance for accurately predicting expectations.

Earlier studies mainly focused on examining the relationship between consumer sentiment and economic variables. However, there is no consensus regarding the value of consumer sentiment as an economic indicator. Recently, even though the media and researchers have shown considerable interest in the consumer confidence index, they have underrated the value of preliminary or mid-month releases of the index and have even been skeptical about its reliability.

This study not only focuses on the theoretical background and previous literature on overall concumer confidence index but also applies an empirical examination in Turkey for the period from April 2010 to January 2023 and it aims to contributes to the literature in two ways. First, an attempt is made to answer the question of how fundamental economic variables are related to a preliminary consumer confidence index and a final consumer confidence index. Second, it introduces the forecasting ability of consumer sentiment using the preliminary and final data for economic and financial variables such as exchange rates, money supply, stock exchange rate, and unemployment to show usefullness of mid-month releases. A subsidiary objective is to evaluate the effects and causes of possible gaps in the answers given to survey questions between periods from political, sociological, and economic perspectives.

This thesis provides a unique contribution to the existing literature on the characteristics of consumer sentiment. Furthermore, studies have mainly focused on consumer confidence in developed countries. The literature on developing countries, such as Turkey, is rather limited compared to that on advanced countries. Hence, it's important to provide an original perspective for understanding the functional characteristics of consumer confidence indices[1] in other emerging countries. To best our knowledge, this is tone of the first studies in Turkey that includes preliminary data on empirical analysis.

Similar to recent literature, the data will be examined using frequency-domain analysis. The empirical study carried out in this thesis will also include wavelet analysis in case there is a causal link between the preliminary and final CCI. This thesis might be helpful for survey providers and research institutions to understand the strengths and weaknesses of the data and the functionality of the indices, as it contributes to the literature by providing a more accurate measurement of consumer behavior. The empirical findings indicate whether the index has predictive power within itself and with other economic variables.

The remainder of this paper is organized as follows: the next section presents the importance of consumer sentiment and consumer confidence indices; Section 3 briefly reviews the literature on consumer confidence by concentrating on studies outside Turkey first and then on studies for Turkey; and finally, literature on frequency domain and wavelet analysis by summarizing theoretical and empirical studies. Section 4 describes the measures of the consumer confidence index; two types of CCI are described for Turkey. Section 5 introduces the study's research data and methodology. Empirical results are expressed in section 6. The last section concludes this thesis, followed by references and an Appendix.

[1] As consumer confidence indices, this study refers to both the preliminary and final releases of the Bloomberg HT CCI.

2. THE IMPORTANCE OF CONSUMER CONFIDENCE INDEX

Expectations have a significant impact on the decision-making mechanisms of economic agents involving households and businesses. Individuals make decisions based on expectations and assessments derived from present and past experiences. In other words, expectations about the state of the economy involve personal experiences at the micro-framework as well as influencing consumer attitudes at macro-level indicators such as consumption, production, investment, and saving (Cinel & Yolcu, 2021). The tradition of explaining recession periods with confidence continues, at least since the argument of Keynes (1936). Overall, there are two primary approaches for discussing the significance of confidence in macroeconomics. The first view of confidence suggests that sentiment contains essential information in the news sense. The approach assumes the link between consumer confidence measurement and subsequent macroeconomic activity arises due to the essential information that sentiment contains about the state of the economy, which is compatible with rational expectations.

The second is presented by Keynes (1936) as one of the first studies arguing the role of sentiment in the economic decision-making. Keynes' definition of 'animal spirits' exhibits that changes in consumers' beliefs have a causal effect on economic activity and are associated with their pessimism or optimism (Barsky & Sims, 2012). Indeed, the studies emphasizing the role of confidence indicate that an increase or decrease in consumer confidence leads to more optimistic or pessimistic economic prospects, which may cause changes in overall economic environment. The studies emphasizing the role of confidence indicate that lack of trust leads to political dissatisfaction since it has a significant connection with politics. (Soulas and Langer, 1994). In this context, the change in consumers' confidence about the future state of the economy will provide information about those major determinants of the macroeconomy. In their book 'Animal Spirits,' Akerlof and Schiller (2009, p.14) explain it as follows:

[…] at the level of macroeconomy, in the aggregate, confidence comes and goes. Sometimes it is justified. Sometimes it is not. It is not just a rational prediction. It is the first and most crucial of our animal spirits.

Even though there is no common consensus on the definition of the notion of "confidence", the consensus view among existing literature is that consumer sentiment is a significant indicator that contains information that is not included in other economic variables (Acemoglu & Scott, 1994; Carroll, Fuhrer, and Wilcox, 1994; Matsusaka & Sbordone, 1995).

Uncertainty regarding economic decision-makers' expectations can lead to changes in consumption, production, and investment preferences. As already mentioned, these fluctuations in preferences tend to occur during periods of high uncertainty in economic confidence. One can assert that such changes could be steered by expectations as well as explain them. It is, therefore, crucial to measure consumer confidence accurately. A growing body of literature uses sentiment indices to indicate economic modeling in forecasting. Hence, the media, economists, and policymakers pay considerable attention to the consumer confidence index since it allows us an opportunity to predict the future state of the economy as well as monitor the current outlook. The dynamic and continuous nature of consumer confidence indicators enables one to monitor the perceptions and expectations of the monthly changing subset of respondents. As the respondent group is constructed based on specific criteria, the results of the index could be considered comparable. The consumer confidence index has become a mechanism tracked by individuals, politicians, and the business community to observe the health of the economy instantly due to its dynamism and measurability functions. In addition to the consumer confidence index, there are several sub-indices derived from consumer surveys. The index also carry significant information and reflect the economic situation.Therefore, understanding the role of confidence is still crucial within the realm of economic theory. This thesis investigates the assumption that the consumer confidence indices carry any information about the future outlook of an economy using such macroeconomic variables and the index itself. Overall, the interpretation of the empirical results in this study is mainly closer to the view of animal spirits by Keynes (1936), as the theoretical background is based on optimistic or pessimistic waves of sentiment.

3. LITERATURE REVIEW

Economic doctrines are fundamentally behavioral theories, and socio-physiological humans produce behaviors. It is impossible to observe individual preferences; economic models assume that the behavior of homoeconomicus is stable. However, in reality, economic agents' preferences may change. The consumer confidence index used in this study is composed of five equally weighted questions[2] and aims to construe these changes in attitudes and expectations at both the individual and aggregate levels (Curtin, 2007). This study examines the proximity between the preliminary and final data published every month between the periods of April 2010 and January 2023. The empirical findings indicate whether the index has predictive ability for the future and consistency within itself. Additionally, the forecasting power of consumer confidence is examined using several methods while modeling consumer sentiment with economic variables, such as the stock exchange, money supply, exchange rate, and unemployment. Therefore, this thesis aims to contribute to the literature by measuring consumer behavior more accurately. A brief review of the relevant literature follows.

Consumer confidence was formulated by George Katona at the University of Michigan in the 1940s to empirically measure consumer expectations within spending and saving behavior models. Katona defined expectations as developments originating from a variety of economic, political, social, and personal perspectives. The process through which they are formed is complex. (Katona, 1960, p. 65) In their earlier works, Adams and Green (1965) exhibit the reason behind the predictive ability of consumer confidence over household expenditures by testing it directly. It is shown that the correlation between consumer sentiment and cyclical indicators, notably financial variables and employment, is valid. One of the pioneering studies was conducted by Mueller (1963) and Mishkin (1978) credited as the inital studies on the relationship between consumer confidence and financial variables for the US economy. It is proposed that consumer behavior contributes directly to the ability to account for fluctuations in spending after a change in the financial position of consumers (Mueller, 1963). Furthermore, Mishkin (1978) interprets the index as one that measures consumers' perceptions and expectations of the probability of financial distress. The theoretical framework is based on the liquidity hypothesis, which uses consumers' balance sheets as the primary indicator of financial distress (Celik; et al., 2010).

Generally, consumer sentiment may be seen as a substantial economic concept for analyzing short-term economic growth (Greenspan, 2002)[3]. There have been a variety of studies conducted in the literature on the link between consumer expenditures and consumer sentiment. Most works by economists argue that consumers' optimism or pessimism primarily affects their decisions regarding

[2] Referring to the Bloomberg HT Consumer Confidence Index utilized in this study.

[3] For further detail see https://www.federalreserve.gov/boarddocs/speeches/2002/20020111/default.htm

saving and consuming (Fuhrer, 1993). They concentrated on the debate over whether consumer confidence predicts consumption behavior and the reasons for changes in consumer sentiment.

Using U.S. data, Fuhrer (1993) argues that the factors determining consumer confidence also influence whether the national economy shifts into a recession or is propelled toward recovery and growth. Indeed, his findings indicate that approximately 70 percent of the variability in consumer confidence can be attributed to the impact of broader macroeconomic factors. However, he also emphasized that the unique information that the sentiment contains is relatively small. He concluded that, although the economic significance of consumer sentiment is modest, its predictive ability is statistically significant and thus reliable. Therefore, the factors determining consumer confidence also influence whether the national economy shifts into a recession or is propelled toward recovery and growth.

Matsuka and Sbordone (1995), using vector autoregressions, investigated the link between the consumer confidence index and economic fluctuations between 1953–1998 period. Their empirical findings for the United States show that there is a causality between consumer sentiment and GNP with a 13-26% impact rate. They argue that changes in consumer sentiment precede changes in output, which can be explained in two ways. Either consumer sentiment causes GNP or it anticipates it. After controlling for the predictors of GNP and fundamentals, they found that consumer sentiment has a significant effect on GNP fluctuations. In other words, Matsuka and Sbordone (1995) suggested that consumer confidence is an independent factor and provides support for macroeconomic models with strategic complementarity. However, they caution that their empirical findings do not prove the causal link between expectations and output fluctuations; there may be a missing third variable for both series that is required. There are many other papers Acemoglu and Scott (1994), Carroll et al. (1994); Huth et al. (1994) Bram and Ludvigson (1998), Souleles (2004), Ludvigson (2004), that reveals the forecasting ability of consumer confidence surveys on consumption.

Acemoglu and Scott (1994) examined the consistency of consumer confidence with the rational expectations of permanent income hypothesis restrictions on standard macroeconomic variables using UK data. Their results display that the information received from consumer confidence indices has explanatory power for the current state and future consumer behavior. However, they suggested that CCI predicts consumption only if consumers are fully informed and rational. Similar to Acemoglu and Scott (1994), Carroll et al. (1994) mentioned the contemporaneous correlation between the growth in household spending and the index of consumer confidence, questioning whether consumer sentiment predicts household spending. They concluded that the ICS, taken alone, has forecasting power on future changes in spending, and likely, lagged consumer confidence has explanatory power on current changes in spending. Furthermore, they assess that the correlation between ICS and spending does not reject the life cycle and permanent income models.

Likewise, Ludvigson (2004) demonstrated the relationship between consumer confidence indices and consumer spending. His empirical findings show that consumer confidence has a relatively modest but statistically significant forecasting power for future consumption. Moreover, within the context of European markets, Dees and Brinca (2013) suggested that consumer confidence surveys could serve as reliable predictive indicators of consumption during specific episodes. In particular, they examined the effect of significant economic or political shocks on economic indicators and found that the U.S. The CCI helps forecast consumer confidence in the Eurozone. These findings are in line with the study by Hüfner and Schröder (2002), who advocated the link between consumption expenditures and consumer sentiment using Granger causality and cross-correlations, including four economic sentiment indicators for Germany. In a study conducted by Lahiri et al. (2016), the predictive power of consumer confidence in relation to personal consumption expenditure is investigated. They employed a dynamic model and real-time dataset of more than 160 explanatory variables. Their analysis focused on the period between March 2005 and June 2014 in the U.S.. They concluded that the CCI had a positive impact on the accuracy of consumption forecasting. Their findings contribute to the relevant literature by providing a deeper understanding of the role of CCI in the context of richer information. Çelik and Özerkek (2009) investigated the relationship between personal consumption expenditures and consumer confidence for nine EU member countries using the panel cointegration method. The study also considers financial variables such as stock returns, exchange rates (real), and interest rates. The findings suggest that the consumer confidence index serves as an early signal variable in predicting future consumption expenditures and that future consumption expenditures can be predicted using consumer confidence indices. The study highlights the role of consumer confidence as an important factor for predicting future consumption trends by considering the influence of financial variables.

On the contrary, several empirical studies (Van den Abeelee, 1983; Garner, 1991; Fuhrer, 1993) have demonstrated a relatively weaker link between consumption and consumer sentiment, whereas Fuhrer (1993) and Howrey (2001) emphasized that the predictive ability of the consumer confidence index loses its significance as additional economic variables are included. Furthermore, many studies have investigated the relationship between stock prices and consumer sentiment (Jansen and Nahuis, 2003; Fisher and Statman, 2003; Golinelli and Parigi, 2003), advocating a statistically significant relationship. Otoo (1999) investigated the relationship between changes in consumer sentiment and stock prices using data from the SRC. As a result, he found that an increase in equity values boosts consumer sentiment. According to him, the two are contemporaneously correlated but not vice versa. In theory, higher stock prices may boost sentiment for two reasons: the traditional wealth effect or because respondents use changes in stock prices as a leading indicator property.

Otoo (1999) concluded that movements in stock prices influence consumer sentiment at the same level regardless of whether the respondent is a stock owner or not. This bolsters the hypothesis that "stock prices may be a leading indicator." Similar to Otoo (1999), Jansen and Nahuis (2003) studied the short-run link between the stock exchange and consumer sentiment in 11 European countries for the period 1986–2001. They stated that rising stock market prices may make consumers more optimistic about the future. For this reason, higher stock prices may lead to higher consumption via increased confidence. This can be attributed to two factors. Either higher wealth caused by higher stock prices is directly related to the traditional wealth effect, or consumers may interpret higher stock prices as an indication of a more favorable economic outlook for the future, even if they do not own stocks. Their empirical findings indicate that stock returns cause consumer confidence in very short horizons of two weeks to one month. Furthermore, expectations about the general economic outlook are more highly correlated with the stock exchange than with personal financial situations.

Similarly, using several statistical methods, the impact of changes in the CCI on economic indicators is examined by using financial and economic variables for several developed countries and considering the period from the 1970s to 2002, Golinelli and Parigi (2003) demonstrated that determinants of consumer sentiment cannot be explained only by several macroeconomic variables. It depends on the country's history and culture, the structure of economic system, and the time period (Golinelli and Parigi, 2003). The current literature shows that causality may be observed not only from stock prices to consumer confidence but also from consumer confidence to stock prices. Earlier empirical studies have provided evidence that supports both directions of causality. Fisher and Statman (2003), using U.S. data, observed a positive correlation between consumer sentiment and contemporaneous stock returns. Their findings indicate that consumer confidence is boosted by high stock returns. Subject to these findings, Lemmon and Portniaguina (2006), who used U.S. data, found that smaller stock returns are significantly more sensitive to consumer confidence than larger stock returns.

On the other hand, several skeptical studies (Dominitz and Manski, 2004; Van Oest and Frances, 2008) point out the caution about the interpretation of changes in consumer sentiment. Dominitz and Manski (2004) exhibit a skeptical outlook about the methods used in index construction, especially question-wording. They suggested that the definitions and methods used in consumer confidence indices are statistically well-known. However, the design of the survey remained essentially unchanged even though improvements are possible. The study proposed improvements in three main dimensions. First, the results indicate that business condition questions are more volatile than personal expectation questions. Adding direct questions about personal expectations is useful for predicting personal consumption. Second, they suggest that traditional questions on consumer sentiment should be replaced by probabilistic questions. Probabilistic questioning provides richer information about consumer attitudes than traditional qualitative questioning. Third, interpreting the consumer

confidence questions separately for different subgroups is important for understanding how CCI varies across socioeconomic and demographic aspects. Furthermore, Oest and Frances stated that announced changes in consumer confidence may be caused by the different sets of respondents used over time. Hence, they highlight a common problem in that the existing measuring methodology does not allow a direct comparison for consecutive months. They proposed a methodology for both the Netherlands and the US, which involves forecasting unobserved confidence as if the same respondents are used. Their empirical findings suggested that the changes between negative, neutral, and positive answers in confidence surveys do not exhibit statistical significance. Furthermore, US respondents tend to change their behaviors more easily compared to Dutch respondents. The reason behind this difference is explained by the differences in social security systems between countries.

