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IDENTIFICATION OF DETERMINANTS OF THE UNEMPLOYMENT RATE IN EUROPE WITH PARTICULAR EMPHASIS ON THE BALKAN REGION

Ph.D. dissertation prepared under the supervision of

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STRESZCZENIE

IDENTYFIKACJA DETERMINANTÓW STOPY BEZROBOCIA W EUROPIE ZE SZCZEGÓLNYM NACISKIEM NA REGION BAŁKAŃSKI

Jonida Rada

Niniejsze badanie koncentruje się na empirycznej identyfikacji wpływu poziomu rozwoju finansowego, zasobów kapitału ludzkiego i wzrostu gospodarczego na stopę bezrobocia w panelu 34 krajów europejskich obserwowanych w okresie 2000–21. Wykorzystując zaawansowane metody analizy danych panelowych dla pełnej próby i heterogenicznych podprób (kraje o wysokich dochodach, o wyższych i wyższych średnich dochodach oraz Bałkanów Zachodnich), nasze wyniki ujawniają zależność w kształcie odwróconej litery U pomiędzy poziomem rozwoju finansowego a stopę bezrobocia. Znajduje to potwierdzenie także w podpróbach. Uzyskane wyniki potwierdzają także liniowy i ujemny wpływ wyposażenia w kapitał ludzki i wzrostu gospodarczego na stopą bezrobocia. Z badania wynika, że decydenci powinni wdrażać politykę zapewniającą zdrowy system finansowy, inwestycje w akumulację kapitału ludzkiego oraz sprzyjające ogólnemu rozwojowi gospodarczemu w celu zmniejszenia bezrobocia w Europie, a tym samym zwiększenia efektywności rynku pracy. Formułujemy również zalecenia dla polityki gospodarczej skierowane do grup znajdujących się w niekorzystnej sytuacji na rynku pracy, zwłaszcza kobiet i młodzieży. Zalecenia formułowane są ogólnie jak i dla regionu Bałkanów Zachodnich w szczególności.

Słowa kluczowe: rynek pracy, stopa bezrobocia, rozwój finansowy, kapitał ludzki, wzrost gospodarczy, ekonometria danych panelowych
Klasyfikacja JEL: E24, J01, J08, J16, J64, C23

ABSTRACT

IDENTIFICATION OF DETERMINANTS OF THE UNEMPLOYMENT RATE IN EUROPE WITH PARTICULAR EMPHASIS ON THE BALKAN REGION

Jonida Rada

This study focuses on the empirical identification impact of the level of financial development, human capital endowment, and economic growth on the unemployment rate for a panel of 34 European countries observed over 2000–21. Using advanced panel data analysis methods for the full sample and heterogeneous subsamples (high-income, upper & upper-middle-income countries, and the Western Balkans), our results reveal an inverted U-shape relationship between the level of financial development and the unemployment rate. This is confirmed also in subsamples. Furthermore, the obtained results prove the linear and adverse impact of human capital endowment and economic growth on the unemployment rate. The study suggests that policymakers should implement policies to ensure a robust financial system, investment in human capital accumulation, and economic development to reduce unemployment in Europe and thus increase the efficiency of the labor market. We formulate, in addition, policy recommendations addressing disadvantaged groups, particularly females and youth. Policy recommendations are formulated for the general sample and Western Balkan regions specifically.

Keywords: labor market, unemployment rate, financial development, human capital, economic growth, panel-data econometrics
JEL Classification: E24, J01, J08, J16, J64, C23

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LIST OF PUBLICATIONS

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
ALMP	Active labor market policies
ARDL	Auto Regressive Distributed Lag
AYS	Average Years of Schooling
CAR	Capital Adequacy Ratio
CD	Cross-Sectional
CIPS	Cross-sectional augmented IPS unit root test
CPI	Consumer Price Index
DV	Dependent Variables
ECM	Error Correction Model
EU	European Union
FDI	Foreign Direct Investment
FE	Fixed Effect
GDP	Gross Domestic Product
GLM	Generalized Linear Model
GMM	Generalized Method of Moments
HALE	Health Adjusted Life Expectancy
HC	Human Capital
ICT	Information, Communication & Technology
IDI	ICT Development Index
IPA	Intelligence Process Automation
IPS	Im-Pesaran-Shin
LDCs'	Least developed states
LLC	Levin-Lin-Chu
LM	Lagrange multiplier
LSDV	Least Square Dummy Variables
MENA	Middle East & North Africa
NAIRU	Non-accelerating inflation rate of unemployment
NAWRU	Non-accelerating wage rate of unemployment
NIM	Net Interest Margin
NPL	Non-performing Loans

NRI	Networked Readiness Index
OECD	Organization for Economic Co-operation and Development
PCE	Personal Consumption Expenditures
PE	Private Equity
PISA	Programme for International Student Assessment
PMG	Pooled Mean Group
PPI	Producer Price Index
RE	Randon Effect
RPA	Robotic Process Automation
SME	Small and Medium Enterprise
SSA	Sub-Saharan Africa
SWB	Subjective well-being
TIMSS	International Mathematics and Science Study
US	United States of America
VAR	Vector Auto Regression
VC	Venture Capital
WB	Western Balkan

INTRODUCTION

Background

The world is exposed to enormous problems, such as social, environmental, and economic related issues. Economic development, social sustainability, and climate change management are among the most significant recent global challenges. Meanwhile, the spread of COVID-19 triggered another crisis and imposed new financial constraints worldwide (Caputo et al., 2021). As a result, lockdown and isolation measures have exacerbated uncertainty and production output obstacles, which have become another obstacle to the continued health of the global economy (Iqbal & Zahid, 1998). Specifically, the current economic, financial, and COVID-19-related challenges have caused unemployment and stagnant economic growth, becoming increasingly critical issues (Cacciatore & Ghironi, 2021).

The issue of escalating unemployment is a global concern that extends beyond industrialized nations (Ahiadorme, 2022b). Persistent unemployment undermines a nation's social, economic, and political stability. To attain sustainable economic growth, it is imperative to implement measures to mitigate the potentially catastrophic consequences of escalating unemployment rates (Amin et al., 2020). The objective of recent studies is to reduce unemployment rates by highlighting the significance of many factors, such as education, financial structure, information and communication technology (ICT), institutional quality, trade openness, financial development, and public expenditure (Amin et al., 2020; Cacciatore & Ghironi, 2021; Núñez & Livanos, 2010).

However, despite its importance, the existing literature remains less focused on minimizing unemployment via financial development. Theoretically, the extant literature provides contradictory justification for financial development's role in shaping the unemployment rate. Financial advancement is necessary for a nation to reduce the cost of external financing, which resolves budget restrictions, improves the likelihood of credit opportunities for businesses, and strengthens business expansion (Mansi et al., 2020). As labor and capital are both primary production factors, the capital's employment rate must rise. Hence, several studies also support this viewpoint (Maqbool et al., 2013).

However, a review of the financial development literature reveals that unemployment problems are most pronounced in developing financial systems (Collins & Stevens, 2002; Van Treeck, 2009). The significance of financial activities and transactions is expected to continue growing, which would eventually cause the real sector of the economy to give way to the economy's financial sector. Consequently, shareholders' power increased compared to the involvement of management and workers, and higher rentier profit claims were reported. In addition, there will be a greater convergence of the interests of shareholders and managers within the company. It would increase businesses' reliance on short-term financial operations rather than long-term market share and sales revenues (Krippner, 2005; Van Treeck, 2009). Hence, these results decline capital expenditures and workers' bargaining power. Additionally, this causes wage growth and job creation to reach a saturation point (Crotty & Lee, 2006; Hattori et al., 1975).

Empirically, Chen et al. (2021) complement this view. Further, the extant literature supports the inverted U-shaped relationship between financial development and unemployment. In the early stages, financial development may further upsurge the unemployment rate. However, at a later stage, improved financial development leads to a lower unemployment rate. Several studies support this view (Obobisa et al., 2023). Considering the above discussion, it is evident that the extant literature provides mixed results regarding the role of financial development and the unemployment rate.

Similarly, the extant literature also supports human development's critical role in shaping economic development, which would improve employment opportunities. The human capital theory suggests that an investment in education can achieve a greater return (Hasbnllah & Ab Rahman, 2023). Similarly, knowledge and expertise are unique characteristics that cannot be changed or replaced. Classical studies on human capital agree with the viewpoint that the training and education of workers are essential factors for long-term economic development (Benhabib & Spiegel, 1994; Nguyen Le & Tran Pham, 2023). Additionally, the endogenous growth theory emphasizes "innovation-based" growth models.

Romer (1990) presented a model to measure the average productivity associated with the degree of product variety. The model demonstrated that production factors include physical capital, human capital (labor equipped with years of schooling and training), and innovations. Moreover, Romer's model supported the endogenous growth model and evidenced that sustainable economic growth depends on the level of human capital. Based on other theoretical perspectives,

human capital is vital for successfully implementing innovative production processes (Maqbool et al., 2013). The empirical study following the time series data approach by Erdem & Tugcu (2012) was conducted in Turkey during 1960-2007 and expressed that higher education significantly reduces unemployment in the long and short term.

Additionally, Li et al. (2014) conducted an empirical test to determine the impact of increased access to higher education on unemployment rates for Chinese college graduates. This test utilized population estimated from the years 2000 and 2005. The results concluded that a more comprehensive policy intervention is also required to increase the percentage of high school graduates. In addition, the study revealed that the Chinese government's economic expansion policy contributes to the unemployment rate among recent college graduates. To reduce the national unemployment rate, however, it is necessary to distribute young college graduates of consistent quality across many regions in a highly flexible manner (Ogundari & Awokuse, 2018). Another opinion suggests that human development is not necessary to aid in lowering unemployment rates or support increasing the overall number of workers employed. Hence, well-qualified people face more job challenges (Erdem & Tugcu, 2012). Furthermore, Kettunen (1997) pointed out that the employment rate can be improved with increased education, but only at the lowest level. Contrarily, an increase in education at the highest level would show the lowest response to the unemployment rate. Hence, political consequences also constrain economic forces (Goulet, 2003). The above discussion revealed that there is still a need to examine the impact of human capital on unemployment. Therefore, the influence of human capital and unemployment is constantly evaluated at the state level to acquire a more comprehensive understanding of the economic development of a nation (Bayar & Diaconu Maxim, 2020).

Moreover, economic development and unemployment are the key economic indicators considered essential macroeconomic issues (Dada et al., 2023). Therefore, the theoretical and empirical literature discussed the relationship between economic development and unemployment at a broader level. Economic literature describes that an increase in the gross domestic product (GDP) rate is vitally dependent on an increase in the employment rate (Amin et al., 2020). Okun's law describes the concept of this theoretical assumption and is extensively used to encompass testing across various countries and areas, especially in the developed world (Crotty & Lee, 2006; Okun, 1962)

Empirically, the existing literature also supported the positive role of economic development in reducing unemployment across individual countries and regions (Bartlett, 2009; Bayar & Diaconu Maxim, 2020). Studies (Al-Habees & Rumman, 2012) established the inverse relationship between economic growth and employment rate. On the other hand, researchers Nguyen & Mohamed (2018) declare that the relationship between economic growth and unemployment is insignificant or positive. Therefore, these inconclusive results highlight the need for further research via sophisticated econometric methods to establish the connection between economic expansion and the unemployment rate.

In a nutshell, the contradictory evidence from the literature demands revisiting the relationships between the unemployment rate and the level of financial development, the level of human capital, and economic growth.

