



## Business resilience in the face of multiple crises: A dynamic perspective

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### ABSTRACT

This study examines the effects of geopolitical risks and economic crises on business management resilience in Türkiye for the 2010:01–2024:09 period. A unique time series, constructed using the ratio of closed to established businesses, measures resilience. Employing RALS-LM unit root and Hatemi-J Asymmetric Causality tests, the analysis identifies two structural breaks in the resilience series: late 2020, reflecting the pandemic's peak impact, and December 2021, marking post-pandemic adaptation amidst currency depreciation and economic uncertainties. The findings highlight an asymmetry in the relationship between resilience and geopolitical risks: rising risks weaken resilience, but subsequent decreases do not lead to immediate recovery. This persistent effect is linked to prolonged uncertainty, cautious business behavior, and time lags in rebuilding confidence. By uncovering the asymmetric impact of geopolitical risks and introducing a novel resilience measure, this study provides critical insights for understanding business vulnerabilities in crisis contexts. It also offers strategic guidance for enhancing resilience through targeted policies, particularly in periods of heightened risks.

## Çoklu krizler karşısında işletme dayanıklılığı: Dinamik bir perspektif

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### ÖZ

Bu çalışma, 2010:01-2024:09 dönemi için Türkiye'de jeopolitik risklerin ve ekonomik krizlerin iş yönetimi esnekliği üzerindeki etkilerini incelemektedir. Kapanan işletmelerin kurulan işletmelere oranı kullanılarak oluşturulan özgün bir zaman serisi, dayanıklılığı ölçmektedir. RALS-LM birim kök ve Hatemi-J Asimetrik Nedensellik

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**Anahtar Kelimeler:**

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testlerini kullanan analiz, dayanıklılık serisinde iki yapısal kırılma tespit etmektedir: pandeminin zirve etkisini yansıtan 2020 sonu ve para birimindeki değer kaybı ve ekonomik belirsizliklerin ortasında pandemi sonrası adaptasyonu işaret eden Aralık 2021. Bulgular, dayanıklılık ve jeopolitik riskler arasındaki ilişkide bir asimetrimin altını çiziyor: artan riskler dayanıklılığı zayıflatıyor ancak; sonraki düşüşler hemen iyileşmeye yol açmıyor. Bu kalıcı etki, uzun süreli belirsizlik, temkinli iş davranışı ve güvenin yeniden inşasındaki gecikmelerle bağlantılıdır. Bu çalışma, jeopolitik risklerin asimetrik etkisini ortaya çıkararak ve yeni bir dayanıklılık ölçütü sunarak, kriz bağlamlarında iş dünyasının kırılma noktalarını anlamak için kritik bilgiler sağlamaktadır. Ayrıca, özellikle risklerin arttığı dönemlerde, hedeflenen politikalar yoluyla dayanıklılığın artırılması için stratejik rehberlik sunmaktadır.

**1. Introduction**

Economic crises exert significant and multifaceted effects across both macroeconomic and microeconomic dimensions, leading to substantial disruptions in the economic structures of nations while also deeply impacting individual well-being and societal stability. These crises are often characterized by their sudden onset and wide-ranging consequences, manifesting in severe disruptions to production processes, sharp declines in employment levels, shifts in income distribution, and destabilization of financial systems. As John Maynard Keynes articulated during the era of the “Great Depression,” such crises frequently originate from a deficiency in aggregate demand and a contraction in overall economic activity (Keynes, 1936). On the other hand, the monetarist school of thought, championed by Milton Friedman and Anna Schwartz, emphasizes financial market imbalances and the role of monetary policy in crisis dynamics (Friedman and Schwartz, 1963).

These contrasting yet complementary theoretical frameworks provide essential insights into the broader economic mechanisms and intricate dynamics that underpin and exacerbate economic crises, offering valuable perspectives for policymakers and researchers alike.

In this study, economic crises are defined as periods of severe macroeconomic instability characterized by sharp contractions in output, financial distress, exchange rate volatility, and disruptions in credit markets. In the context of Türkiye, such crises have manifested through currency shocks (e.g., the 2018 currency crisis), inflationary spirals, and liquidity shortages affecting business sustainability.

