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The Crisis-Creating Effect of Expectations: Long Term Analysis with the Evidence from NARDL Model and Maki Cointegration Test

Beklentilerin Kriz Yaratıcı Etkisi: NARDL Modeli ve Maki Eşbütünleşme Testinden Kanıtlarla Uzun Dönem Analiz

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ÖZ

Çalışma, beklentiler ile ekonomik kriz arasındaki uzun dönemli asimetrik etkiyi ve yapısal kırılmalar altında eşbütünleşik ilişkiyi ortaya koymayı amaçlamaktadır. Bu amaçla, Türkiye ekonomisi 2012-2021 dönemi için Maki Eşbütünleşme ve doğrusal olmayan ARDL yöntemleri kullanılarak analiz edilmiştir. Ampirik bulgulara göre, kriz göstergesi olarak kullanılan spekülatif baskı endeksi ile beklentilerin potansiyel nicel karşılığı olan güven endeksleri arasında uzun dönemde yapısal kırılmalar altında eşbütünleşik bir ilişki bulunmuştur. Tüketici güven endeksi, finansal hizmetler güven endeksi ve reel sektör güven endeksi olmak üzere üç güven endeksi kullanılmıştır. Güven endekslerindeki pozitif değişimlerin spekülatif baskı endeksini azalttığı, negatif değişimlerin ise spekülatif baskı endeksinde artışa neden olduğu görülmüştür. Ayrıca, güven endekslerindeki negatif değişimlerin spekülatif baskı endeksi üzerinde pozitif değişimlerden daha büyük bir etkiye sahip olduğu sonucuna varılmıştır. Çalışmanın sonuçları, ekonomik krizler ve beklentiler arasındaki ilişkinin doğasında var olan asimetrik etkileşimi ampirik olarak ortaya koymaktadır. Ayrıca, piyasalardaki kötümser beklentilerin kriz yaratıcı etkisine işaret etmektedir.

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ABSTRACT

The study aims to reveal the long term asymmetric effect and the cointegrated relationship under structural breaks between the expectations and the economic crisis. For this purpose, Turkish economy has been analysed by using Maki Cointegration and non-linear ARDL methods for the 2012-2021 period. According to the empirical findings, a cointegrated relationship has been found between the speculative pressure index, which is used as a crisis indicator, and the trust indices, which is a potential quantitative counterpart of expectations, under structural breaks in the long term. Three trust indices have been used: consumer trust index, financial services trust index and real sector trust index. It has been observed that positive changes in trust indices decrease speculative pressure index, while negative changes cause an increase in speculative pressure index. In addition, it has been concluded that negative changes in trust indices have a greater effect on the speculative pressure index than positive changes. The findings of the research provide empirical evidence for the inherent asymmetric interaction between economic crises and expectations. Furthermore, it highlights the role of pessimistic expectations in triggering crises within the markets.

1. Introduction

With financial liberalization in the post-1980 period, the interaction between banks, firms, and individuals in the economic and financial system has increased significantly. McKinnon (1973) and Shaw (1973), in their study referred in the economic literature as the financial liberalization hypothesis, argued that the economies of countries that are not under financial stress, are developed, and have completed the liberalization process make a positive

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contribution to growth by encouraging savings and investment. This positive change in economic growth is possible if economic agents and firms' saving and investment drive and the average efficiency of investment increases due to financial liberalization and thus financial development (McKinnon, 1973: 59-61; Shaw, 1973: 13). Assuming that the indicator that constrains investment is financial stress, it is assumed that investment increases when financial stress decreases when the real interest rate increases (Bouzid, 2012: 14-16).

Financial stress, financial pressure, or speculative pressure has been a focal point for academics and policymakers since the 1970s. McKinnon and Shaw first used the concept in the early 1970s to explain the disturbances caused by public intervention will make ways in financial markets. It was called the McKinnon-Shaw hypothesis after its first use, and it was suggested that public intervention in financial markets should end, and financial markets should be liberalized to deepen financial markets (Oktar et al., 2013: 17-18). The macroeconomic indicator that comes to the fore in financial stresses is the expectations that determine the instinctive behavior of economic agents and firms.

The theoretical foundations for the impact of expectations on the economy were laid with the concept of "Animal Spirits" by Keynes. It can be seen that Keynes, starting from this concept, addressed the impact of concepts such as trust and expectations in the economy. It is considered that these effects can be effective in the decisions of economic agents and sectors and, therefore, with their property of sudden action, can cause rapid changes in decisions in the macroeconomic structure that can cause an economic crisis. Kaminsky et al. (1998: 44) states that sudden changes in expectations are an important determinant of economic and financial crises.

Although it is impossible to calculate animal spirits in the modern sense, there are data available used for this purpose. The best example of these data is economic orientation and trust surveys. These data explain what Keynes describes as animal spirits as a potential quantitative indicator. The reason why trust indices are a potential indicator for measuring expectations is hidden in the nature of animal spirits. Animal spirits, by nature, have effects that can spread very quickly and occur spontaneously.

If trust indices are accepted as a source of information closely followed by economic policymakers and businesses, these indices are also the potential quantitative counterpart of optimistic or pessimistic market expectations. On the one hand, trust indices provide information about the current state of the economy and, on the other, act as barometers for the future situation. In particular, the information they provide on the future state of economic activity helps companies to review their sales policies and develop new strategies while at the same time shaping the economic policies to be implemented by the public. In this regard, central banks, relevant public institutions, financial institutions, and companies are the main actors that use trust indices. Trust indices are also one of the most important leading indicators that provide information about the probability of financial crises (Sergeant et al., 2011: 7).

It is undeniable that expectations, which are regarded as a significant factor in economic and financial crises and influence the decisions of economic decision-makers, can lead countries into crises. The objective of this study is to empirically demonstrate the impact of expectations represented by trust indices on the speculative pressure index, which is an indicator of the crisis. To this end, answers are sought to the following questions concerning the impact of expectations on speculative pressure (crisis-creating effect).