For this purpose, this study tested the non-linear financial development and unemployment rate. Further, this study tested the linear impact of human capital and economic growth on the unemployment rate based on 34 European countries following the subsamples via an array of advanced statistical models such as ARDL, static panel estimation models, and dynamic panel estimation models. These approaches support curtailing the issues related to endogeneity, heteroscedasticity, and simultaneity problems. Moreover, the study provides policymakers with a holistic perspective of the determinants of the unemployment rate.

Problem Statement

The developed economies have more coherent economic foundations grounded in superior quality institutions and stronger governance mechanisms and enjoy higher levels of financial development (Rodríguez-Pose & Storper, 2009). By ensuring equitable access to information for all participants, these markets ensure price stability within the stock market and foster a stable political and economic system. It contributes to reducing unemployment rates and, overall, more sustainable economic development (Mansi et al., 2020).

On the other hand, Central, Eastern, and Southeastern European markets, specifically the Balkan region, as economies in ongoing economic transition, are subject to greater risk exposure that could potentially harm economic progress. Various factors contribute to the volatile nature of the Balkan economies. The key contributors to instability in labor markets are the macroeconomic

fundamentals, weak financial systems, dominance of unskilled labor, and lower overall economic development. According to Pavlović et al. (2021), the Balkan region still struggles to cope with the after-shocks of the 2007-08 global financial crisis (GFC). The issue of youth unemployment, leading to increased idleness, is a significant challenge for Balkan nations in their efforts to accelerate and sustain long-term economic growth. This poses a considerable obstacle to successfully lowering the prevailing high unemployment rates observed in these countries.

This study contributes to the literature by examining the role of financial development and human capital endowment in shaping unemployment in Europe and the Balkan region. Its purpose is specifically to provide better insights to policymakers, allowing enhanced targeting of the unemployment problem. In addition, this subject matter provides policymakers with insight into effectively managing change in dynamic economic conditions to reduce unemployment.

Research Significance & Contribution

The worldwide economic and financial challenges have caused unemployment and stagnant economic growth, which are becoming increasingly critical issues. Financial development decreases the cost of external finance by easing financial constraints and allows more firms to access credit, thus raising investment (Aradhya et al., 2023). Labor and capital are essential factors of productivity. Therefore, the employment rate is complementary to the rise in the capital. Similarly, the human capital theory states that educational investments are made to anticipate greater future returns or value. Several empirical studies have argued that the longer a person formally acquires and uses knowledge through education and training, the greater the payoff since it is believed that education is a distinct object.

On the other hand, it is widely accepted in economics that higher economic development increases employment and reduces unemployment (Keji, 2021). Okun's theory, which describes an inverse relationship between productivity and unemployment, reinforces this proposition. Economic law illustrates that economic development reduces the unemployment rate. However, the extant literature provides mixed evidence of financial development, human capital, and economic development in shaping unemployment (Nguyen Le & Tran Pham, 2023).

The contribution of this research to the subject literature is threefold.

Firstly, using a panel of 34 European nations, this study offers an empirical estimate of the importance of financial development in shaping unemployment with the sampling data from 2000 to 2021. This study is based on the theoretical framework that suggests a positive association between financial development and unemployment. On the contrary, some researchers advocate the existence of a negative relationship. At the same time, some scholars support the notion that this relationship is non-linear. In other words, financial development at an earlier time may affect joblessness in the long run. However, at a later stage, further improvement in the level of financial development lowers the unemployment rate. Based on this theory, the current study contributes to the literature by examining the existence of an inverted U-shaped impact of financial development on unemployment in Europe and the Balkan region, in particular, to provide better insights to policymakers.

Secondly, it covers the existing gap in the extant literature on the subject in the European context, specifically the Balkan region, by empirically investigating the relationship between the level of human capital and unemployment. More specifically, it provides simultaneous empirical evidence to determine whether financial development, human capital, and economic growth nexus hinder or spur the unemployment rate and thus affect labor market efficiency. The present study investigates the non-linear role of the level of financial development and the linear impact of human capital and economic development on unemployment in Europe through advanced statistical techniques via the Auto Regressive Distributed Lag (ARDL) method. Afterward, Dumitrescu and Hurlin (2012) (hereafter D-H) are followed to explore the pairwise connection and to measure this causal relationship. In addition, this study applies static and dynamic panel frameworks as a robustness check to produce consistent and efficient parameters and to overcome the endogeneity, heteroscedasticity, and simultaneity problems.

Thirdly, the study contributes to the existing literature by focusing on an interesting Balkan Region and examining the impact of economic development and inflation on the unemployment rate in the Balkan Region since previous studies have been conducted in an individual country or different regions. For instance, Ahiadorme (2022) focused on the relationship between inflation, economic growth, and unemployment in Sub-Saharan countries and found that Okun's law and the Philips curve are effective in the short run. On the other hand, there is a negative relationship

in the long run. According to Friedman's proposition, a temporary relationship exists between inflation and unemployment. Bhattarai (2016) also examined the inflation-unemployment nexus in OECD countries and focused on Indonesian states. The study indicated that adapted techniques regulate inflation but vary unemployment by country. Labor markets should stabilize between employment creation and destruction. Macro and microeconomic structural and institutional improvements may increase firm-worker pay and employment bargaining, making unemployment–inflation trade-offs more critical in these economies. Similarly, Hjazeen et al. (2021) established the growth-unemployment nexus in Jordan. Economic growth is negatively correlated with unemployment, but education, the female population, and the urban population are positively correlated.

The Balkan region, located in southeastern Europe, is a noteworthy and unusual subject of academic inquiry owing to its complex blending of cultures, traditions, and historical occurrences. The existing body of scholarly literature about the Balkans provides a comprehensive analysis, encompassing diverse viewpoints and disciplinary approaches. However, further investigation is still required. For instance, Income inequality in the region must be addressed by altering the current economic paradigm. External circumstances exacerbated the problems. To address the problem of scarce employment opportunities, which has hit many people in the Western Balkans particularly hard, governments must place job development at the top of their agendas. The Western Balkans' economic model has long suffered from chronic underemployment of human potential. While development slowed in 2008, the unemployment rate in the region still hovered around 20%. The jobless rate has hovered around 45% since the year 2000. This is ten percentage points behind the employment rate in the New Member States. The unemployment rates for women and young people in Bosnia and Herzegovina and Kosovo are meager. Significant discrepancies in skill sets are neither unprecedented nor unheard of in the Western Balkans (Murgasova et al., 2015).

Therefore, this study considers Balkan countries as a sample region due to the following reasons:

i. Although the growth rate was more robust in 2018 compared to 2017, the increase in workforce utility was slower in the Western Balkan countries in 2018 than in the previous year.
ii. The youth unemployment rate increased and showed persistence in the Western Balkan regions.
iii. Although the percentage of young people who are neither employed nor in school or training has decreased since last year, it is still relatively high compared to other European countries. Hence, there is a need to bring structural reforms to improve productivity, a competitive environment, a sound monetary system, and sustained development-related strategies to reduce the unemployment rate further. Hence, considering the above discussion, we revisited the impact of economic growth and inflation on the unemployment rate in the Balkan region through sophisticated econometric techniques to provide valuable and robust insight to policymakers on this topic.

Research Questions

a) Does financial development affect the unemployment rate in the Balkan Region and Europe?
b) Does human capital affect the unemployment rate in the Balkan Region and Europe?
c) Does economic growth affect the unemployment rate in the Balkan Region and Europe?

Research Objectives

a) To analyze the financial development as a determinant of the unemployment rate in the Balkan Region and Europe
b) To investigate the human capital as a determinant of the unemployment rate in the Balkan Region and Europe
c) To evaluate economic growth as a determinant of the unemployment rate in the Balkan Region and Europe.

Scope of the Study

This study contributes to the literature by examining the determinants of the unemployment rate in Europe and, more specifically, the Balkan region based on a sample of 34 European countries throughout 2000-21.

The study considers four proxies of the unemployment rate: total unemployment, male and female unemployment, and youth unemployment. The study examines the non-linear impact of financial development on the unemployment rate. Further, the study also examines the linear role of human capital and economic growth in Europe and the Balkan region through an array of advanced statistical techniques, including Panel ARDL methodology, to determine this causal connection's extrinsic and intrinsic effects in the long-term and short-term. Dumitrescu-Hurlin (D-H) panel causality approach is employed to analyze the causal relationship empirically. The study applied the methods of the D-K Model, GLM Model, Arellano and Bond (hereafter AB) (1991), and Blundell and Bond (hereafter BB) for robustness checks to produce consistent and unbiased coefficients even in the presence of autocorrelation within-group and panel-wise heteroscedasticity to verify and validate the empirical findings to provide better insights to the policymakers.

Research Hypotheses

H1: The level of financial development has an inverted U-shape relationship with the unemployment rate

H2: Higher human capital endowment, ceteris paribus, exerts a negative impact on the registered unemployment rate.

H3: Economic development has a negative impact on the unemployment rate

H4: ICT has a negative impact on the unemployment rate

H5: Higher inflation rate exerts a negative impact on the unemployment rate.

H6: Trade has a negative impact on the unemployment rate.

Thesis Outline

The dissertation consists of four chapters. Chapter one introduces and discusses various theories of economic development and provides an overview of the key concepts, debates, and empirical evidence surrounding these theories.

The second chapter explores the relationship of financial development, human capital, economic development, ICT, trade, and inflation with unemployment. It provides a background on this region's economic characteristics, challenges, and opportunities. The thesis analyzed existing literature, theoretical frameworks, and empirical studies to define how the science community tackled the concept and identify the research gap.

Chapter 3 outlines the research methodology, including the model used to analyze the relationship between inflation and unemployment in the whole sample. The study further extended the data analysis for an in-depth understanding of the role, dividing the whole dataset into two groups. This chapter presents and interprets the findings of the data analysis. It discusses the empirical results, statistical significance, and any patterns or trends observed in the data. The chapter may also include relevant tables, charts, or graphs to illustrate the results.

Finally, Conclusions, the thesis's final chapter summarizes the study's main findings, discusses them, shows contribution to the field of work, and draws conclusions based on the research questions and objectives. It furthermore discusses the implications of the findings for theory and policy, in particular for Balkan labor markets' context. The chapter finishes with recommendations for policymakers and practitioners, lists the current research limitations, and points to future research directions.

CHAPTER 1
REVIEW OF THEORETICAL LITERATURE

1.1 Introduction

This chapter aims to establish the foundational theoretical framework for understanding the determinants of unemployment and its broad economic implications.

This chapter comprehensively analyzes the theoretical determinants of unemployment by examining the intricate dynamics of labor markets, wage structures, and various forms of unemployment. It also seeks to elucidate the factors contributing to labor market imbalances and the persistence of unemployment based on the integration of neoclassical, Keynesian, and contemporary labor market theories. *Thirdly*, it also assesses the impact of public interventions, such as active and passive labor market policies, on mitigating unemployment and enhancing workforce skills (Acemoglu & Autor, 2011).

The intricate dynamics of financial development, human capital, economic growth, trade, ICT, inflation, and unemployment form a foundational framework for understanding modern economic systems. Financial development, characterized by the enhancement of financial institutions, markets, and instruments, serves as the bedrock for resource allocation and risk management, ultimately driving economic growth (Levchenko et al., 2009). Investments in human capital, through education and training, bolster this foundation by enhancing labor productivity and innovation capacity. Economic growth, a critical outcome of these investments, is further stimulated by trade, which leverages comparative advantages and expands markets, fostering efficiency and technological transfer (Bartlett, 2009).

Information and Communication Technology (ICT) emerges as a pivotal enabler in this ecosystem, amplifying productivity and innovation across sectors, thus reinforcing economic growth. However, the interplay between these factors and inflation—a key macroeconomic variable—adds complexity to the narrative (Albinowski & Lewandowski, 2022). While moderate inflation can signal a growing economy, high inflation distorts economic decisions and hinders investment, potentially destabilizing growth (Abu, 2019).

