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Examining the Shifting Dynamics of the Beveridge Curve in the Turkish Labor Market during Crises

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Abstract: Following the global financial crisis, an increasing amount of attention has been directed towards examining the Beveridge curve (BC), which indicates the relationship between unemployment and vacancy rates. This research analyzes the unemployment–vacancy rate dynamics in the Turkiye labor market during both the global financial crisis and COVID-19 periods. The findings from this study demonstrate that the labor market exhibits deteriorating efficiency, as evidenced by movement of BC away from the origin. The unemployment and vacancy rates both increase over time, with a leftward (rightward) shift of BC during the global financial crisis (COVID-19) period. The study also reveals that both crises had no significant effect on unemployment–vacancy rate dynamics. In the Turkish labor market, there exists a situation where the vacancy rate is in shortfall of the unemployment level in Turkiye. This creates a positive relationship between these two factors. The labor market in Turkiye experiences inefficiencies as it struggles to generate a sufficient number of jobs to meet the demand from job seekers.

Keywords: Beveridge curve; covid; global financial crisis; labor market; pandemic; unemployment; vacancy

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1. Introduction

The occurrence of an economic crisis has the potential to disrupt labor markets within an economy by causing disruptions in supply chains, declining trade and export demand, and resulting in a reduction of working hours. For example, both developed and developing economies experienced a recession during the global financial crisis, as noted by the International Monetary Fund (IMF) in 2009 (IMF 2009). The recession triggered by the COVID-19 pandemic differs not only in terms of the extent of its impact on economies but also in the distinctive shock it has introduced to the labor market (OECD 2020a). In addition to the personal hardships faced by individuals who have suffered job losses and have had to support their families through various means, Brussevich et al. (2020) reported that the overall effect on the global economy has been significant. Additionally, the impact of the recession caused by the COVID-19 pandemic on the labor market demonstrates a distinct pattern when compared to other economic crises. Unlike previous recessions, there is a higher likelihood of substantial impacts on labor markets with increased movement of workers between jobs or industries. According to Malta et al. (2020), the current crisis is projected to have a greater negative impact on labor market prospects, resulting in extensive job losses. The broad consensus recognizes that economic crises can have profound and wide-ranging effects on the economy, encompassing economic, financial, and social aspects.

In his ground-breaking analysis, Beveridge (1944) argued that most fluctuations in unemployment are driven by changes in the demand for workers and that job openings are a useful measure of this demand. This implies a negative relationship between job openings

and the unemployment rate. A simple interpretation of the Beveridge curve (BC) is that it is a model that captures how the unemployment rate changes in response to a change in the demand for labor, i.e., in the job openings rate. In the last few years, the relationship between BC unemployment and vacancies has become a key organizing principle for understanding the labor markets (Elsby et al. 2015). Interestingly, a common tool for describing the state of the labor market and differentiating between structural and cyclical changes is the Beveridge curve (Acuna et al. 2018). In the aftermath of the global financial crisis, economies worldwide experienced an exceptional increase in the unemployment rate, coupled with a decline in job vacancies, as noted by Hobijn and Şahin (2013). This has led to a heightened interest in studying the factors that influence the movements in the Beveridge curve. Similarly, during the initial phases of the recession caused by the COVID-19 pandemic, there were observable decreases in both unemployment and job vacancy rates in various economies, primarily due to the implementation of restrictive measures (OECD 2020b). This has sparked discussions regarding the effects of crises on the labor market, particularly the limited job opportunities that have led to a high turnover of workers. In the aftermath of the global financial crisis, there has been growing attention to studying the BC, although most studies have focused on developed economies, giving limited attention to developing economies.

Bova et al. (2016) investigated the effects of labor market variables and policy on labor supply and demand matching using data for OECD countries. They discovered that the possibility of an outward movement in the Beveridge curve is considerably reduced by labor force growth and employment protection laws. Their findings contribute to the understanding of why BCs have not been able to reset after the crisis, given the declining labor forces in many advanced economies for a variety of reasons, including demographics. In a similar vein, Destefanis et al. (2020) examined the variables influencing change in the BC for OECD nations. They discovered that institutional factors, including minimum wages, the tax wedge, unemployment benefits, and, to a lesser extent, employment protection laws, greatly alter the BC. Additionally, they discovered that globalization has had a positive effect on the BC, with no consistent change in the curve that can be linked to the Great Recession. This suggests that the crisis dummy had minimal impact on the OECD countries' Beveridge curve.

With the use of US state-level data, Holmes and Otero (2020) demonstrated that BC shifting, or matching efficiency, is influenced by a number of variables, including the distance between states, homeownership rates, and the relative affordability of housing between them. They also discovered that matching efficiency has changed over time, declining most noticeably after the Great Recession and the subsequent period of recovery. According to Barlevy et al. (2023), fluctuations in the BC between 1960 and 2000 can be explained by variations in unemployment inflow rates that are connected to demography. After the Great Recession, a decrease in matching efficiency that lowered unemployment outflows caused the curve to move outward. On the other hand, they showed that BC shifts seem to be caused by variations in employees' desire to change occupations. The unemployment inflow rate was initially under pressure to rise due to a large number of new job seekers. Examining the data for Chile, Acuna et al. (2018) found that the BC has shifted outward, indicating a loss of efficiency in the labor supply and demand matching mechanism as a result of the Asian financial crisis. By contrast, the sub-prime crisis caused the curve to invert, which is evidence of an improvement in the matching process. They also examined a number of labor market variables that could account for the variations in the matching process' effectiveness throughout the two crises. Their findings indicate that the wage level and the labor force were the primary factors that affect variations in matching efficiency.

Notably, the BC in the Turkish labor market has received limited interest, apart from Saglam and Gunalp (2012), and Kanık et al. (2014), who investigated its dynamics during the global financial crisis. To date, no study has conducted a comparative analysis of the impact of both the COVID-19 and global financial crisis on the BC. Conducting such an

analysis would provide us with new insights into understanding shifts in the Beveridge curve during these crises.