Earlier studies mainly focused on consumer confidence in advanced countries. The literature on developing countries is rather scarce compared to that on advanced countries. Murillo and Romeu (2012) demonstrated that the predictive ability of houselholds' inflation expectations, based on data from the National Consumer Confidence Survey of Mexico for the period 2003–2010, over price inflation is weak. However, they also concluded that it would be beneficial to work again on the created indicator for further research because of the observation of changes in consumer behavior. Acuna et al. (2019), using OLS, attempt to show whether consumer confidence predicts consumption in Chile. They found that consumer confidence may be a good proxy for predicting future consumption; higher confidence leads to an increase in consumption, which suggests that including consumer confidence in models provides more accurate predictions for movements in future consumption. Ghosh (2020), employing the NARDL model for 1995–2018, analyzed the relationship between consumer confidence and financial macroeconomic variables in Brazil. She observed that, in the short run, CCI has both positive and negative effects on consumer expenditure, while interest rates have only negative asymmetry. In the long term, Brazilian households' spending behavior is shaped by changes in unemployment, stock market fluctuations, interest rate fluctuations, and changes in the CCI. Consequently, consumers are able to assess future market behavior and participate in it through spending.

Li et al. (2021) explored consumer behaviors in Russia and China comparatively. Their comparative analysis shows that there are major differences in the cultural structures of Russia and China, which indicates the specific effects of the institutional environment on consumer attitudes in terms of product selection and price characteristics. The authors also exhibit that consumer attitudes are directly related to technological developments, and changes in consumer preferences are observed in China due to the impact of COVID-19. According to the authors, because Russia experiences much more insufficient digitalization, it is most often guided by personal experiences when making decisions. A recent study undertaken by Güneş and Sayar (2023), covering more than 10 years of observations, evaluated the role of political risks on consumer sentiment and compared them with

financial risks for five emerging countries that show a similar sense of political instability and macroeconomic fragility: Argentina, Brazil, Mexico, South Africa, and Turkey. The authors concluded that political risk ratings have a much greater effect on consumer sentiment than elections do. Furthermore, political instability significantly influences CCI. In addition, the exchange rate directly affects consumer confidence rather than financial risk, which already causes the exchange rate in the short term.

All of the above studies attempt to examine consumer confidence in various developing countries, which is appropriate for testing the validity of conceptual theories from advanced economies (Özerkek and Çelik, 2010). Given that Turkey is also classified as an emerging country, for a better understanding of Turkish literature, several studies are referred to below. Recent studies have concentrate on the factors and macroeconomic variables that determine consumer confidence. A growing body of literature (Kandır, 2006; Çelik et al., 2010; Görmüş and Güneş, 2010; Topuz, 2011; Kale and Akkaya, 2015) examines the relationship between the stock market, consumption, and consumer sentiment in Turkey. Kandır (2006), analyzed the predictive ability between consumer confidence and stock returns using OLS for the monthly data between February 2002 and June 2005 including 28 sub-sectors. As a result, he demonstrated that changes in the CCI have explanatory power for stock returns in the financial sector. This study makes a valuable contribution to the literature by demonstrating the importance of consumer confidence in elucidating stock market dynamics.

Güneş and Çelik (2010) in their study, explained that income does not adequately reflect all movements in consumption. Thus, confidence may be a leading indicator for measuring both willingness to buy and ability to buy alongside other financial and economic variables. Their study aimed to show consumer confidence as a feature of the endogenous variable while investigating the evolving relationship between financial markets and consumer sentiment in Turkey. Employing various econometric techniques, including unit root tests, cointegration analysis, and the vector error correction model for the period between January 2003 and January 2008, they empirically show that there is a significant relationship between financial market variables and consumer confidence. Accordingly, their study contributes to the academic literature by providing insight into the leading role of consumer confidence in emerging markets, such as Turkey. Similarly, Çelik (2010) exhibits that fluctuations in Turkish consumer confidence are closely related to movements in financial and economic variables such as industrial production and its sub-indices, the stock exchange index, and exchange rates.

Görmüş and Güneş (2010) employed GARC-M, ARDL-ECM, OLS, and Granger causality, using stock prices and the exchange rate for the Turkish economy to inspect the role of consumer confidence. They used the CNBC-E monthly dataset covering January 2001 to December 2008. Their results from the Granger test indicate that the real exchange rate and stock prices are Granger-cause to the consumer confidence index; however, causality is not bidirectional. Moreover, consistent with the

existing literature, the OLS and GARCH-M results indicate that higher confidence levels have a positive impact on both stock prices and the real exchange rate.

Arısoy (2012) constructed two distinct VAR models to analyze the interactions between consumer confidence indices and selected macroeconomic variables such as consumption, industrial production, employment, and the stock market for Turkey between 2007 and 2012. The results display that the CCI has a significant impact on consumer spending, while the business confidence index affects industrial production and the stock market. Overall, consumer confidence indices possess insights about the direction of the economy and shape the spending behavior and expectations of consumers, as well as the production and investment decisions of producers. Using the partial least squares method and a quarterly dataset for the 2004–2012 period, Özdemir (2013) observed that the inclusion of the CCI in the models reduces forecast errors. In other words, the consumer confidence index is helpful in forecasting the total consumption in Turkey.

Topuz (2011), utilizing the Granger causality method to analyze the causality between stock prices and consumer sentiment regarding the Turkish economy in the period between January 2004 and January 2009. He observed that there is unidirectional causality from stock prices to consumer confidence. Similarly, Kale and Akkaya (2015), using VAR models to examine the relationship between consumer/investor confidence and five stock indices from the U.S., Germany, and Turkey, suggesting that there is no causality from consumer sentiment to stock returns. However, they stated that stock returns positively affect consumers' confidence. Additionally, the results indicate that globalization plays a significant role in domestic markets, and the confidence climate of the USA has a stronger influence on Turkey than on Germany.

In their research, Koy and Akkaya (2017) examined the existence of mutual regime-switching dynamics between the consumer confidence index and the stock index. In addition, they examined the dynamic response under different regimes. Initially, the study employed Markov Regime Switching techniques for monthly data of the Bloomberg Consumer Confidence Index, TURKSTAT-CBRT Consumer Confidence Index, BIST100, and real sector confidence index between January 2007 and June 2016. The results reveal that even though consumer confidence signals a negative trend, capital markets gain during normal periods in the economy. However, each index tends to move in the same direction under recessions or expansion regimes.

Quite recently, Karasoy and Yüncüler (2018) examined the role of consumer confidence indices in understanding the dynamics of future private consumption in Turkey from January 2001 to April 2014. The study employs quarterly data[4] for four different confidence series benefiting from the overall indices of the CNBC-e and TURKSAT-CBRT surveys, the consumer expectations index, and the

[4] The researchers transformed monthly data into quarterly data by taking averages.

propensity to consume index[5]. The empirical results indicate that the consumer confidence index has the ability to forecast private consumption expenditures. However, when real labor income, real stock returns, and real interest rates are included in the analysis, it is found that the TURKSTAT-CBRT consumer confidence index can only predict the consumption expenditures of non-durable goods. Moreover, the authors state that they checked whether the results were in line with precautionary savings motives and the permanent income hypothesis for the relevance of CCI to future consumption movements. They pointed out that there is no consistent theory explaining household consumption expenditure in the Turkish economy.

Although there is no vast amount of research employing frequency domain and wavelet comovement analysis to examine the relationship between consumer confidence and economic fundamentals in Turkey, it is beneficial to briefly refer to the associated tools in the literature. Several studies have also used the frequency domain and wavelet approaches simultaneously and separately. Pioneering work done regarding the analysis includes Lemmens, Croux, and Dekimpe (2007), Rua (2010), Mermod et al. (2010), Çelik and Başdaş (2011), Taştan and Yıldırım (2012), Bozoklu and Yılancı (2013), Deniz and Çelik (2017), Khan et al. (2019) and Çepni et al. (2020), and Taştan and Şahin (2020).

Rua (2010) proposed a wavelet method that allows the assessment and measurement of changes in the degree of comovement (that considers both time and frequency domains) across frequencies and over time. Furthermore, he presents an empirical analysis that demonstrates the growth cycle comovement. Therefore, his findings highlight the usefulness of the wavelet-based comovement method. Using dynamic correlation and cohesion through a frequency domain approach, Lemmens et al. (2007) investigated the degree of homogeneity between the consumer confidence indices of 14 European countries. Their study aimed to detach the consumer confidence index series fluctuations at high frequencies from lower frequencies and then analyze how these vary within Europe. Their empirical findings show that short-term dynamic correlation is low. This supports the idea that high-frequency fluctuations in the CCI are country-specific. However, they observed much more homogeneity when the planning horizon was extended. Furthermore, Lemmens et al. highlight that the degree of homogeneity is negatively related to cultural and economic distance. Çelik and Başdaş (2011), using wavelet comovement analysis for the January 2007–March 2011 monthly period for Turkey, considered consumers' responses to tendency surveys to show the existence of any significant comovement between consumer tendency and selected macroeconomic variables such as unemployment, growth, and inflation. The results indicate that business tendency surveys show significant comovement between inflation and industrial production, both at high and low frequencies. Nonetheless, consumer confidence surveys exhibit a significant comovement with industrial

[5] The consumer expectations and propensity to consume indices derived from the CNBC-e survey.

production only at low frequencies. Besides, Çelik and Başdaş (2011) observed similar patterns and significant feedback between indices and variables, especially during the global crisis.

In a similar fashion, Deniz and Çelik (2017), using wavelet comovement analysis with a dataset covering three sub-periods for several developing and developed countries, found that consumer confidence indices in emerging countries better reflect their pessimistic perceptions than those in developed countries. Furthermore, they investigate the comovement between consumer sentiment in the United States and other developing/developed countries. Their findings show that U.S. consumer sentiment plays a leading role, especially in emerging countries during crisis periods. However, the comovements in the pre-crisis and post-crisis periods are not as strong as in the recession period. Khan et al. (2019) explore the dynamic relationship between industry stock returns and household investor sentiment by employing wavelet and frequency-domain methodologies. Using weekly Google trend data as an Internet-based sentiment proxy for the U.S., they display causality from financial and economic attitudes revealed by search keywords (FEARS) to stock returns in both the short and medium run. Furthermore, the results support the existence of the predictive ability of household investors' confidence indicators on the stock market index of the S&P500, but not vice versa for all sectors.

These studies mentioned above provide valuable contributions to the theory and practical applications of frequency-domain Granger causality and wavelet-based comovement analysis. Despite being relatively recently developed tools, it has become more obvious that the superiority of associated tools over traditional methods is well documented in the literature.

4. MEASURES OF CCI

Economic confidence is associated with expectations. In the 1950s, consumer surveys were conducted by the University of Michigan's Survey Research Center (SRC) with valuable contributions from George Katona. The consumer survey is based on the theoretical view of human behavior in economic activity and aims to demonstrate the apparent link between consumer attitudes and economic decisions by collecting relevant data. Over the years, additional questions have been added, and the survey methodology has been expanded to improve the understanding and forecasting capabilities of the index. Moreover, various indices have been developed to measure the tendencies and expectations of economic agents' finances, as well as the general economic conditions of the country. The following subsections describe the measures of consumer confidence indices in Turkey and abroad.

4.1. Measures of CCI Conducted Outside of Turkey

4.1.1. Michigan CCI

As a composite index value of the Michigan consumer survey, consumer sentiment is measured using qualitative and quantitative elements. The samples of consumer surveys are designed to represent the target population of households in the U.S., and each month, the survey center conducts at least 600 interviews with adult men and women. The questions capture three areas of economic conditions: personal finances, business, and purchasing conditions. Each month, the survey asks 50 core questions by telephone, and the questions aim to examine different dimensions of consumer attitudes[6]. The Michigan Consumer Confidence Index aggregates and averages the responses to five questions about expected financial conditions for the next year, current financial conditions, current purchasing conditions, expected general business conditions for the next 12 months, and expected business conditions for the next five years (Fuhrer, 1993). The University of Michigan releases both mid-month preliminary and final estimates of the consumer sentiment index. The preliminary figures cover the first two weeks of interviews and two-thirds of all samples; the results have been released since the August 1990 invasion of Kuwait because it provides a highly accurate estimation of the final releases, which are announced at the end of the month for all months (Curtin, 2002). The Michigan Index of consumer sentiment has been widely recognized as a reliable measure of consumer confidence and has played a significant role in the development of the CCI concept for several decades. Business owners, economists, policymakers, households, financial institutions, and the media improve and contribute to their understanding and forecasting abilities about the economic outlook by

[6] Detailed information on Michigan consumer survey can be found in "Survey of Consumers" published by the Survey Reasearch Center.

tracking changes in consumer confidence. In this regard, the University of Michigan plays a pioneering role in influencing other countries to recognize the importance of evaluating the power of consumer sentiment. After the initiation of Michigan University, the Conference Board started its own consumer confidence index.

4.1.2. Conference Board CCI

The Conference Board has been conducting a mail survey collection method to measure consumer sentiment in the U.S. since 1967. The TCB distributes the qualitative survey questions to around 5000 questionnaires on a monthly basis and collects approximately 3000 completed responses given these questions about current conditions of business, current conditions of employment, expected business conditions in the next six months, expected employment conditions in the next six months, and total family income in the next six months. The Conference Board Consumer Confidence Index is based on the averaged responses to all five questions; questionnaires have options to reply on a negative, positive, or neutral scale. The final version of the index is announced on the last Tuesday of every month, providing totals and breakdowns that include categories such as gender, age, income groups, and geographical regions[7].

Although MCSI and CBCCI focus on consumer sentiment within the United States and have long historical data on sentiment, the sampling and contact methods of each index differ. Furthermore, the main differences between the Board and Michigan surveys are the question-wording processing methods. While CBCCI asks participants about their situation in six months, MCSI asks households about their condition in the next 12 months or five years. The Conference Board CCI tends to focus on the job market and family income with a larger sample size, whereas Michigan CSI concentrates on business conditions with more detailed questions. The overall performance and effectiveness of surveys vary according to multiple components (Linden, 1982). However, these indices generally mirror each other and present remarkably similar results.

4.1.3. European Commission Consumer Survey

The survey program is initiated by the European Commission within the framework of "The Joint Harmonised EU Program of Business and Consumer Servey, BCS," in 1961 and under the management of the General Directorate for Economic and Financial Affairs[8]. Over time, its scope expanded to include questions, sectors, and countries. This growing scope has enhanced the usefulness of the index in providing essential information about economic cycles and monitoring improvements

[7] For further details, see Consumer Confidence Survey® Technical Note (2011) by The Conference Board.

[8] More information on European Commission Consumer Survey can be retrieved from the survey user guide prepared by the European Commission General Directorate of Economic and Financial Affairs (2023).

in the EU. The European Union Consumer Survey currently covers 27 member states of the EU and five EU candidate countries. Each month, the survey contacts approximately 40.000 to ask households questions about expectations of their financial conditions over a year from now, the general economic situation of their country over a year from now, the unemployment level in their country over a year from now and their saving plans over a year from now. The survey data are aggregated and analyzed to provide a composite index of consumer confidence level, which is computed as the average value of the seasonally adjusted balances. Compared to U.S. Michigan survey data, even though survey providers and data collecting methodologies differ from each other, the question wording is similar, and relations with fundamental economic variables show parallel trends.

4.2. Measures of CCI in Turkey

In advanced economies, historical data on the consumer confidence index dates back to the 1950s. However, confidence indicators are relatively recent in emerging countries such as Turkey. The first nationwide index related to consumer confidence in Turkey was launched in January 2002 by CNBC-E. Additionally, the Turkstat consumer confidence index, conducted in collaboration with the Central Bank of the Republic of Turkey, began shortly after the CNBC-e CCI, in December 2003. The following subsections provide an overview of two widely recognized consumer confidence indices in Turkey, Turkstat-CBRT CCI, and Bloomberg HT CCI, that have been published monthly. Figure 1 presents the comparative CCI values of these indices.

