Namık Kemal Üniversitesi Sosyal Bilimler Meslek Yüksek Okulu Dergisi, *Vol 8(2), Ekim 2026* *Makale Gönderim: 17.06.2026*
e-ISSN: 2717-8110 *Makale Kabul: 30.07.2026*

The Impact of Active Fiscal Policies on Unemployment Dynamics: Findings from Nordic Countries

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Abstract

This study examines the relationship between the unemployment rate and the job vacancy rate in the labor markets of Denmark, Finland, Norway, and Sweden within the framework of the Beveridge Curve. Panel data and dynamic panel data methods were applied using data from the period 2000–2024. In addition to the job vacancy rate, the effects of economic growth, inflation, and active labor market expenditures on unemployment were also evaluated in the analysis. Unlike most previous Beveridge Curve studies focusing primarily on unemployment and job vacancies, this study explicitly incorporates active labour market expenditures into both static and dynamic panel data models, providing a comparative fiscal policy perspective for the Nordic countries. The findings show a negative and statistically significant relationship between the job vacancy rate and the unemployment rate. Furthermore, a persistence effect on unemployment was detected, and it was determined that active labor market expenditures have a reducing effect on unemployment. The results reveal that the Beveridge Curve remains valid in the Nordic countries and that institutional structures and active labour market policies play an important role in labour market performance. These findings suggest that sustained investment in active labour market policies can strengthen labour market matching efficiency and contribute to reducing persistent unemployment.

Key Words: Active Fiscal Policies, Unemployment Dynamics, Beveridge Curve, Panel Data Analysis, Nordic Countrie
Jel Codes: J21, J23, J64, E24

Aktif Mali Politikaların İşsizlik Dinamikleri Üzerindeki Etkisi: Nordik Ülkelerden Bulgular

Bu çalışma, Danimarka, Finlandiya, Norveç ve İsveç'in işgücü piyasalarındaki işsizlik oranı ile iş açığı oranı arasındaki ilişkiyi Beveridge Eğrisi çerçevesinde incelemektedir. 2000-2024 dönemine ait veriler kullanılarak panel veri ve dinamik panel veri yöntemleri uygulanmıştır. Analizde, iş açığı oranına ek olarak, ekonomik büyüme, enflasyon ve aktif işgücü piyasası harcamalarının işsizlik üzerindeki etkileri de değerlendirilmiştir. İşsizlik ve iş açığına odaklanan önceki Beveridge Eğrisi çalışmalarının çoğunun aksine, bu çalışma aktif işgücü piyasası harcamalarını hem statik hem de dinamik panel veri modellerine açıkça dahil ederek, İskandinav ülkeleri için karşılaştırmalı bir mali politika perspektifi sunmaktadır. Bulgular, iş açığı oranı ile işsizlik oranı arasında negatif ve istatistiksel olarak anlamlı bir ilişki olduğunu göstermektedir. Ayrıca, işsizlik üzerinde bir kalıcılık etkisi tespit edilmiş ve aktif işgücü piyasası harcamalarının işsizliği azaltıcı bir etkiye sahip olduğu belirlenmiştir. Sonuçlar, Beveridge Eğrisinin İskandinav ülkelerinde geçerliliğini koruduğunu ve kurumsal yapıların ve aktif işgücü piyasası politikalarının işgücü piyasası performansında önemli bir rol oynadığını ortaya koymaktadır. Bu bulgular, aktif işgücü piyasası politikalarına yapılan sürekli yatırımın, işgücü piyasası eşleşme verimliliğini güçlendirebileceğini ve kalıcı işsizliğin azaltılmasına katkıda bulunabileceğini göstermektedir.

Anahtar Kelimeler: Aktif Mali Politikalar, İşsizlik Dinamikleri, Beveridge Eğrisi, Panel Veri Analizi, Nordik Ülkeler
Jel Kodları: J21, J23, J64, E24

Atıf için,
Balı, S. (2026). The Impact of Active Fiscal Policies on Unemployment Dynamics: Findings from Nordic Countries. *Namık Kemal Üniversitesi Sosyal Bilimler Meslek Yüksek Okulu Dergisi*, 8(2), 84-101. doi: 10.56493/nkusbmyo.1973199

1. Introduction

Labour markets are among the most complex areas of modern macroeconomic analysis. Changes in the unemployment rate, the trajectory of job vacancies, and shifts in the labour supply-demand balance are not only reflections of cyclical fluctuations but also of the economy's structural character. Therefore, analytical frameworks that can explain how the labour market operates have become increasingly central in the economics literature. The Beveridge Curve is considered one of the most important analytical tools within these frameworks. The curve provides important information about the labour market's matching capacity by showing an inverse relationship between the unemployment rate and the job vacancy rate (Beveridge, 1944).

One of the fundamental problems facing labour markets today is that changes in unemployment rates cannot be explained solely by cyclical fluctuations. In particular, digitalisation, demographic transformation, skills mismatch, and inter-sectoral restructuring processes are creating new matching problems in labour markets. This situation necessitates evaluating the relationship between unemployment and job vacancies not only in terms of cyclical movements but also in the context of structural transformations.

The importance of the Beveridge Curve does not stem solely from its technical relationship between unemployment and job vacancies. The curve also allows for the observation of structural breaks, skill mismatches, and institutional transformations occurring in the labour market. In particular, the curve's position over time is a critical indicator of the labour market's efficiency. While movements along the curve largely reflect cyclical fluctuations, shifts to the right or left indicate bigger structural changes in the labour market (Blanchard & Diamond, 1989).

The simultaneous observation of both high unemployment and high job vacancies in the labour market necessitated an explanation beyond the classical assumptions of a perfectly competitive market. At this point, the search-matching theory literature played a decisive role. The approach developed by Diamond (1982), Mortensen (1982), and especially Mortensen and Pissarides (1994) shows that labour market matching is a time-consuming, costly process that occurs under incomplete information. Thus, it has become clear that the relationship between unemployed individuals and firms cannot be reduced solely to the supply-demand balance; frictions, search costs, and institutional structures also determine the process.

Technological, demographic, and institutional changes have heightened academic focus on the Beveridge Curve. Notably, research shows that factors such as occupational skills mismatch, sectoral reallocation, and prolonged unemployment rates influence matching efficiency (Elsby, Michaels, & Solon, 2009; Hobijn & Şahin, 2013). Elsby, Michaels, and Solon (2009) argue that unemployment dynamics are tied to variations in job-finding and separation rates, while Hobijn and Şahin (2013) indicate that Beveridge Curve shifts vary cross-nationally, with occupational mismatch and matching efficiency as determining factors. These studies clarify that unemployment dynamics cannot be attributed solely to vacancy fluctuations; institutional and structural determinants are also critical.

This transformation process is particularly important for the Nordic countries, given the sophistication of their labour market institutions and the prevalence of active employment policies. The countries in this study's sample comprise the core Nordic country group, often described as the “Mainland Nordic Countries” in the comparative welfare state literature. This group of countries offers a suitable research ground for comparative analyses due to their similar institutional structures and advanced employment policies. High levels of social protection, active labour market policies, strong education systems, and institutional labour market structures distinguish this group of countries from other developed economies. In particular, digitalisation, demographic transformation, skills mismatch, and inter-sectoral restructuring processes are reshaping unemployment and job vacancy dynamics. Therefore, the core Nordic countries stand out as important examples in which both institutional resilience and structural transformation dynamics can be evaluated together through Beveridge Curve analyses.