The present study aims to examine the relationship between the unemployment and vacancy rates within the Turkish labor market during two major crises, namely the global financial crisis and the COVID-19 pandemic. Specifically, it focuses on analyzing the changes in essential labor market indicators in Turkiye, including unemployment, labor force participation, and employment, to understand their evolution throughout these challenging periods. The BC, which indicates labor market efficiency by illustrating the relationship between unemployment and vacancies (Ghayad and Dickens 2012), plays a crucial role in this study. Economic crises generally lead to changes in the global unemployment–vacancy relationship, and Turkiye is no exception. The primary objectives of this study are twofold. First, the objective is to examine the dynamics of the Beveridge curve, specifically focusing on the interplay between unemployment and vacancies, throughout the global financial crisis (GFC) and the COVID-19 pandemic. Second, it seeks to analyze the impact of these crises on the labor market by employing trend analysis and graphical analysis techniques. Furthermore, the study utilizes an autoregressive distributed lag (ARDL) model to examine the observed effects. The ARDL model investigates the short-run as well as long-run dynamics (Khan et al. 2023; Shahbaz et al. 2023). Moreover, the ARDL model gives much better results when one is interested in single-equation models and the direction of causality is already known (Aysan et al. 2021). The findings reveal the movement of the Beveridge curve away from the origin, suggesting inefficiencies in the labor market. During the global financial crisis period, the curve exhibited a counter-clockwise movement, indicating an increase in both the unemployment rate and the vacancy rate. However, neither the global financial crisis nor the COVID-19 crisis had a substantial impact on the unemployment–vacancy behavior. The Turkiye vacancy rate continues to remain below the level of unemployment, indicating a positive relationship. The lack of consistent job creation in the economy fails to meet the demand from job seekers, resulting in weak labor market efficiencies.

The sections of the paper are organized as follows. Section 1 provides an introductory background to the study. Section 2 covers the methodology employed in the study. Section 3 focuses on discussing the outcomes of the Turkish labor market and the analysis of the Turkiye Beveridge curve. Section 4 comprises a presentation of the results, and conclusions are presented in Section 5.

2. Materials and Methods

This study utilizes a comprehensive dataset sourced from ISKUR, TURKSTAT, and the OECD on a monthly basis. To examine the Beveridge curve in the Turkish labor market, it is crucial to carefully select relevant variables that yield economically significant results reflecting the labor market dynamics. Various factors have the potential to contribute to shifts in the Beveridge curve (see Acuna et al. 2018; Bonthuis et al. 2016; Hobijn and Şahin 2013; Vansteenkiste 2017; Waqas and Awan 2017). Globally, there is a potential measurement problem for the vacancy rate. However, we use vacancy rate data sourced from ISKUR calculated based on employee requests by employers. In this study, the determinants underlying the relationship between unemployment and vacancies are investigated using accessible data on youth unemployment, minimum wage, and employment in specific sectors, with a particular focus on the construction and service sectors. Furthermore, in our analysis, we include data on the GDP growth rate and inflation to consider cyclical factors that may impact the relationship. Unemployment rate, youth unemployment, service and construction sectors employment data were sourced from the TURKSTAT database, GDP and minimum wage data were sourced from the OECD database, and the inflation rate was obtained from the Central Bank of Turkey database. All data were seasonally adjusted from the sources.

The main objective is to assess the impact of crises on the Beveridge curve, specifically the relationship between unemployment and vacancies, in Turkiye. To achieve this, we employed an ARDL technique and analyzed a comprehensive dataset from January 2005 to

March 2021. Our analysis focused on visually inspecting the data during both the global financial crisis and the COVID-19 crisis, with particular emphasis on examining each crisis separately using the same dataset. In order to examine the shifts in the Beveridge curve, we adopted a general model expressed as:

$$u_t = \beta_0 + \beta_1 u_{t-1} + \beta_2 v_t + \beta_3 v_t^2 + \beta_4 Z_t + \pi DU_t^{GFC} + \varphi DU_t^{C19} + \varepsilon_t \quad (1)$$

In Equation (1), the variables are defined as follows: u_t represents the current unemployment rate, the variable u_{t-1} represents the lagged unemployment rate, which serves as a control to account for any ongoing or persistent unemployment in the economy, v_t represents the labor market vacancy rate, and v_t^2 accounts for any nonlinearity or convexity in the Beveridge curve. Additionally, Z_t represents a set of control variables. To account for the impact of the global financial crisis and the COVID-19 pandemic on the relationship between unemployment and vacancies, we introduce crisis dummies in Equation (1). The dummy variable (DU_t^{GFC}) is assigned a value of 1 during the period of at least two consecutive quarters of a negative growth rate from December 2007 to June 2009, and 0 otherwise. Similarly, the dummy variable (DU_t^{C19}) takes a value of 1 from March 2020 until the end of the sample, and 0 otherwise, to capture the effects of the COVID-19 crisis.

Numerous studies have examined the factors responsible for changes in the Beveridge curve, particularly in relation to the intercept parameter. Some studies relied on visual examination of the curve, while others incorporated control variables to explain potential shifts (e.g., Bonthuis et al. 2016; Tagkalakis 2016; Vansteenkiste 2017). In this study, we propose a model, specified in Equation (1), which includes variables accounting for the impacts of crises, the wage institutional structure, and structural and cyclical characteristics that contribute to decomposing unemployment. To explore the determinants driving shifts in the Beveridge curve, we adapted Equation (1) using the ARDL model framework. It is formulated as follows:

$$\begin{aligned} U_t = \beta_0 + \sum_{i=1}^{p} \beta_{i,1} U_{t-i} + \sum_{j=0}^{q} \beta_{j,2} V_{t-j} + \sum_{j=0}^{q} \beta_{j,3} V_{t-j}^2 + \sum_{j=0}^{q} \beta_{j,,4} Z_{t-j} + \pi DU_t^{GFC} \\ + \varphi DU_t^{C19} + \varepsilon_t \end{aligned} \quad (2)$$

In this equation, $\beta_{i,1}$ represents the coefficient for the lagged dependent variable, reflecting the impact of past unemployment rates. The coefficients $\beta_{j,2}$ and $\beta_{j,3}$ capture the effects of the vacancy rate and its squared value on unemployment. $\beta_{j,,4}$ represents the control variables coefficient, which includes factors such as the minimum wage relative to the median wage, inflation rate, GDP growth rate, youth unemployment rate, and the share of construction or service sectors in total employment. Additionally, the model incorporates dummy variables for the global financial and COVID-19 crises. The ECM model allows us to account for short- and long-run fluctuations in the relationship between unemployment and its determinants.