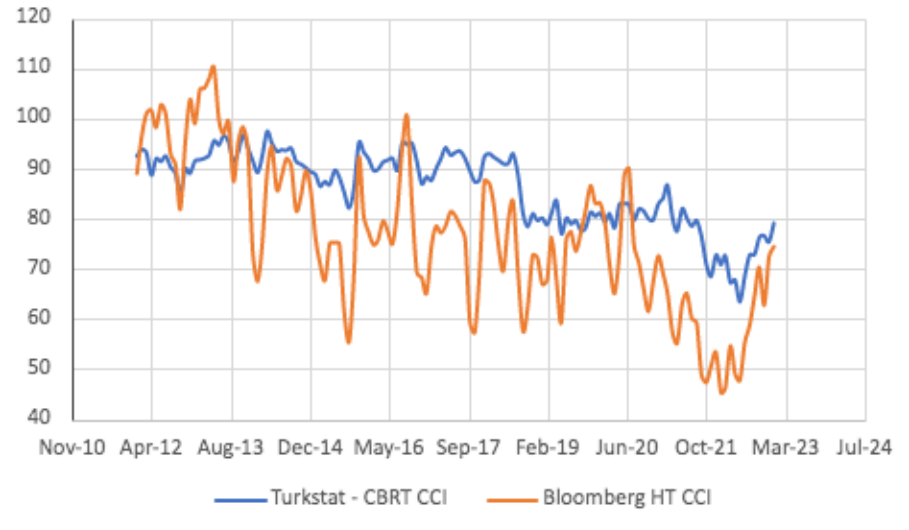


Figure 1: Comparative Graph of BHT CCI and Turkstat-CBRT CCI

4.2.1. Turkstat-CBRT Consumer Confidence Index

The Turkstat-CBRT Consumer Confidence Index was conducted to measure current conditions of the economy and assess future expectations based on three headlines: the consumer's financial position, the general economic outlook, and expenditure and saving decisions. The index, in a seasonally adjusted form, is based on the results of the consumer tendency survey, which is a joint study of the Central Bank of the Republic of Turkey and the Turkish Statistical Institute launched in December 2003. The results of the Turkstat-CBRT CCI are released in the third week of every month. The consumer tendency surveys are made on a monthly basis and applied by face-to-face and telephone interview methods[9]. The sample size of the tendency survey covers approximately 4000 randomly selected households from rural and urban areas of Turkey, at the age of 16 or above, and having income. The Turkstat-CBRT computes the data in accordance with the balance method, which is used by the European Union to calculate the Consumer Confidence Index. Overall, the index is obtained by the average of the following four sub-indices[10] shown in the Table 1.

The implementation of the balance method involves calculating the difference between the percentages of negative and positive responses obtained from each consumer survey question and adding 100 to this difference. Later on, the index computes the arithmetic average of the diffusion indices for the five questions covered in CCI. This approach provides a value scale that differs between 0 and 200. A value below (or above) 100 yields an indicator of pessimistic (or optimistic) consumer sentiment (Karasoy & Yüncüler, 2018).

Table 1: The sub-indices constructs Turkstat - CBRT Consumer Confidence

1.Financial situation of household at present compared to the last 12 months
2. Financial situation expectation of household over the next 12 months
3. General economic situation expectation over the next 12 months
4. Assessment on spending money on durable goods over next 12 months compared to the past 12 months

Source: Turkstat

[9] The monthly survey is applied by using methods of computer-based face-to-face interviews (CAPI) and computer-aided telephone interviews (CATI). For further information see https://data.tuik.gov.tr/Bulten/Index?p=Consumer-Confidence-Index-April-2021-37535&dil=2 .

[10] After the revision of Turkstat in September 2020, Turkstat-CBRT consumer confidence index is computed as the arithmetic average of four sub-indices. For detailed information see "Methodological document on the major revision made in the consumer confidence index" by Turkstat (2020).

4.2.2. Bloomberg HT Consumer Confidence Index:

Based on the questions of the BHT Consumer Confidence Index, two sub-indices are compiled and calculated by BHT: the Consumer Expectations Index (CEI) uses the replies of questions two and four of the CCI, and the Consumption Tendency Index (CTI) is calculated using the replies of the fifth question of the CCI only. The Consumer Expectations Index aims to examine consumer expectations for the next 12 months. On the other hand, the Consumption Tendency Index aims to assess consumers' current tendencies to spend on durable goods. These five questions shown in the Table 2. Although the index methodology of the BHT CCI is adopted from the ICS of Michigan University, certain modifications have been implemented to tailor it specifically to Turkish households. The database, managed by the survey provider, contains records of approximately 9.000.000 individuals. The survey collects data randomly from respondents who are interviewed by telephone through a call center on behalf of the survey provider. For the BHT Consumer Survey, several criteria, such as age, geographic location, and gender, are considered. Thus, the seven criteria required for the compiled survey distribution are:

1) Seventy percent is selected from the three major cities of Turkey: Istanbul, Ankara, and Izmir, while the remaining 30 percent is selected from other cities and big districts across Turkey.

2) Sixty percent of the sample is chosen from the age group 36–55, while the remaining 40 percent is selected from the age group 18–35.

3) Fifty percent is female, and the other 50 percent is male.

4) Fifty percent of the total surveys consist of new records.

5) A minimum of 30 percent of new records belong to individuals who had been successfully surveyed in the previous month.

6) A maximum of 20 percent of all 704 compiled surveys may be composed of additional respondents who are not contacted again in the subsequent month.

7) Finally, one of the most crucial criteria is that respondents are not included in the surveys more than two times. This criterion ensures that the potential biases in the responses are minimized.

Table 2: Bloomberg HT Consumer Confidence Index Questions

1.We would like to learn your current economic situation. Can you compare your (and your family's) current economic and financial situation with the one 12 months prior to the current month?
Better Worse Same No Idea
2. What do you think your (and your family's) future economic and financial situation will be like 12 months from now?
Better Worse Same No Idea
3. Can you compare your expectations for the current month about the Turkish economy with respect to the previous month?
Better Worse Same No Idea
4. What do you think Turkish economy's situation will be in a year's time?
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?
Good Time Bad Time Same

Source: Bloomberg HT

The sample size for the index is 720 interviews per month. The base period of the BHT index is determined as the year 2013 with a fixed value of 100. Similar to the CBRT-Turkstat index, the BHT CCI also has a value scale range of 0-200. The index is computed by the following formula:

Index Value = (Current Period Value / Base Period Value) * 100

Current Period Value = 100 + ((Number of optimistic answer – Number of pessimistic answers) / Total number of answers * 100)

The Bloomberg HT Consumer Confidence Index is released twice per month. On the first business day of every month, the final values of the index for the previous month are released by the Bloomberg HT television channel, which can be accessed through various platforms, such as the Internet and social media. On the 16th day of each month (or the following business day if not a weekday), the Bloomberg HT Preliminary Consumer Confidence Index is published by the Bloomberg HT television channel. Since interviews are conducted between the 27th day of the previous month and the 26th day of the current month, the preliminary results of the consumer confidence index

include survey interviews conducted solely during the first half of the month. Consequently, the sample size of the preliminary mid-month estimates of the BHT CCI is half that of the final releases. Figure 2 presents the index of consumer confidence preliminary versus final values of BHT data. The trend of lines is quite similar since the correlation[11] is 0.99.

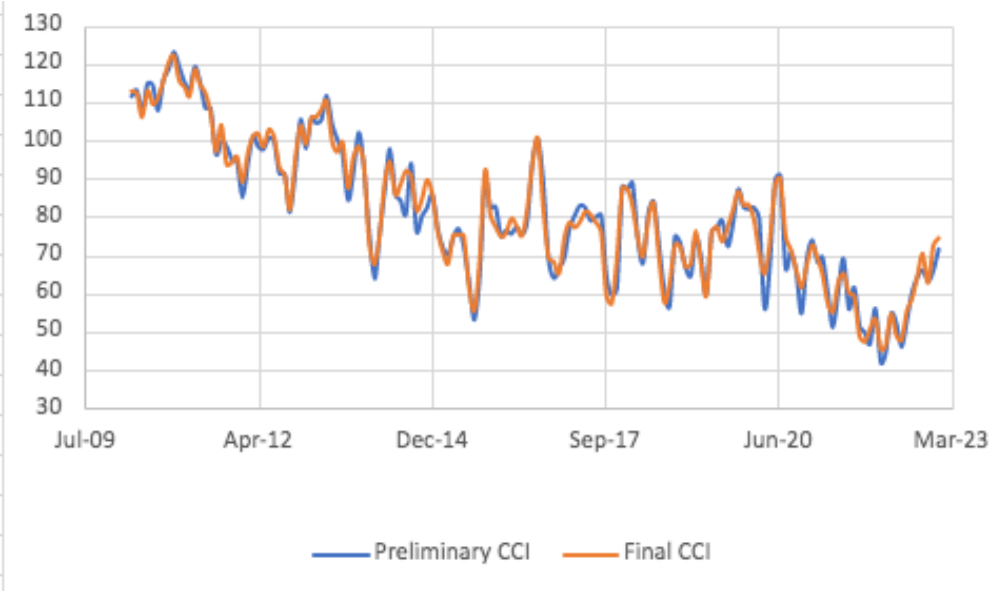


Figure 2: Comparative Graph of Preliminary and Final CCI

[11] Correlation table is given in Appendix 3.

5. RESEARCH DATA AND METHODOLOGY

5.1.Research Data

The main purpose of this study is to analyze the forecasting ability of the consumer confidence index in Turkey, while comparing the preliminary and final results for several macroeconomic variables. As already mentioned in earlier sections, compared to advanced economies, the CCI data on Turkey have a smaller dataset. In this context, there is no data on consumer confidence in Turkey before January 2002. Bloomberg HT is the only available survey provider that allows us to access data on the preliminary releases of the CCI. Therefore, this thesis uses the monthly BHT CCI as a measure of sentiment due to the availability of survey data. The fundamental economic variables include the stock exchange (SEI), money supply (MS), exchange rate (ER), and unemployment rate (UN). The dataset for this study covers the period April 2010 to January 2023 with the exception of unemployment data which only available starting from January 2014.

Table 3 : Data Summary

Variable	Frequency	Converted into & Form	Time Period	Source
CCIF	Monthly	- , natural logarithms	April 2010 - January 2023	Bloomberg HT
CCIP	Monthly	- , natural logarithms	April 2010 - January 2023	Bloomberg HT
ER ($)	Daily	Monthly, natural logarithms	April 2010 - January 2023	CBRT
SEI (XU100.IS)	Daily	Monthly, natural logarithms	April 2010 - January 2023	Yahoo Finance BIST100
MS (M2)	Biweekly	Monthly, natural logarithms	April 2010 - January 2023	CBRT
UN	Monthly	-	January 2014 - January 2023	Turkstat

Table 3 briefly summarizes the required information for all the variables included. Exchange rate (ER) and money supply (MS) data are obtained from the CBRT's official website (https:// www.tcmb.gov.tr). The stock exchange index (SEI) is derived from the Yahoo Finance website (https://finance.yahoo.com). Finally, the unemployment rate variable is extracted from Turkish Statistical Institute website (https://www.tuik.gov.tr/). All fundamental variables and consumer confidence data series used in the econometric analysis are in natural logarithms. Moreover, all data are transformed into monthly data by taking the averages of the associated days for the exchange rate (ER) and stock exchange (SEI) and the associated weeks for the money supply (MS). The only exception is the unemployment rate, which is already in percentage form.

5.1.1 Descriptive Statistics

Before proceeding the empirical analysis, the descriptive statistics of the variables used in this thesis are presented in the Table 4. Furthermore, to observe the trends in each series over the time period of dataset, the series are also presented graphically. Figure 8 portrays how the values of variables fluctuate in related time.

Table 4: Descriptive Statistics of the Variables

	CCIF	CCIP	ER	MS	SEI
Mean	4.373	4.367	1.301	21.119	6.857
Median	4.363	4.372	1.103	20.983	6.738
Maximum	4.804	4.812	2.934	22.845	8.565
Minimum	3.813	3.737	0.357	20.044	6.266
Std. Dev.	-0.226	0.233	0.716	0.733	0.446
Skewness	-0.250	-0.270	0.659	0.574	1.655
Kurtosis	2.539	2.606	2.465	2.449	6.173
Jarque-Bera	2.972	2.873	13.002	10.404	134.985
Probability	0.226	0.237	0.001	0.005	0.000
Sum	673.586	672.610	200.487	3253.326	1056.094
Sum Sq. Dev.	7.925	8.362	78.459	82.414	30.451
Observations	154	154	154	154	154

Note: Variables computed in their natural logarithms.

In Figure 8 (see Appendix 3), it has shown the level values of the variables: ER, MS, SEI, CCIP, and CCIF. It can be seen that, overall while all the economic variables exhibit significant upward trends similar cyclical fluctuations, consumer confidence indices show a downward trend over time. Additionaly, it should be noted that the fluctuations in CCI are relatively higher compared to fundamental economic variables, as expected.

5.1.2. Limitations of the Study

In this thesis, empirical application focuses on the Turkish economy. While there are numerous studies in the consumer confidence literature that utilize variables such as exchange rates, stock exchanges, money supply, and unemployment, studies conducted specifically for emerging countries such as Turkey are rather limited. Furthermore, due to the absence of preliminary data for CCI in most countries, there is a gap in both Turkish and international literature in this regard. This study contributes to the literature in these two aspects.

At this point, it should be mentioned that data unavailability exists in CCIs, in addition to unemployment. The Turkish Consumer Confidence Index dataset began in January 2002. A larger dataset enables a wider range of information to be captured, with better results. The economic variables employed in the empirical analysis are published at different frequencies. This study includes these variables by converting them into monthly values. Another limitation is that although the methodology used is comprehensive and rich, it would be beneficial for future studies to utilize different methodologies in line with the data characteristics to examine the relationship in question.

5.2. Methodology

In this study, the data will be examined by frequency-domain analysis. The empirical study that will be carried out in this thesis will also include wavelet analysis in case there is a causal link between the variables and CCIs.

5.2.1. Frequency Domain Granger Causality

Time domain analysis provides average interactions over all frequencies; thus, the test may ignore the possibility that the strength and direction of Granger causality could change over different frequencies (Lemmens et al., 2007). As compared to time domain analysis, the superiority of frequency domain approach, or spectral analysis, is that it enables us to obtain more detailed information and a comprehensive picture of the interaction between variables and CCIs. Furthermore, frequency domain analysis decomposes causality over different frequencies; it allows us to focus on prominent frequencies and distinguish short-term and long-term impacts of components.

The decomposition of frequency domain-Granger causality testing was originally emphasized by Clive Granger in 1969. Geweke (1982, 1984) and Hosoya (1991) present several linear feedback measures in the frequency domain. The concept of causality shows how a variable can be used to forecast another variable one period ahead after controlling the past variable. In other words, if past variety in x (y) has an impact on current y (x), we say that x (y) granger causes and predicts the current value of y (x). After using a Fourier transformation to VAR (p) model, Geweke's linear feedback measure from y to x at frequency ω can be written as:

$$M_{y\to x}(w) = log\left[\frac{2\pi f_x(w)}{|\Psi_{11}(e^{-iw})|^2}\right] = log\left[1 + \frac{|\Psi_{12}(e^{-iw})|^2}{|\Psi_{11}(e^{-iw})|^2}\right]$$

The frequency domain-granger causality is not necessarily symmetric. Consequently, if both variables granger-causes each other, it can be concluded that there is a bidirectional causal relationship. Alternatively, if there is only feedback from one variable to another, it means that the relationship is unidirectional. If the condition $\left|\Psi_{12}(e^{-iw})\right|^2 = 0$ holds, then Geweke's linear feedback measure from *y (x)* to *x (y)* at frequency ω will be zero (this means that there is no Granger causality from *y* to *x* at frequency *ω*).

$$H_0 : M_{y\to x}(w) = 0$$

Geweke's spectral measure of linear feedback may be interpreted as a frequency domain Granger causality test. Nonetheless, implementing this test may be difficult due to the necessity of resorting to numerical differentiation or parametric bootstrapping. Based on the studies of Geweke (1982) and Hosoya (1991), Breitung and Candelon (2006) proposed a simpler approach to testing the null hypothesis with a standard F test for the following linear restrictions:

$$\sum_{k=1}^{p} \theta_{12,k} \cos(kw) = 0$$

$$\sum_{k=1}^{p} \theta_{12,k} \sin(kw) = 0$$

By reformulating these restrictions, to simplify it let $a_j = \theta_{11,j}$ and $b_j = \theta_{12,j}$, Breitung and Candelon (2006) evaluate this test in the VAR (p) equation:

$$x_t = a1x_{t-1} + ... + apx_{t-p} + b_1y_{t-1} + ... + b_py_{t-p} + e_{1t}$$

The null hypothesis of Geweke, $M_{y\to x}(w) = 0$ coincide with the null hypothesis of $H_0 : R(w)b = 0$ where $b = [b_1, ..., b_p]$ and

$$R(w) = \begin{bmatrix} cos(w) & cos(2w) & ... & cos(pw) \\ sin(w) & sin(2w) & ... & sin(pw) \end{bmatrix}$$

Since these linear restrictions are simpler, the standard F test can be used. This study uses Breitung and Candelon's (2006) version of Geweke's (1982) frequency domain Granger causality tests with %5 and 10% critical values. The Granger causality frequency domain for all frequencies ω in (0, π) are expressed as scale plots that involve two dimensions. The vertical axis represents the test statistics and the horizontal axis represents the frequencies. These frequencies can be converted to the periodicity of *P* years by $P = \pi / (2\omega)$[12]. In accordance with Yıldırım and Taştan (2012), Table 5 shows the main frequency bands used in this study, where *P* represents the period measured in months, and ω represents the frequency.