(i) Is there a long-term interaction between trust indices (expectations) and the speculative pressure index (crisis indicator) in structural breaks?

(ii) What is the severity of effect and direction of positive changes (optimistic expectation) and negative changes (pessimistic expectation) in trust indices on the crisis indicator?

(iii) Does the effect of expectations on the crisis indicator differ between optimistic and pessimistic expectations?

The number of studies that examine trust indices as a potential quantitative indicator of expectations is quite limited. No study has analyzed the effect of trust indices on the speculative pressure index. Although the crisis-creating effect of pessimistic expectations is theoretically emphasized in the literature, it has not been empirically tested in the example of the Turkish economy. In our study, increases in trust indices represent optimistic expectations and decreases represent pessimistic expectations. In order to determine the effectiveness of these expectations in the direction of increase or decrease, the most appropriate method is the non-linear models. In addition, in econometric analysis, multiple structural break tests is preferred to draw attention to the importance of structural breaks in shaping expectations.

After describing the conceptual framework in the first section of the study, empirical studies on this topic are included in this context. Then, the methods used in the econometric analysis are explained, and the results are presented. Lastly, the empirical results are evaluated and interpreted, and policy recommendations are made.

2. Speculative Pressure Index

Although there is a significant increase in interest rates during financial and economic crises, there is also a decrease in net international reserves, above normal. When computing the speculative pressure index, a measure formulated with consideration of this aspect in economic literature, alterations in both interest rates and international reserves were employed. This approach mirrors the methodologies utilized in research conducted by

Eichengreen et al. (1995) as well as Kaminsky and Reinhart (1999).

When speculative pressure is prevalent, the mediating role of the financial system slows down considerably, and four main distinguishing features reveal financial stress. These are (Balakrishnan et al., 2011: 56):

(i) Sharp changes in asset prices

(ii) Sudden rise in risks and increasing uncertainty

(iii) Liquidity shortage

(iv) Concerns regarding the stability of the banking system.

The speculative pressure index has been constructed in various ways by different authors. Nevertheless, nearly all of these share the characteristic of establishing a connection between financial stress and the real economy, encompass a range of values from highest to lowest, and endeavor to anticipate financial crises. Different authors include different variables in the index when they construct their indexes. These variables are GDP, credit growth, credit and deposit rates, credit/GDP, inflation rates, policy rates, monetary aggregates, policy developments, exchange rates, expectations, uncertainty (Kaya and Kılınç, 2016), domestic debt stock, non-resident stock portfolio, returns of stocks traded on the stock market (Akkaya, 2021). Each study focusing on creating the index uses different variables and weights them differently depending on the purpose and scope.

3. Indicators of Expectations

Keynes used the concept of animal spirits, which laid the theoretical foundations of expectations, as a basis for explaining investment. According to Keynes, investors look at data reflecting the real situation in the economy and use interest to make their investments. However, animal spirits and pessimism, an inherent characteristic, can change investors' perception of risk in a short period. For example, a small group's desire to exit the market or their pessimistic expectations of the market can spread to other market participants can occur in a shorter time period. A subsequent attack to withdraw investments can quickly spread and lead to a crisis in such a situation. With such a pessimistic market mood, neither the interest rate nor other data will make sense.

Economic orientation and trust surveys are potential quantitative indicators representing expectations among existing macroeconomic variables.

3.1 Consumer Trust Index

The economic decisions made by consumers have important effects on the economy as a whole. The impact of the rise and fall of consumer spending, which accounts for almost 70% of national income in many countries, on the real economy is quite strong. For this reason, it is extremely important to predict consumer behavior and develop policies based on these predictions.

The consumer trust index is an index that attempts to measure how consumers feel about economic factors. The index consists of various surveys directed to consumers, and the index score is determined by digitizing the responses to the surveys. The digitized score provides consumers' financial situation and subjective opinions about their spending intentions and general economic conditions. The calculated index changes as the general economic conditions change; sometimes it increases, sometimes decreases (Sergeant et al., 2011: 7).

If consumers' future expectations are optimistic, it is reasonable to assume that consumers' willingness to spend and borrow will increase soon. If, on the other hand, consumers' expectations are pessimistic, they can be expected to reduce their spending and reconsider their financial situation. Whether consumers are optimistic or pessimistic about the future is determined by using questionnaires prepared for consumers to assess their attitudes, behaviors and expectations. These surveys seek to understand the reasons for changes in consumer expectations over time and what impact these changes will have on consumption and savings. These surveys also provide the basic data for the index to be constructed.

3.2 Real Sector Trust Index and Financial Services Trust Index

Like the consumer trust index, the real sector trust index provides information about the state of the economy and how it will develop in the future. There is a strong correlation between the real sector trust index and macroeconomic variables (Canöz, 2017: 38). The real sector is the part of the economy where production, investment, and employment decisions are made, and the expectations of this sector for the future cause fluctuations in investment and national income, which depends on investment. Just as the consumer trust index is closely followed by those who make economic policy and businesses, the real sector trust index is an indicator that should be followed closely.

The real sector trust index is formed using data from business surveys. Business cycle surveys are conducted to gather qualitative information that helps monitor current business conditions and predict potential short-term changes. These surveys have been used since the 1920s to track real business cycles. The main reason for the emergence and popularity of business surveys is that official statistics are sparse and published over a long period. Numerous studies have been conducted showing that the results of these surveys are valuable and useful (Kaufmann and Scheufele, 2017: 880). The threshold value for the real sector trust index is set at 100. When the index value rises above this value, it is determined that business expectations for the future are positive, and when the index value falls below this value, business expectations for the future are negative. The increase or decrease of the index value

indicates turning points for business cycles (Kılcı, 2021: 951-952). As mentioned above, economic policymakers are mainly guided by this index value and estimate whether the economy is expanding or contracting and set policies accordingly.