Although there is a vast body of research on the Beveridge Curve, a significant portion of the literature focuses on specific country examples or engages in theoretical discussions independent of empirical analyses. Comparative studies that consider the core Nordic countries together are particularly limited. Furthermore, studies that examine the relationship between structural factors such as digitalisation, demographic transformation, and skills mismatch and the Beveridge Curve from a comparative country perspective are relatively limited. This situation necessitates a reassessment of labour market efficiency in Nordic countries. In particular, the relationship between the job vacancy rate and the unemployment rate, when considered together within the framework of institutional structure, skills mismatch, and active labour market policies, remains a significant research area in the existing literature.

This study aims to fill this gap. The main objective of the study is to examine the relationship between the unemployment rate and the job vacancy rate in Denmark, Finland, Norway, and Sweden within the framework of the Beveridge Curve and to comparatively evaluate the structural transformations occurring in employment dynamics. Accordingly, this study systematically examines the theoretical framework of the Beveridge Curve based on a search-and-match approach and empirically analyses changes in labour market performance over time across Nordic countries.

The study is considered to offer three main contributions to the literature. First, it re-examines the Beveridge Curve literature within a holistic framework that considers both theoretical and empirical dimensions. Second, it presents a comparative analysis

covering the core Nordic countries, revealing the common and differing aspects of Nordic labour markets. Third, it contributes to the fiscal policy literature by evaluating the effects of active fiscal policy instruments on unemployment dynamics within the framework of institutional structure and matching effectiveness. In this respect, the study demonstrates that the Beveridge Curve is not only a tool for explaining the relationship between unemployment and job openings; it also provides a comprehensive analytical framework for evaluating institutional and structural transformations in the labour market.

Building on these contributions, the study addresses the following research questions: (i) Does the Beveridge Curve remain valid in the labour markets of Denmark, Finland, Norway, and Sweden? (ii) To what extent do active labour market expenditures affect unemployment dynamics when macroeconomic factors are taken into account? (iii) How do the findings obtained from static fixed-effects models differ from those derived from dynamic panel GMM estimations in explaining unemployment persistence and labour market matching efficiency?

The remainder of the article is organised as follows. Section 2 presents the theoretical framework of the Beveridge Curve. Section 3 reviews the relevant empirical literature. Section 4 explains the dataset, variables, and econometric methodology. Section 5 reports the empirical findings and discusses the econometric results. Finally, Section 6 concludes the study by presenting the main findings, policy implications, limitations, and suggestions for future research.

2. Beveridge Curve and Theoretical Framework

The Beveridge Curve is one of the most fundamental macroeconomic tools for analysing the relationship between the unemployment rate and the job vacancy rate in the labour market. The curve was first systematically introduced by Beveridge (1944) and subsequently became a central component of labour market theory. Initially considered primarily a descriptive relationship, the Beveridge Curve gained a micro-level analytical framework, particularly with the development of search-matching theory. Thus, the relationship between unemployment and job vacancies began to be explained not only by cyclical fluctuations but also by labour-market frictions and institutional structures.

The theoretical basis of this study rests on the integrated framework of the Beveridge Curve and the Diamond–Mortensen–Pissarides (DMP) search-matching model. This approach explains the coexistence of unemployment and job vacancies by accounting for search costs and matching frictions in the labour market. In this context, the Beveridge Curve is considered a macroeconomic reflection of matching efficiency.

The basic logic of the Beveridge Curve is that the unemployment rate and the job vacancy rate are inversely related. During periods of economic expansion, firms' demand for labour increases, the number of job vacancies rises, and the unemployment rate falls. Conversely, during periods of economic contraction, labour demand decreases, the job vacancy rate declines, and unemployment rises. Therefore, the curve generally exhibits a negative slope (Blanchard & Diamond, 1989). However, over time, it has become clear that this relationship is not solely due to cyclical movements. In particular, the simultaneous observation of both high unemployment and high job vacancy rates has revealed structural mismatches in the labour market.

The matching theory has been a decisive turning point in explaining these mismatches in the labour market. Models developed by Diamond (1982), Mortensen (1982), and Mortensen and Pissarides (1994) have shown that the labour market does not function as a perfectly competitive mechanism. According to this approach, the matching process between unemployed individuals and firms takes time; Due to information gaps, geographical constraints, search costs, and skill mismatches, matching cannot occur in full efficiency. Therefore, the simultaneous presence of both unemployed individuals and unfilled job vacancies in the economy becomes a natural consequence.

There is an important distinction between the movements and shifts of the Beveridge Curve over time. Movements along the curve mostly reflect cyclical changes. During periods of accelerated economic growth, the economy tends to move downwards along the curve, while during periods of contraction, job vacancies are expected to decline and unemployment to increase. Conversely, a complete shift of the curve indicates structural changes. A rightward shift of the curve indicates weakening matching efficiency in the labour market, increased structural unemployment, and intensified labour market frictions. A leftward shift of the curve indicates a more efficient labour market structure (Pissarides, 2000).

Technological, demographic, and institutional changes now strongly affect the Beveridge Curve in advanced economies. The literature highlights their structural nature and direct impact on matching efficiency. Elsby, Michaels, and Solon (2009) found that labour market disruption mainly results from a lower employment rate. Hobijn and Şahin (2013) showed that mismatches between occupations and sectors persistently affect the Beveridge Curve.

The technological transformation process has also become a key element, altering the structure of the Beveridge Curve. In particular, the widespread adoption of digitalisation, automation, and artificial intelligence applications is transforming the nature of labour demand. The decline in jobs requiring traditional skills, the increasing demand for highly skilled labour, and the expansion of the service sector are creating new matching problems in the labour market. As Acemoglu (2002) emphasises, skill-driven technological change increases labour market heterogeneity and can deepen structural unemployment. Therefore, the Beveridge

Curve has become an indicator reflecting not only the dynamics of unemployment but also the economy's capacity for technological transformation.

Institutional structure also plays a decisive role in the position of the Beveridge Curve. Unemployment insurance systems, active labour market policies, education infrastructure, unionisation rates, and labour market regulations create significant differences between countries. There is strong evidence that active labour market policies implemented in Nordic countries improve labour market matching efficiency. However, the ability to maintain both high levels of social protection and high labour flexibility places these countries in a special position in terms of Beveridge Curve analysis. Therefore, the Beveridge Curve is considered not only a tool for explaining the labour market matching process but also an important analytical framework for evaluating the relationship between institutional capacity and economic transformation.

One of the striking aspects of Nordic labour markets is their relatively high institutional resilience, even during periods of crisis. However, in recent years, new structural pressures have emerged in the labour market in these countries due to factors such as ageing populations, migration movements, digitalisation, and inter-sectoral transformation. Despite rising job vacancy rates, particularly in highly skilled sectors, the persistence of unemployment in some labour force groups indicates a lack of homogeneity in matching efficiency. Therefore, the Beveridge Curve offers a powerful framework for analysing not only labour-market equilibria but also the transformative capacity of the welfare-state model in Nordic countries.

When the theoretical literature is considered together, it becomes clear that the Beveridge Curve does not simply represent a relationship between unemployment and job vacancies. The curve is a dynamic indicator of the labour market shaped by matching efficiency, structural unemployment, institutional structure, technological transformation, and macroeconomic shocks. Therefore, Beveridge Curve analyses are considered a critical analytical tool today for understanding not only the labour market but also economic transformation processes.

3. Literature Review and Analytical Evaluation

When the Beveridge Curve literature is evaluated within its historical development, it is seen as a direct reflection of the transformation in economic thought regarding the functioning of the labour market. In particular, it is understood that the relationship between unemployment and the job vacancy rate (the percentage of unfilled jobs in the labor market) was initially treated primarily as a macro-level descriptive indicator, but over time it evolved into a more complex analytical framework explained through labor market frictions (barriers that prevent quick matching between job seekers and vacancies), matching processes (the mechanism by which workers find jobs and employers fill vacancies), and institutional structures (the set of legal and policy frameworks shaping the labor market). This transformation led the Beveridge Curve to move beyond being merely a technical curve showing cyclical unemployment movements and to become a fundamental indicator of the labour market's structural efficiency.