Table 5: Main Frequency Bands

Main Frequency Bands	**Range**	**Wavelengths**
Long-term	($\omega < 0{,}35$)	$18 \leq P$
Medium-term	($0.35 \leq \omega < 0.69$)	$9 \leq P < 18$
Short-term	($0.69 \leq \omega < \pi$)	$2 \leq P < 9$

Source: Adapted from Yıldırım and Taştan (2012)

[12] The period is defined as 2π/ω, inverse of the frequency $f \in (0, 1/2)$.

5.2.2 Wavelet Comovement Analysis

The Fourier transformation uses sine and cosine base functions of varying amplitudes and frequencies. Because the Fourier analysis assumes that the signals are stationary, there is no chance to observe changes in the signals over time. Hence, the limitations of the Fourier transform disregard all time-based information. Under this criticism, a windowed Fourier transform has been suggested as a new approach. This method divides signals into windows and performs the Fourier transform separately across all the data. Although the windowed or short-time Fourier transform performs a more localized analysis, the issue of a constant window width and time resolution remains. When a wider range of frequencies is used, the results may over-present high-frequency components and thus under-present low-frequency components. Consequently, the windowed Fourier transform is unable to provide decent resolution for all frequencies.

Compared to Fourier transforms, wavelet analysis is a recently developed mathematical tool that uses localized functions. The wavelet approach utilizes a basic function -the mother wavelet- and decomposes the signal in both frequency and time simultaneously (Khan et al., 2019; Gencay et al., 2001). Indeed, the time resolution is adjusted to the frequency with a widening window width "on low frequencies while a narrowing window width on high frequencies. Since it provides a more flexible method for time series analysis, wavelet analysis can be seen as a revised version of Fourier analysis.

Croux et al. (2001) demonstrate a dynamic measure of comovement and named as cohesion. Their study of cohesion is an effective approach for analyzing the dynamic properties at certain frequency bands. However, such an analysis does not take into account cases where the degree of comovement varies over time. To overcome this, Rua (2010) proposes a wavelet-based measure that allows one to assess the degree of comovement changes over time and across frequencies. Following Rua (2010), this thesis presents how the literature defines the wavelet transform mathematically. The growing and decaying wavelets are described as

$$\Psi_{\tau,s}(t) = \frac{1}{\sqrt{s}}\Psi\left(\frac{t-\tau}{s}\right), \qquad s, \tau \in \mathbb{R},\ s \neq 0$$

where τ denotes the time position of the wavelet (translation parameter), s reveals the scale (dilation parameter), which is inversely related to the frequency.

The expression $\frac{1}{\sqrt{s}}$ stands as a normalization factor to make sure that the wavelet transforms are analogous across scales and time series (Rua, 2010). The term $\Psi(t-\tau)$ refers to the range of wavelet being changed by τ factors to the right side, whereas the expression $\Psi(t/s)$ is expands its range by a multiplicative factor (Gencay et al., 2001).

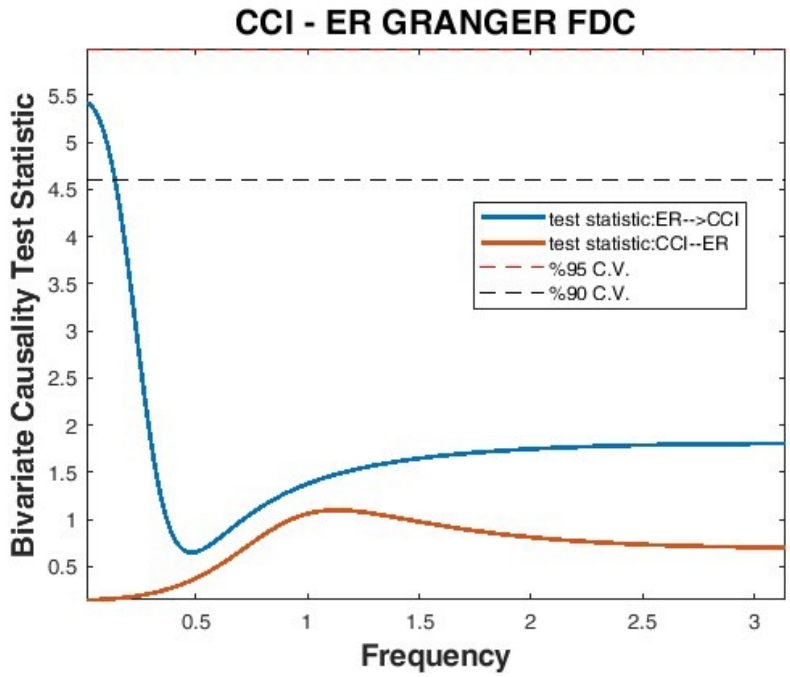
In a similar way to Croux et al. (2001), Rua (2010) proposes that the standard correlation coefficient and the dynamic correlation between two time series $P_{xy}(\tau, s)$ vary between -1 and 1. Since there is no test to measure the statistical significance of the correlation coefficients, this thesis assumes that any coefficient more than 0.75 is statistically significant (Çelik and Başdaş, 2011). The results are shown through a contour plot which involves three dimensions. The horizontal axis refers to the time period of 2010:4-2023:1 and the vertical axis indicates frequency bands which are measured time units, years. The third dimension of the contour plot is the gray scale which displays the strength of the comovement between time series and varying features of comovement. The darker areas in the grayscale correspond to a higher value of wavelet comovement (Rua, 2010).

6. EMPIRICAL FINDINGS

The following sections present the findings of the baseline model employed in the analysis, where monthly averages of economic variables are used and 3-lag is selected in the frequency domain analysis. All computations are done using MATLAB for both Granger causality in the frequency domain and wavelet-based comovement analysis.

6.1. Granger Causality in Frequency Domain

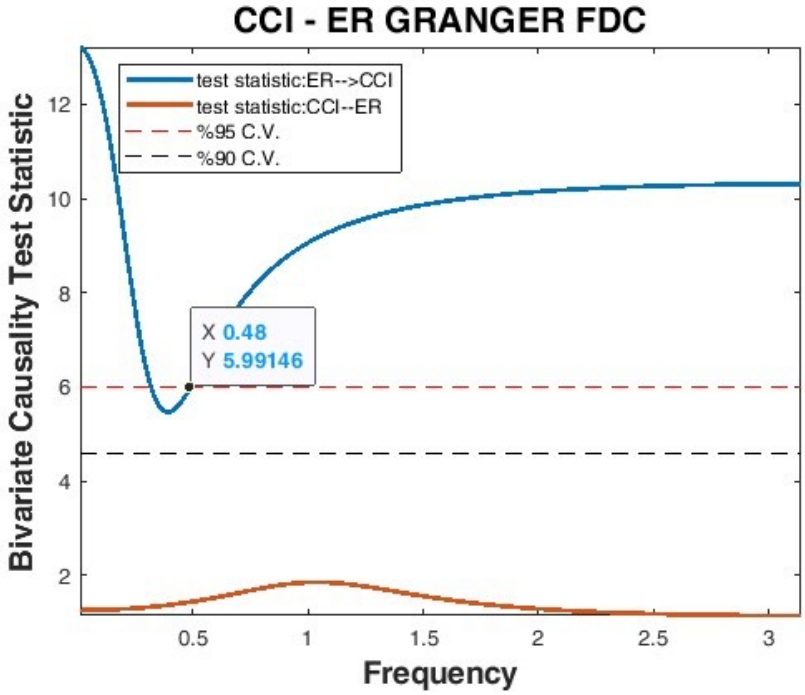
This thesis investigates whether the preliminary and final CCIs have predictive ability within self and other economic variables. This section presents the results employing the Granger Causality analysis in the frequency domain for all frequencies ω in (0,π). The frequency-domain Granger causality test results for the exchange rate, money supply, stock exchange, and CCIs are shown in Tables 6, 7, 8 and 9. First, it is conducted the bivariate analysis of the relationship between the final consumer confidence index and the exchange rate in the frequency domain. The results depicted in Graph 1 suggest that the exchange rate can predict the change in CCIF at frequencies lower than 0.16 at 10% significance level, approximately to wavelengths longer than 39 months.



Graph 1: Frequency Domain Granger Causality between the CCIF and ER

On the other hand, Graph 2 shows the exchange rate has a predictive ability for future CCIP for all frequencies except for ω ∈ [0.48,0.69], corresponding to between 9-13 months. The results suggest that the exchange rate is correlated with the preliminary and final consumer confidence indices in the long run (low

frequencies). However, the strength of the frequency domain–Granger causality in CCIF is much smaller at higher frequencies (short run).



Graph 2: Frequency Domain Granger Causality between the CCIP and ER

In contrast, the preliminary estimates of consumer confidence respond more quickly to exchange rate movements. As shown in Table 6, no causality exists between final release of consumer sentiment and the exchange rate in short and medium run.

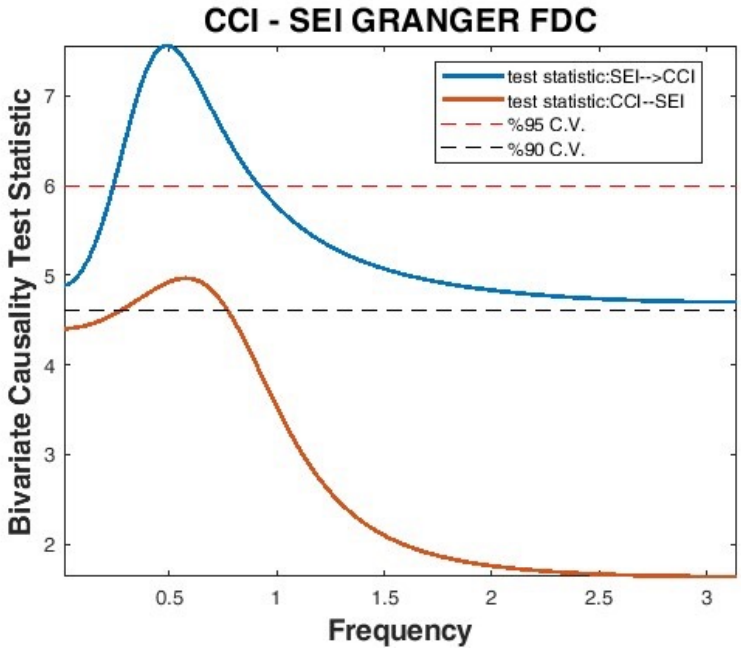
Table 6: Bivariate Frequency Domain Granger Causality Results for CCIs and ER

Variables		**Period**		
From	**To**	**Short Term** $(0.69 \leq \omega < \pi)$	**Medium Term** $(0.35 \leq \omega < 0.69)$	**Long Term** $(\omega < 0{,}35)$
Exhange Rate	CCIP	+	+	+
Exhange Rate	CCIF			+

Note: The "+" sign denotes the existence of a unidirectional relationship between variables.
Source: Author's calculations.

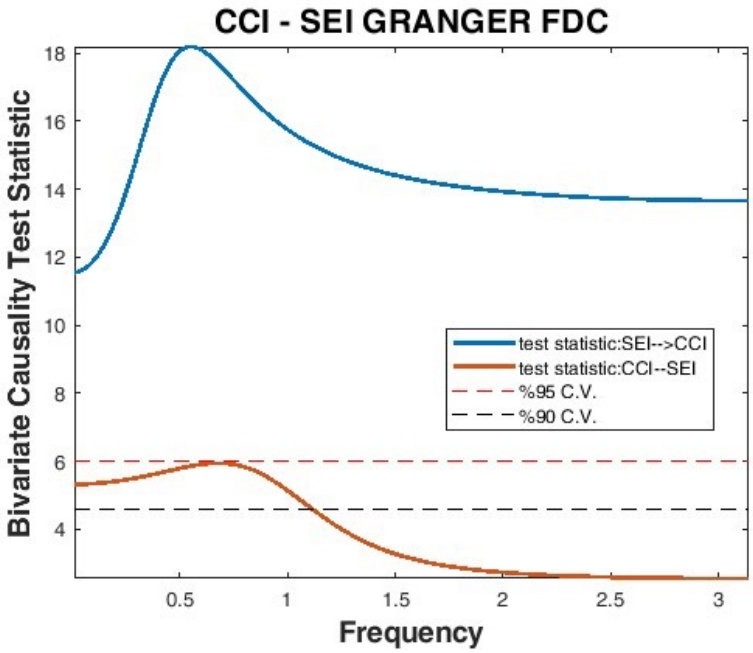
Table 7 demonstrates that the short-, medium-, and long-term causality results of the stock exchange and consumer confidence are statistically significant. Graph 3 suggests that stock exchange grangers cause CCIF

in the range $\omega \in [0.25,0.93]$ (corresponding to periodicities between 7 and 25 months), which includes short ($0.69 \leq \omega < \pi$), medium ($0.35 \leq \omega < 0.69$), and long run ($\omega < 0,35$) frequency bands.



Graph 3: Frequency Domain Granger Causality between the CCIF and SEI

As shown in Graph 4, a similar picture emerges for the relationship between CCIP and SEI. The only difference is that causality from SEI to CCIP is significant at all frequencies. Thus, Graph 4 implies that the stock exchange has a significant predictive ability on the preliminary consumer confidence index. As compared to other variables, it seemed that there is also significant feedback with direction from CCIP to SEI at the frequencies around the range $\omega \in [0.62,0.74]$ at 5% and $\omega \in [0,1.12]$ at 10% significance level.



Graph 4: Frequency Domain Granger Causality between the CCIP and SEI

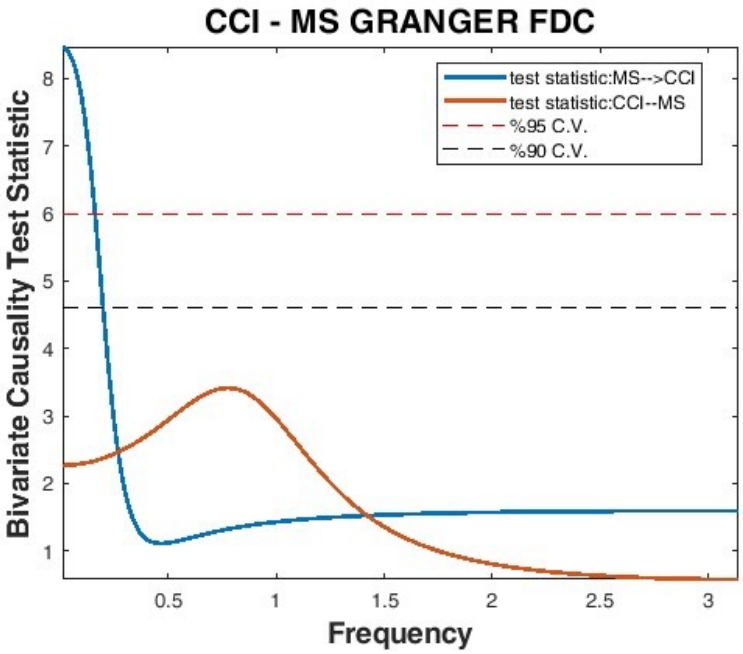
The detected bidirectional causality between CCIP and SEI corresponds to the medium- and long-term frequencies.