Statistical data on financial services are indicators that reveal trends in the financial services sector by considering financial institution managers' assessments and expectations of current and future business conditions. The financial services trust index is a metric that monitors shifts in financial markets, considering historical evaluations and future projections provided by financial institution managers, including banks, insurance firms, as well as leasing and factoring enterprises operating within the financial framework. In creating the index, the survey method is used as in other indices (İskenderoğlu and Akdağ, 2017: 628).

4. Empirical Literature

In this section of the study, some of the studies on Turkey and economies of different countries have been addressed.

Mishkin et al (1978), in their study on the relationship between consumer confidence and expenditures on consumer durables, state that when consumer confidence increases, consumers will start to have a more favorable view of future economic conditions and will tend to spend more. The authors argue that this will lead to an increase in consumer expenditures, which in turn may lead to an increase in economic growth. The authors discuss the limitations of using consumer confidence as an explanatory variable and argue that the consumer confidence index can reflect not only the impact of consumer spending but also the impact of other factors affecting economic growth and financial markets. On the other hand, Acemoğlu and Scott (1994), in their study on the relationship between consumer confidence and expectations, emphasize that there is a high correlation between the confidence indicator and the current state of the economy and that consumer confidence can be considered as an indicator of the strength of the economy in the future.

Otoo (1999) found that there is a positive and strong relationship between consumer confidence index and stock prices in all the studies examining the relationship between consumer confidence and stock prices, and that increases in stock prices lead to an increase in consumer confidence. The existence of a positive and strong relationship between stock prices and confidence index has also been tested in similar studies (Jansen and Nahuis (2003); Fisher and Statman (2003); Golinelli and Parigi (2003); Ludvigson (2004)).

Topuz (2011) found a one-way causality between stocks and consumer trust. The research conducted from 2004 to 2009 employed the Granger causality test. Arısoy (2012) conducted a study spanning from 2005 to 2012, focusing on the correlation among consumer and real sector trust indices, as well as the stock market, employment, output changes, and consumer spending. Using the VAR model, they established that the trust index exerts influence over vital macroeconomic variables. In a distinct perspective, İbicioğlu et al. (2013) analyzed the interrelationship between the consumer trust index and the exchange rate. Their study, covering the period from 2003 to 2011, employed Johansen cointegration and Granger causality tests. Their findings indicated a connection between the exchange rate and the consumer trust index, both in the short and long term.

In their investigation conducted between 2015 and 2017, İskenderoğlu and Akdağ (2017) examined the interconnection among the Financial Services Trust Index, BIST 100 Index, and CBRT Net Funding variables. They employed Granger causality and Breitung and Candelon frequency causality tests. The results indicated a bi-directional and enduring causal relationship between the Financial Services Trust Index and the BIST 100 Index in the long term. Additionally, they found a unidirectional, temporary causality between the Financial Services Trust Index and CBRT Net Funding in the medium term. Conversely, Azazi and Kılıç (2019) focused on the link between economic, financial, and political risks, and the real sector trust. Their study, spanning from 2007 to 2015, utilized the ARDL Bounds Test Method. Their findings revealed that a decrease in economic risk had a positive impact on the real sector trust index throughout the examined period.

Ardor and Sertkaya (2018) analyzed the relationship between macroeconomic factors and stock indices for G-7 and E-7 countries. Using the real effective exchange rate index, M2 money supply, inflation, interest rate, industrial production index, consumer and business confidence indices as macroeconomic variables, they concluded that there is no statistically significant relationship between stock indices, business confidence index and M2 money supply in G-7 countries, while there are statistically significant correlations between other variables. As a result of the analysis, only the results between the real effective exchange rate and stock indices were statistically significant in E-7 countries, while there was no statistically significant correlation between other variables.

Çilingir's (2021) research delved into the connection between the consumer trust index and the stock index by implementing the Granger causality test between 2011 and 2019. The empirical results unveiled a one-way and substantial association between the BIST 100 index and the trust index in sectors such as retail, construction, and services. In a parallel vein, Hamurcu (2021) scrutinized the interrelationship between the consumer trust index and the investments of foreigners, including both portfolio and stock, using the Granger causality test covering the span from 2012 to 2020. The outcomes demonstrated a constructive and unidirectional Granger causality running from the consumer trust index to both the domestic portfolio investment and domestic stock investment of foreigners. In the study conducted by Contuk (2021), the interplay

between the housing price index and the consumer trust index was examined using the NARDL model within the time frame of 2010 to 2020. The results brought forth that positive shocks in the housing price index had an adverse and statistically significant influence on the consumer trust index in the long term. Conversely, negative shocks were linked to a constructive and noteworthy impact on the consumer trust index.

Theoretical and empirical studies show that expectations in both real and financial markets are a crucial factor in the economic decisions to be made and that sudden changes in expectations lead to shocks in aggregate demand and pave the way for the emergence of some economic and financial crises. When examining the empirical studies on expectations, the gap in the literature regarding the interaction between trust indices and speculative pressure is striking. Trust indices have mostly been studied with basic macroeconomic indicators such as the exchange rate, which is included in the speculative pressure index, but it's impact on speculative pressure has not been analyzed with a holistic approach.

Financial stress, financial pressure or speculative pressure is affected by many variables. An index to be developed will be used to convert the variables that cause financial stress into a more understandable format, and an attempt will be made to estimate financial distress or crisis using the index. The speculative pressure index, which is created using factors such as changes in exchange rates, changes in reserves, changes in interest rates, and changes in the value of the national currency, provides important opportunities for policymakers to determine times of crisis and uncover the signals that can be considered precursors or harbingers of crisis in times of crisis. From this point of view, determining the impact of changes in trust indices, which are the quantitative indicators of expectations, on the speculative pressure index as a leading indicator of crisis will provide important information to policy and economic decision-makers.