In emerging economies like Türkiye, the repercussions of crises are often more severe and prolonged. Geopolitical risks, in particular, exacerbate economic vulnerability by influencing capital flows, exchange rate volatility, and financial instability (Akyüz and Boratav, 2003). Additionally, economic crises challenge the sustainability of entrepreneurial ecosystems by heightening uncertainty and limiting access to financing (Reinhart and Rogoff, 2009). A closer analysis of these crises' characteristics reveals how the Turkish economy's sensitivity to such shocks is intertwined with macroeconomic structural dynamics. Since the liberalization of capital movements in 1989, Türkiye's economic structure has shown an increased propensity for financial crises. Addressing these crises predominantly through short-term financial remedies, rather than addressing underlying structural issues, has been a recurring challenge.

Business resilience is a crucial factor in mitigating the social and economic costs of crises. Its effectiveness hinges on the flexibility and adaptability of business management, which can contribute to sustained growth beyond macroeconomic stabilization. However, many Turkish businesses are family-run and lack institutionalization, making them more susceptible to economic shocks. This structural characteristic reduces their resilience and amplifies the adverse effects of macroeconomic uncertainty.

The interplay between business resilience and geopolitical risks warrants close examination. Research on how geopolitical risks influence investment and corporate strategies (Caldara and Iacoviello, 2018) highlights their potential to affect the establishment and closure rates of businesses. For instance, the increase in Türkiye's geopolitical risk index during Operation Peace Spring (2019) reflects the sensitivity of economic activity to political tensions and regional conflicts.

Theoretical debates on crisis contagion have also focused on the localized impacts of global crises. Reinhart and Rogoff (2009) emphasize that financial crises often have more destructive consequences in developing economies. In Türkiye, responses to crises have frequently relied on temporary measures rather than comprehensive structural reforms, highlighting the need for a more sustainable approach to mitigate recurring vulnerabilities.

This study investigates the effects of economic crises on business resilience in Türkiye, with a particular focus on the role of geopolitical risks. While the macroeconomic dimensions of crises and their direct impact on businesses are well-documented, research on the intersection of business resilience and geopolitical risks remains scarce. This study addresses this gap by developing a novel time series that quantifies business resilience using microeconomic indicators, such as business openings and closures, and examining its relationship with geopolitical risks.

This study assumes that business resilience is sensitive to geopolitical shocks and that uncertainty effects may persist asymmetrically due to confidence rebuilding delays and structural fragilities in emerging economies.

Building on this conceptual and empirical gap, the study formulates the following testable assumptions:

- $H_1$ : Business resilience in Türkiye exhibits structural breaks in response to major economic crises and extraordinary shocks.
- $H_2$ : Business resilience follows a trend-stationary process rather than a unit root process, implying that shocks are temporary but may shift the series to a new level.
- $H_3$ : Positive shocks in geopolitical risk negatively affect business resilience.
- $H_4$ : The impact of geopolitical risk on business resilience is asymmetric; decreases in geopolitical risk do not generate an immediate positive recovery effect.

This study contributes to the literature in three ways: (i) by developing a novel micro-based time series to measure business resilience, (ii) by identifying structural breaks using robust RALS-LM procedures under non-normal errors, and (iii) by revealing asymmetric effects of geopolitical risks on business resilience in an emerging economy context. Accordingly, it advances the literature by offering a dynamic and macro-level assessment of business resilience under multiple crisis conditions.

## 2. Literature review

Geopolitical risk refers to the probability of adverse economic effects arising from political tensions, armed conflicts, diplomatic disputes, or terrorism that may disrupt economic stability and investment decisions. In the case of Türkiye, geopolitical risks have intensified during events such as Operation Peace Spring (2019), regional conflicts, and heightened diplomatic tensions.