Table 7: Bivariate Frequency Domain Granger Causality Results for CCIs and SEI

Variables		**Period**		
From	**To**	**Short Term** ($0.69 \leq \omega < \pi$)	**Medium Term** ($0.35 \leq \omega < 0.69$)	**Long Term** ($\omega < 0{,}35$)
Stock Exchange Index	CCIP	+	+	+
Stock Exchange Index	CCIF	+	+	+
CCIP	Stock Exchange Index	+		

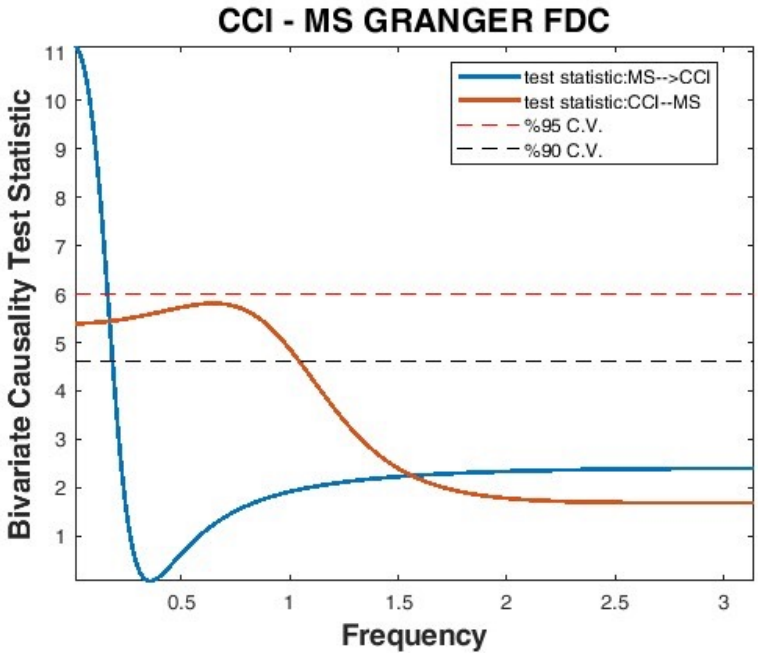
Note: The "+" sign denotes the existence of a unidirectional relationship between variables.
Source: Author's calculations.

As shown in Table 8 and Graph 5, it is observed that the money supply contains some future information about CCIF at lower frequencies around $0 < \omega < 0.20$ (periods longer than 31 months). This suggests that MS Granger causes CCIF in the long run. However, there is no feedback from CCIF to MS across all frequencies.



Graph 5: Frequency Domain Granger Causality between the CCIF and MS

The relationship between MS and CCIP in the long term is quite similar to the earlier case: there is significant feedback from MS to CCIP at lower frequencies around $0 < \omega < 0.16$ (periodicities longer than 39 months), but no feedback from CCIP to MS at 5% significance level.



Graph 6: Frequency Domain Granger Causality between the CCIP and MS

As shown in Graph 6, the degree of feedback from CCIP to MS is relatively strong; CCIP causes MS at both low and high frequencies at 10% significance level. As mentioned before, money supply has predictive ability for both final and preliminary consumer confidence indices in the medium and long term.

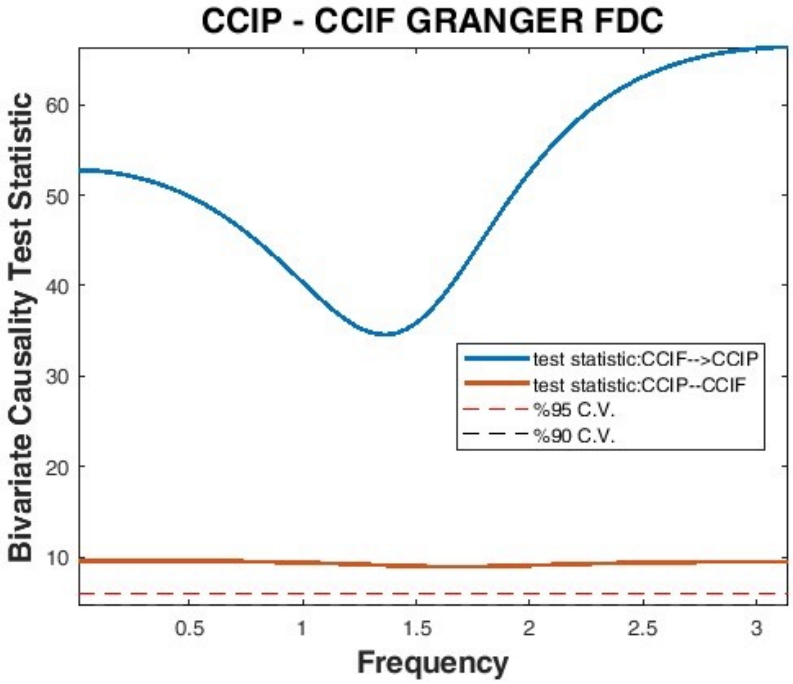
Table 8: Bivariate Frequency Domain Granger Causality Results for CCIs and MS

Variables		**Period**		
From	**To**	**Short Term** $(0.69 \leq \omega < \pi)$	**Medium Term** $(0.35 \leq \omega < 0.69)$	**Long Term** $(\omega < 0{,}35)$
Money Supply	CCIP			+
Money Supply	CCIF			+

Note: The "+" sign denotes the existence of a unidirectional relationship between variables.
Source: Author's calculations.

The results obtained from the frequency domain Granger causality tests shown in Graphs 7 and 8 (see Appendix 1), there is no significant relationship between unemployment and the consumer confidence index at any frequency.

Graph 9 demonstrates that the causalities between CCIF and CCIP are bidirectional across all the frequencies. The statistically significant frequency domain causalities between CCIF and CCIP indicate that both preliminary and final consumer sentiments contain predictive power for each other.



Graph 9: Frequency Domain Granger Causality between the CCIP and CCIF

As can be seen in Table 9, there is a highly significant feedback from CCIP to CCIF. In this sense, the degree of association is considerably higher

Table 9: Bivariate Frequency Domain Granger Causality Results for CCIs

Variables		**Period**		
From	**To**	**Short Term** $(0.69 \leq \omega < \pi)$	**Medium Term** $(0.35 \leq \omega < 0.69)$	**Long Term** $(\omega < 0{,}35)$
CCIP	CCIF	+	+	+
CCIF	CCIP	+	+	+

Note: The "+" sign denotes the existence of a unidirectional relationship between variables.
Source: Author's calculations.

The analysis so far suggests that computing only with spectral tools may not be adequate to understand the relationship between consumer confidence and economic fundamentals. To explore this further, this research captures a wavelet-based comovement analysis between the preliminary and final versions of the consumer confidence index and macroeconomic variables.

6.2. Wavelet-Based Comovement Analysis

As already mentioned, the superiority of this method is that by presenting the contour plots in the form of frequency over a certain time interval, one can identify where time series co-move and how the strength of comovement vary across frequencies (Rua, 2010).

Figure 3 includes the wavelet comovement analysis between the preliminary-final results of the consumer confidence index and the exchange rate for the full sample period. CCIP is shown to have a negative comovement with the exchange rate at 18 months or more, whereas negative comovements occur during 2014–2016 and 2018–2021 in the short run. Hence, the comovement between the final-preliminary release of the consumer confidence index and the exchange rate presents a similar comovement pattern. Figure 3 depicts that while the long-run positive comovement between CCI and ER is significant at 18 months or more before 2015, the correlation suddenly seems to be significant, however weaker, after 2015. These results empirically validate the existence of a significant comovement between the consumer confidence index and the exchange rate. According to both figures, which contain preliminary and final results of CCI, there has been a significant negative comovement between CCI and ER in the short run (approximately three to seven months) for the period 2018–2021.

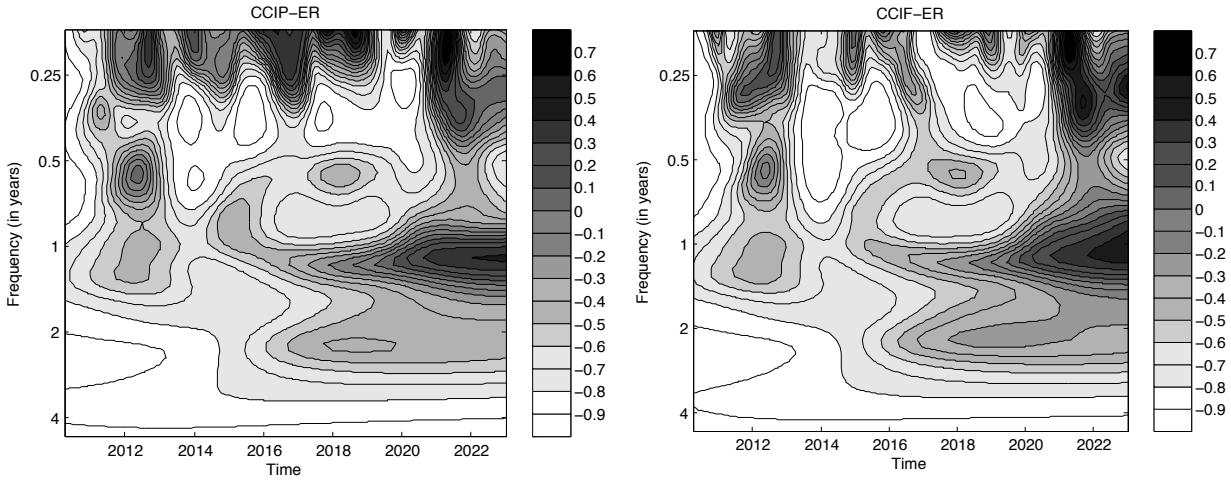


Figure 3: Wavelet Comovement between exchange rate and consumer confidence indices

Figure 4 presents the wavelet-based comovement analysis of the stock exchange and consumer confidence indices. It is found that there are positive comovements at higher frequencies range. In the short and medium run, covering periods of less than two years, it is observed that the relationship between the stock exchange and consumer confidence indices is rather mixed. Figure 4 represents all

types of fluctuations for shorter horizons (less than three months). There is a positive comovement between SEI and CCIP for longer terms than four years. Although some statistically significant specifications are in the medium term for SEI and CCIs, the level of significance is not stable alongside for the full sample period. Through the analysis, comovements between the index (both preliminary and final) and SEI tend to show similar comovement patterns. In contrast to the CCIP results, a significant high-frequency correlation between CCIF and SEI is stronger around the 2014–2016 period.

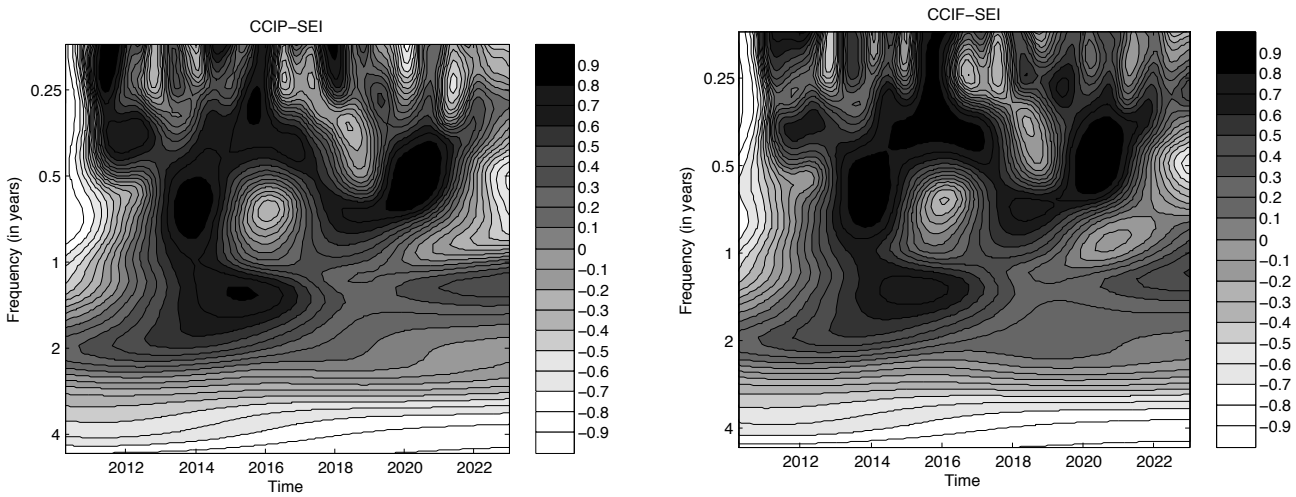


Figure 4: Wavelet Comovement between stock exchange index and consumer confidence indices

Some findings emerge through an overview of wavelet comovement analysis between consumer confidence indices and money supply. Figure 5 displays the negative comovement between MS and CCIP at two years or more. Even though there is a positive comovement in horizons shorter than four months, the negative comovement between CCIP and MS is particularly high between the range of to 3-9 months around the 2014-2021 period. Figure 5 (right) exhibits the final consumer confidence index and the money supply comovement results. Similarly, there is a strong negative comovement at low frequencies, two years or more, whereas the comovement in to 3-9 months between the range of 2014-2020 is relatively weaker for shorter terms.

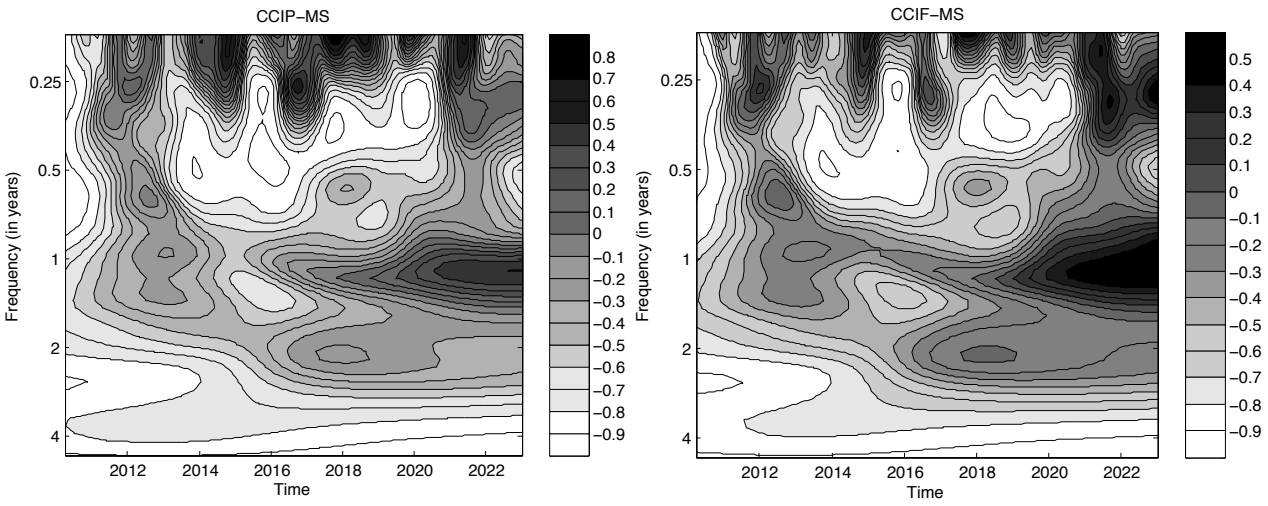


Figure 5: Wavelet Comovement between money supply and consumer confidence indices

In figure 6, the results obtained with wavelet analysis for CCIP and CCIF are presented. There is a highly significant correlation, positive comovement, between the preliminary and final versions of CCI almost all over the chart for the entire sample period. This finding provides evidence that the reflecting fact that preliminary results of CCI accurately estimate the final consumer confidence.

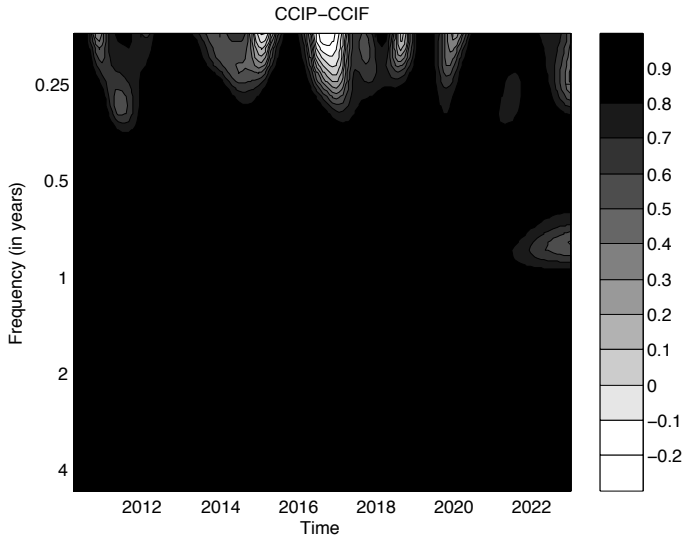


Figure 6: Wavelet Comovement between preliminary CCI and final CCI

6.3. Economic Interpretation of Results

To summarize all the results obtain from the analysis in earlier sections, first of all, this study investigates the causality between macroeconomic variables and both the preliminary and final releases of the Consumer Confidence Index using the frequency domain Granger causality method. Then, the comovement between these variables and the confidence index demonstrated using the wavelet analysis method. Additionally, causality and comovement are measured between the

preliminary and final data as well. Table 10 presents the summary of results from both econometric analyses.