Unemployment, influenced by all preceding factors, remains a critical indicator of economic health. Understanding its determinants—ranging from financial development to inflation—enables the formulation of effective employment policies. Empirical studies consistently test these interconnections, validating hypotheses such as the positive impact of financial development on growth, the significance of human capital, and the stimulative effects of trade and ICT on economic performance (Pavlović et al., 2021).

Ultimately, this research aspires to bridge the gap between traditional economic models and the complex reality of human behavior, providing a nuanced understanding of labor market dynamics and informing the development of effective policy responses (Strauss, 1985).

This comprehensive exploration of economic theories and empirical evidence underscores the multifaceted interactions that shape economic outcomes. By synthesizing these elements, we gain a holistic understanding of the drivers of economic growth and stability, providing valuable insights for policy development aimed at fostering sustainable economic advancement and mitigating unemployment (Ahiadorme, 2022a).

1.2 Theoretical Determinants of Unemployment

1.2.1 Labor Market

The term "*labor market"* refers to the marketplaces where employees exchange their labor for pay, status, and other benefits (Reich et al., 1973). The term broadly refers to the organizations and customs controlling labor services bought, sold, and priced. Workers strive to find jobs that match their skill set in a labor market, while firms aim to generate revenue following a profit-maximizing paradigm (Ehrenberg et al., 2021). Workers seek to market their labor at a competitive rate, while businesses aim to acquire labor with specific skills at an efficient cost. This dynamic reflects the fundamental principles of the labor market, where the interplay of supply and demand determines market equilibrium. Workers' quest for fair compensation is closely linked to businesses' endeavors to control labor costs—a balance influenced by economic conditions, industry dynamics, and government regulations (Rosen, 1972). The labor market determines a worker's wealth, the items they can afford to purchase, their social circles, their holiday

destinations, the schools their children attend, and even the kinds of people they find attractive (Staiger et al., 1997).

A famous economist, Borjas (2003), defined the labor market as a place where workers exchange their labor for wages with employers. Cahuc & Carcillo (2012) also discussed an essential viewpoint in defining the labor market, where individuals offer their services at the workplace to earn income in the form of money.

Ehrenberg et al. (2021) and Smith (1937) studied modern labor economics and expressed their opinion to define the labor market as the arena in which workers find opportunities to work with employers. Similarly, employers hunt people to do work for them. They further discuss the factors that affect the behaviors of employees and employers. Labor market and economic expansion develop a solid connection to make a business cycle, as expressed by (R. E. Hall, 2005). The labor market is closely connected to the economy's ups and downs, called business cycles. These cycles include times when the economy is expanded, when it's passing from recession, and when it's getting better to recover. Understanding how the labor market and the economy affect each other is important for economists and policymakers.

The alignment of the social and economic systems is one aspect of the multifaceted development process. Classical economists viewed the development stage as necessary for all nations to experience economic progress. Wages and productivity are crucial components enabling institutional and administrative structure (Goulet, 2003). According to economic theory, saving, spending, and foreign aid are all essential activities for the growth of the economy. Later, a sustainable economic growth system was developed using current economic theory and empirical research. Dependence theories frequently emphasized the institutional and political barriers to economic progress that were both internal and external. The necessity of significant new measures to end poverty, offer more varied work options, and lessen income inequality was emphasized (Strauss, 1985).

Additionally, progress requires fresh investments that net up the capital stock. One of the most well-known early theoretical models of development examined by Lewis (2013) in the middle of the 1950s and later revised, formalized, and expanded by Ranis & Fei (1961) focused on the structural change of a mostly subsistence economy.

The central concept of surplus labor development emerged from the Lewis two-sector model. The model's key foci are the labor transfer process and the growth of production and

employment in the modern sector. The contemporary sector's increased production has led to both an increase in employment and labor migration. How swiftly this development occurs depends on how quickly industrial investment and capital accumulation occur in the modern economy. The pay scale in the urban industrial sector is based on a predetermined premium above the standard subsistence rate in the traditional rural sector.

Marshall (2009) provided a list of factors contributing to unemployment, including altering consumer demand and a shortage of "human capital." It should be highlighted that the economic tradition has mostly ignored information asymmetry.

The free labor market and the similarity of employers and employees have long been held to be true (Jarmołowicz & Knapińska, 2005). Because of this, employment offers are comparable in salary for workers, and for employers, every worker is equally productive.

1.2.2 Labor Supply & Demand – Labor Market Equilibrium

The supply and demand for labor in an economy are called the job market or employment market. It covers all facets of employment, such as the number of open positions (vacancies), the number of persons actively looking for work (currently unemployed), and the pay and perks provided to employees. Workers, businesses, and the government are the three main players in the labor market. The labor supply is produced by the entrance of a number of people into the labor market to hunt for jobs based on their skills and expertise. In contrast, labor demand is created by firms' need to sustain or expand their business operations. Moreover, government interventions in the labor market play an important role in keeping the labor market and the economy in general in equilibrium (Nickell & Layard, 1999).

Fundamental principles in labor economics revolve around the concepts of labor supply and demand. A comprehensive understanding of the labor market's supply and demand dynamics is imperative for determining the economy's employment levels. Examining the interplay between employees and employers, wage measurement, and other factors influencing market behavior is pivotal. For economists engaged in policy considerations, addressing matters pertaining to labor demand is crucial. The consequences of any policy altering the prices of factors employers encounter hinge on the structure of labor demand (Stigler, 1962).

According to a particular perspective, labor demand is defined as the quantity of labor that employers or firms are prepared and capable of hiring at different wage rates. This denotes the necessity for workers' services in the production of goods and services. Research conducted by Reich et al. underscores the significance of the wage rate in shaping labor demand. Typically, an increase in the wage rate prompts firms to hire fewer workers, while a decrease in the wage rate induces a willingness to hire more workers. The downward-sloping labor demand curve graphically represents this inverse relationship. An alternative viewpoint presented by Harari (2023) contends that firms' demand for labor is contingent on their production levels and technological advancements. If a firm adopts more efficient technology or experiences heightened demand for its products, there is a likelihood of an increased demand for labor to meet production requirements.

On the flip side, the literature on labor supply is marked by significant debates, particularly surrounding the measurement of labor supply elasticities and the methodologies applied for their estimation. Davis et al.'s (2023) research underscores the importance of unemployment in the context of labor supply, revealing that economic downturns witness a substantial increase in individuals actively seeking employment due to significant disruptions in their previous workplaces.

Economists commonly employ the neoclassical model of labor-leisure choice to scrutinize patterns in labor supply. This model posits that individuals, when not participating in work, experience a reduction in leisure time. The economic framework separates the decision-making process of labor-leisure choice from an individual's wage rate and income, influencing the time distribution between engagement in the labor market and leisure activities (Strauss, 1985).

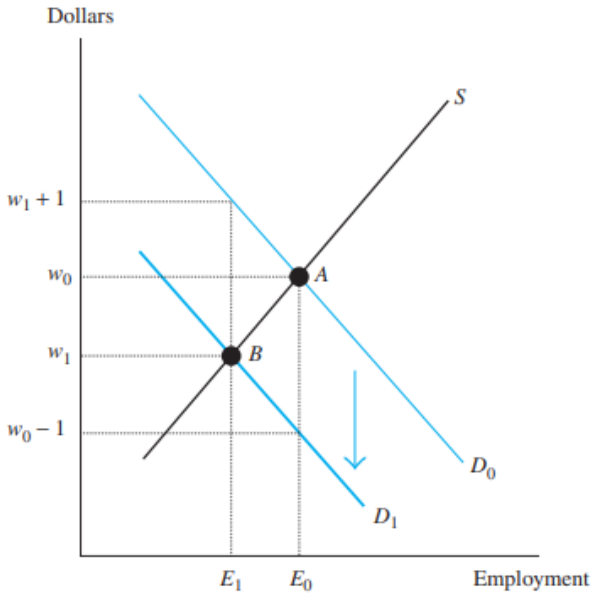
Workers tend to seek employment when wages are high, while firms are more inclined to hire when wages are lower. The notion of labor market equilibrium plays a crucial role in reconciling these conflicting preferences and determining the observed wage and employment levels in the labor market. In real-world scenarios, achieving a stable equilibrium in the labor market proves challenging due to continuous shifts in both supply and demand curves resulting from various economic shocks. Nevertheless, the theoretical framework of labor market equilibrium remains valuable in understanding the fluctuations in wages and employment in response to economic or political events (Mucciaroni, 2023). Efficient allocation in the labor market pertains to the optimal distribution of individuals to firms, maximizing overall gains from

trade; in a competitive economy where workers and firms have the freedom to enter and exit labor markets, a single wage characterizes the equilibrium, ensuring an efficient allocation of labor resources (Rees, 2022).

Empirical studies on the Japanese labor market demonstrate a diminishing trend in wage differentials across regions over time, akin to patterns observed in interstate wage differences in the United States (Harari, 2023). The neoclassical model provides insights into how changes in economic conditions or government policies impact work incentives. For example, payroll taxes alter the labor market equilibrium by causing a downward shift in the labor demand curve. This shift reflects employers considering the total cost of hiring, leading to a decrease in the amount they are willing to pay workers to cover the payroll tax. Payroll taxes, whether imposed on workers or firms, tend to reduce overall employment, resulting in an inefficient after-tax equilibrium that does not maximize gains in the labor market (Paul, 2022).

Government subsidies, designed to encourage firms to hire more workers, also impact the labor demand curve. Employment subsidies reduce the cost of hiring for firms, often in the form of tax credits, leading to a new equilibrium in the labor market and indicating increased employment. Additionally, subsidies raise the actual wage received by workers and decrease the wage that firms need to pay out of their own funds. The impact of these subsidies on the labor market depends on the elasticities of both the labor supply and demand curves (E. J. Davis et al., 2023).

A payroll tax of $1 assessed on employers shifts down the demand curve (from D_0 to D_1). The payroll tax cuts the wage that workers receive from w_0 to w_1 and increases the cost of hiring a worker from w_0 to $w_1 + 1$.



A payroll tax assessed on workers shifts the supply curve to the left (from S_0 to S_1). The payroll tax has the same impact on the equilibrium wage and employment regardless of who it is assessed on.

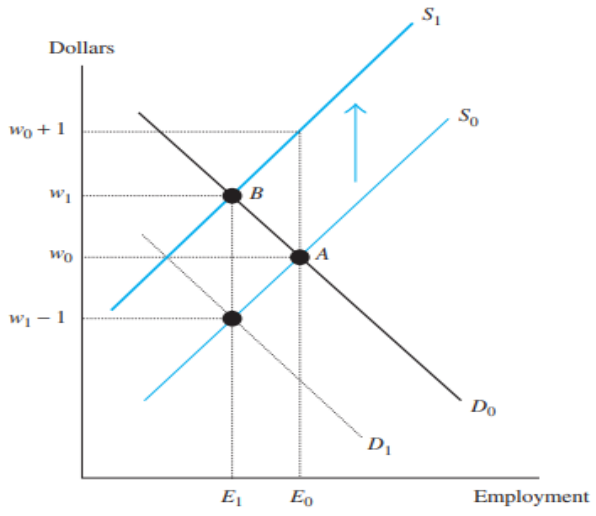


Figure 1 Impact of payroll on the equilibrium wage

Source: (Borjas & Van Ours, 2010a)

An employment subsidy of $1 per worker hired shifts up the demand curve, increasing employment. The wage that workers receive rises from w_0 to w_1. The wage that firms actually pay falls from w_0 to $w_1 - 1$.