Economic crises are also widely regarded as some of the most significant indicators of macroeconomic instability, reflecting deep-seated disruptions in economic systems that can profoundly affect both national economies and individual enterprises. The literature places particular emphasis on examining the multifaceted impacts of such crises on businesses, given their pivotal role in driving economic activity and maintaining employment. According to Schumpeter (1934), crises generate a phenomenon he termed "creative destruction," wherein existing economic structures are dismantled and replaced with more efficient and innovative ones. This process, he argued, relies heavily on the adaptive capacity of enterprises, which serves as a cornerstone for economic recovery and long-term growth. Nonetheless, the ability of businesses to adapt is not without constraints. As Bernanke (1983) pointed out, crisis periods are often accompanied by severe liquidity shortages and sharp contractions in demand, both of which can significantly hinder the capacity of enterprises to navigate these challenging conditions and contribute to broader economic recovery.

Studies on the impact of geopolitical risks on businesses have attracted more attention, especially in recent years when globalization has gained momentum. Caldara and Iacoviello (2018) developed a geopolitical risk index and showed that these risks increase economic uncertainty and negatively affect investments. Similarly, Bloom (2009) emphasized the impact of economic stability on business investment activities and decisions, and stated that businesses are more cautious in their decision-making processes during periods of uncertainty.

The literature has also extensively examined the effects of abrupt and unforeseen shocks, such as pandemic crises, on the resilience of businesses. For instance, Ivanov and Dolgui (2020) looked at how the COVID-19 pandemic affected supply chains and found that one of the key elements affecting a company's sustainability is how resilient it is to crises. According to research conducted in Turkey, the effects of economic crises change depending on the size, sectoral distinctions, and financing arrangement of businesses (Karaca and Uysal, 2017).

Finally, the concept of business resilience has an important place in the literature for understanding organizational sustainability, especially in times of crisis. Resilience is shaped by both internal factors (e.g. leadership, innovation capacity) and external factors (e.g. macroeconomic stability, geopolitical risks) (Sheffi, 2005). Understanding the effects of economic crises and geopolitical risks on business resilience is of strategic importance for policymakers and business managers, especially in emerging economies (Dawson, 2018).

Table 1

*Literature review*

Researcher	Period	Country	Method	Result
Banebed (2023)		World scale	VOSviewer, Literature Review	Global economic and geopolitical concerns are taken into consideration while analyzing business resilience. The study concludes that businesses that have expanded internationally are more resilient to these risks than businesses that have not.
Reyad, Ayesha, Iqbal and Zariyawati (2024)	2014-2023	Poland, Russia, Ukraine	Panel Regression and GMM	Data and Geopolitical risk and firm performance were found to be significantly and negatively correlated. The report suggests using environmental, social, and governance (ESG) strategies to make organizations more resilient to geopolitical threats.
Rücker and Treibich (2024)	2024	10 countries, 12,065 companies	Multivariate regression analysis	Much of the political risk measurement is driven by Chinese firms. As uncertainty increases in the risk environment, access to capital becomes more difficult, which

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					negatively affects the resilience of businesses.
NguyenHuu and Örsal, (2024)	1985-2019	17 Developed countries	Fixed effect model and quantile regression		When financial stress is high, geopolitical risk affects businesses more and increases this stress more. Increasing a company's resilience to geopolitical shocks can be achieved through operational initiatives, financial resilience, business model adaptation, and scenario preparation.
Le and Tran (2021)	1995-2018	Developing Asian countries	Two-stage least squares method		Corporate business investments in China and Russia are negatively affected by geopolitical risk. In India and Türkiye, geopolitical risk affects corporate business investments to a lesser extent.
Sorvi (2023)	April-May 2023	Finland	Case analysis, qualitative analysis.		Increasing a company's resilience to geopolitical shocks can be achieved through operational initiatives, financial resilience, business model adaptation, and scenario preparation.

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Table 1 shows the studies on business resilience and their results. This literature provides a broader understanding of the impact of economic crises on business resilience and provides the theoretical foundation for this study.