Building on its evolution, early Beveridge Curve studies verified the negative relationship between unemployment and job vacancies. With the search-and-match theory, the literature shifted to a micro-based framework on labour market frictions, matching, and institutions. Diamond (1982), Mortensen (1982), Blanchard and Diamond (1989), and Mortensen and Pissarides (1994) laid the modern theoretical foundations. Later work examining matching efficiency, structural unemployment, and institutional capacity showed that the Beveridge Curve reflects both cyclical and structural changes.

From the 1990s, researchers examined more closely how institutional structures affect the Beveridge Curve. Studies on European labour markets show that labour market institutions directly impact matching efficiency. Ljungqvist and Sargent (1998) argued that high unemployment in Europe is largely due to rigid labour-market regulations. Similarly, Nickell, Nunziata, and Ochel (2005) analysed OECD countries and found that unemployment insurance, unionisation rates, and active labour market policies are decisive for unemployment dynamics. Thus, researchers concluded that the Beveridge Curve reflects not only cyclical macroeconomic conditions but also institutional capacity.

In light of these institutional insights, the structural transformations observed in labour markets have led to the emergence of new research areas in the Beveridge Curve literature. The recovery in job openings despite continued high unemployment rates in many developed economies reveals a deepening of structural problems in the labour market. Michael Elsby, Michaels, and Solon (2009) showed that the deterioration in the labour market is largely due to a decline in the job-finding rate. Rand Ghayad and William Dickens (2012), on the other hand, argued that long-term unemployment and skills mismatch are particularly decisive in the rightward shift of the Beveridge Curve. Hobijn and Şahin (2013) highlighted the importance of labour market institutions' resilience to crises by showing that post-crisis Beveridge Curve shifts differ across countries.

Barnichon and Figura (2015) showed that shifts in the Beveridge Curve are largely due to changes in labour market matching efficiency. The study demonstrates that even when job openings remain high, deteriorations in matching efficiency can perpetuate unemployment. This approach supports the idea that the Beveridge Curve reflects not only cyclical but also institutional and structural factors.

In modern literature, technological transformation and digitalisation are also considered key determinants of the Beveridge Curve. Acemoglu (2002) states that skill-side technological change creates structural pressures on low-skilled labour and increases labour market heterogeneity. Groshen and Potter (2003) showed that the post-crisis "jobless recovery" process is linked to sectoral restructuring. Helpman and Itskhoki (2010) argued that globalisation creates redistribution effects in the labour market, with lasting consequences for the Beveridge Curve. Thus, the Beveridge Curve has become a multidimensional indicator reflecting not only the technical relationship between unemployment and job openings, but also the economy's capacity for technological transformation, skill adaptation, and structural adaptability.

Studies on Nordic countries, however, focus more on the relationship between active labour market policies and matching efficiency. Denmark's "flexicurity" model, in particular, holds a special place in the literature for demonstrating that high levels of social protection and labour market flexibility can coexist. However, in recent years, new structural pressures have emerged in the labour market in Nordic countries due to factors such as digitalisation, an ageing population, and migration. The persistence of unemployment in certain labour market groups despite rising job openings indicates that matching efficiency is not homogeneous. This situation necessitates a reassessment of the Beveridge Curve for Nordic countries.

However, a significant portion of the existing literature focuses on single-country applications, and the number of studies that comparatively evaluate core Nordic countries remains limited. Comparative research examining the combined effects of current structural factors, such as digitalisation, demographic transformation, and skills mismatch, on the Beveridge Curve is relatively insufficient. This necessitates a reassessment of the current dynamics of Nordic labour markets.

A review of the Turkish literature reveals that studies largely focus on empirically verifying the relationship between unemployment and job vacancy rates. Subsequent research has investigated the effects of matching frictions, structural unemployment, youth and female unemployment, and technological transformation on the Beveridge Curve. Overall, studies on Türkiye indicate that there are certain mismatches in the labour market and that the Beveridge Curve shifts significantly in post-crisis periods (Sağlam and Günalp, 2012; Kanık et al., 2014; Tokatlıoğlu, 2016).

Table 1. An Analytical Review of the Beveridge Curve Literature (Before 2015)

Author(s)	Period	Country/Region	Method	Key Variables	Key Findings
Dow & Dicks-Mireaux (1958)	1946–1956	United Kingdom	UV analysis	Unemployment, job openings	A systematic negative relationship has been identified between unemployment and job openings.
Hansen (1970)	Various periods	Advanced economies	Theoretical and empirical evaluation	Unemployment, wages, job openings	The relationship between unemployment and job openings has been shown to be linked to wage dynamics and discussions about full employment.
Taylor (1972)	1958–1971	United Kingdom	Time series analysis	Unemployment, job openings	The negatively sloped structure of the Beveridge Curve has been confirmed.
Foster (1974)	1958–1972	United Kingdom	UV analysis	Unemployment, vacancy rate	It has been determined that the curve can exhibit periodic shifts.
Diamond (1982)	Theoretical	—	Search theory	Search costs	Theoretical foundations of friction in the labor market have been developed.
Mortensen (1982)	Theoretical	—	Job search model	Job creation and job finding processes	It has been shown that matching in the labor market is a costly process.

Table 1. An Analytical Review of the Beveridge Curve Literature (Before 2015) (Continue)

Blanchard & Diamond (1989)	Post-war period	USA	Beveridge curve estimation	Unemployment, vacancies	It has been stated that movements on the curve are cyclical, while shifts are structural.
Blanchard & Diamond (1990)	Post-war period	USA	Matching function estimation	Unemployed people, job openings	It has been shown that the matching function is predictable at the macro level.
Mortensen & Pissarides (1994)	Theoretical	—	Structural search-matching model	Unemployment, vacancies, frictions	The modern micro-level foundations of the Beveridge Curve have been established.
Petrongolo & Pissarides (2001)	Various countries	Many countries	Matching-function analysis	Unemployment, job openings	It has been shown that matching efficiency differs between countries.
Groshen & Potter (2003)	Post-crisis period	USA	Sectoral analysis	Unemployment, sectoral transformation	It has been argued that the "jobless recovery" process is related to structural transformation.
Shimer (2005)	Cyclical periods	USA	Dynamic labor market analysis	Job placement rate, unemployment	It has been stated that unemployment fluctuations are largely caused by changes in the job finding rate.
Nickell et al. (2005)	1960–1990s	OECD countries	Panel data analysis	Unemployment, institutional variables	It has been found that labor market institutions are decisive on the Beveridge Curve.
Elsby et al. (2009)	Conjunctural cycles	USA	Flow decomposition	Job placement rate, vacancies	It has been shown that the Beveridge Curve shifts to the right during periods of crisis.
Acemoglu (2002)	Technological transformation period	Advanced economies	Theoretical analysis	Skills mismatch	It has been emphasized that technological change can increase structural unemployment.
Helpman & Itskhoki (2010)	Globalization period	Many countries	Theoretical modeling	Trade, unemployment	It has been stated that trade creates redistribution effects in the labor market.