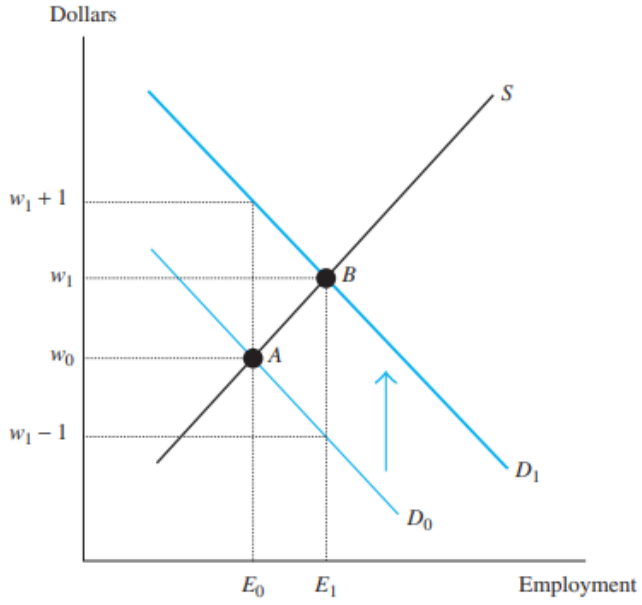


Figure 2 An employment subsidy

Source: (Borjas & Van Ours, 2010a)

1.2.3 The Wage Structure

Various labor-market-related theories examine a whole spectrum of features related to the labor markets: information costs, recruitment costs, wage structures, wage discrimination, or the formation of job-relevant skills (Kaufman, 2010). The remuneration structure within the labor market is intricately shaped by the interplay of supply and demand dynamics, inevitably resulting in a degree of inequality among workers. This wage disparity stems from two fundamental aspects. Firstly, differences in productivity contribute to varying wage levels, with more pronounced distinctions arising from greater productivity gaps. Secondly, the ebb and flow of the rate of return to skills across different labor markets and periods respond to fluctuations in the supply and demand for those skills. A widening gap between skilled and unskilled workers, leading to increased income inequality, results from higher rewards for specialized skills.

In industrialized labor markets, a recurring pattern is the presence of a long tail at the upper echelons of the wage distribution, signifying that a select few workers enjoy a substantial proportion of the rewards allocated by the labor market. Drawing inspiration from the human capital model, numerous studies serve as a foundational framework to elucidate the observable characteristics in contemporary labor markets (Fahmi et al., 2022).

Within the human capital framework, wage differentials emerge not solely from variations in the accumulation of human capital among workers but also due to the ongoing skill acquisition phase for younger workers, leading to deferred earnings. In contrast, older workers reap the benefits from prior investments. The positive skewness observed in the wage distribution is also explicable within the human capital model. Workers invest in human capital until the marginal rate of return equals the discount rate, resulting in a positively skewed wage distribution even when the underlying distribution of ability in the population is symmetric (Rosen, 1972).

Researchers have linked historical shifts in the wage structure to simultaneous changes in economic fundamentals and labor market institutions. Two primary mechanisms through which alterations in economic conditions can accentuate the wage gap between skilled and unskilled workers are a reduction in the relative number of skilled workers (a leftward shift in the supply curve) or a relative increase in the demand for skilled workers (a rightward shift in the demand curve). The prevailing trend suggests that the demand curve has outpaced the supply curve, indicating a faster increase in the relative demand for skilled workers than the relative supply (Borjas & Van Ours, 2010a).

A proposition posits that the labor market entry of the baby boom cohort in the 1970s had a profound impact on the supply curve of college graduates, influencing the returns to a college education during that period. Empirical evidence points to a decline in the relative wages of skilled workers between 1970 and 1979. Additionally, shifts in rewards for similarly educated workers with varying experience can be attributed to "cohort effects," which reflect long-term demographic changes. The examination of the contribution of foreign trade to changes in the wage structure has been a focal point for many researchers. While methodologies may differ, a consensus is that increased foreign trade has a modest impact on wage inequality, accounting for less than 20 percent of the overall increase (Borjas & Van Ours, 2010a).

The investigation of destabilizing macrodynamic feedback mechanisms has not typically been a central concern in mainstream macroeconomic analysis, even though these dynamics were

recognized early in dynamic Keynesian theory. Tobin has extensively summarized and modeled these feedback mechanisms in his works, particularly in 1975, 1989, and 1993. While the Keynes effect and Pigou effect are frequently included in macrodynamic analyses due to their stabilizing impact on wage inflation and deflation, the Mundell effect—related to the impact of inflationary expectations on investment and consumption demand—is often neglected (Pigou, 1912). Tobin (1975) was a pioneer in modeling this effect within a three-dimensional dynamic framework. Despite its essential role in traditional Keynesian IS-LM-PC analysis, the Mundell effect's importance is often minimized, as shown by Romer (1990), where it is mentioned only as a problem rather than being integrated into the core discussion of traditional Keynesian theories of economic fluctuations.

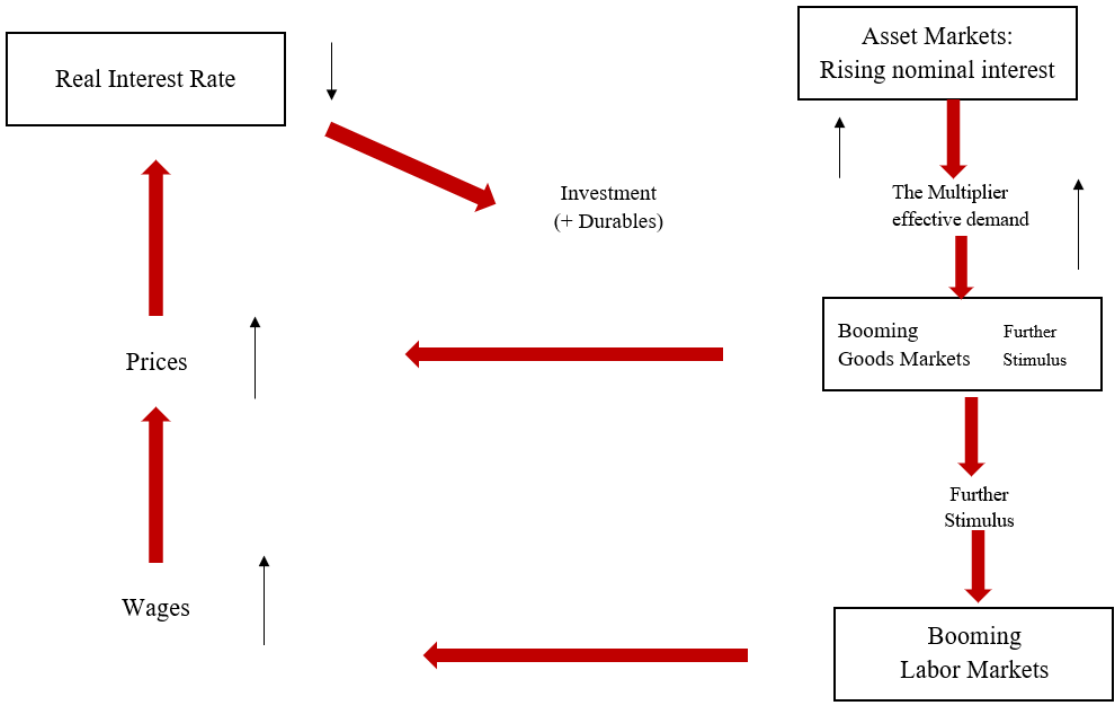


Figure 3 Destabilizing Mundell effect

Source: Mundell (1965)

1.3 Unemployment

Workers encounter unemployment for diverse reasons, prompting policymakers to prioritize certain forms of unemployment. A typical scenario involves individuals transitioning between jobs, marked by resignations, layoffs, or recent entries (or reentries) into the labor market. This period requires efforts to gather information about and identify available job opportunities. Even in a well-functioning market economy where job availability matches the number of job seekers, some level of unemployment is inevitable as workers actively seek suitable positions (Ehrenberg et al., 2021).

Preceding the recent economic downturn, there was a discernible pattern in the "unemployment gap" between highly educated and less educated workers, characterized by an initial widening followed by a substantial narrowing. Education contributes to diminished unemployment rates for two key reasons. Firstly, educated workers invest more in on-the-job training, establishing a robust connection between firms and workers. This connection decreases the likelihood of firms laying off educated workers during adverse economic conditions. Additionally, educated workers transitioning between jobs tend to navigate this shift without undergoing an intervening period of unemployment (Altonji & Blank, 1999).

There is a discernible indication that educated workers possess heightened information or more resilient networks that facilitate awareness of alternative job opportunities. An examination presenting unemployment rates across various demographic factors, including age, race, gender, and industry, underscores that younger workers are more likely to be unemployed than their older counterparts (Altonji & Blank, 1999).

Further investigation has probed into the economic ramifications of minimum wage legislation, suggesting that the heightened unemployment rate among teenagers may be linked to the adverse employment effects of minimum wage policies. This viewpoint emphasizes the need for a nuanced evaluation of the impact of labor market regulations on specific demographic groups (Neumark, 2018).

Unemployment, which affects the economy and society, is one of the most critical concerns facing Jordanian policymakers. According to Kreishan (2011b), high unemployment rates signal a labor market shortfall, an increase in poverty rates, and the emergence of subpar living

circumstances. Based on the viewpoint of Greenwald & Stiglitz (1987), it was observed that the unemployment rate increases as a result of a decrease in demand for labor.

Young individuals and urban residents face a heightened vulnerability to unemployment, as evidenced by Baah-Boateng's empirical research in 2013. The study also associates reservation salaries with elevated unemployment rates. Given that the employment elasticity of output is higher in industrial and agricultural investments, the research recommends implementing policies that incentivize such investments. Targeted interventions, including financial support for entrepreneurship education and startup initiatives, are deemed essential to foster innovation among the youth in the economy. Adjusting job candidates' expectations for reservation compensation is suggested as a potential strategy to mitigate unemployment.

Maqbool et al. (2013) conducted a study to identify the causes of unemployment in Pakistan over the past decades. The research aimed to investigate the impact of financial development on economic growth and its subsequent influence on unemployment, utilizing the ARDL approach. The findings revealed a robust long-term and short-term connection between these explanatory variables.

Anyanwu's (2013) analysis employs cross-sectional data and focuses on the impact of investment opportunities in African countries. The author highlighted that the creation of local-level investment prospects supports youth employment in Sub-Saharan Africa. However, North African states did not experience positive outcomes from such strategies. The research concluded that Northern and Southern African states exhibit a significantly positive correlation between economic development and youth employment opportunities. Additionally, as Africa's economy expands, the study anticipates a decline in the percentage of unemployed youth.

1.3.1 Types of Unemployment

The labor market undergoes constant changes, with workers resigning or being laid off and firms experiencing contractions or expansions. New entrants join after completing education, while others reenter from the nonmarket sector. This continuous flux results in a significant number of workers being in transitional phases between jobs. The ideal scenario, where job seekers and employers instantly connect, would eliminate unemployment (R. E. Hall, 2005).

The labor market is in a perpetual transition state, witnessing workers leaving or being laid off from their positions as firms experience contractions and expansions. This dynamism is further augmented by the continual influx of new entrants who have recently completed their education and individuals reentering from non-market sectors. Consequently, a substantial proportion of the workforce is consistently found in transitional phases between jobs. The hypothetical scenario of instantaneous connections between job seekers and employers, eliminating any duration of unemployment, remains an ideal aspiration (Borjas & Van Ours, 2010a).