5. Data Set, Methods and Findings

Kaminsky et al. (1998, p. 42) used the speculative pressure index (spe) to predict economic and financial crises specific to currency crises. The researchers used three economic indicators to calculate the spe (Çepni, 2014: 172).

$$spe = \beta_1.nex + \beta_2.int - \beta_3.rez \quad (1)$$

nex: The alteration in the nominal exchange rate expressed as a percentage.

int: The alteration in interest rates presented as a percentage.

rez: The alteration in international reserves expressed as a percentage.

The "β" coefficients used in the spe calculation in equation 1 were set as 1 in some studies, and it was considered that this does not affect the empirical results much (Krkoska, 2001: 47). The upward trend of this index indicates the stress on the financial system and is accepted as a crisis indicator. In our study, based on the assumption $\beta_1 = \beta_2 = \beta_3 = 1$ in equation 1, the index SPE was calculated for the Turkish economy and included as a dependent variable in the model.

Table 1: Dataset and Descriptions

Variables	Descriptions
Dependent Variable: spe	Speculative pressure index
Maki (2012) Cointegration Test Independent Variables	
cti	Consumer trust index
rti	Real sector trust index
fti	Financial services trust index
NARDL Model Independent Variables	
cti_neg	It includes negative changes in the consumer trust index and represents the pessimistic expectations of consumers.
cti_pos	It includes positive changes in the consumer trust index and represents the optimistic expectations of consumers.
rti_neg	It includes the negative changes in the real sector trust index and represents the pessimistic expectations in the real sector.
rti_pos	It includes the positive changes in the real sector trust index and represents the optimistic expectations in the real sector.
fti_neg	It includes negative changes in the financial service trust index and represents pessimistic expectations for financial services.
fti_pos	It includes positive changes in the financial service trust index and represents optimistic expectations for financial services.

In the empirical analysis of our study, the consumer trust index (cti), real sector trust index (rti), and financial services trust index (fti) are included as independent variables. Information on the dependent and independent variables can be found in Table 1.

The functional process number 2 is considered as economical basis through the variables explained in Table 1.

$$spe = f(cti, rti, fti) \quad (2)$$

Utilizing monthly (M) data from May 2012 (2012M5) to December 2021 (2021M12), the examination delved into the enduring relationship between trust indices and the speculative pressure index within the Turkish economy. We have formulated the speculative pressure index based on Equation 1. The variables and trust indices have been taken from the publicly accessible data distribution system of the Central Bank of the Republic of Türkiye. This analysis specifically accounted for structural shifts, employing the Maki (2012) cointegration test. To ascertain any potential asymmetric impact, a nonlinear autoregressive distributed lag (NARDL) model was constructed. During the empirical analysis, structural breaks were factored into the stationarity phase, and this was assessed using the stationarity test outlined by Kapetanios (2005). Prior to the stationarity assessment, all series underwent seasonal adjustments using the "difference from moving average" technique. Due to the presence of negative values in certain periods within the speculative pressure index variable, a logarithmic transformation was not applied to the variables under scrutiny.

The basic model for the econometric application is shown in equation 3.

$$spe_t = \beta_0 + \beta_1 cti_t + \beta_2 rti_t + \beta_3 fti_t + \varepsilon_t \quad (3)$$

In equation 3, ε_t represents the error term, β_0 represents the constant term, β_1, β_2 and β_3, represent the coefficients of the trust indices.

Using non-stationary data for model estimation leads to a spurious regression problem and thus affects statistical inference (Granger and Newbold, 1974: 118). Kapetanios (2005) unit root test with multiple structural breaks was used in this study to examine the stationarity properties of the series under investigation. The unit root test of Kapetanios (2005) test can include up to 5 structural break periods, and these break periods can be determined internally in the analysis. Critical values for the test of stability analysis can be calculated by the bootstrap cycle (Uslu, 2019: 49). The test of Kapetanios (2005), which is a very powerful test from these points of view, was preferred in this study. The model of the stationary test with multiple structural breaks, which allows for a constant and a trend break, is based on Equation 4.

$$y_t=\alpha_0 + \alpha_1 t + \beta y_{t-1} + \sum_{i=1}^{m} \gamma_i \Delta y_{t-} + \sum_{i=1}^{k} \varphi_i DU_{i,t} + \sum_{i=1}^{k} \aleph_i DT_{i,t} + \varepsilon_t \quad (4)$$

While the H_0 hypothesis of the test is that the series is non-stationary and has a unit root, the alternative hypothesis emphasizes that the series is stationary with a maximum number of "m" breaks of 5. The H_0 hypothesis is tested by comparing the critical values computed by Kapetanios (2005: 129) with the t-statistics according to the condition $\alpha = 1$. The critical values for the fixed and trend models in equation 4 are calculated using the Monte Carlo technique (Bayrak, 2019: 47-48). For the maximum number of "m" breaks, we first search for a single break in the entire sample and determine the structural break date in the model where the residual sum of squares is minimal. After the appropriate break date is estimated and added to the model, the values of the t-statistics for condition $\alpha = 1$ are calculated, and the process is completed when the maximum number of "m" breaks is reached.

In Kapetanios (2005) test, the minimum t-statistic value indicates the appropriate number of fractions. When the t-statistical values calculated according to the results of the multiple structural unit root test are lower than the critical values determined by Kapetanios (2005), it is concluded that the variables used in the empirical analysis under structural breaks have unit roots; in other words, the series is not stationary (Çalışkan et al., 2018: 85-86).