Source: Prepared by the author using relevant studies

Table 2. An Analytical Review of the Beveridge Curve Literature (After 2015)

Author(s)	Period	Country/Region	Method	Key Variables	Key Findings
Bonthuis et al. (2016)	Post-Euro crisis	Eurozone	Panel data	Unemployment, vacancies, institutions	It has been shown that curve shifts are related to country heterogeneity.
Hobijn & Şahin	Post-Great Recession	Multiple countries	Comparative analysis	Unemployment, mismatch	It has been revealed that post-crisis shifts differ from country to country.
Ghayad & Dickens	Post-Great Recession	USA	Decomposition analysis	Long-term unemployment, sectors	It has been shown that skill mismatch is a determining factor on the Beveridge Curve.
Christl (2020)	Liberalization period	Austria	Regional panel data	Labor market reforms	The effects of liberalization on the curve have been decomposed.
Bouvet	Regional periods	Europe	Macroempirical analysis	Unemployment, vacancy rate	It has been determined that national and regional Beveridge curves exhibit different behavior.
Destefanis & Fonseca	Reform periods	Italy	Beveridge Curve estimation	Labor reforms	It has been shown that reforms affect the position of the Beveridge Curve.
Tokatlıoğlu (2016)	Pre- and post-crisis	Türkiye	ARDL model	Unemployment, job openings	It has been found that the position of the curve changed in the post-crisis period.
Tatar (2023)	1961–2021	Türkiye	Time series analysis	Number of unemployed, job openings	A negative relationship has been identified between unemployment and job vacancies in the long run. The negatively sloped Beveridge Curve has been confirmed in Türkiye.
Sağlam & Günalp	Long term	Türkiye	Matching-function approach	Unemployment, job openings	It has been shown that matching frictions are significant in Türkiye.
Kanık et al.	2005–2013	Türkiye	Method	Vacancy indicators	Key Findings

Source: Prepared by the author using relevant studies.

The literature shows that the Beveridge Curve has developed from a simple tool for explaining the unemployment-job vacancy relationship to a multidimensional framework. This framework considers institutional structure, matching efficiency, technological change, and structural unemployment. Early studies demonstrated a negative relationship between unemployment and job vacancies. Later research explored how labour market frictions, skill mismatches, and institutional structures affect the Beveridge Curve. Since 2015, studies have focused more on how digitalisation, technological transformation, and labour market institutions impact matching efficiency. Few studies compare the current dynamics of the Beveridge Curve across the core Nordic countries. This research addresses this gap by providing empirical findings and explaining the institutional dimensions of labour-market structural change.

4. Methodology

This section explains the methodological framework adopted to examine the relationship between unemployment dynamics and active fiscal policy instruments within the Beveridge Curve framework. The empirical analysis combines static and dynamic panel data approaches to capture both contemporaneous and persistent effects of labour market variables. The methodology is designed to ensure consistency in model specification, address potential endogeneity, and provide robust estimates for the Nordic countries included in the sample.

4.1. Dataset and Sample

This study analyses the behaviour of the Beveridge Curve in Nordic countries using a comparative panel data approach. Denmark, Finland, Sweden, and Norway are included in the analysis. The study sample comprises Denmark, Finland, Norway, and Sweden, defined as the "Mainland Nordic Countries" in the comparative welfare-state and labour-market literature. These countries are analysed together due to their similar welfare state institutions, active labour market policies, high levels of social protection, and comparable data structures. Iceland was not included in the analysis due to limitations in long-term, cross-country comparable data series on the job vacancy rate. These countries offer a unique dataset for Beveridge Curve analyses, given their institutional characteristics that enable them to maintain high levels of social protection alongside flexible labour market structures. This structure allows for a more accurate monitoring of matching processes and structural transformations in the labour market. However, in recent years, factors such as digitalisation, an ageing population, migration movements, and inter-sectoral transformations have been observed to put pressure on labour market matching efficiency in these countries as well. Therefore, Nordic labour markets serve as a powerful laboratory for analysing not only the cyclical but also the structural movements of the Beveridge Curve.

The dataset used in this study was obtained from OECD, Eurostat, and World Bank databases. Unemployment rate, economic growth, and inflation data were obtained from the World Bank's World Development Indicators (WDI) database; job vacancy rate data from the OECD Job Vacancies and Registered Unemployment Indicators and Eurostat Job Vacancy Statistics databases; and active labour market expenditures from the OECD Labour Market Programmes database. The fact that job vacancy rate data is calculated using different methods across countries is a common methodological problem in the Beveridge Curve literature. Petrongolo and Pissarides (2001) state that differences in the measurement of job vacancy data can directly affect the efficiency of matching analyses. Therefore, in this study, care was taken to use series with high inter-country comparability and methodological consistency when constructing the dataset.

The analysis period covers the years 2000–2024. Since job opening rate data are published quarterly in some countries, the relevant series were converted into an annual panel by averaging the quarterly data. This creates a comparable data structure with unemployment, growth, inflation, and active labour market expenditures at the same frequency. The main reason for choosing this period is to evaluate the effects of long-term structural transformations in labour markets and of different economic conjunctures on the Beveridge Curve together. Thus, not only short-term cyclical fluctuations but also long-term structural changes are included in the analysis. Furthermore, the period examined, which encompasses various economic and institutional developments such as technological transformation, demographic changes, and labour market reforms, provides a suitable analytical framework for comparing the behaviour of the Beveridge Curve over time.

The balanced panel initially covers four Nordic countries (Denmark, Finland, Norway, and Sweden) over the 2000–2024 period. However, the effective number of observations reported in the dynamic panel estimations is smaller because lagged dependent variables are used in the GMM framework and because observations are lost during instrument construction and estimation. This reduction is a standard feature of dynamic panel estimation and does not affect the consistency of the estimated coefficients.

4.2. Variables

The main dependent variable used in the study is the unemployment rate. The unemployment rate shows the proportion of individuals in the total labour force who are actively seeking employment but cannot find employment. In the Beveridge Curve approach, the unemployment rate is considered a key indicator of labour supply. The job vacancy rate is the ratio of unfilled positions to the total workforce. The job vacancy rate is a key indicator of labour demand. Olivier Blanchard and Peter Diamond (1989) state that the relationship between unemployment and job vacancies provides strong information about the overall efficiency of the labour market.

Using only unemployment and job vacancy rates in the model was deemed insufficient to explain the labour market's multidimensional structure. Therefore, in line with the literature, the model included various control variables. The first control variable is the economic growth rate. The real GDP growth rate reflects the expansion and contraction of labour demand. During periods of accelerated economic growth, job vacancy rates are expected to rise as firms' labour demand increases. Conversely, during periods of economic contraction, weakening labour demand increases unemployment. This approach is also consistent with Okun-type macroeconomic relationships.

The second control variable is the inflation rate. Inflation is a key indicator of macroeconomic stability and can indirectly affect labour market performance. Especially during periods of high inflation, increased economic uncertainty can affect investment decisions and labour demand. Therefore, the inflation rate has been included in the model as an important control variable in evaluating the relationship between unemployment and job vacancy rates.

The third control variable is active labour market expenditures. One of the distinguishing features of the Nordic countries' labour markets is their high level of investment in training programs, reskilling practices, and job placement support mechanisms. OECD (2009) reports show that active labour market policies can contribute to a leftward shift of the Beveridge Curve by increasing matching efficiency. In particular, the "flexicurity" approach implemented in Denmark provides a framework that increases labour market flexibility while preserving social protection mechanisms. Therefore, including active labour market expenditures in the model is important for measuring the effects of institutional capacity on the Beveridge Curve.

4.3. Econometric Model

To evaluate the relationship between unemployment and labour market conditions, the study estimates a baseline fixed-effects model. The model includes the unemployment rate as the dependent variable and the job vacancy rate, economic growth, inflation, and active labour market expenditures as explanatory variables. Country-fixed effects and time effects are incorporated to control for unobserved heterogeneity.

Having established these control variables, the basic model used in the analysis is based on the following panel data frame:

$$\mathbf{UNEMP_{it} = \alpha + \beta_1 VAC_{it} + \beta_2 GDP_{it} + \beta_3 INF_{it} + \beta_4 ALMP_{it} + \mu_i + \lambda_t + \varepsilon_{it}} \qquad (1)$$

$UNEMP_{it}$: unemployment rate,
VAC_{it} : job vacancy rate,
GDP_{it} : real GDP growth rate,
INF_{it} : inflation rate,
$ALMP_{it}$: active labor market expenditures,
μ_i : country fixed effects,
λ_t : time effects,
ε_{it} : error term.