Table 10: Summary of Empirical Results

Variables	Frequency Domain Analysis	Wavelet Comovement
CCIP-ER	Significant causality from ER to CCIP at all frequencies	Significant negative comovement between variables in the short and long run.
CCIF-ER	Significant causality from ER to CCIF at lower frequencies	Significant negative comovement between variables in the short and long run.
CCIP-MS	Significant causality from MS to CCIP at lower frequencies	Significant negative comovement between variables in the short and long run.
CCIF-MS	Significant causality from MS to CCIF at lower frequencies	Significant negative comovement between variables in the short and long run.
CCIP-SEI	Significant causality from SEI to CCIP at all frequencies, from CCIP to SEI at higher frequencies.	Significant positive comovement between variables in short, med- and long run.
CCIF-SEI	Significant causality from SEI to CCIF at all frequencies,	Significant positive comovement between variables in short, med- and long run.
CCIP-UN	No significant causality between variables at any frequency	Significant positive comovement in medium run wheares negative comovement occurs in longer horizons
CCIF-UN	No significant causality between variables at any frequency	Significant positive comovement in medium run wheares negative comovement occurs in longer horizons
CCIP-CCIF	Significant bidirectional feedback between variables at all frequencies,	Highly significant positive comovement between variables.

Consistent with the literature precedent, it is indicated that exchange rate and CCI are correlated for both CCIP and CCIF. Negative and significant comovement between ER and CCIs leads one to believe that Turkish consumers lose their confidence as the exchange rate rises; purchasing power declines. Declining purchasing power creates pessimistic sentiments and negatively reflects consumer

behavior. To expound further on the preceding statement, the import costs of goods and services also increase when the exchange rate rises. This reflects higher consumer prices, inflation, and potentially constrained consumer spending, which decreases consumer confidence. Considering the significance of the frequency domain results between ER and CCIs in a comparative manner, it can be concluded that respondents may not closely follow fluctuations in exchange rates on a day-to-day basis. Moreover, the index cannot provide data on consumers' daily responses to daily changes in exchange rates. In this context, considering that price increases for goods and services often occur at the beginning of the month, the impact of exchange rates is more substantial in interviews conducted at the beginning of the month, notably during the preliminary period. This structural relationship may explain the long-run negative comovement in the CCI-ER wavelet results. Following the significant depreciation of the exchange rate in 2018, consumer expectations may be more pessimistic; therefore, consumer confidence declines. As a result, the comovement between variables may have a more substantial effect. This explains the stronger negative comovement between ER and CCIs around 2018-2021.

The findings emerged from frequency domain analysis between SEI and CCIs confirm that the consumer confidence index is forecasted by the stock exchange index and may predict future shocks (movements) in the stock market. According to the findings by Jansen and Nahuis (2003), the linkage between the stock market and consumer confidence is shaped more by expectations about the general economic outlook rather than personal finances. The relationship between CCIs and SEI may be examined based on the third and fifth questions. While the third question is based on economy-wide expectations, the fifth question focuses on expectations regarding household finances. The results reveal that there is a partially bidirectional feedback between the SEI and CCIs. Both CCIP and CCIF are affected by the changes in SEI; however, the effects of the changes in consumer confidence indices on SEI are not as strong as the impact of SEI shocks on consumer confidence indices. These findings support the earlier studies of Çelik (2010), Görmüş and Güneş (2010), Topuz (2011), Kale and Akkaya (2015), Koy and Akkaya (2017), Çağlı (2019). The relevant literature argues for three ways in which changes in SEI could affect consumer confidence. Except for Tobin's Q theory, this relationship is assumed to be directly related to the traditional wealth effect. Rising stock markets mean higher wealth, and thus, more optimistic consumers. On the other hand, economic agents may perceive higher stock prices as signals of a more favorable state of the economy in the future. Therefore, this leads them to spend more. The "leading indicator" mechanism provides a channel through equity prices and its impacts on consumer behavior regardless of whether consumers are involved in the stock market or not (Jansen and Nahuis, 2003). The positive comovement between SEI and CCIs could be attributed to various factors. These are the expectations of higher wages due to increased company profits, higher welfare through increased economic growth, new employment opportunities, and earnings from investing in the stock market.

The results obtained from both the frequency domain and wavelet-based comovement analysis show an economically meaningful and statistically significant response from money supply to consumer confidence in the long run. The results on the relationship between MS and CCIs may be attributed to expansionary movements in money supply, which stimulate the economy and increase consumer confidence. However, this may be related to the direct impact of inflationary pressures on consumer sentiment in the long term, especially in developing countries such as Turkey. At 10% significance level, the significant causality from CCIP to MS may be explained by increasing consumer spending at higher consumer confidence levels, leading to an increase in demand for money, and hence, money supply. The construction of the third question of the BHT index focuses on how the current economic conditions of Turkey have changed, interpreting that the impact of money supply on CCI is measured through the current state of the economy compared to the previous year. In this context, price inflation may explain this relationship. People may not closely follow monetary changes, which involve direct decisions of CBRT that affect money demand by lowering or raising short-term interest rates. While the analysis results demonstrate a significant long-term relationship, weaker results are obtained in the short term. This is probably the result of money illusion. Consumers may focus on nominal changes in MS and strive to accurately evaluate changes in their real purchasing power. This prevents them from perceiving the decrease in real income despite positive nominal changes. This leads to deceptive assessments regarding the perception of the effects of inflation in the short term. At this point, it is important to highlight that Figures 3, 4 and 5 show the wavelets that differ from the overall trend of the figures beginning in early 2020. This may be attributed to the Covid-19 pandemic being an independent shock. As this can be considered an externality and disrupts the link between variables, it may be disregarded.

The results obtained from the wavelet analysis show that the comovement (See Figure 7 in Appendix 1) between unemployment and CCIs is mixed. This may be related to the fact that the unemployment rate is typically considered a more long-term related indicator of economic cycles. In contrast, the Consumer Confidence Index is a variable that is more sensitive to short-term fluctuations. Therefore, it may not be expected that changes in the CCI directly and immediately affect the unemployment rate (or vice versa); thus, the time lag may be the reason for the insignificant relationship. Moreover, since the relationship between the variables is expected to emerge in the long run, data unavailability may also be the reason for an insignificant causal link.Consistent with the literature, the preliminary consumer confidence results are reliable estimates of the final monthly results, even in smaller sample sizes (Curtin, 2002). Both the frequency domain and wavelet analysis results reveal that, despite the smaller sample size of the preliminary release, it provides as highly accurate results as the final releases and, in some cases, even more significant results. Furthermore, the preliminary release of CCI shows a high level of predictability for the final release. Based on the findings concluded, it can be inferred that consumers not only rely on the month-end data for selected

economic variables but also track the preliminary data released during the period when making decisions.

6.4. Interpretations of Alternative Results

Regarding empirical strategies, this study takes advantage of Granger causality in the frequency domain and wavelet-based comovement analysis to investigate the link between preliminary and final consumer confidence indices and their relationship with fundamental economic variables. This thesis uses monthly averages of economic variables with a selection of three lags. Alternatively, it is conducted an analysis using 15-day averages of economic variables (see Appendix 2); however, it is observed that the analysis based on monthly averages provides more statistically significant results. Although both 2- and 3-lags were examined during the frequency domain analysis, findings show that analysis with a 3-lag length yields more meaningful and optimal outcomes. Due to the statistical significance of the results emerged from the frequency domain analysis conducted using overall data, the wavelet analysis is continued using monthly average data for economic fundamentals.

The results of the frequency domain decomposition of the Granger causality analysis based on the 15-day averages are shown in the Appendix. The findings indicate that similar to earlier results, there is significant unidirectional causality from ER to CCIF in the long run (See Graph 10). Additionally, there is a unidirectional predictive relationship between MS and CCIF (See Graph 14) in the long term. Again, comparing the main results, the trends of the relationship is quite similar. However, the depicted results from the alternative analysis suggest that there is no statistically significant feedback from SEI to CCIF (See Graph 12) , with even lower significance at 10% significance level. Regarding the analysis conducted on the preliminary data, this study obtained slightly different results. It is obvious that the degree of association between economic variables and CCIP is significantly higher in the main results using monthly averages for fundamentals. Feedback from the ER to the CCIP only emerges at very high and low frequencies. As shown in the earlier sections, the feedback from CCIP to MS (See Graph 15) is insignificant in the alternative analysis. Moreover, the link between SEI and CCIP becomes insignificant at 5% significance level and quite weak at 10% significance level in the alternative frequency domain analysis. The main differences frequency analysis emerge using preliminary data analysis of both overall and alternative, biweekly, data.

7. CONCLUSIONS

This thesis' primary objective is to examine the interactions between selected economic variables, namely, exchange rate, stock exchange index, money supply, unemployment, and both preliminary mid-month and final month-end releases of the consumer confidence index in Turkey for the period 2010:04–2023:01 based on Bloomberg HT data. In addition to a recent version of the causality test of Geweke's in the frequency domain decomposition of the Granger causality formulated by Breitung and Candelon (2006), this thesis employs wavelet-based comovement analysis to show the predictive ability of preliminary and final consumer confidence indices.

Some of the key points from the empirical analysis are as follows: First, at lower frequencies, causality from the exchange rate to CCIs demonstrates that consumers are affected by the volatility of the Turkish Lira and that there is a significant negative comovement between the exchange rate and CCIs. The recent history of the Turkish Lira (TL) shows its volatility and dependency on foreign currencies. The concept of exchange rates in Turkey is closely associated with the notion of confidence due to past societal experiences. Therefore, a high exchange rate does not have a positive perception in the minds of Turkish households. In this context, the findings align well with what is expected. Empirical findings indicate that unemployment has no causal effect on CCIs, whereas the outcomes of the wavelet comovement analysis show the presence of a negative relationship between unemployment and CCIs. However, it should be noted that positive comovement is observed at specific periods as a result of the deterioration in relationships caused by the COVID-19 pandemic for all economic variables. Another noteworthy aspect is that presence of substantial feedback from the stock market to both the preliminary and final verisons of the CCI across all frequencies. Indeed, causality running from the preliminary CCI to the stock exchange is observed. Moreover, significant positive comovement supports a priori expectations about the stock exchange and CCIs. The last but not least, findings reveal that the only significant causality from MS to CCIs is observed at lower frequencies. Interestingly, similar to the stock exchange, money supply is also caused by preliminary estimates of CCI at both low and high frequencies. Thus, when households feel more optimistic about the current and future economic outlook, it is possible to observe an increase in demand for money and, hence, the money supply. The comovement between variables is mixed in nature. However, it is possible to interpret the positive comovement between money supply and CCIs at certain wavelets. At this point, it can be argued that the preliminary CCI results have the ability to shape consumers' expectations for forthcoming periods.

The mid-month preliminary results of consumer confidence are simply an attempt to provide an early indication of the overall data for the associated month. The nature of causality and comovement between types of consumer confidence indices are substantial. The findings demonstrate that the link between CCI and economic variables based on preliminary mid-month releases is as accurate as that based on the final releases. In fact, despite the smaller sample size of the preliminary mid-month release, in some cases, it provides even more significant results and affects other economic variables.

Initially, the purpose of this thesis is to examine the relationship between economic variables and CCI, particularly to demonstrate the strength of the preliminary release of CCI. For this purpose, an initial analysis was conducted using biweekly data on the economic fundamentals. However, it is observed that the analysis based on monthly averages provides more statistically significant results. In other words, longer horizons in economic variables presents more optimal results regarding consumer reactions. Households may monitor preliminary releases of the CCI as well as final figures, but they follow up monthly figures of fundamental economic variables. Essentially, different time frequencies can yield varying results, because the consumer confidence indicator is shaped by consumer behavior.

The differences observed in the significance of the results derived from the dataset adjusted through two different frequencies. It demonstrate that the relationship between CCI and economic variables shows various dynamic characteristics across different scenarios. At this point, it should be considered that alternative analysis can also yield significant results with a different respondent group. As the respondents are interviewed by telephone, the survey provider does not have information about their locations during the survey. However, consumers gather information from various locations and their responses may be affected by the places and situations they are in. For instance, if individuals exchange currency, shop, or engage in stock market transactions, it is possible for them to change their decisions. As a result, individual responses may depend on mood switches triggered by their location. Additionally, individual responses may be affected by factors rather than location, such as the time period in which individuals are in, for example, the interviews can coincide the payday or day of a price increase. This leads consumers to change their responses. In a manner of time; although interviews are conducted within business hours, considering a month, this thesis offers a new time constraint by adding preliminary CCI in the analysis at least for 15 days. Both analyses used in this thesis consider the preliminary and overall time horizons. In this context, the utilization of preliminary data collected from different time intervals could potentially contribute to unveiling the presence of non-linear asymmetry.

In addition to the consumer side of the relationship, it is also essential to emphasize the importance of confidence in the level of production. In Turkey, approximately 99% of enterprises are small and medium-sized[13]. These enterprises often operate with a borrowing and fund-dependent production

[13] For detailed information see https://www.kosgeb.gov.tr/.

structure due to capital constraints. This leads to an even more competitive market environment for firms. Thus having developed entrepreneurial skills, following animal spirits, which can provide an advantage in anticipating the mood of consumers because it captures general market information (Deniz, 2014). To sum up, empirical results have shown that the selected main economic variables affect consumer confidence, which measures an individual's mood. Therefore, one can conclude that it provides clear information as an indicator capable of predicting demand and the future path of the economy. This thesis concludes that it is crucial for policymakers, researchers, economists, and the media to monitor CCIs and economic variables included in the analysis that contain leading information.

The methodology used in this study is relatively new, and there is an issue of data unavailability due to a smaller dataset compared to advanced countries for CCIs in Turkey. However, to the best of our knowledge, this thesis is the first to empirically test the role of preliminary CCI figures on economic variables. In this regard, this thesis makes a specific contribution to the consumer confidence literature. Further research could examine preliminary data using other econometric tools, such as forecasting analysis or searching for structural breaks in associated periods, while including other dynamic macroeconomic indicators. As more confidence data accumulates, there will be growing opportunities to work on further topics.