In equation 4, $DU_{i,t}$ and $DT_{i,t}$ represent dummy variables in the case of a constant and trending tendency, respectively, while $T_{b,i}$ indicates the date of structural break (i= 1, 2, ……, m). The dummy variables and structural break dates in the equation are defined as $t>T_{b,i}$ then $DU_{i,t} = 1$; $t \leq T_{b,i}$ then $DU_{i,t} = 0$ and $t > T_{b,i}$ then $DT_{i,t} = t - T_{b,i}$; $t \leq T_{b,i}$ then $DT_{i,t} = 0$ (Hepaktan, 2016: 86).

Table 2: Kapetanios (2005) Stationarity Test Results of Constant and Trend Containing Model

Variable	m*	T-Statistics**	Structural Break Periods
spe	4	6.175	2012M8; 2016M11; 2020M8; 2021M3
rti	4	7.071	2012M10; 2016M12; 2018M9; 2020M5
fti	3	6.148	2013M2; 2018M12; 2021M4
cti	3	5.139	2017M2; 2019M5; 2021M11

* Number of structural breaks

** For comparison of statistical values, Kapetanios (2005) critical values are 8,243, 7,736, 7,426 for 4 structural breaks, 7,401, 7,006, and 6,686 for 3 structural breaks at 1%, 5%, and 10% significance levels, respectively.

The outcomes of the unit root test, utilizing Kapetanios' (2005) method for multiple structural breaks, indicate that the minimum t-statistic value corresponds to 4 for the speculative pressure index and the real sector trust index, while it is 3 for the financial services trust index and the consumer trust index. The detailed results can be observed in Table 2.

According to the results of the stationary analysis with multiple structural breaks by Kapetanios (2005), it can be seen that all variables have unit roots and are non-stationary during the identified structural break periods. The calculated

values of the test statistics were lower than the critical values at all three significance levels. From these results in Table 2, it is clear that the variables become stationary when the first difference is taken. On the other hand, the lagged effects of the global economic crisis of 2008 and the European debt crisis of 2010 (EURO Crisis) in 2012-2013 become evident when analyzing the structural break periods obtained from the stationarity analysis. In addition, the social and political developments that Turkey experienced in 2016 were identified in a significant way. Lastly, the exchange rate fluctuations (currency shock) in the Turkish economy from 2018 to 2021 and the COVID-19 global epidemic have caused structural breaks.

In long-term analysis, conventional methods like Johansen (1988) fail to consider structural breaks. On the other hand, Westerlund and Edgerton (2006: 683) only consider a break in the cointegration vector. However, methods that account for more than one structural break are needed for long-term analyses. The cointegration test of Maki (2012), which can be used not only for stationary series in first difference but also for stationary series of different degrees, can capture up to 5 structural breaks. The model in which structural fractions can be determined and various solutions are included is presented in equations 5, 6, 7, and 8 (Maki, 2012: 2011-2012).

In equations 5, 6, 7, and 8, $D_{i,t}$ represents the dummy variable that indicates structural breaks. When the test statistics are greater than the critical value, the value $D_{i,t}=1$ is taken; in other words, while a structural break is detected, the value $D_{i,t}=0$ is taken when there are no structural breaks. While t in the equation represents time, Y_t and X_t represent dependent and independent variables, β and γ represent the trend of the independent variable and the time trend, respectively, and ε_t represents the error term (Adebayo et al., 2021: 1019; Hepaktan, 2016: 86).

Break in Level;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + e_t \quad (5)$$

Break in Level and Independent Variables;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + \sum_{i=1}^{k} \beta X_t D_{i,t} + e_t \quad (6)$$

Break in Level with Trend;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + \gamma_t + \sum_{i=1}^{k} \beta X_t D_{i,t} + e_t \quad (7)$$

Break in Level and Independent Variables with Trend;

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta X_t + \gamma_t + \sum_{i=1}^{k} \gamma D_{i,t} + \sum_{i=1}^{k} \beta X_t D_{i,t} + e_t \quad (8)$$

In Maki cointegration analysis, if the calculated statistical values are higher than the critical values from the Monte Carlo simulation, It means that there is a cointegrated relationship under structural breaks (Bayrak, 2019: 49). The critical values vary depending on the number of structural breaks (k) and the independent variables (X_t); when the values of "k" and "X_t" increase, the critical values decrease (Maki, 2012: 2012-2013).

In the Maki cointegration test, which internally determines the maximum of 5 structural breaks, the most appropriate model among the solutions whose equations are given is determined based on the statistical values. Accordingly, similar to the stationarity analysis of Kapetanios (2005), the model that yields the lowest t-statistic value is chosen (Çalışkan et al., 2018, p. 88).

According to the results of the Maki multiple structural break cointegration analysis in the study, it is the model-level analysis shown in equation 8 that includes the trend break in the independent variables and yields the lowest t-statistic value. The results of the analysis are shown in Table 3. The critical values were taken from Maki's (2012: 2013) study according to the k and X_t values.

Table 3: Maki Multiple Structural Break Cointegration Test Results

Analysis: Break in Level and Independent Variables with Trend					
Model	k	X_t	T-Statistic	Critical Values*	Structural Break Periods
spe = f (cti, rti, fti)	4	3	9.147	8.851; 8.269; 7.960	2012M9; 2018M12; 2020M4; 2021M11

* Values at 1%, 5% and 10% significance level, respectively.

The unit root characteristics of the series displayed in Table 2 reveal that all variables are integrated into an I(1) process and exhibit stationarity at the first difference. Consequently, there exists no impediment to applying the Maki (2012) cointegration test for investigating the long-term equilibrium interaction amidst the pertinent variables in the presence of structural breaks (Adebayo et al., 2021: 1020). The outcomes of this test are presented in Table 3. The results of the Maki (2012) cointegration test in Table 3 illustrate that the trust indices and the speculative pressure index manifest long-term interaction when accounting for structural breaks. The calculated t-statistic values consistently surpass the critical values established by Maki (2012) at all three significance levels. Moreover, the identified periods of structural breaks are consistent with the stationarity analysis carried out by Kapetanios (2005). These time intervals gain importance when considering the economic, political, and social events that took place during those specific periods.