The main goal of the model is to examine how the unemployment rate and job vacancy rate are linked and the strength of that link. The Beveridge Curve suggests that when job vacancies rise, unemployment falls, and vice versa. But if it's harder for people and jobs to find each other, this link can change. For example, if there are more job openings but unemployment stays high, it shows a growing mismatch in the job market.

4.4. Estimation Strategy

The empirical analysis proceeds in four stages. First, panel unit root tests are employed to determine the order of integration of the variables. Second, the long-run relationship among the variables is evaluated through panel cointegration analysis. Third, a fixed-effects estimator is applied to obtain baseline estimates while controlling for country-specific heterogeneity. Finally, a dynamic panel estimator based on the Arellano–Bond Generalized Method of Moments (GMM) is employed to account for persistence in unemployment and potential endogeneity arising from the inclusion of the lagged dependent variable.

The dynamic panel specification is preferred because unemployment dynamics are inherently persistent and current unemployment is expected to depend on past labour market conditions. The inclusion of the lagged dependent variable introduces endogeneity, making conventional fixed-effects estimation inconsistent (Nickell, 1981). Therefore, the Arellano–Bond GMM estimator is employed to obtain consistent parameter estimates by using internal instruments. Model validity is evaluated using AR(1), AR(2), Hansen J, Hausman, cross-sectional dependence, heteroskedasticity, and serial correlation diagnostics.

Prior to the regression analysis, a set of diagnostic tests was conducted to evaluate the underlying assumptions of the static panel model. The Hausman specification test was employed to compare the fixed-effects and random-effects estimators. Cross-sectional dependence was examined using the Pesaran CD test, while groupwise heteroskedasticity was evaluated through the Modified Wald test. The Wooldridge test was additionally applied to identify first-order serial correlation in the panel residuals. Where a violation of the classical error assumptions was detected, the covariance matrix of the estimator was adjusted to obtain robust statistical inference.

5. Empirical Findings and Econometric Analysis

This study analyses the behaviour of the Beveridge Curve in Nordic countries, focusing on the direction of the relationship between the unemployment rate and the job vacancy rate, and the transformation of labour market dynamics over time. The findings show that the Beveridge Curve in the labour markets of Denmark, Finland, Sweden, and Norway generally exhibits a negative slope, consistent with theoretical expectations. This result indicates that not only cyclical but also institutional and structural factors are influential in the labour market.

In the first stage of the analysis, the stationarity of the variables was examined using panel unit root tests. The findings regarding the panel unit root tests are presented in Table 3. These findings allow for the evaluation of the stationarity and long-term relationship properties of the variables.

Table 3. Panel Unit Root Test Results

Variables	Level p-Value	First Difference p-Value	Result
UNEMP	0.586	0.000	I (1)
VAC	0.677	0.000	I (1)
GDP	0.000	0.000	I (0)
INF	0.849	0.000	I (1)
ALMP	0.900	0.000	I (1)

Source: Authors' calculations.

Table 3 presents the panel unit root test results. The results show that the economic growth variable is stationary at the level, while the unemployment rate, job openings rate, inflation, and active labour market expenditures become stationary after taking their first differences. These findings reveal that the variables differ in their degree of integration and that labour market indicators exhibit significant long-term dynamics.

Table 3A. Panel Data Diagnostic Test Results

Test	Result
Hausman test (p-value)	0.9999
Pesaran CD test (p-value)	0.9669
Modified Wald test (p-value)	0.9978
Wooldridge test (p-value)	0.0198

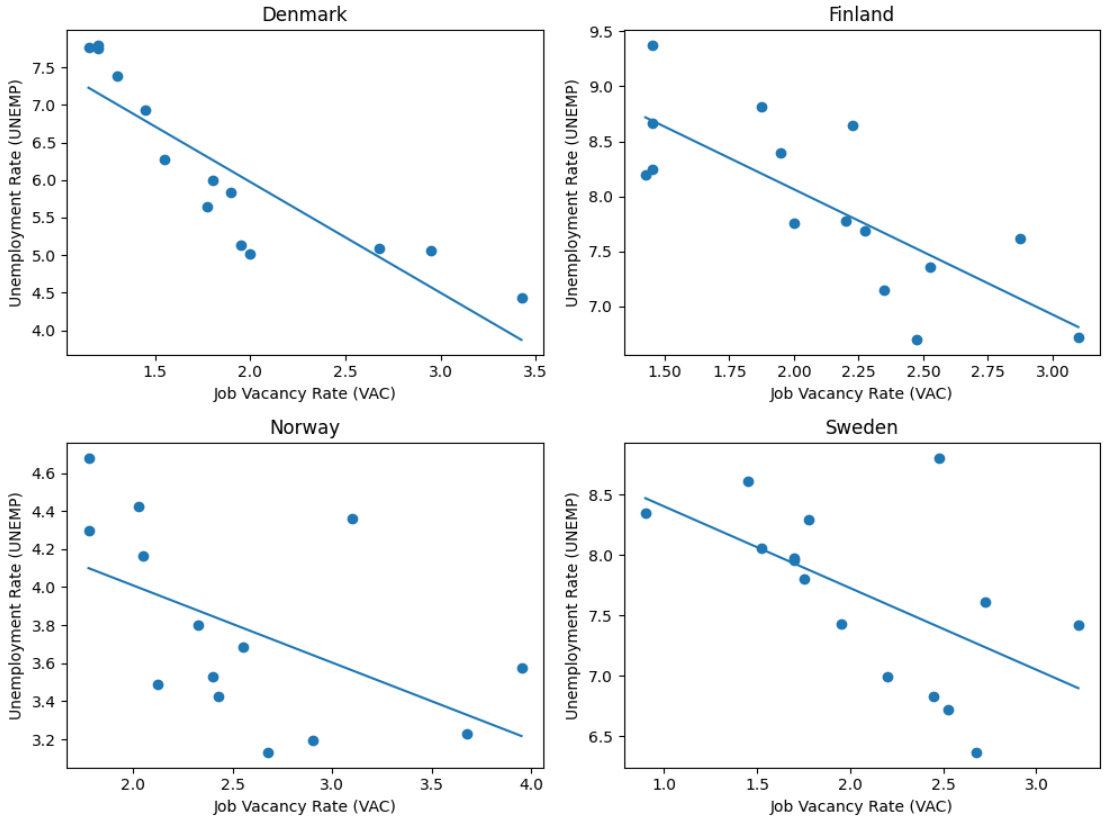
Note: The diagnostic tests were performed prior to estimating the static panel regression model. The Hausman specification test was used to compare the fixed-effects and random-effects estimators. Cross-sectional dependence was evaluated using the Pesaran CD test, groupwise heteroskedasticity was examined using the Modified Wald test, and serial correlation was assessed using the Wooldridge test. The results indicate no evidence of cross-sectional dependence or heteroskedasticity, whereas first-order serial correlation is detected. Therefore, robust covariance estimation is employed in the interpretation of the static panel estimates.

Source: Authors' calculations.

The results of the panel diagnostic tests are presented in Table 3A. The Hausman specification test fails to reject the null hypothesis that the random-effects estimator is consistent ($\chi^2 = 0.028$, $p = 0.9999$). Nevertheless, the fixed-effects specification is retained as the baseline model because the analysis focuses on a deliberately selected group of Nordic countries rather than on a random sample drawn from a larger population. Moreover, country-specific institutional and labour market characteristics may theoretically be correlated with the explanatory variables.