- ***Frictional unemployment***, distinguished by its transient nature, manifests due to the time workers and firms need to identify each other and evaluate the potential compatibility of job matches. Unlike structural unemployment, which suggests a fundamental imbalance between job seekers and available positions, policymakers exhibit relatively lower levels of concern for frictional unemployment due to its temporary character. Furthermore, the activities associated with the search for employment during this phase are considered "productive," contributing to enhanced resource allocation. Policy interventions, such as disseminating information about job openings, emerge as viable strategies to mitigate frictional unemployment (Stigler, 1962).

  Even in a state of equilibrium, unemployment persists as individuals undergo job transitions (frictional unemployment) and new participants, such as recent graduates, enter the labor market. The concept of the natural unemployment rate is intrinsically linked to the minimum rate dictated by real economic forces, encompassing job transitions and technological advancements (Kreishan, 2011).
- ***Structural unemployment***, a cause of prolonged joblessness, stems from a misalignment between workers' skills and those sought by firms. Remedial measures involve implementing training programs to equip displaced workers with skills that are currently in demand.
- ***Seasonal unemployment,*** typified by its predictability, is observable in industries like garments and automobiles, where layoffs align with routine model changes. This form of unemployment does not elicit significant concern, as the majority of workers tend to return when the seasonal employment cycle recommences.
- ***Cyclical unemployment*** emerges when the creation of new jobs fails to meet the escalating employment demands of a growing population, resulting in involuntary unemployment.

Additionally, voluntary unemployment can transpire when corporations defer recruitment despite the availability of qualified candidates (Cacciatore & Ghironi, 2021). Cyclical unemployment, characterized by reduced consumer demand prompting firms to lay off workers, is compounded by the presence of sticky wages that do not adjust downward. Policy interventions are geared towards stimulating aggregate demand to restore market equilibrium at the sticky wage level (Amor & Hassine, 2017).

1.3.2 Unemployment duration issue

Recent investigations have uncovered a mechanism known as hysteresis effects, elucidating how alterations in the unemployment rate may impact the duration of unemployment. The premise is that a rising unemployment rate could disproportionately diminish the likelihood of a worker's re-employment, particularly as the duration of their unemployment extends. This phenomenon is suggested to occur when the increasing unemployment rate elevates the proportion of recently unemployed workers in the overall pool of the unemployed, with employers showing a preference for these recently unemployed individuals over those experiencing longer-term unemployment. This employer ranking behavior, as theorized by Blanchard & Diamond (1994), may be attributed to factors such as the worsening of human capital loss with the duration of unemployment.

An examination of the unemployment structure in the United States during the mid-1970s suggested that although a majority of unemployment spells might be brief, a disproportionate amount of time spent unemployed could be ascribed to a small subset of workers undergoing exceptionally lengthy spells of unemployment. This select group, constituting only a fraction of the population, is posited to bear the predominant burden of overall unemployment. These findings underscore the importance of not only considering the frequency but also the duration of unemployment spells for a comprehensive understanding of the intricate dynamics within the labor market (Mueller et al., 2021).

1.4 Steady-State Rate of Unemployment

The natural rate of unemployment, often termed the steady-state rate, emerges from the intricate interplay of worker flows across jobs and market entry and exit (Aradhya et al., 2023). This rate, a product of a stable and dynamic process, converges to a distinctive equilibrium when external shocks are absent. It's important to recognize that this equilibrium is not static but rather endogenous, shaped by factors such as technological advancements, institutional frameworks, and demographic dynamics, rendering it susceptible to change over time. It's worth noting that identifying the steady state doesn't necessitate a comprehensive specification of each contributing structural factor but requires discerning the collective impact of these elements (Maqbool et al., 2013; Burdett & Hool, 1983).

In a notable study conducted by Feldmann (2006), a unique approach involved estimating a static panel data model employing country random effects across 19 industrial nations. The findings of the research underscored a noteworthy correlation: a larger government size corresponded to a higher unemployment rate.

The concept of the natural rate of unemployment is essentially defined as the unemployment rate congruent with a consistent inflation rate. It serves as a benchmark, representing the unemployment rate unaffected by cyclical variations and encapsulating the combined essence of structural and frictional unemployment components (Özgür Bayram Soylu, İsmail Çakmak, Fatih Okur)., 2018).

Farber (2015) highlights that the likelihood of job loss decreases as job tenure increases. During the 2008 Great Recession, companies showed a marked reluctance to lay off employees who had been with them for a longer period. Despite the overall increase in the risk of dismissal, it remained comparatively low for those who had been employed for three years or more. Remarkably, even after being laid off, many employees find themselves rehired by their former employers. According to Feldstein (1975), a significant majority of laid-off manufacturing workers are rehired by the same companies, often after taking up other jobs temporarily. Katz & Meyer (1990) found that 52% of unemployment periods conclude with a recall, with this percentage being higher in manufacturing (64%) and lower in services (35%). This trend is not confined to the U.S.; in Spain, as reported by Alba et al. (2012), about one-third of laid-off workers are eventually recalled to their previous jobs.

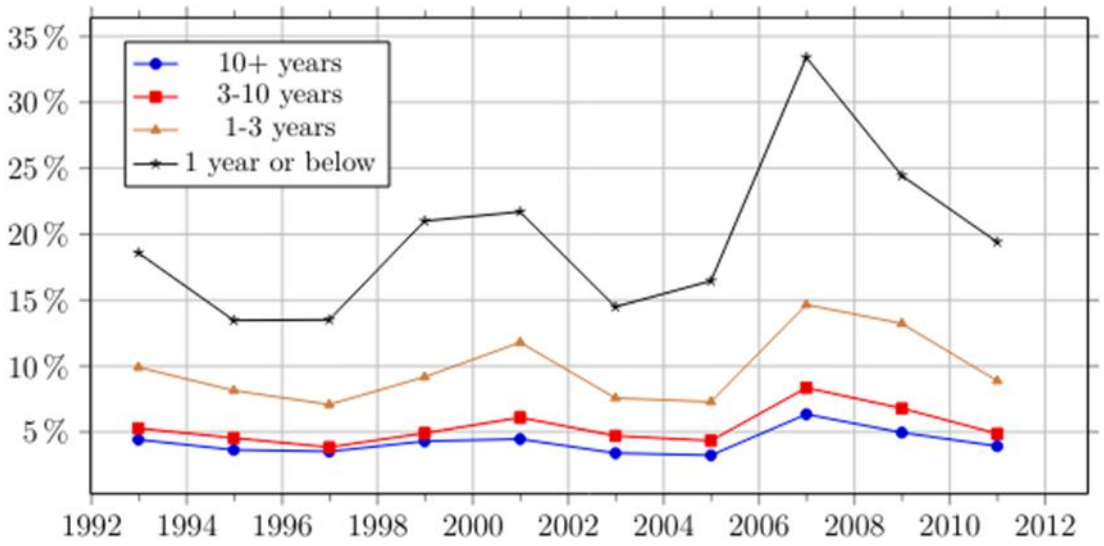


Figure 4 Probability of job loss over the next years in different job tenure groups 1993 - 2011

Source : Farber (2015)

1.4.1 Job Search

Various theories attempt to clarify the persistence of unemployment within competitive markets. The diverse job offerings from different firms, coupled with limited worker information about optimal job locations, contribute to prolonged unemployment periods. Wage differentials for similar work prompt individuals to engage in an extended search for better job opportunities, a phenomenon known as search unemployment. This process can be viewed as an investment in human capital, with individuals dedicating time to gather information about the labor market in anticipation of securing higher-paying positions (Mortensen, 1986).

The rise of the information revolution holds the promise of reducing the costs associated with job searches for both job seekers and employers. The prevalence of Internet usage in job searches among unemployed individuals in the United States underscores this technological shift. While optimism abounds regarding the potential impact on the speed and quality of job acquisition, empirical studies caution against overly optimistic expectations (E. J. Davis et al., 2023).

I. Intertemporal Substitution Hypothesis

Job search models play a crucial role in elucidating the existence of frictional unemployment, portraying it as a voluntary phenomenon where workers dedicate time and effort to gathering information, aiming for improved wages after unemployment. Intriguingly, certain studies propose that even the significant upsurge in unemployment witnessed during severe economic downturns might possess a voluntary component, notwithstanding its apparent dissociation from typical job search activities (Mortensen, 1986).

Guided by the intertemporal substitution hypothesis, workers are motivated to allocate their time to work during periods of the life cycle with higher wages, choosing leisure consumption during phases of lower wages when leisure is more economical. This hypothesis bears noteworthy implications for how workers manage their time across the business cycle. Calculating the movement of the real wage over the business cycle proves challenging due to shifts in the labor force's composition (Schumpeter, 1939). Unemployment, particularly impactful on low-skill workers, tends to disproportionately affect this group during economic contractions, influencing the cyclical trend in the real wage. While a long-held belief in the stickiness of real wages existed, studies attempting to rectify the "composition" bias suggest that real wages may exhibit a procyclical nature. Nevertheless, skepticism persists regarding the notion that a substantial pool of unemployed workers during severe recessions is "voluntarily unemployed," as implied by the intertemporal substitution hypothesis, given the hypothesis's assumption of responsive labor supply to changes in the real wage over the business cycle (Borjas & Van Ours, 2010a).

Furthermore, the empirical analysis reveals that labor supply curves, especially for men, tend to be inelastic, with labor supply demonstrating limited responsiveness to changes in wages (Altonji & Blank, 1999). Another study concludes that labor supply elasticity is necessary to explain intertemporal shifts in labor supply. Hence, the evidence does not strongly indicate that much of the observed increase in unemployment during an economic downturn can be interpreted as a rational reallocation of a worker's time (Blau & Kahn, 2013).

II. Sectoral Shifts Hypothesis

Expanding beyond job search activities, the Sectoral Shifts Hypothesis emerges as an alternative model to elucidate the existence and persistence of long-term unemployment. This hypothesis underscores the likelihood that workers seeking jobs may lack the qualifications necessary for available vacancies, particularly when demand shifts unevenly across economic sectors. Some sectors experience rapid growth, while others decline, leading to sectoral shocks that could instigate structural unemployment. For instance, favorable shocks in sectors like the computer industry can augment labor demand. At the same time, laid-off manufacturing workers may encounter difficulties transitioning due to skills not easily transferable to the flourishing computer industry (Seo et al., 2023).

Empirical analysis correlating the aggregate unemployment rate to the dispersion in employment growth rates across industries lends support to the Sectoral Shifts Hypothesis. This perspective posits that the unemployment rate increases when there is substantial dispersion in employment growth rates across industries, establishing positive correlations between measures of dispersion in employment growth rates and the aggregate unemployment rate (Fields, 2011).

Recent studies extend the testing of this hypothesis by examining the impact of sectoral shocks on stock market prices. The positive correlation between the dispersion in stock price movements and the unemployment rate underscores the significance of sectoral shocks in the economy. Estimates suggest that sectoral shifts may account for approximately 25 to 40 percent of unemployment, with certain periods exhibiting significantly higher contributions (Staiger et al., 1997).

1.4.2 Mismatch

Neoclassical growth theory, in contrast, assumes perfect market competition. In this approach, job seekers make every effort to find the right employment, while businesses look for certain qualifications to fill open positions in their organizations. However, the mismatch between labor demand and necessary skillset leads to unemployment. This gap typically arises as a result of technology advancements that render certain workers' abilities outdated (Abowd et al., 2006). At the same time, according to a different theoretical viewpoint represented by (Burdett & Hool

(1983), individuals often choose lower-paying jobs over those with higher salaries if the lower-paying jobs are more secure and give insurance benefits and social security

Public intervention- active/passive labor market policies (e.g., unemployment compensations)

Public intervention in labor markets encompasses both active and passive labor market policies, including instruments like unemployment compensations. These policies are designed to tackle unemployment, enhance workforce skills, and overall improve labor market functionality (Seo et al., 2023).