$$\begin{aligned} \Delta U_t = \alpha_0 + \alpha_1 U_{t-1} + \alpha_2 V_{t-1} + \alpha_3 V_{t-1}^2 + \alpha_4 Z_{t-1} + \sum_{i=1}^{p} \beta_{i,1} \Delta U_{t-i} + \sum_{j=0}^{q} \beta_{j,2} \Delta V_{t-j} \\ + \sum_{j=0}^{q} \beta_{j,3} \Delta V_{t-j}^2 + \sum_{j=0}^{q} \beta_{j,,4} \Delta Z_{t-j} + \pi DU_t^{GFC} \\ + \varphi DU_t^{C19} + \gamma ECM_{t-1} + \varepsilon_t \end{aligned} \quad (3)$$

In the equation, α_0 represents the intercept term, while α_1, α_2, α_3, α_4 are the long-term coefficients. The term γ_j represents the error-correction term, which captures the adjustment process. The variable ECM_{t-1} represents the error-correction term that reflects the extent of deviation from the long-run equilibrium.

3. Labor Market in Turkiye

3.1. Labor Market Characteristics

The Turkish labor market will be examined in relation to the COVID-19 crisis, taking into account its historical context with the global financial crisis (GFC). Various indicators such as GDP, unemployment, inflation, and vacancy rate are used to assess the impact of these crises on the economy. Turkiye has made consistent efforts to maintain high employment levels despite facing economic crises. According to the OECD, prior to the global financial crisis, Turkiye's unemployment rate averaged 9.51 percent in 2005 and decreased slightly to 9.07 percent in 2006. These values were significantly higher than the OECD average rates of 6.84 percent for 2005 and 6.32 percent for 2006. It is important to compare unemployment with vacancy rates in order to gain a comprehensive understanding of the labor market. The lowest unemployment rate in Turkiye was recorded in May 2006, with 1.9 million people unemployed and an unemployment rate of 8.8 percent. During the 2009 period, Turkiye experienced its highest unemployment rate, mainly due to the global crisis' impact on the global economy. In recent years, unemployment in Turkiye reached double-digit figures in 2015, with 3.3 million people unemployed, marking the highest level since 2010. At the beginning of 2019, the unemployment rate remained high, with 4.6 million people unemployed and a rate of 13.9 percent. This could be associated with an increase in the labor force. However, there has been a decline in the unemployment rate as the economy has shown signs of improvement and job creation. The government implemented measures such as employment subsidies to reduce unemployment (Adaman and Erus 2018). The expansion of the labor force in the country has not had a significant impact on job creation, as the number of job vacancies from both the public and private sectors has been inadequate to address unemployment. Despite a gradual increase in vacancy postings over time, there was a sharp decline during the period of lockdown measures and work-from-home policies. However, both the demand and supply of labor started to rise again after the easing of these measures, leading to a remarkable increase in the latter half of 2020.

During the global financial crisis, the employment rate remained around 39 percent in 2009. Figure 1C,D indicate a steady increase in employment and labor force over time. In the second half of 2018, there was a slight decline in the employment rate from 47.9 percent to 47.4 percent. The outbreak of COVID-19 led to a decline in both the labor force and employment rate, primarily due to government restrictive policy measures. Between March and June 2020, the employment rate remained stagnant at around 41 percent. However, the labor force participation rate, shown in Figure 1D, exhibited a continuous upward trend until the pandemic hit, indicating that individuals were leaving the labor force due to crisis. Nevertheless, the government authority's efforts to mitigate the impact of the pandemic on employment resulted in a slight improvement, with the employment rate rising to approximately 43 percent in July. This increase can be attributed to the gradual easing of lockdown measures and the resumption of economic activities.

Youth unemployment in Turkiye can be associated with the significant increase in the population of young people unable to find employment due to factors such as experience and a high birth rate. Youth unemployment rates soared in the aftermath of the 2007 global crisis, rising from 16.6 percent in May 2008 to 25 percent in May 2009, representing a marginal increase of about 7 percent within a year. During this period, it meant that one out of every four young individuals was unemployed, surpassing the global average. The crisis had a greater impact on youth unemployment compared to older age groups, posing a significant challenge to domestic production. Over time, the effect of the crisis on employment has intensified due to the growing number of youths. Despite Turkiye's rapid economic growth, the country has struggled to generate sufficient jobs for its young population. It is anticipated that a high GDP growth rate would be associated with increased employment and labor force participation. As a response to the financial crisis, the government implemented a range of fiscal stimuli, positioning Turkiye as the country with the most stimulus in OECD. By 2016, the labor force in Turkiye had expanded, reaching a total of 30.5 million people.