The Pesaran CD test does not indicate statistically significant cross-sectional dependence among the residuals ($p = 0.9669$). Likewise, the Modified Wald test suggests that groupwise heteroskedasticity is not present. However, the Wooldridge test identifies first-order serial correlation. Therefore, robust covariance estimation is employed when interpreting the static panel estimates.

Figure 1. Beveridge Curves in Nordic Countries



Note: The figure shows the relationship between the unemployment rate (UNEMP) and the job vacancy rate (VAC) for Denmark, Finland, Norway, and Sweden. Linear trend lines are included to visualize the overall direction of the Beveridge Curve.

Figure 1 shows the Beveridge Curves generated for the Nordic countries. The graphs generally show a negative relationship between the unemployment rate and the job vacancy rate. While the slope and intensity of the relationship differ between countries, the tendency for unemployment rates to decline during periods of increased job vacancy rates is consistent with the theoretical expectations of the Beveridge Curve. These visual findings support the empirical results from fixed-effects and dynamic panel-data models and indicate that the labour-market matching mechanism generally functions effectively in the Nordic countries.

Following the diagnostic evaluation of the panel data assumptions, the empirical analysis proceeds with the estimation of the baseline fixed-effects model. The diagnostic tests provide additional confidence regarding the reliability of the estimated coefficients and support the interpretation of the static panel regression results.

The estimation results for the fixed effects model are presented in Table 4. These results indicate the nature of the relationship between unemployment and job vacancy rates, allowing interpretation of how changes in job vacancies can affect unemployment dynamics in the Nordic countries' labour markets. The implications suggest that effective labour-market matching, as reflected in the model, may inform policy decisions to reduce unemployment.

Table 4. Fixed Effects Panel Data Model Results

Variable	Coefficient	p-value
VAC	-1.279***	0.000
GDP	0.073**	0.045
INF	0.120**	0.010
ALMP	-0.092	0.866

Note: *** p < 0.01, ** p < 0.05, * p < 0.10.

Model statistics: Number of observations = 100; Number of countries = 4.

The fixed effects model results presented in Table 4 are consistent with the basic assumption of the Beveridge Curve. The negative, statistically significant coefficient for the job vacancy rate indicates that an increase in job vacancies reduces the unemployment rate. This result suggests that the labour market matching mechanism in Nordic countries generally operates effectively. While economic growth and inflation variables appear statistically significant, no significant short-term effect of active labour market expenditures was detected.

The negative association between job vacancies and unemployment is consistent with the original Beveridge framework (Beveridge, 1944) and the subsequent theoretical developments of Blanchard and Diamond (1989), who distinguish cyclical movements along the Beveridge Curve from structural shifts. The present findings are also in line with Petrongolo and Pissarides (2001), who emphasise that improvements in matching efficiency strengthen the inverse unemployment–vacancy relationship, and with Hobijn and Şahin (2013), who show that labour market institutions play a decisive role in explaining cross-country differences in Beveridge Curve dynamics. Accordingly, the Nordic evidence confirms that labour market adjustment broadly follows the theoretical predictions of the Beveridge Curve despite institutional heterogeneity.

The findings regarding economic growth and inflation variables show that labour market performance cannot be explained solely by macroeconomic indicators. The fact that the effect of economic growth on unemployment can vary with seasonal conditions and the structural characteristics of the labour market indicates that growth does not always create the same level of employment. Similarly, the effect of inflation is not direct but rather occurs through the macroeconomic stability channel. These results show that institutional and structural factors, as well as macroeconomic indicators, should be considered in evaluating labour market performance.

The findings regarding active labour market policies highlight key institutional features of Nordic labour markets. Notably, active labour market expenditures are statistically insignificant in the fixed-effects model but significant and negative in the dynamic panel model. This contrast suggests that while the fixed-effects model may not capture the impact of these expenditures, the dynamic panel model reveals that such policies reduce unemployment. The dynamic panel model's sensitivity to time effects may reflect the fact that policy tools such as training programs, reskilling, and job placement support often require a lag before improving labour market matching efficiency. Thus, the dynamic model is considered more suitable for detecting these delayed effects, which aligns with the literature and OECD (2009) findings on the importance of active labour market policies for reducing long-term unemployment and supporting re-entry.

The dynamic effect of active labour market expenditures is also consistent with the institutional labour market literature. Nickell, Nunziata, and Ochel (2005) argue that labour market institutions and active policy interventions are important determinants of unemployment dynamics across OECD countries. Likewise, Barnichon and Figura (2015) demonstrate that improvements in matching efficiency contribute to favourable shifts in the Beveridge Curve, while Bonthuis et al. (2016) emphasise that institutional heterogeneity explains differences in labour market adjustment across European economies. The present findings therefore support the argument that active labour market policies improve labour market performance primarily through medium- and long-term institutional mechanisms rather than through immediate short-run effects.

While the fixed-effects model provides evidence on the contemporaneous relationship between unemployment and labour market variables, it does not fully capture the dynamic nature of unemployment. To address persistence and potential endogeneity, the analysis is extended using a dynamic panel Generalized Method of Moments (GMM) estimator.

The dynamic panel findings are broadly consistent with studies emphasising unemployment persistence and structural labour market adjustment. Elsby, Michaels, and Solon (2009) show that persistent unemployment is closely related to changes in job-finding dynamics, while Ghayad and Dickens (2012) attribute prolonged unemployment to increasing skills mismatch. Similarly, Hobijn and Şahin (2013) demonstrate that institutional resilience explains why Beveridge Curve adjustments differ across countries after major economic shocks. The present findings extend this evidence by showing that active labour market expenditures constitute an important fiscal mechanism supporting labour market adjustment in the Nordic countries.

Finally, the results of the dynamic panel analysis are presented in Table 5. The findings indicate that unemployment exhibits significant persistence over time.

Table 5. Dynamic Panel GMM Results

Variable	Coefficient	p-value
L.UNEMP	0.667***	0.000
VAC	-0.785***	0.000
GDP	-0.046	0.240
INF	-0.024	0.503
ALMP	-1.961***	0.001

Note: *** p < 0.01, ** p < 0.05, * p < 0.10.

Table 5A. Dynamic Panel GMM Diagnostic Tests

Test	Result
AR(1) p-value	0.029
AR(2) p-value	0.139
Hansen J p-value	0.734
Number of instrumental variables	10
Number of observations	46
Number of countries	4

The GMM diagnostic tests, conducted to assess the validity of the model, support the suitability of the instrumental variables used and the reliability of the model specification. The statistically insignificant AR(2) test indicates the absence of a second-order autocorrelation problem. The non-rejectability of the Hansen J test reveals that the instrumental variables are consistent with the exogeneity assumption. Furthermore, limiting the number of instrumental variables reduces the risk of estimation bias that may arise from excessive instrumental variable use.

The results of the dynamic panel data model show a strong persistence effect in the unemployment rate. The positive and high coefficient of the lagged unemployment variable indicates that the effects of shocks in the labor market continue over time. However, the negative and statistically significant coefficient of the job vacancy rate shows that the Beveridge Curve relationship remains valid under the dynamic model. Unlike the fixed effects model, the negative and significant coefficient of active labor market expenditures suggests that these policies can create long-term and lagged effects in reducing unemployment.

The findings allow for an assessment of the relationship between the common institutional characteristics of Nordic labor markets and unemployment dynamics. Therefore, it is important to interpret the analysis results within the framework of labor market institutions, matching efficiency, and active labor market policies.

A comparison of the fixed-effects and dynamic GMM estimations reveals important differences regarding the determinants of unemployment dynamics in the Nordic countries. While both models consistently confirm the negative relationship between job vacancy rates and unemployment, the estimated magnitude of the vacancy coefficient becomes smaller in the dynamic specification. This finding suggests that part of the contemporaneous effect identified by the static model is explained by the persistence of unemployment over time.