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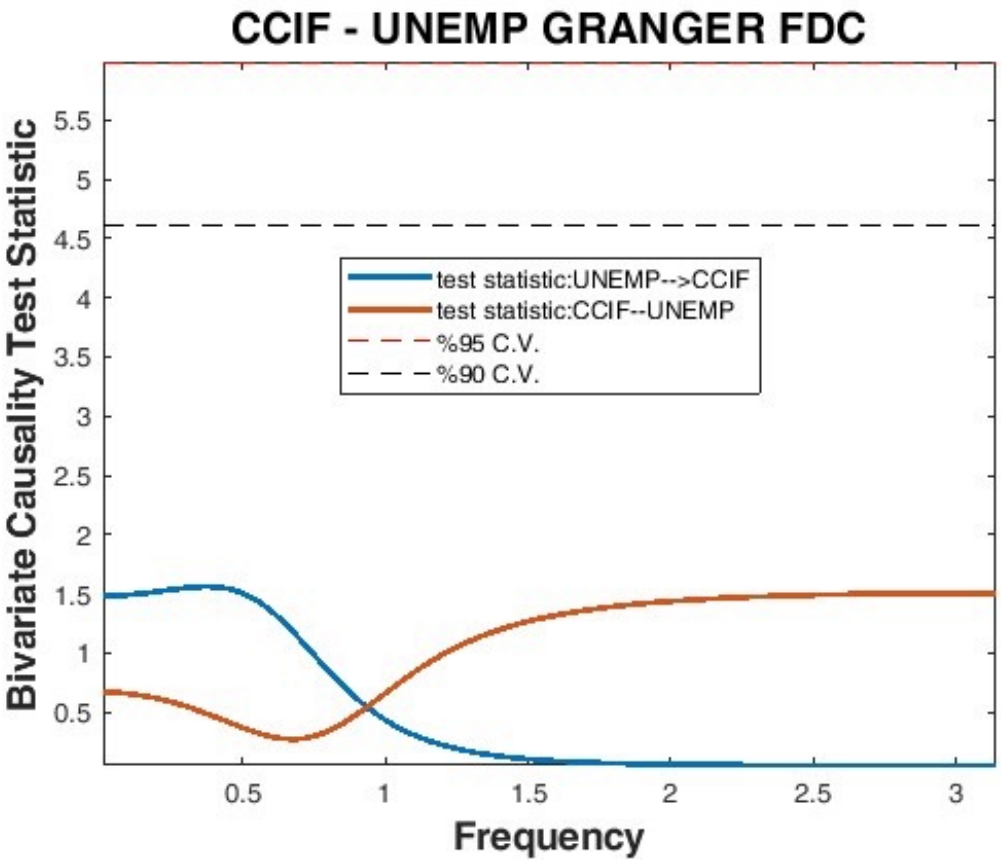
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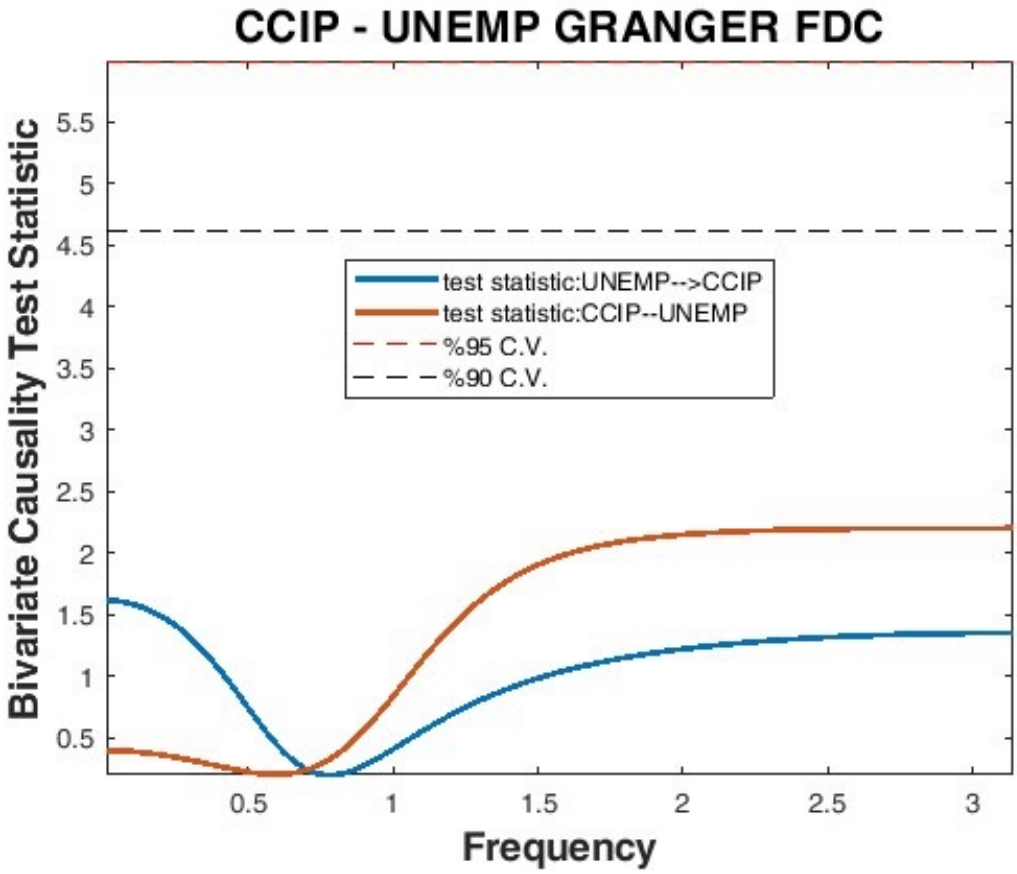
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APPENDIX

Appendix 1: Frequency Domain Granger Causality Graphs for Unemployment and CCIs

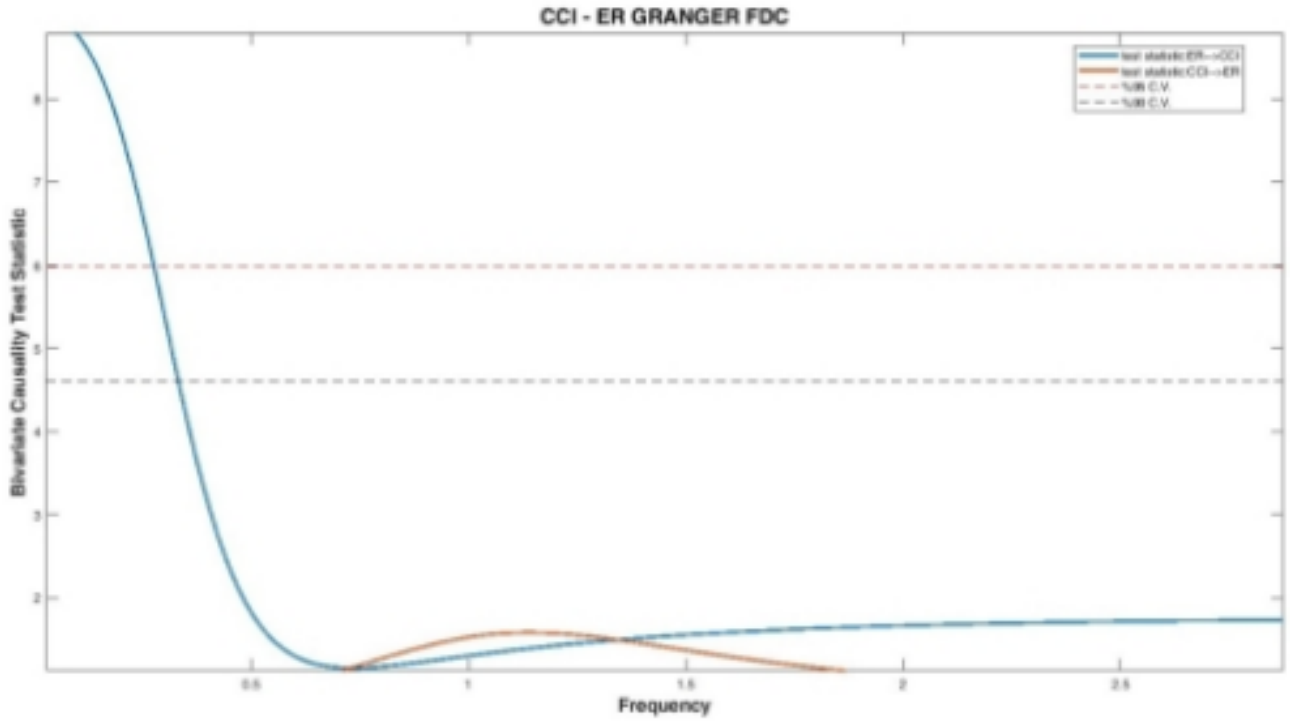


Graph 7: Frequency Domain Granger Causality between the CCIF and UN

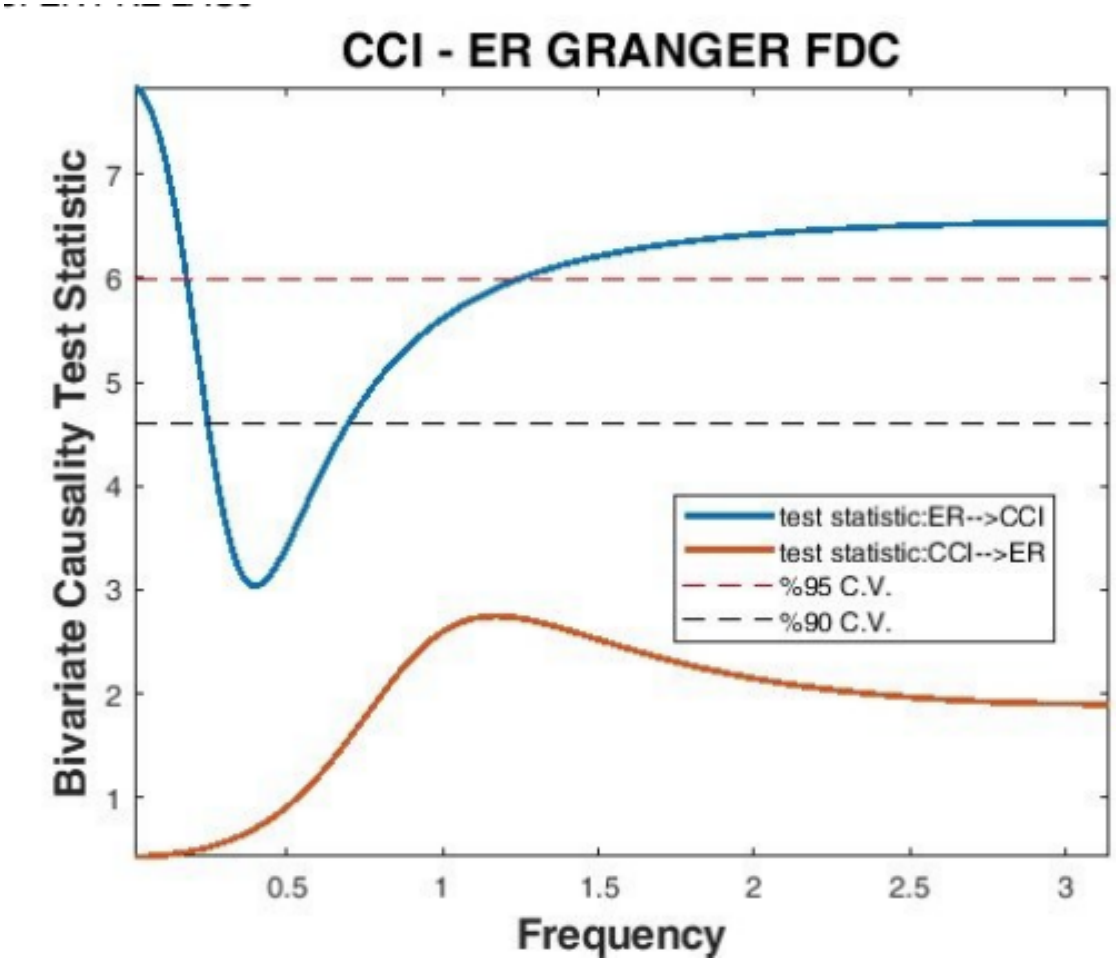


Graph 8: Frequency Domain Granger Causality between the CCIP and UN

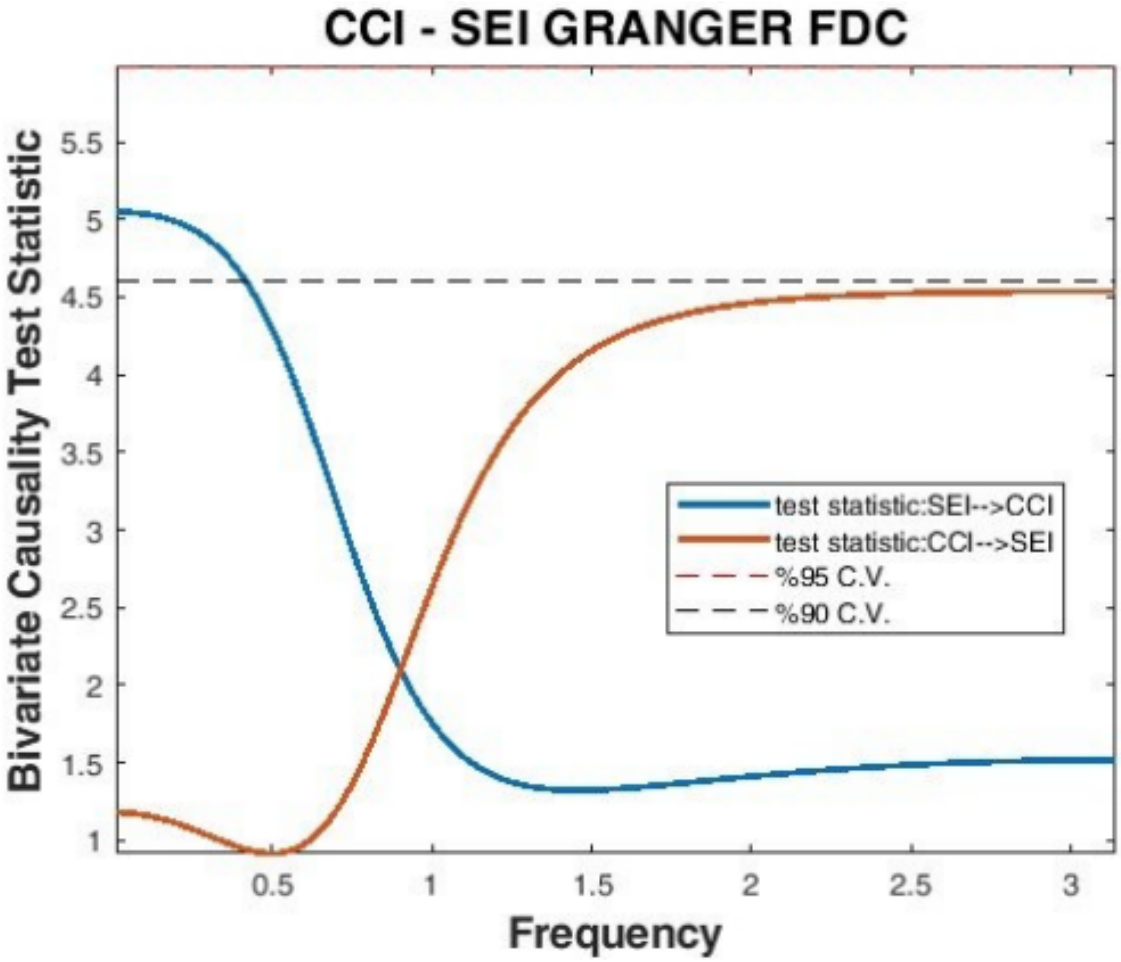
Appendix 2: Frequency Domain Granger Causality Graphs for Alternative Analysis



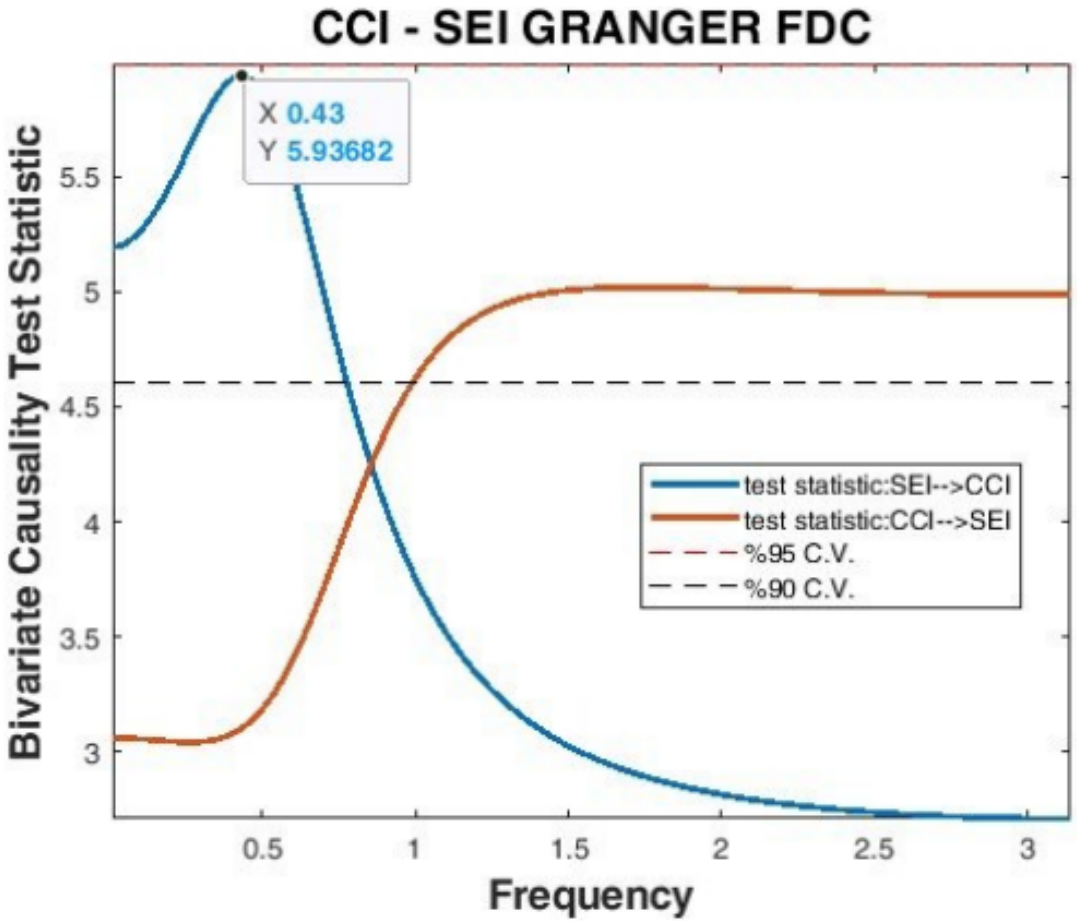
Graph 10: Alternative Frequency Domain Granger Causality between the CCIF and ER