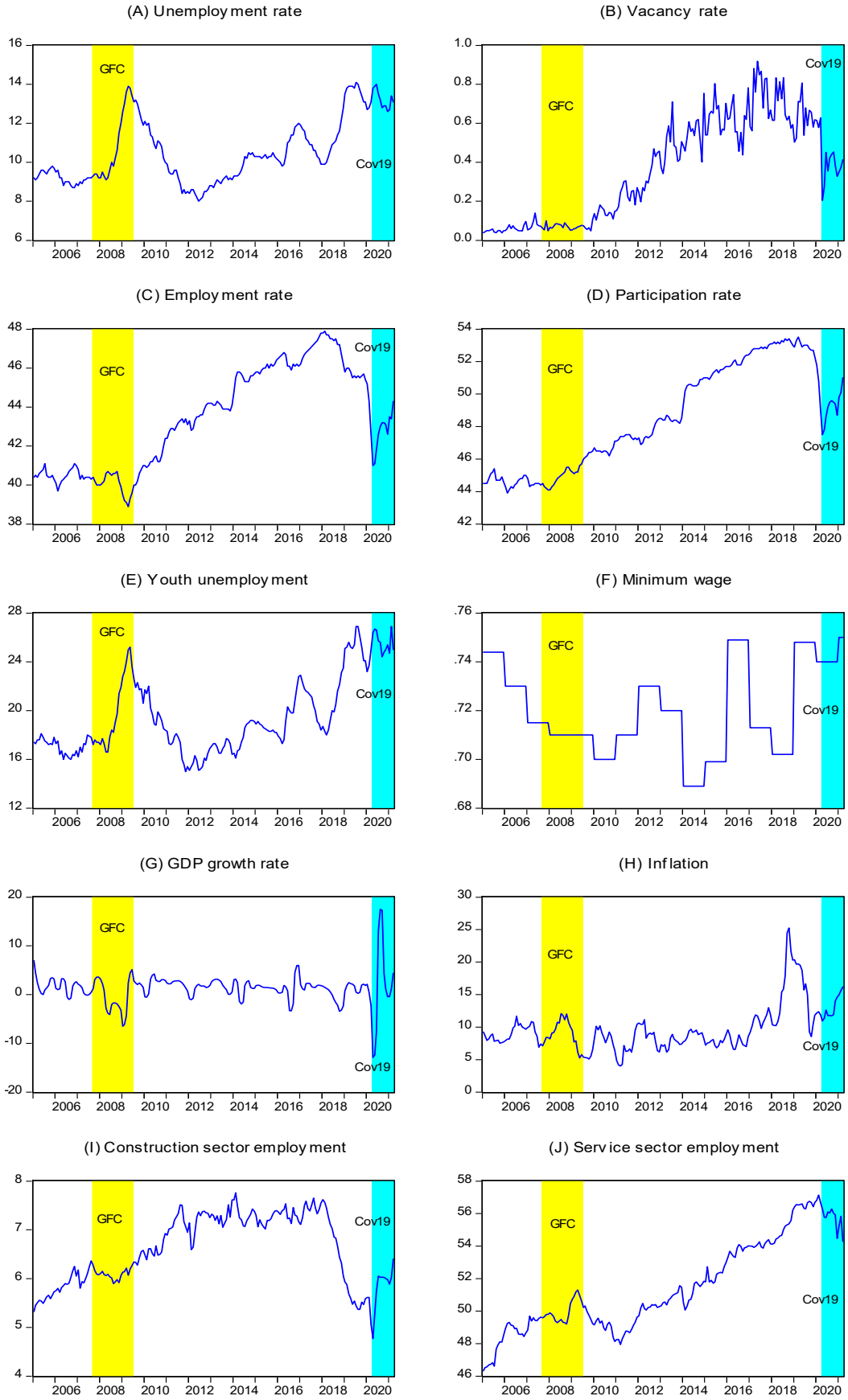

Figure 1. Turkiye labor market variables.

The Turkish economy has been characterized by economic imbalances, inflation, and exchange rate pressures, leading to challenges in the labor market, particularly reflected in the unemployment rate (Saglam and Gunalp 2012). Figure 1G,H depict the GDP growth rate and inflation rate in Turkiye, respectively. The data reveal a consistent growth pattern in GDP, with a decline from 4.9 percent in the first half of 2005 to approximately 1.2 percent in the following year. Prior to the global crisis, Turkiye exhibited stable growth in GDP, which peaked at 3.05 percent in the second quarter of 2006. However, there was a negative growth of −0.75 percent in the third quarter of 2006. During the 2008–2009 period, the Turkish GDP contracted by 4.9 percent, aligning with the global financial crisis. The crisis significantly impacted the Turkish economy, primarily due to a decrease in demand, as indicated by OECD data. Further analysis of the data reveals that household consumption and investment had negative contributions to GDP, evidenced by consecutive negative growth during this period. Nevertheless, growth started to recover in the mid 2009, reaching 4 percent. Positive growth rates were sustained throughout the year, except for a slight contraction of −0.29 percent in the first quarter of 2010.

The Turkish economy experienced severe repercussions during the global financial crisis, standing out among European countries like Ukraine and Russia (Cömert and Yeldan 2018). The crisis persistently affected Turkiye at the end of 2009. It is worth noting that growth in national output exhibits seasonal patterns, particularly during winter, which could account for the decline in productivity. The negative growth period in Turkiye was accompanied by a record-high unemployment rate, and there was a lack of substantial employment growth in the aftermath of the crisis. Despite the GDP expansion that followed, job creation in the economy remained limited, resulting in an increase in the number of unemployed individuals. The inflation rate in Turkiye provides valuable insights into the economy's stability. High and persistent inflation contributes to uncertainty, creates economic distortions, and discourages investors. Figure 1H illustrates the significant inflation crisis in Turkiye. Between 2005 and 2008, inflation increased from 8.2 percent to 10.4 percent. The country experienced an annual average improvement of 6.3 percent in its price level in 2009. Over the past decade, inflation has consistently remained below 10 percent, except for a surge to approximately 11.4 percent in 2017 and a peak of 16.3 percent in 2018. There was a notable improvement as the average inflation rate dropped to 15.2 percent in 2019. Regarding wages, Turkiye witnessed relatively little changes. From the early years until 2010, the minimum wage demonstrated a gradual decrease in relation to the median earnings of full-time employees, characterized by stepwise declines. However, a shift occurred in 2010, leading to an increase in the minimum wage. Subsequently, in 2012, there was a subsequent decline in the minimum wage. During the financial crisis period, the minimum wage remained stable. Despite the notable economic growth experienced by Turkiye, there was a lack of significant wage growth. As illustrated in Figure 1F, wages experienced a decline in 2009 and later started to increase in 2011.

Figure 1I,J provide an overview of the sectoral employment composition in Turkiye during the specified period. The data reveal significant changes in the rural–urban labor market structure. Service and construction sectors have witnessed growth throughout the period. It is worth noting that the service sector is characterized by large informality. Ideally, as workers transition from rural areas, they should find opportunities in the industrial sector. However, the industrial sector has shown a downward trend until 2018, when it started to recover. The service sectors have been particularly impacted by the COVID-19 pandemic and the measures implemented to curb its spread. Industries such as tourism, transportation, and other service subsectors have suffered significant declines. The outbreak of the pandemic has worsened labor market outcomes, with factories facing restrictions and lockdown measures (Açikgöz and Günay 2020). Different businesses have experienced varying employment outcomes depending on the overall economic conditions. Sectors such as aviation and tourism have been hit the hardest (Zhang et al. 2020). The labor market continues to witness substantial job losses, and there is uncertainty regarding when normalcy will be restored. According to the International Labor Organization (ILO), the

global pandemic could result in the loss of around 25 million jobs, with an estimated income loss ranging from USD 860 billion to USD 3.4 trillion (ILO 2020).