The most notable difference concerns active labour market expenditures. In the fixed-effects model, the coefficient of ALMP is statistically insignificant, whereas the dynamic GMM model reports a negative and statistically significant effect. This divergence indicates that the impact of active labour market policies is not immediate but materialises gradually through improvements in matching efficiency, labour-force participation, and skills adaptation. Because the dynamic specification explicitly controls for unemployment persistence and potential endogeneity, it is better suited to capture these delayed policy effects.

Furthermore, the lagged unemployment coefficient confirms that labour market shocks are highly persistent in the Nordic countries. Ignoring this persistence may bias the estimated effects of labour market policies in static panel models. Consequently, although the fixed-effects estimates provide useful baseline evidence, the dynamic GMM results offer a more comprehensive explanation of unemployment dynamics by accounting for both state dependence and endogenous adjustment processes.

Table 6. Theoretical and Institutional Evaluation of the Findings

Findings	**Theoretical Correspondence**	**Comment**
VAC negative and significant	Beveridge Curve	The unemployment-open job relationship has been confirmed
Persistence of unemployment	Hysteresis approach	The effects of the shocks are continuing
ALMP negative and significant	Active labor market policies	Matching efficiency is increasing
Weak GDP effect	Jobless Growth debate	Growth alone is not sufficient
Limited inflation effect	Phillips-Beveridge relationship	There is an indirect effect

Table 6 shows how the main findings match with theory and institutional views in the Beveridge Curve literature. The results confirm the negative link between the job vacancy rate and unemployment, supporting the Beveridge Curve. The lasting effect of unemployment fits with the hysteresis approach. Also, more spending on active labour market policies seems to help match and can be improved by policy.

Table 6A. Institutional and Empirical Assessment of the Nordic Countries

Country	Institutional Characteristics	Interpretation of Findings
Denmark	Strong implementation of flexicurity approach and active labor market policies	The institutional structure supporting matching efficiency contributes to maintaining the negative relationship between the job vacancy rate and unemployment.
Finland	Immediate need for technological transformation and skills adaptation	The persistence effect in unemployment dynamics increases the importance of reskilling policies.
Norway	Strong public capacity and high level of social protection	Macroeconomic resilience and institutional capacity provide a structure that can limit the impact of unemployment shocks.
Sweden	Advanced active policy tools and high labor market participation	Active policies play a decisive role in maintaining the match between labor supply and demand.

Table 6A presents common Nordic institutional characteristics and the context in which empirical findings are evaluated. Although panel data analyses use a common framework, national structures and policy practices shape interpretation. Denmark combines labour market flexibility with active policies. Finland emphasises technological transformation and skills adaptation. Norway's strong public institutions and social protection ensure resilience to unemployment shocks. Sweden supports efficient matching, high participation, and advanced active policy tools. These distinctions highlight the need to assess Nordic countries both as a collective welfare model and as distinct by specific institutional features.

When all the findings are considered together, the Beveridge Curve remains valid in the Nordic countries. The negative relationship between job vacancy rate and unemployment rate is confirmed in both static and dynamic models. However, the results show that the labour market is affected not only by cyclical movements but also by institutional and structural factors. The strong persistence of the unemployment rate indicates that labour-market shocks can have long-term consequences. The negative, statistically significant effect of active labour market expenditures in the dynamic model suggests that these policies can reduce unemployment and improve matching efficiency. Thus, labour market performance is closely related not only to macroeconomic conditions but also to institutional structure, policy choices, and the effectiveness of matching mechanisms. The Beveridge Curve is not just an indicator of the relationship between unemployment and job vacancies. It also serves as a comprehensive analytical framework for evaluating the effects of active fiscal policy instruments, institutional structures, and matching efficiency on labour market performance.

6. Conclusion

The study's findings show that the Beveridge Curve remains valid in Nordic countries and that the inverse relationship between the unemployment rate and the job vacancy rate continues to have explanatory power today. Both the fixed-effects model and the dynamic panel data model results reveal that an increase in the job vacancy rate reduces unemployment. This result is consistent with the fundamental approach put forward by Beveridge (1944) and with the basic assumptions of the search-matching theory developed by Blanchard and Diamond (1989) and Mortensen and Pissarides (1994). According to this theory, an increase in the number of job vacancies in the labour market increases the probability that unemployed individuals transition to employment, indicating that the matching mechanism is functioning effectively. Therefore, the research findings show that the Beveridge Curve is not only a theoretical relationship but also retains its capacity to explain labour market dynamics in Nordic countries.

One of the striking results of the study is the observed continuity effect in the unemployment rate. The positive and significant lagged unemployment variable in the dynamic panel data model indicates that the effects of labour market shocks do not dissipate quickly. This suggests, consistent with the hysteresis approach, that unemployment is influenced not only by current economic conditions but also by past labour market performance. Although Nordic countries stand out with their strong institutional structures and advanced social protection systems, the results show that their labour markets are not entirely immune to external shocks. In particular, structural factors such as technological transformation and demographic change can prolong the labour market's adjustment to a new equilibrium and cause unemployment to persist to some degree.

A key feature distinguishing Nordic countries from other developed economies is their ability to implement active labour market policies alongside high institutional capacity. Strong education systems, lifelong learning mechanisms, high levels of social

protection, and active labour-market intervention tools help maintain the balance between labour supply and demand. Therefore, the structure of the Beveridge Curve observed in Nordic countries can be considered a result not only of market relations between labour supply and demand but also of public policies that strengthen institutional capacity. This situation demonstrates that unemployment rates in Nordic countries depend not only on economic growth performance but also on the effective use of active fiscal policy tools.

Another important finding is the impact of active labour market policies on labour market performance. The dynamic panel data model shows that active labour market expenditures are effective in reducing unemployment, indicating that training programs, reskilling practices, and job placement support mechanisms can increase matching effectiveness. This result is consistent with OECD assessments and underscores the importance of the active policy approach, a fundamental characteristic of the Nordic welfare state model. Especially in today's world, where digitalisation is accelerating and the nature of labour demand is changing, policies that enable the workforce to acquire new skills are critical for reducing labour market mismatches. In this respect, active labour market expenditures can be considered not only a social policy tool but also an important public policy and fiscal intervention tool that increases the efficiency of the labour market.

The results on economic growth and inflation reveal that labour market performance is shaped by factors beyond macroeconomic indicators alone. Notably, the limited effect of growth on unemployment underscores that job creation depends on factors such as institutional structure, sectoral transformation, and labour-market adaptability. Likewise, inflation's indirect impact illustrates the multi-dimensional nature of labour market dynamics. Taken together, these findings show that labour market performance is influenced by both cyclical developments and deeper institutional and structural elements.

Research findings highlight that expanding and improving active labour market policies is essential. Reskilling programs, lifelong learning, and reintegration mechanisms directly help cut unemployment and boost job matching. Strengthening the link between education and the labour market, gaining skills for digital transformation, and expanding early unemployment support can also raise labour market performance. Nordic countries show that these policies benefit both social protection and economic efficiency.

The study's original contribution lies in clarifying three key points: First, it moves beyond the traditional Beveridge Curve literature, which focuses on the relationship between unemployment and job openings, by explicitly including active labour market expenditures to analyse the fiscal policy dimension of the labour market. Second, it systematically compares the common and distinct features of the Nordic model using a unified panel data approach across Denmark, Finland, Norway, and Sweden. Third, it examines both the matching mechanism and the persistence of unemployment, employing fixed effects and dynamic panel GMM methods. Together, these contributions position the study within the Beveridge Curve literature from a fiscal policy perspective, demonstrating how unemployment dynamics are shaped by public expenditures, institutional capacity, and market indicators.