Although prior studies have extensively examined the impact of geopolitical risks and economic crises on firm-level performance, investment decisions, and financial stress, most of them rely on panel data or firm-level indicators. In contrast, this study adopts a macro-level perspective by constructing a resilience indicator based on business openings and closures. Moreover, while existing research generally assumes symmetric effects of geopolitical risk, this study explicitly investigates asymmetric responses and structural breaks within a unified time-series framework. Accordingly, it extends the literature by integrating crisis dynamics, structural break analysis, and asymmetric causality in the context of an emerging economy.

### 3. Data and methodology

To ensure methodological robustness in analyzing crisis-driven dynamics, this study employs advanced time-series techniques that account for structural breaks and asymmetric responses.

The RALS-LM unit root test was preferred because the resilience series exhibited non-normal residuals, which may lead to biased conclusions in traditional unit root tests. By incorporating structural

breaks and relaxing normality assumptions, RALS-LM provides more reliable results in crisis-driven time series.

The Hatemi-J asymmetric causality test was selected to capture potential asymmetric responses of business resilience to increases and decreases in geopolitical risks. Since uncertainty shocks may not generate symmetric recovery dynamics, this method allows for a more realistic interpretation of crisis effects.

To implement these econometric procedures, a monthly dataset covering the period January 2010–September 2024 is utilized. In this study, the number of established enterprises, the number of closed enterprises, and the geopolitical risk index data in Türkiye constitute the empirical basis of the analysis. The number of established and closed enterprises is obtained from the website of the Union of Chambers and Commodity Exchanges of Türkiye (TOBB), while the geopolitical risk index data are obtained from <https://www.matteoiacoviello.com/gpr.htm>

As a measure of the resilience of company managements in Türkiye, a new time series specific to this study is generated, calculated as follows:

$$Resilience_t = \frac{Number\ of\ Closed\ Enterprises_t}{Number\ of\ Established\ Enterprises_t} \quad (1)$$

The index  $t$  in equation (1) denotes time. The reason for using the number of established enterprises is to include the economic conjuncture structure in the analysis.

Statistical summary information about the variables is presented in Table 2.

Table 2

*Statistical summary of variables*

	Geopolitical Index	Risk	Number of Established Enterprises	Number of Closed Enterprises
Mean	0.321582		6872.989	1417.362
Median	0.280000		6022.000	1141.000
Maximum	1.180000		21513.00	6236.000
Minimum	0.060000		2393.000	427,0000
Standard Deviation	0.173604		3030.314	773.6064

In this study, econometric time series methods were utilized to determine the resilience of business managements in the face of crises. Initially, the stationarity of the variables under consideration was examined. Here, the objective is to ascertain whether the shocks to the resilience series, as expressed in Equation (1), are permanent or temporary. To determine stationarity, unit root tests were applied. The first unit root test in the literature was developed by Dickey and Fuller (1979). Following this, many other unit root and stationarity tests were developed, such as the Augmented Dickey-Fuller (1981), Phillips-Perron (1988), Kwiatkowski, Phillips, Schmidt and Shin (1992) tests. These unit root tests do not account for structural breaks in time-series data and assume that shocks are temporary. However, Nelson and Plosser (1982) demonstrated in their study that shocks may be permanent. Additionally, Perron (1989) showed that if there is a structural break in the series and this break is not incorporated into the unit root test, biased results might emerge, leading to the acceptance of the null hypothesis of a unit root. The first unit root test that takes structural breaks into account was also developed by Perron (1989). After Perron's unit root test, several other structural break unit root tests were developed, including those by Zivot and Andrews (1992), Lumsdaine and Papell (1997), Perron (1997), Lee and Strazicich (2003, 2004), Kapetanios (2005), Carrion-i Silvestre, Kim and Perron (2009), and Narayan

and Popp (2010), among others, with methods that determine the break dates endogenously. Both traditional unit root tests and structural break unit root tests assume that the residuals from the model follow a normal distribution. In cases where the residuals do not follow a normal distribution, the results obtained from these unit root tests can become controversial. In such cases, unit root tests based on the Residual-Based Augmented Least Squares (RALS) method, developed by Im, Lee and Tieslau (2014), Meng, Im, Lee and Tieslau (2014), and Meng, Lee and Payne (2017), can provide more robust results.