The labor market has experienced significant disruptions as a result of the COVID-19 pandemic, leading to a notable decline in employment and working hours. These losses can be attributed to the implementation of lockdown measures aimed at containing the spread of the virus, as well as the overall decrease in demand for goods and services. For instance, between February and April, the average annual unemployment rate stood at 13.2 percent, and it slightly increased to 13.4 percent between May and July. The impact of the COVID-19 crisis on the labor market is unprecedented, with far-reaching consequences that continue to unfold. Measures implemented by authorities to flatten the curve and control the spread of the virus have significantly impacted aggregate demand in recent months. While most economies worldwide have been affected by the health crisis, the Turkish labor market has shown relative immunity. This is noteworthy, considering that many countries opted for total lockdown policies, whereas Turkiye implemented a comparatively more lenient approach. As other countries shifted towards partial lockdowns to manage subsequent waves, the impact on unemployment in the Turkish labor market has not been significant. The relatively lenient COVID-19 measures in Turkiye have played a role in safeguarding jobs in the economy.

3.2. Beveridge Curve

Unemployment and vacancy data are essential indicators of labor demand in the Turkish labor market, as in other economies. Since the COVID-19 outbreak in Turkiye, the labor market has been severely impacted by stringent measures, causing an unprecedented blow to the economy. This section examines the behavior of the Beveridge curve and contextualizes the current crisis with the Great Recession. During the global financial crisis, the relationship between unemployment and vacancies exhibited distinct patterns as shown in Figure 2. As the economy entered a crisis, the vacancy rate sharply declined while the unemployment rate increased significantly. This behavior could be attributed to firms responding to the recession by laying off workers in line with the business cycle (Blanchard et al. 1989). An alternative interpretation for the observed dynamics in Turkiye's Beveridge curve during the period is that the unemployment rate responded more rapidly to economic shocks compared to the vacancy rate. The relationship between unemployment and vacancies exhibited inconsistent patterns. This can be observed in the Figure 2 below, which illustrates the monthly variations in both rates.

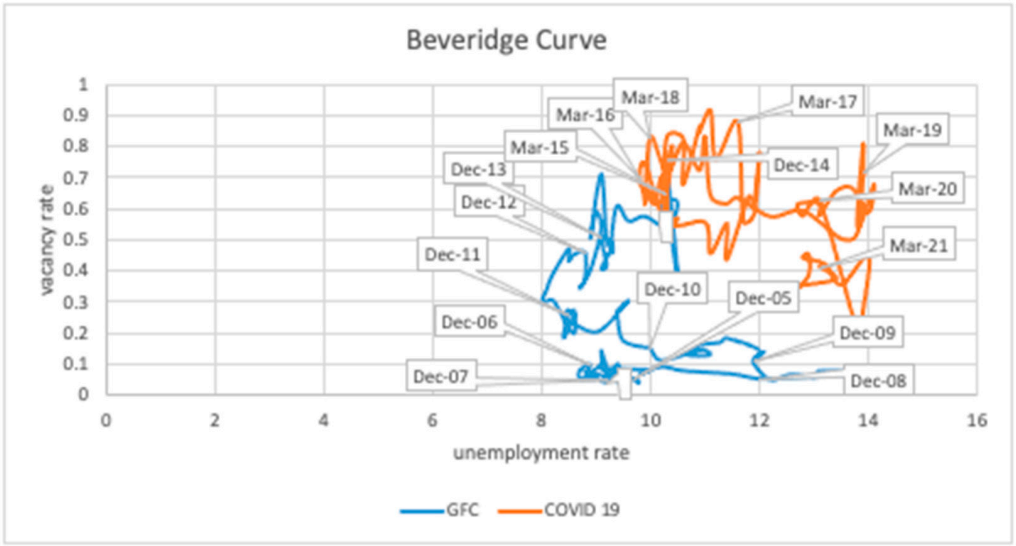

Figure 2. Turkiye Beveridge curves.

The Beveridge curve during the global financial crisis (GFC) exhibits several key characteristics. First, it is downward-sloping, indicating a negative relationship between unemployment and vacancies. Second, the curve shifts rightward during the crisis, suggesting a decrease in job openings. Lastly, it displays a countercyclical feature, where unemployment increases as vacancies decline due to the economic downturn. This behavior can be attributed to firms responding to the recession by laying off workers and the faster response of unemployment to economic shocks compared to vacancies. The Beveridge curve during the COVID-19 period deviates from the pattern observed during the global financial crisis. It shows a clockwise rotation and a rightward shift, indicating a different relationship between unemployment and vacancies. The COVID-19 crisis has introduced irregular and relatively steep dynamics to the unemployment–vacancy relationship. One possible explanation for this irregularity is the significant expansion of the labor force in recent years. Kanık et al. (2014) suggested that during this period, newly unemployed individuals did not find new job opportunities. Therefore, the relationship between unemployment and vacancies became less significant. Prior to the COVID-19 crisis, the Beveridge curve showed a downward slope, a clockwise pattern with a rightward shift, and a relatively vertical pattern.

In summary, the number of job vacancies posted by companies on ISKUR, in both the public and private sectors, falls short of the unemployment numbers in Turkiye. The Figure 3 below clearly shows constant vacancy rate alongside an increasing trend in the unemployment rate. This indicates a lack of sufficient job opportunities compared to the number of unemployed individuals in the country. The unemployment–vacancy rate relationship in Turkiye during the COVID-19 crisis is believed to be influenced by structural changes in the economy, which affect the matching process between job vacancies and unemployed individuals. This suggests a lack of effective matching, indicating an inefficient labor market and a mismatch between the skills possessed by the unemployed individuals and the qualifications needed for the available job vacancies.