In this research, the nonlinear Autoregressive Distributed Lag (NARDL) methodology was adopted to identify long-term asymmetric effects of expectations on the speculative pressure index. The primary rationale for selecting this approach is to ascertain the influence of negative and positive shifts in expectations on the speculative pressure index (Shin et al., 2014: 285-289). Prior to the econometric investigation, it is imperative to assess whether the NARDL methodologies adhere to the assumptions by conducting a unit root test on the pertinent variables. According to the outcomes of the stationarity assessment, the variables should

be integrated up to the first order [I(0)]. It is evident from the findings presented in Table 2 that this prerequisite is satisfied.

The NARDL approach is a method that can be used to determine the relationships between long-term dependent and independent variables. Moreover, it differs from other methods (ARDL, Johansen cointegration, Granger cointegration, etc.) in terms of clarifying whether the long-term relationships in question have a symmetric or asymmetric structure. According to the method, first, it is investigated whether there is an asymmetric (nonlinear) relationship between the variables, and depending on the result, the long-term coefficients are estimated.

$$cti\_pos = \sum_{k=1}^{m} \Delta cti\_pos_t = \sum_{k=1}^{m} \max(\Delta cti\_pos_t , 0) \quad (9)$$

$$cti\_neg = \sum_{k=1}^{m} \Delta cti\_neg_t = \sum_{k=1}^{m} \min(\Delta cti\_neg_t , 0) \quad (10)$$

$$rti\_pos = \sum_{k=1}^{m} \Delta rti\_pos_t = \sum_{k=1}^{m} \max(\Delta rti\_pos_t , 0) \quad (11)$$

$$rti\_neg = \sum_{k=1}^{m} \Delta rti\_neg_t = \sum_{k=1}^{m} \min(\Delta rti\_neg_t , 0) \quad (12)$$

$$fti\_pos = \sum_{k=1}^{m} \Delta fti\_pos_t = \sum_{k=1}^{m} \max(\Delta fti\_pos_t , 0) \quad (13)$$

$$fti\_neg = \sum_{k=1}^{m} \Delta fti\_neg_t = \sum_{k=1}^{m} \min(\Delta fti\_neg_t , 0) \quad (14)$$

In the study, the response of the speculative pressure index to the trust indices is investigated using the linear functional process number 2. Equations (9)-(14) are the partial sums of positive and negative changes in trust indices. When we include these changes in the functional process number 2, the model is as presented in equation 15.

$$spe_t = f(cti\_neg_t , cti\_pos_t , rti\_neg_t , rti\_pos_t , fti\_neg_t , fti\_pos_t) \quad (15)$$

The fundamental equation for the NARDL model formulated for conducting long-term analysis is depicted in equation 16. In order to observe the asymmetric or nonlinear impact of expectations, the partial sum of positive and negative alterations in trust indices was incorporated into the model. To explore the asymmetric effects of trust indices on the financial pressure index in both the short and long terms, the NARDL model described in equation 16 was developed.

$$\Delta spe_t = \beta_0 + \beta_1 spe_{t-1} + \beta_2 cti\_neg_t + \beta_3 cti\_pos_t + \beta_4 rti\_neg_t + \beta_5 rti\_pos_t + \beta_6 fti\_neg_t + \beta_7 fti\_pos_t + \sum_{i=0}^{m} \S_{1i} \Delta spe_{t-1} \sum_{i=0}^{n} \S_{2i} \Delta cti\_pos_{t-1} + \sum_{i=0}^{o} \S_{3i} \Delta cti\_neg_{t-1} \sum_{i=0}^{p} \S_{4i} \Delta rti\_pos_{t-1} \sum_{i=0}^{q} \S_{5i} \Delta rti\_neg_{t-1} + \sum_{i=0}^{r} \S_{6i} \Delta fti\_pos_{t-1} + \sum_{i=0}^{s} \S_{7i} \Delta fti\_neg_{t-1} + \varepsilon_i \quad (16)$$

H_o: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0 = \beta_7 = 0$ [No long term relationship]

H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0 \neq \beta_7 \neq 0$ [Long-term relationship]

In equation 16, the coefficients of the constant term, β_0 represent the constant term, β_1 β_2 , β_3 , β_4 , β_5 , β_6 and β_7 coefficients represent the long-run relationship, and the positive and negative shock parameters, respectively. m, n, ..., s represent the lag lengths. In building the NARDL model, the VAR model with information selection criteria determines the optimal lag length. $\sum_{i=0}^{m} \S_{1i}, \ldots\ldots, \sum_{i=0}^{s} \S_{7i}$ are representative parameters for short-term positive or negative shocks. Since the study's empirical analysis is limited to the long run in parallel with the Maki cointegration test, only the long-run results are included.

Table 4: Optimum Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1543.193	NA	32613108	28.65173	28.75107	28.69201
1	-1328.022	410.4197	815965.2	24.96337	25.46006*	25.16476*
2	-1311.374	30.52105*	807270.9*	24.95137*	25.84542	25.31388
3	-1296.640	25.92067	829023.5	24.97482	26.26622	25.49843
4	-1285.824	18.22799	917913.5	25.07081	26.75956	25.75554
5	-1271.770	22.64175	960691.6	25.10686	27.19296	25.95269
6	-1259.673	18.59422	1047376.	25.17913	27.66258	26.18608
7	-1245.288	21.04480	1100755.	25.20903	28.08984	26.37709
8	-1231.750	18.80293	1183227.	25.25462	28.53278	26.58380

Table 4 shows the results of the information selection criteria considered in selecting the optimal lag length of the NARDL model. The optimal lag length indicated by the information criteria is determined by the "*" sign above the values. The information selection criteria (LR, FPE, and AIC) indicate 2 lag lengths according to the results. However, since there was a structural problem with this lag length, 6 lag lengths without structural problems were selected.