The resurgence in the unemployment rate has brought labor market policies to the forefront, necessitating consideration of social policies, both active and passive. Passive policies involve provisions such as unemployment insurance and related welfare benefits to aid the unemployed (Nickell & Layard, 1999). On the other hand, active policies are formulated to assist individuals in securing employment (Pelin & Osoian, 2021). As articulated by Shen et al. (2022), passive labor market policies encompass income benefits for the unemployed, including unemployment insurance, social assistance, disability benefits, and early retirement benefits. These measures temporarily compensate for financial losses. Active labor market policies, however, aim to facilitate employment with a focus on the potential effectiveness of "activation strategies" to assist the unemployed, particularly those at higher risk (Martín-Rojas et al., 2021).

Active labor market programs are commonly categorized into four types, including job search assistance, labor market training, private and public sector incentive programs, and direct employment programs. Job search assistance involves search courses, vocational guidance, counseling, and monitoring to enhance the efficiency of job matching. Labor market training encompasses various forms of education and vocational skills training to boost participants' qualifications and employability. Private and public sector incentive programs provide wage subsidies and self-employment grants to incentivize behavioral changes in employers and workers. Direct employment programs in the public sector involve the creation of public works or activities producing public goods and services, targeting the most disadvantaged workers to maintain their connection with the labor market and prevent the loss of human capital (Shen et al., 2022; Gradstein & Justman, 2000; Mortensen, 1986).

Passive labor market policies, including unemployment compensation, serve as a financial support system for individuals involuntarily losing their jobs, acting as a safety net during periods of unemployment. Additionally, regulations addressing severance pay and job security contribute to shaping labor market dynamics (C. Lee & Lane, 2023).

1.5 Labor market theories

Economic literature, encompassing both traditional and contemporary perspectives, dedicates considerable attention to the dynamics of labor market equilibrium and the broader economic balance. Consequently, it is essential to examine certain employment and labor market theories, with a particular emphasis on those addressing workforce mobility and employee flows.

1.5.1 Neoclassical perspective on labor market functioning

The labor market perfect competition model (1934) is built upon several key assumptions. First, it assumes that both workers and firms possess complete awareness of employment opportunities and have comprehensive information about prevailing wages. Second, it posits that firms driven by economic principles seek high returns, while workers motivated by the same principles strive for maximum wages and job satisfaction, thereby exhibiting rational behavior. Third, the model suggests that each employer and employee constitutes such a minute fraction of the overall labor demand that their individual decisions do not wield influence over wages. Fourth, it assumes the absence of impediments to labor force mobility and other production factors. Fifth, it holds that employers and employees independently make decisions regarding pay or employment without coordination with others in their respective groups. Finally, the model contends that labor in specific markets is uniform and interchangeable in the economic sense (Dimand & Hagemann, 2019).

According to this neoclassical growth model, the equilibrium in the labor market has a limited impact on unemployment. Furthermore, the mechanism of the wage structure is noted to exert a negative influence on labor decisions. Unemployment is ascribed to imbalances in the labor market and is considered a voluntary phenomenon (Lazear & Rosen, 1981).

Marshall (2009) explored factors influencing unemployment—shifts in goods demand, human capital deficiencies, and economic fluctuations. The author emphasized the voluntary nature of unemployment, where workers embraced trade unions, acknowledging it as a consequential aspect. The economic tradition assumed a transparent labor market with homogeneous entities, leading to the belief that job offers and work efficiency were uniform (Jarmołowicz & Knapińska, 2005).

Neoclassical proponents envisioned perfectly flexible wages, responding swiftly to labor supply-demand dynamics (Borjas, 2003). A. Smith (1937) suggested market imperfections triggered migration, balancing labor demand and wages. Classical and neoclassical theories associated unemployment, especially structural unemployment, with limited labor force mobility. Reduced mobility impacted wage rates less than anticipated (Abowd et al., 2006). Practically, employee mobility faced hurdles due to job-specific skills, geographic constraints, and the need for professional training. This contrasted with the idealized labor market under perfect competition. Neoclassically, the workforce supposedly accepted reduced wages in challenges, seeking equilibrium where demand met supply.

1.5.2 Keynesian perspective on labor market functioning

Contrary to conventional wisdom, Keynes (1924) challenged the idea that labor and wages displayed flexibility. He argued that their inherent rigidity, particularly in resisting downward movements, could lead to economic equilibrium even with less than full employment. Keynes (1924) attributed this scenario not solely to interference in wage adjustments but primarily to a global demand deficiency.

A study posited that reducing nominal wages might decrease the transaction demand for money, creating a speculative surplus based on Keynes's analysis (Burdett & Hool, 1983). This surplus could lower interest rates, stimulate investments, and foster a multiplier effect on production and employment. Despite acknowledging the potential impact of lowering nominal wages on employment, the author considered it uncertain. He highlighted weaknesses, including the possibility that a drop in nominal wages might not necessarily result in a lower interest rate and that increased investments were not guaranteed, as capital efficiency might decrease. Thus,

Keynes concluded that lowering nominal wages did not ensure full employment (Dimand & Hagemann, 2019).

Expanding his objections, Keynes rejected the idea of 'cutting down' on nominal wages, both in practical and theoretical terms. He also argued that the imbalance in labor market supply represented involuntary unemployment. Further, unemployed individuals could not change their situation through requalification, increased mobility, or accepting lower wages. He advocated government intervention as the only viable solution to combat unemployment (Jarmołowicz & Knapińska, 2005).

Hence, J. M. Keynes departed from neoclassical perspectives on the effectiveness of market mechanisms in a free-market economy. He believed that under such conditions, a surplus of labor force supply over labor demand would result in unemployment, attributing this to insufficient demand for goods (Bayar & Diaconu Maxim, 2020).

1.5.3 Contemporary Labor Market Theories

In contemporary economic discourse, various alternative theories shape our understanding of the labor market's functioning. Despite their diversity, these theories largely build upon and extend the foundational principles of neoclassical and Keynesian approaches. The adaptations introduced often incorporate diverse, expanded, and supplementary hypotheses to illuminate the emergence, occurrence, and perpetuation of imbalances within the labor market. Broadly, three primary categories can be identified to encapsulate these alternative hypotheses.

The first category significantly emphasizes structural and institutional factors as the primary contributors to labor market imbalances. The theories within this realm, such as the segmentation theory, emphasize the crucial role of limitations on labor force mobility in explaining the genesis and persistence of imbalances within the labor market (Reich et al., 1973).

Within the second category, theories posit that imbalances can be attributed to prolonged adjustment processes within the labor market, stemming from factors like job searches and changes in qualifications. The human capital theory, the natural rate of unemployment theory, and the job search theory fall under this domain. These theories highlight the intricate relationship between restrictions on employee mobility, particularly of a professional nature, and the imbalances observed in the labor market (Christopherson & Clark, 2020).

The third set of hypotheses asserts that labor market imbalances may result from the inflexibility of wages. The efficient work theory and the insider-outsider theory, situated within this category, elucidate the reasons and conditions prompting certain employers to offer wages exceeding the equilibrium level. Unlike theories in the first and second categories, the consideration of labor force mobility is comparatively minimal in this group. Instead, the focus is on the premise that employee movements are contingent upon the wage structures established by employers—a higher wage corresponds to a lower inclination to relocate. Consequently, in this perspective, employee mobility is construed as a derivative of the prevailing wage structure in a given labor market (Christopherson & Clark, 2020).

Labor Market Segmentation Theory

Labor market segmentation theories in the literature assume labor market diversity, highlighting inherent heterogeneity. This differentiation in work supply and demand identifies market segments with relative homogeneity. While a precise definition may be lacking, common features of segmentation and resulting market sectors are evident. Segmentation theories highlight two fundamental components. Firstly, the labor market is stratified into different levels, each characterized by unique conditions in terms of wages and employment policies. Secondly, there exists a limitation on entry into these levels or labor market sectors, especially during specific time frames. This restriction implies a surplus of individuals seeking employment in these sectors compared to the available job opportunities provided by employers (Reich et al., 1973).

Doeringer & Piore's (2020) labor market theory suggests a division into primary and secondary sectors governed by distinct principles in employee-employer interactions. The primary sector offers stable, well-compensated roles with advancement opportunities, while the secondary sector encompasses less prestigious, lower-paid positions prone to economic fluctuations. Entry into the primary sector involves strict criteria, a defined career path, and periodic assessments ensuring task competence. In contrast, the secondary sector experiences high turnover and is populated by immigrants, young workers, and individuals compelled into it (Neumark, 2018).

Literature explores disparities between labor market sectors, particularly in wages dependent on qualifications. While issues like racial, sexual, and national discrimination are prevalent, research by Dickens and Lang challenges stereotypes. Their findings indicate faster

wage growth among dark-skinned workers with increasing qualifications than their white counterparts (Neumark, 2018). Notably, research highlights that dark-skinned workers starting their careers in the secondary labor market are less inclined to transition to the primary market than their white counterparts in similar situations. This empirical evidence substantiates the existence of a dual labor market, particularly concerning racial segmentation in the American context (Azzollini et al., 2023).

Płachta & Janicki (2022) extends the dual labor market theory, explaining external migrations through macroeconomic factors. The theory posits a persistent shortage of citizens in developed countries for jobs deemed undesirable due to prestige concerns. These jobs include dangerous, low-paid, and minimally skilled positions, making this sector a target for immigrants.

The internal-external labor market theory posits that the labor market comprises internal and external segments. Researchers predominantly focus on defining the internal market, regulated by constant norms and procedures within entities like enterprises. This internal labor market involves functions such as setting labor prices, allocation, and training, all guided by institutional principles. These principles also determine criteria for entry into internal markets, privileges for employees, and relationships between jobs, which are crucial for internal employee mobility (Collins & Stevens, 2002).

Furthermore, the literature introduces the concept of a traditional static division in specific labor market segments. This division considers various professional, demographic, and spatial criteria. These segments can operate relatively independently due to the diverse nature of labor supply and demand. Geographic location is a significant factor in differentiating labor markets and determining local and regional markets. However, labor force mobility is limited by high movement costs, making geographical space a barrier. Consequently, migrations and commuting lack the flexibility needed for efficient adjustments between supply and demand at the national labor market level (Neumark, 2018).

I. Human Capital Theory

In the realm of theories addressing substantial delays in labor market adjustments, the Human Capital Theory assumes significance. (Becker (2023) is credited with its development, attributing wage differentials to individual human capital variations, encompassing education, professional qualifications, skills, and work experience. According to the study, these components are cultivated through individual decisions to invest in one's labor potential.

The Human Capital Theory establishes a dichotomy in labor force qualifications, distinguishing between universal and specific qualifications. Individuals with universal qualifications typically secure positions requiring minimal training and involving straightforward tasks. Conversely, those with specific qualifications often attain more esteemed roles with higher remuneration and lower job turnover (Ben-Porath, 1967). Employees with universal qualifications may be more willing to change workplaces. In contrast, those with specific qualifications adhere closely to their current positions, independent of the offered remuneration level (Blundell et al., 2005).

The human capital hypothesis proposed a binary division between general and specialized labor force characteristics. Jobs involving simple duties and little training were regularly granted to workers with universal credentials. However, if employees passed specific requirements, they were given more important responsibilities that paid more and had fewer changes at work (Cacciatore & Ghironi, 2021). It concludes that education is crucial in forming an efficient labor force. On the other hand, less qualified people may have fewer opportunities to grow.