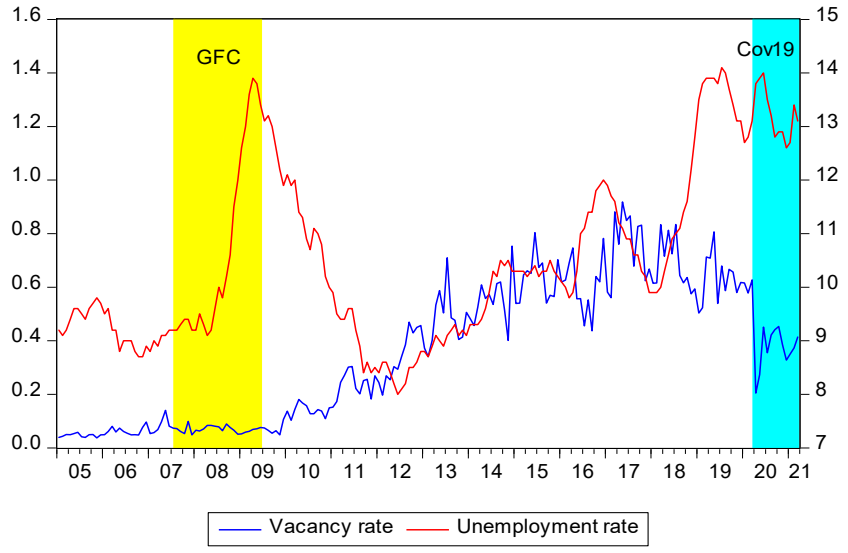

Figure 3. Unemployment–vacancy rate behavior.

Upon visual examination of the data in Figure 2, it is evident that the Beveridge curve has experienced a significant rightward shift during the COVID-19 period. This shift can be attributed to several factors, including an increase in unemployment relative to the vacancy, a simultaneous increase in both vacancy and unemployment rates, or an increase in the vacancy rate given a certain level of unemployment. These factors indicate a lack of efficient matching between job seekers and available job opportunities, resulting in structural unemployment within the Turkish labor market. It is likely that additional factors are contributing to the shift in the Beveridge curve and the overall sluggishness

observed in the Turkish labor market. The analysis of the Beveridge curve reveals a low capacity for job creation and matching of unemployed individuals in Turkiye. The labor market tightness in Turkiye has declined, as depicted by the Beveridge curve being far from the origin for both sample periods.

4. Results and Discussion

4.1. Stationarity Test

Table 1 below shows stationarity test results conducted on the time series data. These tests are important in determining the stationarity of variables to avoid the issue of spurious regression and misleading predictions. Two types of unit root tests were employed: the augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests for the null hypothesis of the unit root, and the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test for the null hypothesis of stationarity. The results of the unit root tests indicate that both the unemployment rate and vacancy rate exhibit a unit root at the level. However, they are found to be stationary at the first difference, with significance levels of 1 percent, 5 percent, and 10 percent for the ADF and PP tests. The KPSS test also points to the rejection of null of stationarity at the level for the intercept only, and similarly for intercept and trend specifications. Therefore, the unemployment rate as well as vacancy rate are stationary at first difference.

Table 1. Stationarity test results.

Variable	Level			First Difference			Decision
	ADF	PP	KPSS	ADF	PP	KPSS	
Intercept Only							
Unem	−2.09	−1.58	0.62 **	−4.68 ***	−9.58 ***	0.07	First Diff
Vcr	−1.78	−1.91	1.42 ***	−21.62 ***	−28.67 ***	0.20	First Diff
GDPg	−4.11 ***	−4.74 ***	0.05				Level
Infl	−2.71 *	−2.3	0.73 **		−10.58 ***	0.07	Mixed
Yun	−1.56	−1.34	0.74 ***	−5.97 ***	−11.68 ***	0.08	First Diff
Cons	−2.003	−2.003	0.47 **	−12.46 ***	−12.47 ***	0.21	First Diff
Serv	−1.56	−1.56	1.55 ***	−12.34 ***	−12.34 ***	0.12	First Diff
Mnw	−2.42	−2.53	0.24	−13.82 ***	−13.82 ***	0.13	First Diff
Intercept and Trend							
Unem	−2.74	−2.10	0.18 **	4.68 ***	−9.56 ***	0.05	First Diff
Vcr	−2.4	−3.5675	0.25 ***	−21.60 ***	−29.93 ***	0.13	First Diff
GDPg	−4.05 ***	−5.17 ***	0.05				Level
Infl	−3.39 **	−3.04	0.23 ***		−10.56 ***	0.02	Mixed
Yun	−2.37	−2.08	0.24 ***	−5.99 ***	−11.66 ***	0.05	First Diff
Cons	−1.74	−1.8	0.34 ***	−12.49 ***	−12.43 ***	0.05	First Diff
Serv	−1.9	−1.94	0.29 ***	−12.34 ***	−12.34 ***	0.10	First Diff
Mnw	−2.57	−2.66	0.20 **	−13.86 ***	−13.86 ***	0.03	First Diff

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Only the GDP growth rate was found to be stationary at the level, with significance levels of 1 percent, 5 percent, and 10 percent. Inflation shows mixed findings in the unit root tests. It is stationary at the level with a significance level of 10 percent in the ADF test with the intercept-only specification. However, it was found to be stationary at the level with significance levels of 5 percent and 10 percent in the ADF test with intercept and trend specification. The results from the PP and KPSS tests contradict these findings and suggest that inflation was stationary after first differencing, i.e., stationary at the first difference.

Youth unemployment, share of employment in the service sector, and minimum wage were all found to be stationary at the first difference across all tests and specifications. The construction share of employment, however, exhibits a unit root at level for KPSS test at 5 percent and 10 percent significance levels for the intercept only, and at 1 percent, 5 percent, and 10 percent significance levels for the intercept and trend. It is concluded that

the construction share of employment was stationary at the first difference. Similarly, the minimum wage variable was also found to be stationary at the first difference, regardless of the model specification used.

Table 2 presents the results of the structural unit root tests conducted on the time series data. These tests aim to examine the presence of structural breaks in the data. The results of the structural unit root tests indicate that the GDP growth rate is stationary at the levels, with significance levels of 1 percent, 5 percent, and 10 percent. This suggests that there are no structural breaks in the GDP growth rate series. Inflation, on the other hand, shows mixed findings in terms of its stationarity. It was found to be stationary at the 5 percent and 10 percent levels of significance when considering the intercept only in the specification. However, when including both the intercept and trend, inflation is stationary only at the 10 percent level of significance. For the general structure of the models in this study, inflation is considered to be stationary at the levels. The unemployment rate and construction employment results, specifically when considering the intercept and trend specification, indicate that they are stationary at the 10 percent level of significance. This implies the presence of a structural break in these variables. The table provides information about the period in which these structural breaks occurred. Overall, the structural unit root tests help identify the presence of structural breaks in the time series data, indicating potential shifts in the underlying patterns of the variables.

Table 2. Stationarity test results. Structural break stationarity tests.