Table 5 displays the outcomes of the bound tests derived from the NARDL model, considering six lag lengths. The null hypothesis, postulating the absence of a long-term connection between the trust indices and the speculative pressure index, was subject to evaluation against the

alternative hypothesis. As indicated by the F-statistics computed from the table, these values surpass the critical thresholds established by Pesaran et al. (2001) for both lower I(0) and upper I(1) limits. Consequently, the null hypothesis is declined, implying the existence of a long-term relationship among the relevant variables.

Table 5: NARDL Long-Run Cointegration Relationship

Estimated Functional Form
spe_t= f(cti_neg$_t$, cti_pos$_t$, rti_neg$_t$, rti_pos$_t$, fti_neg$_t$, fti_pos$_t$)
Optimal Lag Length*
NARDL(5, 6, 3, 1, 5, 6, 2)

F-Stat (F-Statistic)	CV (Critical Values)**			Result
	Significance Level	I(0)	I(1)	
7.96	% 10	1.75	2.87	H_0 is rejected as it is F-Stat>CV for all four levels of significance. There is a long-term relationship.
	% 5	2.04	3.24	
	% 2.5	2.32	3.59	
	% 1	2.66	4.05	

* AIC was used to determine the optimal lag length for each variable.
** Critical values are derived from Pesaran et al. (2001).

The diagnostic outcomes for the NARDL model, as presented in Table 6, reveal the absence of any structural issues within the constructed model. Autocorrelation was examined using the Breusch-Godfrey test, heteroscedasticity was assessed through the Breusch-Pagan-Godfrey test, normality was evaluated via the Jarque-Bera test, and the functional form of the model was scrutinized using the Ramsey reset test. These tests collectively indicate the absence of any structural problems within the NARDL model, as the probability values exceed the significance levels at 1%, 5%, and 10%.

Table 6: NARDL Long-Term Estimates and Diagnostic Tests

Long-Term Estimates			
Variables	Coefficients	T-Statistics	Probability
fti_pos	-0.188	-2.405	0.0186
fti_neg	2.138	2.351	0.0246
rti_pos	-0.487	-2.028	0.0461
rti_neg	2.795	2.514	0.0140
cti_pos	-0.842	-2.929	0.0045
cti_neg	2.291	3.856	0.0002
Model Diagnostic Tests			
Diagnosis	Test Type	Statistics	Probability
Autocorrelation	Breusch–Godfrey	0.180	0.835
Heteroscedasticity	Breusch–Pagan Godfrey	0.973	0.549
Functional Form	Ramsey Reset	0.443	0.658
Normality	Jarque–Berra	1.591	0.451

When the results of the NARDL model are examined in Table 6, the coefficients indicate the effect of positive and negative changes in the trust indices, in other words, increases (optimistic expectation) and decreases (pessimistic expectation) in these indices on the index of speculative pressure (crisis indicator) in the long run show that the values of the T-statistics are statistically significant. While positive changes in the trust indices decrease the index of speculative pressure, negative changes increase it. The severity of the negative effect is greater than that of the positive values, resulting in an asymmetric relationship. Moreover, the results of the Wald test in Table 7 show the statistical significance of the asymmetric effect.

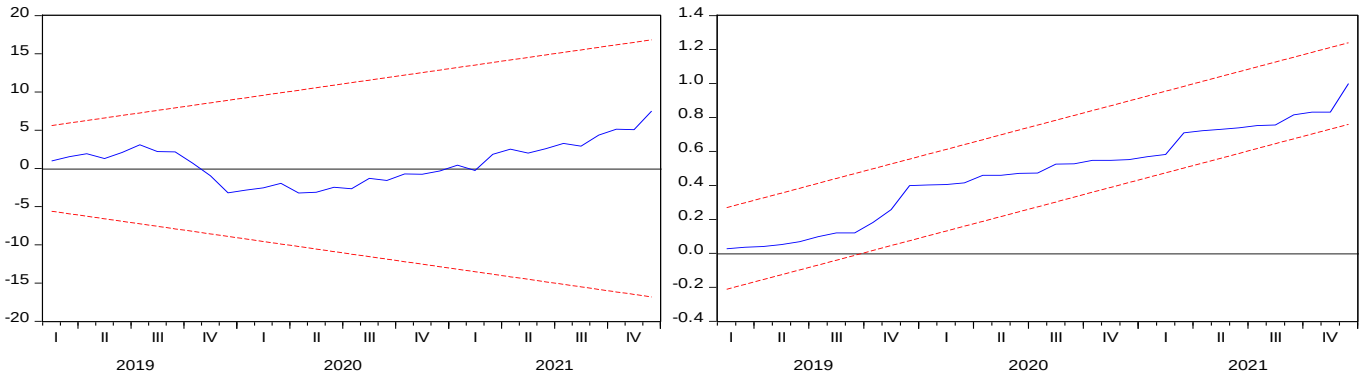
Table 7. NARDL Long-Term Asymmetrical Relationship

Wald Value		Result
Long Term Asymmetry		Due to the substantial F-Stat value and the Prob value falling below significance levels of 1%, 5%, and 10%, the null hypothesis (H_0) asserting symmetrical long-term coefficients is declined. This signifies the presence of a long-term asymmetric relationship.
F-Stat (F-Statistics)	Prob (Probability)	
8.54	0.0000	

In the NARDL model, where the asymmetric effect of trust indices is examined, the CUSUM and CUSUMSQ tests were applied, considering the possibility of a structural break in the 2012-2021 time interval. These tests can determine the suitability of the coefficients in econometric analysis (Brown et al., 1975: 157). Figure 1 and Figure 2

show that the relevant variables, and therefore the model used, are stable at the 5% significance level in the mentioned period.