II. Natural rate of unemployment theory

The balance unemployment theory, often known as the natural rate of unemployment hypothesis, is another generally recognized theory in the school that highlights the occurrence of significant delays in labor market changes. It was created by Gordon et al. (1977) and Friedman (1995), Although other scientists—as is widely known—also had a substantial influence. Since they are the source of this idea, statistical and economic studies should be given the most credit. This research study indicates a negative relationship between the pace of nominal wage growth and the unemployment rate (Phillips, 1958).

Lipsey & Scarth (2011) suggested that the rate of surplus labor demand over supply correlates with the unemployment rate, and Hina Ali et al. (2021) identified a critical level of unemployment stabilizing nominal wages. Friedman (2010), endorsing the Walras equations, considered structural features of labor and goods markets, market imperfections, and the stochastic variability of demand and supply.

Winter Jr (1964) argued that the natural unemployment rate represents a level of frictional and structural unemployment inherent to labor market imperfections, deviating from perfect competition. Few studies (Gruber, 1994; Aradhya et al., 2023) propose that the natural unemployment rate would be zero under perfect competition assumptions. However, information limitations on job availability, restricted labor mobility, and constrained employer-employee competition contribute to the existence of natural unemployment (Jarmołowicz & Knapińska, 2005). Consequently, the theory underscores imperfections and limitations in market functioning rather than attributing unemployment primarily to free market mechanisms. Thus, the natural rate of unemployment theory aligns with theories emphasizing delays in adjustment processes (Christopherson & Clark, 2020). In the 1970s, the Phillips curve faced instability, challenging the belief in a consistent trade-off between inflation and unemployment. Some economists argued for a theoretical vertical Phillips curve, proposing a persistent natural unemployment rate irrespective of inflation, thereby rejecting the trade-off concept.

According to Burdett & Hool (1983), unemployed workers initially set an asking wage based on their indifference between accepting a job and continuing their search. This asking wage remains constant until workers become aware of inflation. The delayed recognition of inflation prevents a prompt upward adjustment of the asking wage, resulting in a reduced asking wage relative to new offers and a decline in the unemployment rate.

However, as workers realize the impact of inflation while spending their newfound wealth, they adjust the asking wage upward to match the observed inflation rate. This adjustment leads to an increase in the unemployment rate back to the natural rate. The 1990s witnessed a disruption in the trend towards an increasing natural rate, challenging prior assumptions. The period post-2008 prompts questions about whether the higher unemployment rate signifies a new norm or if the natural rate remains unchanged post-financial crisis (Dimand & Hagemann, 2019).

Transition probabilities, encompassing job loss and finding rates, along with flows between market and non-market sectors, influence the natural unemployment rate. Demographic shifts and

structural economic changes are inevitable, with evidence suggesting that the 1980s increase in the natural rate is linked to the economic experiences of less skilled workers (Brixiova et al., 2009).

III. Job Search Theory

This extends discussions by Gordon et al. (1977) and Friedman (2010) within the natural unemployment rate theory, deviating from perfect competition assumptions in the labor market. This results in a nontransparent labor market, where employers and employees lack comprehensive knowledge, particularly about wages. Informed career decisions necessitate extensive information, leading individuals to invest time in job searches, with some opting for temporary unemployment to explore better opportunities (Mortensen, 1986).

Search theories in the labor market examine microeconomic behaviors of job seekers and providers, mobility processes, and the relationships between inflation and unemployment, as per the Phillips curve. Efficient search processes in both areas improve with larger labor markets, where favorable relationships exist between information acquisition costs and potential profits. In contrast, fragmented labor markets with limited search benefits lead to less efficiency, resulting in higher 'search unemployment' and fewer job opportunities (Bhuller et al., 2023).

This theory highlights labor force dynamics. Firstly, seeking better-paid jobs may lead employed individuals to resign temporarily, optimizing job searches within the unemployment pool. Secondly, the transition from unemployment to employment depends on search intensity. Thirdly, the reservation wage influences the probability of moving from unemployment to employment. Lastly, as unemployment persists, decreased job search intensity reduces the chance of transitioning to employment, potentially leading to professional inactivity (Lazear, 1990).

Furthermore, the reservation wage theory concept, derived from the broader search theory, asserts that job seekers prioritize wage levels over the number of job offers available (R. E. Hall, 2005). The initiation of the search process involves setting a minimum acceptable wage, known as the reservation wage, below which individuals opt to remain unemployed (Burdett & Hool, 1983).

Several scholarly investigations have introduced the sample size model, proposing that in their quest for employment, individuals adhere to the principle of selecting the most financially rewarding offer from a pre-determined set of options tailored to their preferences. The overarching goal of the search process is to pinpoint a subset of employers providing mutually attractive and

compatible job opportunities aligning with the expectations of the unemployed (Aradhya et al., 2023; Burdett & Hool, 1983; Gruber, 1994; Blanchard & Diamond, 1994). However, accessing a specific group of companies incurs costs, with larger researched samples translating into higher expenses.

In accordance with the sample model, an unemployed individual strategically decides to explore and consider offers from a randomly selected subset of companies in the market before embarking on the job search. Ultimately, the individual opts to accept the job offer from the employer offering the most competitive wages (Doeringer & Piore, 2020).

A cluster of theories suggests that imbalances in the labor market are attributable to wage inflexibility (Seo et al., 2023). A study by Blanchard & Diamond (1994) highlights exploring the roles of motivation, efficiency, and the nature of work in determining wages. As suggested by Neumark (2018), the efficient work theory posits that motivated employees tend to work more efficiently, which should be reflected in their compensation. Building upon the efficiency-shaping wages theory, researchers have indicated that wages are influenced by an employee's demonstrated efficiency level, potentially resulting in higher pay for those contributing more to overall organizational efficiency. Another addition to the literature is the theory of work versus efficiency. It explores the dynamic relationship between the quantity or quality of work and its efficient execution, examining how these factors interact and impact wage structures (Ehrenberg et al. (2021). Furthermore, the pro-efficient wage theory contends that wages are established to incentivize and reward high-efficiency levels, with employers willing to pay higher wages to consistently efficient employees (R. E. Hall, 2005).

Based on Woźniak et al. (2020) framework, firms establish fixed wages above market equilibrium to boost employee efficiency. Woźniak et al. (2020) delineate four motivating wage concepts in contemporary economic thought. The 'idling' model posits that wages significantly above market rates discipline employees through the threat of dismissal, tolerating some inefficiency due to the ease of finding new employment (Mueller et al., 2021). Moreover, the staff fluctuation rate model, associated with efficient work theory, suggests that maintaining wages above equilibrium is cost-effective, balancing turnover expenses with the additional costs of higher wages (Pelin & Osoian, 2021).

Thirdly, D. R. Davis & Reeve (1997) proposes a negative selection model by offering wages above market levels to attract more qualified employees. However, adjusting wages

quantitatively to market levels may risk losing the best employees. Fourth was the sociological concepts defining the gift exchange and fair-wage models (Strauss, 1985). Moreover, Reich et al. (1973) assert that employees demonstrate higher efficiency and commitment with wages above the average for their work, perceived as fair.

Bhuller et al. (2023) posit that employees' commitment is a valuable asset for firms, and higher wages represent significant benefits. The Fair Wage for Fair Work model advocates for equitable treatment, emphasizing that wages should align with the level of commitment to enhance motivation. According to this model, employees optimize a utility function influenced by the relationship between their received wage, the perceived fair wage, and the unemployment rate (Kwiatkowski et al., 2020). Conversely, an excess of wages results in real wage stickiness and compulsory unemployment.

In a related perspective, Snower (2019) proposes the insiders-outsiders theory, attributing labor market imbalances to wage inflexibility. This model categorizes employees into insiders, often affiliated with trade unions and enjoying job security, and unemployed outsiders. Insiders' strong position is safeguarded by the significant costs of adapting new employees, including searching, choosing, training, and dismissing other workers. Outsiders indirectly influence the risk of job loss and wage reduction among insiders, separated by the employer's exchange costs barrier.

1.6 Phillips curve – short run versus long run

Phillips (1958) conducted a well-known study highlighting an inverse relationship between inflation and unemployment rates in the United Kingdom from 1861 to 1957. This correlation, now termed the Phillips curve, suggests a potential trade-off between inflation and unemployment.

According to the Phillips curve, governments could pursue expansionary policies to lower unemployment, even at the cost of increased inflation. Policymakers may consider this trade-off depending on the national interest, opting for fiscal and monetary strategies to reduce unemployment. Nobel Prize-winning economist William Vickrey supported this notion, stating that a decreased unemployment rate would be a favorable outcome, even with a steady inflation rate (Vickrey, 1993).

In the short run, an inverse relationship between inflation and unemployment declares that high unemployment occurs with the decline in price level. On the other hand, the long-run Phillips

curve suggested that the nexus of inflation and unemployment becomes less stable. Further, it is also observed that there is no permanent relationship exists between inflation and unemployment (Benati, 2015).

The analysis determined that the economy tends to return to its natural potential output level, and factors such as inflation expectations and wage adjustments come into play. In this way, inflation and unemployment wouldn't impact the output in the long run. The dynamics of the short-run and long-run Phillips curves are essential for policymakers to understand in order to make effective decisions (Russell & Banerjee, 2008).

Moreover, few studies have supported the idea that short-run trade-offs show ineffective outcomes in the long run and can be exploited. V. L. Smith (1998) discussed Lucas's critique and rejected the hypothesis of the relationship between inflation and unemployment. After the Second World War, King & Watson (1994) explored the condition of the United States to measure these variables following the Phillips curve. The author further concluded that a Phillips curve might be present if both long-run and short-run noise are eliminated from the data. A similar study was conducted by Hogan (1998) in the context of the US and found a strong and adverse association between unemployment and inflation. In addition, Hansen & Pancs (2023) conducted similar research in Lativa and demonstrated the existence of the Phillips curve in the long run and short run.

During the US economic crisis in the 1960s, a trade-off existed between inflation and unemployment, and the hypothesis became true. Further, this trade-off was analyzed in the US during the last decades of the twentieth century, and a stable Phillips curve analysis was examined. However, in the 1970s, policymakers' confidence in the inflation-unemployment trade-off was disrupted—empirical evidence diverged from expectations, deviating from a stable Phillips curve. The relationship between inflation and unemployment appeared unpredictable, with multiple Phillips curves emerging from the data points. This departure from a consistent pattern highlighted the intricate and variable nature of the relationship between inflation and unemployment during this era. (Borjas & Van Ours, 2010a).

1.6.1 NAIRU/NAWRU

NAIRU theory was introduced by Nickell & Layard (1999) in the last decade of the 20th century; a group of British economists focused on the concept of NAIRU and assessed the role of balanced unemployment. According to this notion, it is believed that unemployment levels led to a decrease as inflation processes escalated. NAIRU, known as Non- Accelerating Inflation Rate of Unemployment, is considered the equilibrium point sustaining the dynamics of inflation processes (Staiger et al., 1997). It is also worth noting that the natural rate of unemployment and NAIRU are distinctive. Few authors found short-term flexibility in prices and wages based on the neoclassical growth model, whereas conflicting views exist (Woźniak et al., 2020).

The NAIRU/NAWRU concept shows a trade-off between inflation and unemployment and closely depicts the Phillips curve model. Similarly, NAWRU, known as the Non-Accelerating Wage Rate of Unemployment, also comprehends the interplay between inflation and unemployment. NAWRU shows changes based on labor market conditions, productivity, and other macroeconomic variables. This signifies the level of unemployment at which the trade-off is balanced. Changes in the actual unemployment rate relative to NAWRU are anticipated to impact the inflation rate.