In traditional LM tests, structural breaks are taken into account, and these tests are based on the LM test developed by Schmidt and Phillips (1992), which uses the Lagrange multiplier. The following model is used in the Schmidt-Phillips (1992) test.

$$y_t = \delta' z_t + x_t \text{ ve } x_t = \beta x_{t-1} + \varepsilon_t \quad (2)$$

In the above Equation (2), the expression  $z_t$  represents the constant term and the trend variable. The auxiliary regression equation for the Schmidt and Phillips (1992) test is expressed as follows.

$$\Delta y_t = \delta' z_t + \phi \tilde{y}_{t-l} + \varepsilon_t \quad (3)$$

In the above equation, the variable  $\tilde{y}_t$  represents the detrended form of  $y_t$ . The null and alternative hypotheses of the Schmidt-Phillips (1992) unit root test are formulated as follows.

$$H_0: \phi = 0 \quad (4)$$

$$H_1: \phi < 0 \quad (5)$$

The unit root test developed by Schmidt and Phillips (1992) does not account for structural breaks. However, Lee and Strazicich (2003, 2004) developed a structural break unit root test by defining  $z_t$  as follows.

$$z_t = [1, t, D_{1,t}, D_{2,t}, DT_{1,t}, DT_{2,t}] \quad (6)$$

In the above Equation (6),  $D_{i,t}$  represents the dummy variables indicating structural breaks in the intercept, while  $DT_{i,t}$  represents the dummy variables indicating structural breaks in both the intercept and the trend, which are added to the model as explanatory variables. The RALS-LM unit root tests developed by Meng et al. (2014) and Meng et al. (2017) are expressed as extended versions of the LM tests using residuals. In LM tests, when the residuals from the model do not follow a normal distribution, the test results become controversial, whereas RALS-LM tests can provide more robust results. In RALS-LM tests, in the first stage, traditional test regressions are estimated using the least squares method, and residuals are obtained. In the second stage, the extended variables, as defined in Equations (7) and (8) below, are calculated.

$$\widehat{w}_{2t} = \widehat{\varepsilon}_t^2 - m_2 \quad (7)$$

$$\widehat{w}_{3t} = \widehat{\varepsilon}_t^2 - m_3 - 3m_2 \widehat{\varepsilon}_t \quad (8)$$

The moment value  $m_j$  appearing in the above equations is calculated as follows.

$$m_j = \frac{\sum_{t=1}^T \varepsilon_t^j}{T} \quad (9)$$

In the third stage, these variables are added to the test regression, resulting in the following form.

$$\Delta y_t = \delta' z_t + \phi \widehat{S}_{t-1} + \theta_2 \widehat{w}_{2t} + \theta_3 \widehat{w}_{3t} + v_t \quad (10)$$

In the above Equation (10), the model specifications for the four different cases of  $z_t$  are determined. For a break in the intercept, two breaks in the intercept, a break in both the intercept and trend, and two breaks in both the intercept and trend,  $z_t$  is expressed as follows.

$$z_t = [1, t, D_{1,t}] \quad (11)$$

$$z_t = [1, t, D_{1,t}, D_{2,t}] \quad (12)$$

$$z_t = [1, t, D_{1,t}, DT_{1,t}] \quad (13)$$

$$z_t = [1, t, D_{1,t}, D_{2,t}, DT_{1,t}, DT_{2,t}] \quad (14)$$

The null and alternative hypotheses for the RALS-LM unit root test are expressed as follows for all model specifications.

$$H_0: \phi = 0 \quad (15)$$

$$H_1: \phi < 0 \quad (16)$$

The test statistic is formulated as follows:

$$\tau_{RALS-LM} = \rho\tau_{LM} + \sqrt{1 - \rho^2}Z \quad (17)$$

Within the above equation,  $Z$  is defined as any variable with a zero mean and constant variance. The value of  $\rho$ , on the other hand, represents the correlation coefficient between the residuals of the LM model and the RALS-LM model. The calculated test statistic is compared with the critical values developed by Meng (2014) for level models and Meng (2017) for models with levels and trends, thereby concluding the testing process. If the absolute value of the calculated test statistic is smaller than the critical value, the null hypothesis cannot be rejected, leading to the conclusion that the series follows a unit root process under structural breaks.