However, the study has limitations. We limited the analysis to Denmark, Finland, Norway, and Sweden because of data constraints. We could not directly include variables like skills mismatch, quality of education, sectoral transformation, technological intensity, and labour mobility in the model. We also did not apply structural break tests for specific crisis periods. Instead, we assessed the link between unemployment dynamics and active fiscal policy instruments in a general panel-data framework. Future studies should examine periodic breaks, country-specific structural changes, and the structural determinants of the Beveridge Curve using wider country datasets and other institutional indicators.

In conclusion, this research confirms the validity of the Beveridge Curve in Nordic countries, highlighting that labour market performance is shaped by both institutional factors and active policy choices. The persistent negative relationship between job vacancies and unemployment underscores the Curve's ongoing relevance. The study contributes comparative empirical evidence to fiscal economics by examining how active fiscal policy tools influence unemployment dynamics in Nordic countries.

References

Acemoglu, D. (2002). Technical change, inequality, and the labor market. *Journal of Economic Literature, 40*(1), 7–72. doi:10.1257/0022051026976

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies, 58*(2), 277–297. doi:10.2307/2297968

Baltagi, B. H. (2005). *Econometric analysis of panel data* (3rd ed.). John Wiley & Sons.

Barnichon, R., & Figura, A. (2015). Labor market heterogeneity and the aggregate matching function. *American Economic Journal: Macroeconomics, 7*(4), 222–249. https://doi.org/10.1257/mac.20130070

Beveridge, W. H. (1944). *Full employment in a free society*. George Allen & Unwin.

Blanchard, O. J., & Diamond, P. (1989). The Beveridge curve. *Brookings Papers on Economic Activity, 20*(1), 1–76. doi:10.2307/2534495

Blanchard, O. J., & Diamond, P. (1990). The cyclical behavior of the gross flows of U.S. workers. *Brookings Papers on Economic Activity, 21*(2), 85–155. doi:10.2307/2534505

Bonthuis, M., Jarvis, V., & Vanhala, J. (2016). *Shifts in euro area Beveridge curves and their determinants*. IZA *Journal of Labor Policy*, 5, Article 20. https://doi.org/10.1186/s40173-016-0076-7

Bouvet, F. (2012). The Beveridge curve in Europe: New evidence using national and regional data. *Applied Economics, 44*(27), 3585–3604. doi:10.1080/00036846.2011.581216

Christl, M. (2020). The Beveridge curve and Austrian labor market reforms. *Empirica, 47*(3), 567–593. doi:10.1007/s10663-019-09452-4

Destefanis, A., & Fonseca, R. (2017). Matching Efficiency and Labour Market Reform in Italy: A Macroeconometric Assessment. *Labour*, 21(1), 57–84. https://doi.org/10.1111/j.1467-9914.2006.00368.x

Diamond, P. A. (1982). Aggregate demand management in search equilibrium. *Journal of Political Economy, 90*(5), 881–894. doi:10.1086/261099

Dow, J. C. R., & Dicks-Mireaux, L. A. (1958). The excess demand for labour: A study of conditions in Great Britain, 1946–1956. *Oxford Economic Papers, 10*(1), 1–33. doi:10.1093/oxfordjournals.oep.a040756

Elsby, M. W. L., Michaels, R., & Solon, G. (2009). The ins and outs of cyclical unemployment. *American Economic Journal: Macroeconomics, 1*(1), 84–110. doi:10.1257/mac.1.1.84

Eurostat. (2024). *Job vacancy statistics database*. Retrieved from https://ec.europa.eu/eurostat

Foster, D. F. (1974). Unemployment and vacancies: The Beveridge curve in the United Kingdom. *Oxford Bulletin of Economics and Statistics, 36*(3), 167–185. doi:10.1111/j.1468-0084.1974.mp36003002.x

Ghayad, R., & Dickens, W. T. (2012). What can we learn by disaggregating the Beveridge curve? *Public Policy Briefs, Federal Reserve Bank of Boston, 12*(3), 1–12.

Gregg, P., & Petrongolo, B. (1997). Random or non-random matching? Implications for the use of the UV curve as a measure of matching effectiveness. *Oxford Bulletin of Economics and Statistics, 59*(3), 443–445. doi:10.1111/1468-0084.00076

Groshen, E. L., & Potter, S. (2003). Has structural change contributed to a jobless recovery? *Current Issues in Economics and Finance, 9*(8), 1–7.

Hansen, B. (1970). Excess demand, unemployment, vacancies, and wages. *Quarterly Journal of Economics, 84*(1), 1–23. doi:10.2307/1880548

Helpman, E., & Itskhoki, O. (2010). Labour market rigidities, trade and unemployment. *Review of Economic Studies, 77*(3), 1100–1137. doi:10.1111/j.1467-937X.2010.00600.x

Hobijn, M., & Şahin, A. (2013). Beveridge curve shifts across countries since the Great Recession. *IMF Economic Review, 61*(4), 566–600. doi:10.1057/imfer.2013.14

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics, 115*(1), 53–74.

Kanık, M., Sunel, E., & Taşkın, T. (2014). *Unemployment and Vacancies in Turkey: The Beveridge Curve and Matching Function. Central Bank Review*, 14. Ankara, Türkiye: Central Bank of the Republic of Türkiye.

Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics, 108*(1), 1–24.

Ljungqvist, L., & Sargent, T. J. (1998). The European unemployment dilemma. *Journal of Political Economy, 106*(3), 514–550. doi:10.1086/250020

Mortensen, D. T. (1982). Property rights and efficiency in mating, racing, and related games. *American Economic Review, 72*(5), 968–979.

Mortensen, D. T., & Pissarides, C. A. (1994). Job creation and job destruction in the theory of unemployment. *Review of Economic Studies, 61*(3), 397–415. doi:10.2307/2297896

Nickell, S., Nunziata, L., & Ochel, W. (2005). Unemployment in the OECD since the 1960s: What do we know? *Economic Journal, 115*(500), 1–27. doi:10.1111/j.1468-0297.2004.00958.x

OECD. (2009). *OECD employment outlook: Tackling the jobs crisis*. OECD Publishing. doi:10.1787/empl_outlook-2009-en

OECD. (2024). *OECD statistics database*. Retrieved from https://stats.oecd.org

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics, 61*(S1), 653–670.

Petrongolo, B., & Pissarides, C. A. (2001). Looking into the black box: A survey of the matching function. *Journal of Economic Literature, 39*(2), 390–431. doi:10.1257/jel.39.2.390

Pissarides, C. A. (2000). *Equilibrium unemployment theory* (2nd ed.). MIT Press.

Sağlam, A., & Günalp, E. (2012). Türkiye'de Beveridge Eğrisi'nin analizi. *Ankara Üniversitesi SBF Dergisi, 67*(4), 145–168.

Shimer, R. (2005). The cyclical behavior of equilibrium unemployment and vacancies. *American Economic Review, 95*(1), 25–49. doi:10.1257/0002828053828572

Taylor, J. (1972). The behaviour of the unemployment and vacancy rates in Britain. *Economica, 39*(153), 134–152. doi:10.2307/2552080

Tatar, İ. (2023). Türkiye'de Beveridge Eğrisi'nin ampirik analizi: ARDL yaklaşımı. *İnternational Journal of Social and*

Humanities Sciences Research (JSHSR), 10 (95), 1201-1212.https://doi.org/10.26450/jshsr.3639

Tokatlıoğlu, A. (2016). Kriz sonrası dönemde Türkiye'de Beveridge Eğrisi'nin dönüşümü. *Çalışma ve Toplum, 48*(1), 173–198.

World Bank. (2024). *World Development Indicators database*. Retrieved from https://databank.worldbank.org