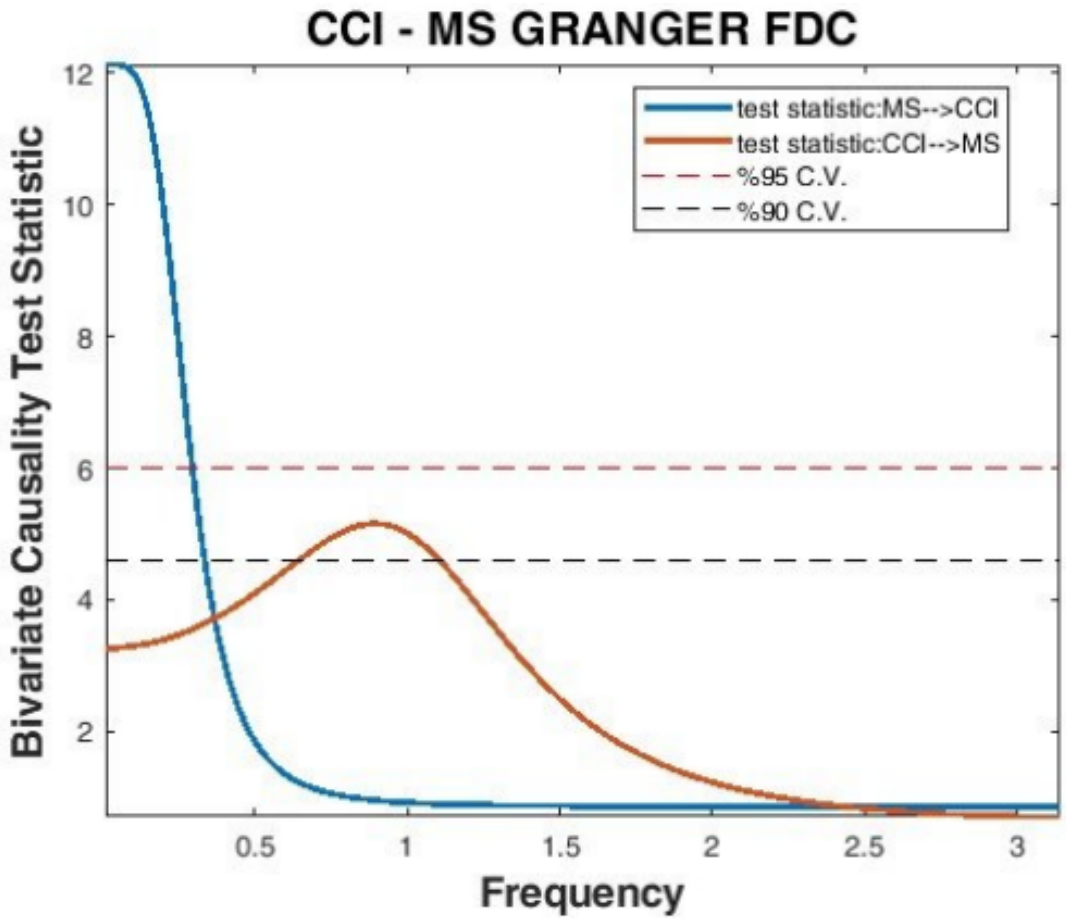
Graph 11: Alternative Frequency Domain Granger Causality between the CCIP and ER



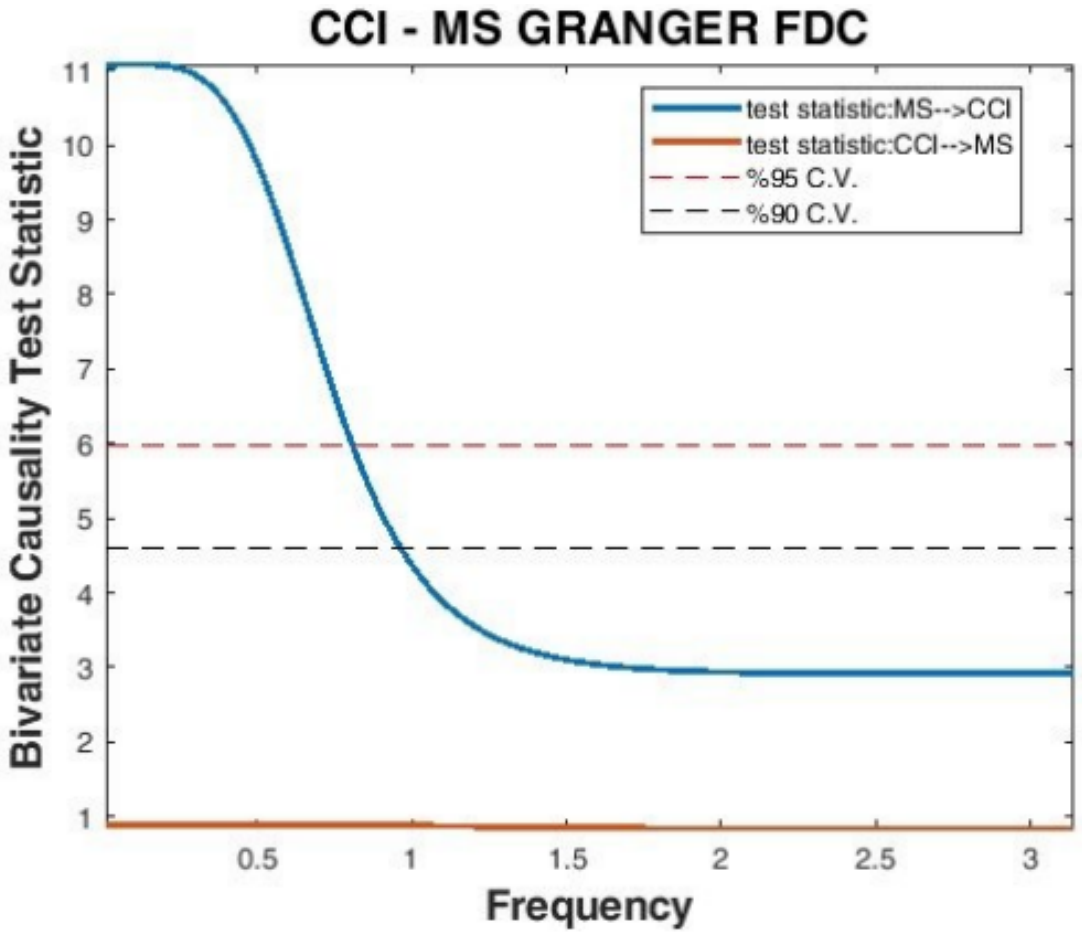
Graph 12: Alternative Frequency Domain Granger Causality between the CCIF and SEI



Graph 13: Alternative Frequency Domain Granger Causality between the CCIP and SEI



Graph 14: Alternative Frequency Domain Granger Causality between the CCIF and MS



Graph 15: Alternative Frequency Domain Granger Causality between the CCIP and MS

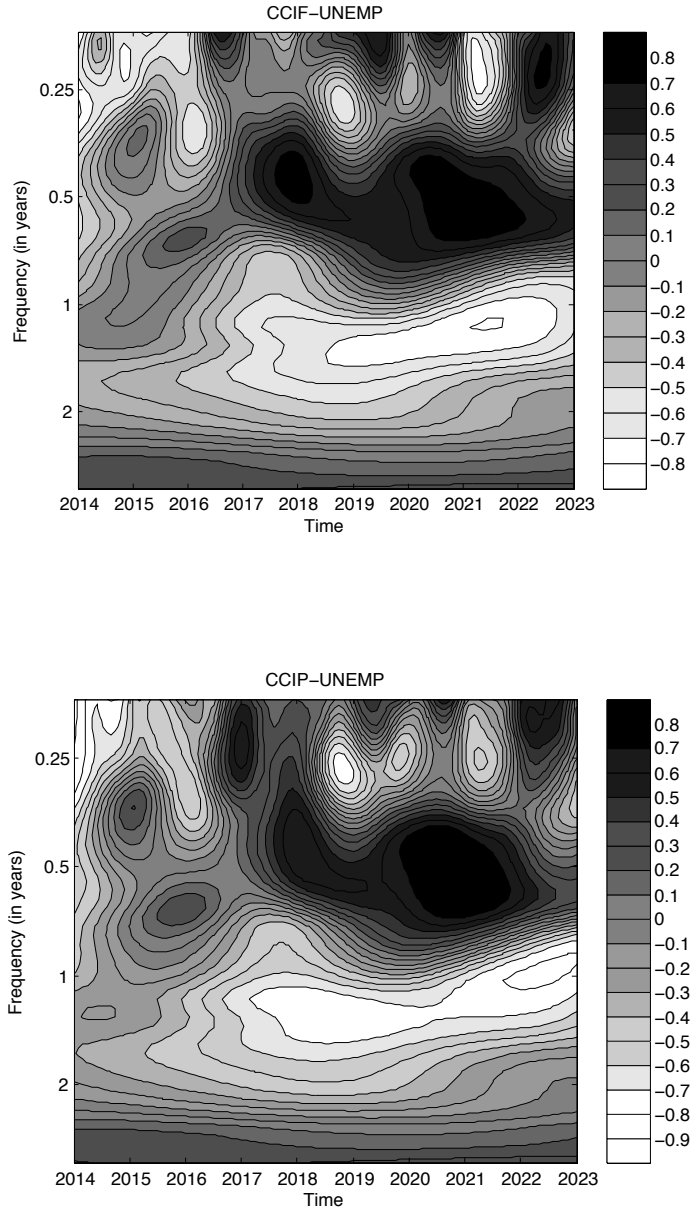


Figure 7: Wavelet Comovement between Unemployment and CCIs

Appendix 3: Further Descriptive Statistics

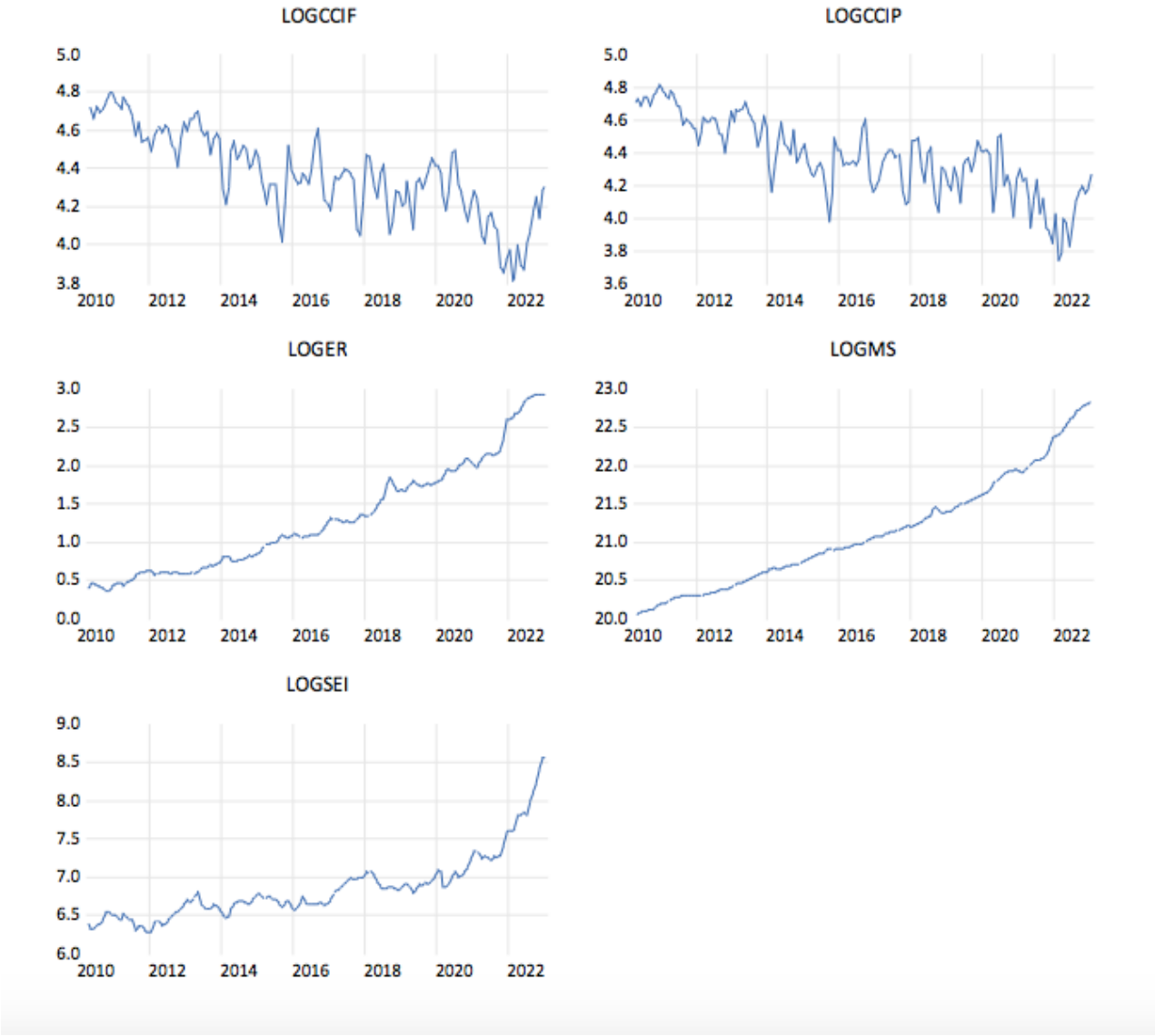


Figure 8: Timeline Graphs of variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
LOGER	-0.113	0.146	-0.777	0.438	
LOGMS	-0.299	0.150	-1.989	0.048	
LOGSEI	0.275	0.061	4.485	0.000	
C	8.946	2.873	3.113	0.002	
R-squared	0.687	**Mean dependent var**	4.367	**Schwarz criterion**	-1.109
Adjusted R-squared	0.681	**S.D. dependent var**	0.233	**Hannan-Quin criterion**	-1.156
S.E. of regression	0.131	**Akaike info criterion**	-1.188	**Durbin-Watson stat.**	0.736
Sum squared resid	2.609	**Log likelihood**	95.483		
Prob.(F-statistic)	0.000	**F-statistic**	110.254		

Table 11: Regression Results for CCIP

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
LOGER	-0.127	0.138	-0.919	0.359	
LOGMS	-0.285	0.142	-2.005	0.046	
LOGSEI	0.283	0.058	4.872	0.000	
C	8.631	2.722	3.170	0.001	
R-squared	0.704	**Mean dependent var**	4.373	**Schwarz criterion**	-1.217
Adjusted R-squared	0.698	**S.D. dependent var**	0.237	**Hannan-Quin criterion**	-1.264
S.E. of regression	0.124	**Akaike info criterion**	-1.296	**Durbin-Watson stat.**	0.503
Sum squared resid	2.341	**Log likelihood**	95.483		
Prob.(F-statistic)	0.000	**F-statistic**	119.229		

Table 12: Regression Results for CCIF

	LOGCCIF	LOGCCIP	LOGER	LOGMS	LOGSEI
LOGCCIF	1	0.981	-0.810	-0.808	-0.656
LOGCCIP	0.981	1	-0.803	-0.801	-0.655
LOGER	-0.810	-0.803	1	0.994	0.910
LOGMS	-0.808	-0.801	0.994	1	0.920
LOGSEI	-0.656	-0.655	0.910	0.920	1

Table 13: Correlation between variables