The reason for applying RALS unit root tests in this study is that the assumption of normal distribution of residuals was not satisfied in the applied structural break unit root tests. When the normality assumption is not satisfied, the results obtained from unit root tests become questionable. In this context, RALS unit root tests were applied to obtain more robust results.

Another method utilized in this study is the Hatemi-J (2012) asymmetric causality test, which is applied to determine the causality relationship between variables. The Hacker-Hatemi-J (2006) causality test is based on the Toda-Yamamoto causality test. However, it extends the Toda-Yamamoto framework by incorporating the maximum order of integration among the variables, thereby proposing a novel structure. In the Hatemi-J (2012) asymmetric causality test, the analysis is conducted using the following two equations.

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{1,0} + \sum_{i=1}^t \varepsilon_{1i}^+ + \sum_{i=1}^t \varepsilon_{1i}^- \quad (18)$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{2,0} + \sum_{i=1}^t \varepsilon_{2i}^+ + \sum_{i=1}^t \varepsilon_{2i}^- \quad (19)$$

The positive and negative shocks in Equations (18) and (19) are defined as follows:

$$\varepsilon_{1i}^+ = \max(\varepsilon_{1i}, 0), \varepsilon_{1i}^- = \min(\varepsilon_{1i}, 0), \varepsilon_{2i}^+ = \max(\varepsilon_{2i}, 0), \varepsilon_{2i}^- = \min(\varepsilon_{2i}, 0) \quad (20)$$

$$\varepsilon_{1i} = \varepsilon_{1i}^+ + \varepsilon_{1i}^- \quad (21)$$

$$\varepsilon_{2i} = \varepsilon_{2i}^+ + \varepsilon_{2i}^- \quad (22)$$

In this regard, time series reactions to positive and negative shocks can be distinguished using the asymmetric causality test created by Hatemi-J (2012). In other words, the Hatemi-J (2012) causality test is defined as an asymmetric causality test that emerged by separating the negative and positive shocks within the Hacker and Hatemi-J (2006) causality framework. At the decision-making stage of the test, if the critical value is exceeded by the computed test statistic, the null hypothesis asserting the absence of causality is rejected, leading to the conclusion that an asymmetric causality relationship exists.

#### 4. Findings

The interpretation of the results focuses on whether shocks to resilience are temporary or permanent, and whether geopolitical risks create symmetric or asymmetric effects on business behavior. Trend-stationarity implies that resilience adjusts over time despite shocks, whereas asymmetric causality indicates that risk increases and decreases do not generate equivalent responses.

Initially, the traditional LM unit root test, which accounts for two structural breaks in both level and trend, was applied to the variables used in the study. The test results are presented in Table 3.

Table 3

*LM unit root test results*

	Resilience	Geopolitical Risk
Lag Length	13	0
Break Dates	Nov. 2012/ Jan. 2016	Jan. 2016/ Apr. 2022
Test Statistic	-6.2325	-9.0298
Critical Value (1%)	-6.4791	-6.4525
Critical Value (5%)	-5.7429	-5.7608
JB Test Statistic	138.853034	259.465153
Probability (JB)	0.000000	0.000000

Table 3 shows that, at the 5% significance level in absolute value, the test statistic computed for the resilience series is greater than the crucial value. In this context, the resilience series is determined to be trend stationary with two structural breaks in level and slope when the null hypothesis is rejected. A similar situation is observed for the geopolitical risk index series. As can be seen from the table, the calculated test statistic is greater than the critical values in absolute value. The geopolitical risk index series is also found to be trend stationary with two structural breaks in the level and slope. However, according to the results of the Jarque-Bera test applied to the residuals obtained from the LM test for both series, it is seen from the table that the normality assumption is not met. It can be stated that the results obtained from the LM test are controversial because the normality assumption is not met. In this framework, the RALS-LM test, which takes into account the non-normal distribution of the residuals, was applied. Table 4 displays the test results.