Figure 1: CUSUM and CUSUMSQ Test at 5% Significance Level



6. Conclusion and Evaluation

The econometric part of this study was modeled by Maki Co-integration and NARDL method. By using these methods, it was possible to take into account whether the responses to the decrease or increase in expectations differed in the crisis, and structural breaks could be taken into account. The results in NARDL model are important in two ways. First, the asymmetric effect of the increase and decrease in trust indices on the speculative pressure index shows that optimistic and pessimistic expectations in the markets affect the speculative pressure index differently. Second, the crisis-creating effect of pessimistic expectations in the markets is observed as a decline in trust indexes affecting the speculative pressure index more than the increases. From these findings, in which the asymmetric effect was detected, it was determined that the effect of positive and negative changes in the trust indices on the speculative pressure index was in different directions and sizes.

The findings of this study are partially consistent with national and international literature such as Mishkin (1978), Acemoğlu and Scott (1994), Ludvigsen (2004) and Hamurcu (2021). Although these studies, which are specific to Turkey and other economies, do not directly use speculative pressure indices, they use important crisis indicators such as portfolio investments, stock prices, durable consumer goods, M2 money supply, inflation and interest rates (Kaminsky et al., 1998: 44). In line with the findings of our study, there is a statistically significant relationship between confidence indices (mostly and preferably consumer confidence index) and the mentioned indicators.

The limited investment and savings opportunities of developing countries such as Turkey, which is under financial stress and has not yet completed the liberalization process, negatively impact the growth. On the other hand, optimistic or pessimistic expectations in the real and financial sectors can also influence the investment decisions of entrepreneurs and cause negative economic fluctuations such as the economic crisis. As Kaminsky et al. (1998: 40-46) stated, pessimistic expectations in the markets, in particular, are the indicator of a crisis. The results of the study support this statement for the Turkish economy.

In numerous countries, including Turkey, financial stress often arises due to the deterioration of public finances. Financial stress occurs when governments implement policies that divert funds away from other sectors of the economy. At this point, authorities or policymakers must decide in line with market expectations. In contrast, measures that ensure that funds from institutional investors such as pension funds and bank loans are channelled to the government, measures aiming to cap interest rates, and regulations on foreign capital flows increase financial stress (Reinhart et al., 2011: 23). These measures are not in line with market expectations and, as the empirical results of our study show, have a negative and increasing impact on financial stress.

In the 2000s, the tendency of the capitalist system to cause crises has become widespread, and due to the negative impact of these crises on the real sector, governments have intervened directly and indirectly in markets. Intervention is not only through fiscal policy but also through monetary and financial market policies. After the 2008 financial crisis, many countries, including Turkey, adopted so-called unconventional monetary policy measures to transfer more funds to the real sector. These measures, implemented to stimulate the private sector, lead to financial pressure or stress in the markets. The empirical results of the study support this situation.

When consumers' optimism about the future decreases in the context of market expectations, their consumption decisions change to decline or be postponed. This decision, which also indicates uncertainty, may negatively impact countries' economies. As a result, production volumes and consumption levels decline. On the other hand, the market's upbeat mood means a decrease in uncertainty, and the current economic environment indicates an increase in consumer spending and production. In this respect, the study

results are significant for practical purposes. While negative changes in trust indices used to represent expectations increase financial stress relative to positive changes, the effect of positive changes on speculative pressures is reduced, even if they remain small. In other words, the effects of pessimistic expectations in the markets on the Turkish economy in terms of the crisis indicator is stronger and more negative.

Financial stress is one of the most important issues that have been discussed for a long time. It is defined as government interventions in the financial markets that change the equilibrium values in the financial markets. The main purpose of the interventions is to provide cheap sources of financing for the private sector and governments (Balakrishnan et al., 2011: 61). Recently, governments have had to revive markets due to the negative impact of the global crisis in the world economy and the European debt crisis (euro crisis), especially in 2008-2012, the global Covid 19 epidemic that started in 2019, and the exchange rate fluctuations in Turkey in 2018-2021, calls for intervention in financial markets became louder. If we analyze the Turkish economy in particular, it is a fact that the social and political developments in the corresponding periods also impacted intervention policies. The discussions about the financial crisis, which came on the agenda as direct interventions in interest rates to provide more credit to the private sector, led to a renewed discussion about the negative effects of these interventions. In parallel with these discussions, the structural break periods identified in the study's empirical results draw attention to the aforementioned negative effect.

This study, which analyzes the expectations of consumers, producers, and financial actors in an environment of economic uncertainty, is significant in terms of policy recommendations because the existence of this activity under structural breaks was investigated, and its structure was revealed. First, consumer perceptions toward economic policy, real sector dynamics, and the effectiveness of trust in financial services through speculative pressures were analyzed. In the environment of uncertainty, it was found that market expectations interact with the index of speculative pressure, which is an indicator of the crisis. The finding of a long-run relationship also suggests that this relationship occurs with a lag in the economy. Second, the potential crisis-causing effectiveness of the long-run relationship is discussed in terms of pessimistic and optimistic expectations. It has been found that the pessimistic expectations of consumers, producers, and financial agents, which are the defining sectors of the macroeconomy, increase speculative pressures more. This finding, which is more prone to crisis, provides important guidance to the government or policymakers, another determinant sector of the macroeconomy. Lastly, the effectiveness of expectations in structural breaks was analyzed using trust indices, which are quantitative indicators, and as a result, structural break phases came to the fore.

From the results of the study, it appears that the existence of a relationship between the expectations of consumers, producers, and financial actors and the index of speculative pressure, which is an indicator of crisis, could not be rejected in structural breaks and the effectiveness of pessimistic expectations in the markets came to the fore. These results are important in the sense that the economic decision-making mechanisms in Turkey take into account the trust indices, especially in the periods of structural breaks, and make a policy towards the pessimistic expectations that these indices potentially indicate, without the passage of time or a negative effect mechanism taking hold in the markets.

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