Variable	Level		First Difference		Decision
	ADF	Break Period	ADF	Break Period	
			Intercept Only		
Unem	−3.46	2018/Mar	−9.14 ***	2006/May	First Diff
Vcr	−3.88	2012/Mar	−22.78 ***	2020/Apr	First Diff
GDPg	−5.75 ***	2005/Nov			Level
Infl	−4.84 **	2018/Mar			Level
Yun	−3.51	2018/Mar	−11.54 ***	2006/Mar	First Diff
Cons	−2.92	2018/Jan	−13.20 ***	2020/Mar	First Diff
Serv	−3.52	2014/Mar	−13.19 ***	2020/Dec	First Diff
Mnw	−3.79	2018/Dec	−16.40 ***	2016/Jan	First Diff
			Intercept and Trend		
Unem	−4.81 *	2010/Aug			Level
Vcr	−4.51	2019/May	−22.72 ***	2020/Apr	First Diff
GDPg	−5.74 ***	2005/Nov			Level
Infl	−4.85 *	2018/Mar			Level
Yun	−4.33	2010/Aug	−11.50 ***	2006/Mar	First Diff
Cons	−4.84 *	2018/Mar			Level
Serv	−3.71	2009/Apr	−13.16 ***	2020/Dec	First Diff
Mnw	−3.88	2018/Dec	−16.40 ***	2016/Jan	First Diff

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.2. Autoregressive Distributed Lag Result

Table 3 presents the ARDL result. Initially, the model included all of the variables of the study. However, using the ARDL technique, which employs a general-to-specific approach, insignificant variables were eliminated from the model. The resulting model is displayed in Table 3. Four lags were used to specify all of the variables in the model, namely unem (unemployment rate), vcr (vacancy rate), vcr^2 (squared vacancy rate), GDPg (GDP growth rate), infl (inflation), yun (youth unemployment), cons (construction share of employment), serv (service share of employment), and mnw (minimum wage). The variables that were found to be stationary at first difference were estimated as dynamic regressors in the model while those stationary at the level were estimated as fixed regressors. Additionally, crisis dummies were included to capture the effects of the global financial

crisis and the COVID-19 crisis. Through several iterations of the model, the final model selected was ARDL in (1, 1, 1, 1, 0) order, indicating the lag lengths for each variable in the model. The estimation results of this final model are provided in Table 3.

Table 3. ARDL results.

Model		**(1, 1, 1, 1, 0)**
UNEM	**Coefficient**	**Std. Error**
UNEM (−1)	0.88 ***	0.03
VCR	0.13	0.13
VCR (−1)	−0.21 *	0.13
YUN	−0.28 ***	0.02
YUN (−1)	−0.22 ***	0.02
CONS	−0.28 ***	0.07
CONS (−1)	0.30 ***	0.08
SERV	−0.005	0.01
GDPG	−0.02 ***	0.00
GDPG (−3)	−0.01 ***	0.00
COV19	−0.04	0.06
GFC	0.04	0.04
C	−0.32	0.60
Long Run Estimates		
Model		
UNEM	Coefficient	Std. Error
VCR	−0.68	0.96
YUN	0.53 ***	0.05
CONS	0.17	0.21
SERV	0.05	0.10
ECM Regression		
Model		
UNEM	Coefficient	Std. Error
C	−0.32 ***	0.09
D(VCR)	0.13	0.11
D(YUN)	0.28 ***	0.02
D(CONS)	−0.28 ***	0.07
GDPG	−0.02 ***	0.004
GDPG(−3)	−0.01 ***	0.003
COV19	−0.04	0.04
GFC	0.04	0.04
ECM(−1) *	−0.12 ***	0.03

Note: * $p < 0.1$, and *** $p < 0.01$.

The results in Table 3 indicate that the current unemployment rate is significantly affected by lagged unemployment rate in Turkiye. This suggests the current level of unemployment to be significantly influenced by unemployed persons in the past period. However, the relationship between the unemployment rate and vacancy rate was found to be insignificant, contradicting the traditional Beveridge curve theory and previous studies that showed significant opposite movement in unemployment and vacancy rate (Saglam and Gunalp 2012; Pater 2017; Holmes and Otero 2020). Conversely, the effect of the lagged vacancy rate on the unemployment rate was found to be statistically significant and negative. This can be attributed to the imbalance between the number of job vacancies and the pool of unemployed individuals, resulting in minimal fluctuations in the unemployment rate. This finding indicates a decreasing job creation capacity in the Turkish economy (see Kanık et al. 2014). In terms of other variables, the construction sector employment shows a significant impact on unemployment dynamics, possibly as a result of the increasing

number of large-scale construction projects and the growth of the real estate industry. Conversely, the service sector has an insignificant impact on unemployment dynamics.

The findings suggest a positive relationship between youth unemployment and overall unemployment, potentially stemming from the influx of young individuals entering the labor market following the global financial crisis. The composition of the unemployed population seems to be more significant in labor market dynamics (Bonthuis et al. 2013). That is, an increased proportion of youth unemployment is linked to curve outward shifts. This could be due to employers' preference of candidates with greater (on-the-job) experience and simpler signaling during the recruiting process, a growing skills mismatch between employers and unemployed, and a decrease in the level of effort employers put into hiring new employees, which makes it more challenging for workers to find other employment. Moreover, the analysis revealed a significant influence of the GDP growth rate on unemployment, indicating that higher economic growth leads to reduction in unemployment. The inclusion of dummy variables to represent the global financial crisis and the COVID-19 crisis did not yield statistically significant results in terms of their impact on the unemployment–vacancy relationship. This is supported by the finding of Destefanis et al. (2020), who showed no consistent change in the Beveridge curve that can be linked to the Great Recession, suggesting that the crisis dummy has no significant effect. This suggests that government interventions and measures implemented during these crises may have effectively mitigated their adverse effects on the labor market, such as business compensation for the economic and social effects of the pandemic. The government implemented financial policies to support minimum wage, short-term employment allowance, and the inability to terminate a labor contract in an effort to lower labor costs and prevent a sharp increase in the unemployment rate (Bayar et al. 2023). The long-run estimates obtained from the ARDL model indicate that among the variables considered, only youth unemployment exhibits a significant and consistent impact on the overall unemployment rate across all levels of statistical significance. This finding suggests that the elevated unemployment rate observed in the Turkish labor market can be primarily attributed to the increasing number of young individuals who are unable to secure employment opportunities. The results highlight the importance of addressing the specific challenges and barriers faced by youth in the labor market in order to effectively reduce overall unemployment in Turkiye.