Table 4

*RALS-LM unit root test results*

	Resilience	Geopolitical Risk
Lag Length	12	3
Break Dates	Nov. 2020/ Dec. 2021	Sept. 2019/ Dec. 2019
Test Statistic	-7.53642	-4.61441
$\rho^2$	0.6	0.7
Critical Value (1%)	-4.371	-4.498
Critical Value (5%)	-3.778	-3.918

The model specification results, which take into consideration two structural breakdowns in both level and trend, are shown in Table 4. The computed test statistic for the resilience series is greater than the critical values in absolute terms, as the table illustrates. The resilience series is thus determined to be trend-stationary with two structural discontinuities in level and trend, rejecting the null hypothesis

of a unit root. The break dates are significant within the scope of this study. The first break is observed in November 2020, as indicated in the table. An examination of the data reveals a significant jump during this period. As shown in Equation (1), the numerator of the resilience variable represents the number of company closures. In other words, an increase in the numerical value in the equation corresponds to a decrease in resilience. Within this context, it can be concluded that the resilience series experienced a break in the last months of 2020, a time when the pandemic crisis was at its peak. This suggests that business management resilience in Türkiye was low during this phase of the pandemic crisis. The second break is identified in December 2021. This break is characterized by a sharp drop in the resilience series, which, paradoxically, indicates an increase in resilience. The end of 2021 marks a period when the effects of the pandemic were beginning to wane, and businesses had started to adapt to the crisis conditions. Considering the results as a whole, the first key finding of this study is that business management resilience varied according to the state of the pandemic crisis. However, given the identified break dates, the trend-stationary nature of the series carries important implications. Although the pandemic crisis caused shock effects on the resilience series, these shocks shifted the series to a new level, and the series followed a stationary process. Within this framework, it can be concluded that the resilience of business management in Türkiye is in a sustainable state.

Another issue investigated in the study is the causal relationship between the geopolitical risk index and business management resilience. In this context, the Hatemi-J (2012) asymmetric causality test was applied, and the test results are presented in Table 4. Since both the resilience and geopolitical risk index series are stationary at level, the order of integration was  $I(0)$ .

The causal association between company management resilience and the geopolitical risk index is another subject covered in the study. The findings of applying the Hatemi-J (2012) asymmetric causality test in this situation are shown in Table 5. Since both the resilience and geopolitical risk index series are stationary at level, the order of integration was considered to be zero. Within the framework of the test, critical values are determined by bootstrap simulation. Each of the 1,000 simulations is associated with 800 bootstrap replications.

Table 5

*Asymmetric causality test results*

	Test Statistic	Critical Value (%1)	Critical Value (%5)
<i>Geopolitical Risk(+)</i> <i>→ Resilience (+)</i>	7.500	14.322	10.034
<i>Geopolitical Risk(+)</i> <i>→ Resilience (-)</i>	26.184	20.575	14.784
<i>Geopolitical Risk(-)</i> <i>→ Resilience (-)</i>	7.267	14.735	9.838
<i>Geopolitical Risk(-)</i> <i>→ Resilience (+)</i>	8.210	14.372	9.811

As shown in Table 5, there is an asymmetric causality only from the positive changes in the geopolitical risk index series to the negative changes in the resilience series.

## 5. Conclusion

This study seeks to address and fill a significant gap in the existing literature by comprehensively analyzing the multifaceted effects of economic crises and geopolitical risks on the resilience of business management systems. Utilizing extensive data derived from the Turkish economy spanning the period from January 2010 to September 2024, the research constructs and develops a

unique and innovative time series specifically designed to measure business resilience. This resilience is then meticulously evaluated within the context of both macroeconomic shocks and geopolitical risks, providing a nuanced understanding of the interplay between these factors. To achieve this, the study employs advanced econometric techniques, including the Residual Augmented Least Squares with Structural Breaks (RALS-LM) unit root test, which enables the identification of structural breaks, and the Hatemi-J Asymmetric Causality Test, which is instrumental in uncovering asymmetric and non-linear relationships between business resilience and geopolitical risks.

The main findings of this study can be summarized in three key points. First, business resilience in Türkiye exhibits structural breaks during major crisis periods, particularly during the peak of the pandemic and the subsequent macroeconomic instability phase. Second, resilience follows a trend-stationary adjustment path, indicating that although crises shift the level of resilience, they do not cause permanent structural collapse. Third, geopolitical risks exert asymmetric effects: increases in risk significantly weaken resilience, whereas decreases in risk do not immediately restore business confidence.

The findings of this study reveal that the pandemic crisis initially delivered a severe and widespread shock to businesses, profoundly disrupting their operations and overall performance. However, as time progressed, businesses exhibited adaptive adjustment mechanisms, responding to these unprecedented challenges by gradually enhancing their resilience levels and developing strategies to mitigate risks. A significant structural break was observed in late 2020, a period that aligns with the peak of the pandemic crisis and represents the culmination of its most severe impacts. The second structural break occurred in December 2021, marking a pivotal moment influenced by multiple factors, including the post-pandemic recovery process, the rapid depreciation of the Turkish Lira, and the escalation of economic uncertainties. This particular period underscores the complex and dual challenges businesses faced, as they simultaneously navigated the process of post-pandemic normalization while contending with macroeconomic difficulties. These included significant currency shocks, persistent inflationary pressures, and an environment of heightened economic volatility, which collectively tested the resilience and adaptability of businesses across various sectors.

An additional critical finding is the lack of causality from decreases in geopolitical risks to business resilience, despite the presence of causality when geopolitical risks increase. In other words, while rising geopolitical risks negatively impact business resilience, their subsequent reduction does not immediately lead to an improvement. This asymmetry can be attributed to the persistent nature of uncertainty, the cautious behavior of businesses in the face of potential future risks, and the time lag required to rebuild confidence and operational normalcy. It suggests that businesses respond more sensitively to the escalation of risks than to their resolution.

The negative relationship between the geopolitical risk index and business resilience underscores that geopolitical risks are a critical factor weakening business management. This finding demonstrates that not only economic crises but also geopolitical uncertainties have profound effects on business resilience. By developing a unique time series to measure business resilience and analyzing it within a trend-stationary framework, this research introduces a novel perspective to the literature.

Beyond its empirical findings, this study offers a distinct contribution by integrating structural break analysis and asymmetric causality within a resilience framework. Unlike prior studies that primarily focus on firm-level performance or investment decisions, this research constructs a macro-level resilience indicator and demonstrates how geopolitical risk dynamics shape business sustainability over time.

From a policy perspective, the asymmetric impact of geopolitical risks suggests that merely reducing political tensions may not be sufficient to restore business confidence immediately. Policymakers should therefore design forward-looking risk mitigation frameworks, strengthen institutional credibility, and enhance financial access mechanisms during periods of elevated uncertainty.

For business managers, the findings highlight the importance of scenario planning, liquidity buffers, diversification strategies, and institutionalization to enhance resilience against prolonged

uncertainty shocks. Particularly in emerging economies like Türkiye, resilience-building should be treated as a strategic priority rather than a reactive measure.

Moreover, the study provides valuable theoretical and practical insights by illustrating how business management behaviors are shaped in macroeconomic and geopolitical contexts during crisis periods. Future studies are encouraged to further elaborate on the resilience series at a sectoral level and to analyze its relationships with macroeconomic shocks in greater detail. Additionally, designing and implementing effective policy tools to enhance business resilience levels would represent an important step for both academic research and practical applications. Such analyses can offer a critical roadmap for understanding business dynamics and developing sustainable strategies, particularly during periods of intensified crises.

### **Author statement**

#### **Research and publication ethics statement**

This study has been prepared in accordance with the ethical principles of scientific research and publication.

#### **Approval of the ethics board**

Ethics committee approval is not required for this study.

#### **Author contribution**

The authors contributed equally to the study.

#### **Conflict of interest**

There is no conflict of interest arising from the study for the authors or third parties.

#### **Declaration of support**

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