The short-run dynamics reveal that the vacancy rate has an insignificant positive relationship with unemployment, contrary to the negative relationship proposed by the Beveridge curve. The construction sector is found to be an important factor in reducing unemployment in the short run. Current GDP and lagged GDP growth are also significant in reducing unemployment, indicating a positive impact of economic growth on the labor market. The crisis dummies do not show a significant effect on the Beveridge curve, indicating government efforts to address labor market issues during periods of crisis. This supports the findings of Bonthuis et al. (2013), who showed evidence that crises have less strong impacts on the outward shift of BC for the majority of Euro-area countries. It is interesting to say that both the COVID-19 and global financial crises did not yield significant impacts on the labor market dynamics during the sample period. The bound test suggests the existence of a stable and robust long-run relationship among the variables in the model. The significance of the error correction term (ECM) coefficient in the ARDL model emphasizes the importance of incorporating long-run dynamics in analyzing the Turkish labor market. The highly significant ECM coefficient indicates the strength of the adjustment mechanism that drives the dependent variables towards their equilibrium relationship. This suggests that any deviations from the long-run equilibrium between the variables are corrected in a timely manner, illustrating the existence of a stable and robust long-run relationship among the variables studied. The ECM coefficient provides valuable insights into the speed and magnitude of adjustments in the labor market, highlighting the responsiveness of the dependent variables to restore equilibrium conditions in the long run. As a robustness check, an ARDL model in differences was estimated when no cointegration was present. The results are presented in Table 4, obtained through a general-to-specific

approach by dropping insignificant variables. Multiple models were evaluated based on the Schwarz information criterion (SIC), which led to the selection of the final model as the one above.

Table 4. Autoregressive distributed lag in differences.

Model		**(1, 1, 0, 1, 1)**
UNEM	**Coefficient**	**Std. Error**
D(VCR)	0.19	0.12
D(YUN)	0.27 ***	0.02
D(CONS)	−0.29 ***	0.07
GDPG	−0.02 ***	0.00
GDPG(−3)	−0.01 ***	0.00
COV19	0.03	0.04
GFC	0.04	0.04
C	0.05 ***	0.01

Note: *** $p < 0.01$.

Table 4 presents results similar to those in Table 3, with little differences in coefficients sizes. The overall behavior of the variables remains consistent. The final ARDL model with differences includes 192 observations after adjustments. Like Table 3, Table 4 provides evidence that the relationship between the vacancy rate and unemployment rate is positive but statistically insignificant. This contradicts the traditional Beveridge curve theory. Notably, the construction sector remains influential in explaining unemployment fluctuations. Consistent with the findings in Table 3, the analysis reveals that current GDP is significantly negatively correlated with unemployment, indicating that higher economic growth is associated with lower unemployment rates. Lagged GDP growth also shows a significant negative relationship, with a quarterly lag effect on the labor market. Additionally, youth unemployment, the only variable found to be significant in the long-run model, exhibits a similar pattern in the short run. The elevated unemployment rate is primarily attributed to the growing number of young individuals entering the labor force. Similarly, the crisis dummies do not significantly impact the Beveridge curve during the sample period, suggesting that government measures likely alleviated the crises' effects on unemployment dynamics. These results confirm the findings reported in Table 3. It is likely that additional factors are contributing to the shift in the Beveridge curve and the overall sluggishness observed in the Turkish labor market. The analysis of the Beveridge curve reveals a low capacity for job creation and matching of unemployed individuals in Turkiye. The labor market tightness in Turkiye has declined, as depicted by the Beveridge curve being far from the origin for both sample periods.

5. Conclusions

This study focuses on examining the shifting dynamics of the Beveridge curve in Turkiye during the global financial crisis and the COVID-19 pandemic. The findings indicate that these crises did not significantly affect the Beveridge curve in Turkiye. However, the COVID-19 pandemic had notable impacts on the vacancy rate and labor force due to lockdown measures. Surprisingly, the vacancy rate shows a positive relationship with the unemployment rate, contrary to expectations and the Beveridge curve. This suggests a mismatch between job vacancies and job seekers in Turkiye, highlighting a lack of consistent job creation in the labor market. The behavior of the unemployment–vacancy relationship in Turkiye exhibits irregular patterns, deviating from the expected trend. This irregularity can be attributed to the rapid growth of the labor force in recent years. Previous research suggests that newly unemployed individuals did not benefit from new job opportunities during the sample period. The insignificant responsiveness of unemployment to vacancy further supports the irregular nature of the Beveridge curve in the Turkish labor market. The study concludes that youth population growth has a significant impact on unemploy-

ment dynamics in Turkiye, highlighting the importance of economic prosperity and job creation in specific sectors for reducing unemployment.

These findings have important implications for policymakers. It is crucial to focus on job creation and employment opportunities for the youth to effectively improve the unemployment rate in Turkiye. Increasing job opportunities will lead to a higher number of job vacancies, which can help reduce unemployment. The government should design labor market policies aimed at preventing shifts in the Beveridge curve and facilitating the reemployment of the unemployed. Furthermore, policies should target the creation of new jobs, provide education and training programs, and address labor market inefficiencies through incentives for employers. Owing to the Turkish labor market problem of skill mismatch despite a large increase in the labor force, emphasis should be given to upskilling the youth in readiness for the labor market. Having the right skills would prevent labor market matching inefficiency.

The study is fraught with some limitations that include data availability constraints resulting in a narrow focus on the Beveridge curve, potential measurement problems of the vacancy rate, and potential discrepancies in crisis timing, which may limit the depth of the analysis. Future research directions should encompass a more comprehensive exploration of the composition of unemployment, demographic factors (including factors such as age, gender, skills, duration, and education), and some economic events affecting unemployment, an in-depth examination of the skill mismatch issue, and comparative analyses of Turkey's labor market against other countries. Furthermore, assessing the effectiveness of labor market policies, employing longitudinal data to trace changes in the Beveridge curve over time, conducting case studies, and international comparative studies can enrich our understanding of labor market dynamics and yield insights for informed policymaking.

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