1.7 Okun’s law – linkage with the potential output gap

Okun's law (1962) is an empirically observed relationship between unemployment and a country's production (productivity) losses. It does not constitute a formalized labor market model in itself. The law postulates that unemployment and productivity are correlated based on their difference from the natural unemployment rate and potential production. The "gap version" of Okun’s law states that for every 1% increase in the unemployment rate, a country's GDP will be roughly an additional 2% lower than its potential GDP. The "difference version" describes the relationship between quarterly unemployment and real GDP changes (Gordon et al., 1977).

The macro-level empirical knowledge of the demand-side explanation for unemployment is provided by Okun's claim that the difference between the actual and potential productivity of the country is highly reflected by the change in unemployment (Moosa, 2008).

The relationship varies depending on the country and period under consideration. It has to be stressed that the stability and usefulness of the law have been disputed in the academic literature (Bhattarai, 2016). Okun's reasoning could be partly outdated due to certain nations' delayed employment growth in response to GDP growth. This is due to the possibility that some nations' highly capital-intensive and technologically sophisticated mining and oil sectors may not result in employment growth proportionate to GDP growth (Hogan, 1998).

Moosa (2008) examined the applicability of Okun's legislation in four Arab states - Algeria, Egypt, Morocco, and Tunisia. He found that higher output did not increase employment, making Okun's coefficient statistically negligible. According to Okun's law, a percentage decline in output below the trend is typically followed by a sizable but lessening time increase in unemployment. When output and unemployment show a consistent negative connection beyond trend and cyclical changes, this prediction and its policy consequences are simple.

Nguyen Le & Tran Pham (2023) discovered that a framework for technological equipment in industries is crucial to lowering unemployment. The author further discovered that over the course of a decade, a sizable portion of the market share was shifted from falling enterprises to expanding firms in Canada. In contrast to the failing businesses, the farmers simultaneously improved their production. The technology users who blended technologies from multiple distinct technology classes or who used communications technologies had the highest relative productivity gains. Market share gains followed relative productivity (Wright, 2014).

1.8 Development & skills – skills biased technological change

The rise in demand for skilled workers has potentially outpaced unskilled labor due to skill-biased technological advancements. Continuous technological progress in the labor market, when introducing innovations that effectively replace tasks performed by unskilled workers while complementing the abilities of highly educated workers, tends to diminish the demand for unskilled labor and concurrently elevate the demand for skilled labor. A pertinent example of this transformative effect is observed in the swift integration of personal computers into workplaces, significantly influencing wage structures. Individuals utilizing computers generally command higher earnings than their non-computer-using counterparts, and this demographic often possesses a higher level of education. (Moore & Ranjan, 2005).

Skill-biased technological change propels an outward shift in the relative labor demand curve. Introducing high-tech capital into the labor market disproportionately favors highly skilled workers, reflecting the complementary relationship between capital and skills. Moreover, Buera et al. (2022) provide evidence suggesting that increased capital stock enhances the productivity of skilled workers.

Hence, the challenge arises from the lack of a universally accepted measure of skill-biased technological change directly correlating with shifts in the wage structure. Some studies use a "residual" methodology to assess technological change's impact on wages. Still, this approach has limitations, attributing effects to skill-biased technological change that may be influenced by unidentified or challenging-to-measure variables (Cascio & Narayan, 2022).

Furthermore, several investigations highlight a temporal misalignment between the surge in wage inequality and the skill-biased technological change theory. According to these studies, a substantial portion of the escalation in wage inequality transpired in the 1980s, even as the information revolution persisted, if not intensified, throughout the 1990s (Thoenig & Verdier, 2003).

Compelling evidence suggests that inaccuracies in tracking wage inequality over time may have exaggerated the perceived increase in inequality during the 1990s. Addressing these data issues implies a potential slight decrease in inequality within skill groups over the same period. Explaining this decline in the context of technological change becomes challenging unless one considers the possibility that technological bias favored skilled workers in the 1980s and shifted against them in the 1990s. While the skill-biased technological change hypothesis remains widely accepted as an explanation for wage structure shifts, ongoing research poses crucial questions about its validity that are yet to be satisfactorily resolved (Acemoglu & Autor, 2011).

1.9 Conclusions

Comparing traditional labor market models to the complex reality of human behavior reveals severe limits since they rely on assumptions of entirely rational decision-making. For a more accurate understanding of labor market outcomes, behavioral elements, including social effects and cognitive biases, must be considered (Camerer & Malmendier, 2007).

Furthermore, empirical research is essential for improving and validating current ideas and establishing the grounding of conceptual frameworks in practical situations. This literature review offers a thorough overview of the complex factors at work in the contemporary labor market by combining ideas from behavioral economics, technology impact evaluations, education and training efficacy, empirical validation, and interdisciplinary views. Over time, a comprehensive understanding of decision-making processes and external influences has been incorporated into labor market theories. Modern labor market theories emphasize the impact of cognitive biases, heuristics, and social influences on job search behavior and employment decisions. These psychological factors influence people's choices as they navigate the job market, affecting opportunities and career paths (Jarmo\lowicz & Knapińska, 2011).

Concurrently, the ubiquitous impact of automation, artificial intelligence, and digitalization modifies the terrain of employment generation, skill prerequisites, and the comprehensive configuration of the labor market. Because of this technological growth, existing theories of the labor market must be reevaluated to consider the dynamic interactions between automated systems and human workers. The labor market is being shaped by technological breakthroughs, which significantly impact skill needs, employment structures, and worker dynamics overall. This literature survey explores how automation, AI, and digitalization are changing the nature of labor and highlights the need for new theoretical frameworks. Current theories may not adequately explain how technology is changing job patterns. It may become necessary to develop new models to fully reflect the dynamic changes that occur in a labor market driven by technology (Postula et al., 2021).

A closer look at human capital development in contemporary theories is also warranted, especially with regard to the pervasive skill gap. The impact of human capital on the unemployment rate across a range of demographic proxies highlights the critical role that skilled workers play in lowering unemployment. This is consistent with the theoretical framework of human capital theory, which emphasizes that making investments in education and skill development positively impacts economic development and, as a result, creates job opportunities. Education and training programs play a crucial role in shaping the workforce by aligning skills with the evolving demands of the labor market. By focusing on the effectiveness of educational programs, this review explores avenues to ensure workforce adaptability through mitigating skills mismatches (Blundell et al., 2005).

When cultural, institutional, and economic circumstances vary, a critical evaluation of the robustness and generalizability of theoretical frameworks becomes vital. Furthermore, the importance of interdisciplinary ideas may be seen in revealing the complicated interplay between societal institutions, human psychology, and economic pressures. Because many models have been simplified, a careful evaluation is required to determine the influence of predictive power and how these models correlate with the complex and diverse results observed in the real-world labor market (Gradstein & Justman, 2000).

Furthermore, testing the hypotheses and predictions of labor market theories in various economic circumstances necessitates empirical study using real-world data. Examining the interplay between economic forces, cultural norms, and societal institutions provides an interdisciplinary perspective on the complex dynamics influencing the labor market. This integrated approach makes a more comprehensive knowledge of the many factors driving labor market trends and employment outcomes possible (Brixiova et al., 2009).

On the other hand, Okun's law supports the negative effect of economic development on the unemployment rate, indicating an inverse link between unemployment and economic growth. This supports the notion that job prospects tend to rise in tandem with economies, demonstrating a positive relationship between labor market results and economic development (Moosa, 2008).

Within labor-market theories, the complex interactions between different elements are apparent, such as the impact of inflation and financial development on wage structures. Wage disparity is a natural byproduct of supply and demand dynamics in the labor market. It is influenced by variations in productivity and the ebb and flow of the rate of return on skills. Advances in economic systems, indicative of financial progress, add to the intricacy of pay distribution. With a long tail In the pay distribution, certain workers will receive substantial rewards in industrialized labor markets with strong financial growth (Abowd et al., 2006).

Since the need for skilled labor is still greater than the supply, historical changes in pay structures are directly related to fluctuations in the economy, with inflation and financial development playing complex roles in this picture. The effect of inflation on salaries' buying power further muddies the edges of the pay structure by affecting how earnings are distributed overall (Burdett & Hool, 1983; Blanchard & Diamond, 1994; Chávez & Rodríguez-Puello, 2022).

CHAPTER 2
EMPIRICAL LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Introduction

This chapter aims to critically review the empirical literature on the intricate relationships between unemployment and key economic variables, including financial development, human capital, economic growth, trade, and Information and Communication Technology (ICT). Building on the theoretical foundations laid out in Chapter One, this review seeks to synthesize existing empirical studies to identify patterns, discrepancies, and gaps in the current understanding of these relationships. By systematically examining empirical evidence, this chapter aims to establish well-grounded hypotheses that will guide further empirical analysis and contribute to the broader discourse on labor market dynamics (Borjas & Van Ours, 2010b).

The review begins by exploring the nexus between financial development and unemployment, highlighting how financial market efficiency and access to credit can influence job creation and economic stability. It then examines the impact of human capital on unemployment, focusing on how education and skills development can mitigate joblessness and enhance economic resilience (Ayyagari et al., 2021). Furthermore, the literature on economic growth and unemployment is reviewed to understand how GDP fluctuations and structural changes in the economy affect labor market outcomes. Additionally, the relationship between trade and unemployment is scrutinized, considering how global economic integration and trade policies influence domestic employment levels (Abbasov, 2023). Finally, the chapter investigates the role of ICT in shaping labor market dynamics, assessing how technological advancements contribute to both job creation and displacement (Oikonomou et al., 2023).

Through this comprehensive literature review, the chapter aims to establish a set of empirical hypotheses that will form the basis for subsequent analyses and policy recommendations.

2.2 Financial Development and Unemployment Rate

Capital market inefficiencies and their impact on economic growth have been the subject of numerous studies in the academic literature. The difficulties in the credit market exacerbate the tensions in labor markets (unemployment) for various reasons. Investment is one of the reasons. Similarly, the credit market is characterized by uncertainty due to asymmetric information. It prevents financial institutions from effective intermediation and limits fewer wealthy investors from borrowing money due to a lack of information or an inability to communicate with these financial institutions (Azzollini et al., 2023).

Stimulating financial development is the only way to lower the price of external financing. As a result of lowering credit requirements, enterprises have more space in their budgets to finance further growth. The potential for growth through investments (capital deepening) is enhanced (Bhuller et al., 2023). Credit market restraints, therefore, make it difficult for businesses to make optimal employment decisions, which in turn can increase the unemployment rate (Opuala-Charles & Orji, 2023). According to the Keynesian theory (Keynes, 1924), increasing production output is the most efficient way to deal with the high initial costs associated with the human resource management decisions related to hiring, training, and termination processes (Fils et al., 2023). Therefore, businesses need to rely on outside funding.

Further, enterprises' balance sheets clearly explain their financial situation and express the corresponding labor force demand (Pagano & Pica, 2012). Hence, business demand for labor is substantially correlated with the efficiency of credit markets. Since potential investors need more money to start new enterprises, the credit market's inadequacies or imperfections create a significant entry barrier.

In addition, constraints in the credit market make it harder for entrepreneurs to invest in new enterprises and hire additional workers (Ahiadorme, 2022b; Stigler, 1962), thereby increasing the possibility that unemployment will persist for a protracted length of time (Dada et al., 2023). Companies rely extensively on financial budgeting and resource allocation procedures to comprehend the issues they confront monetarily, informing their strategic decisions. It makes it seem more strenuous for smaller enterprises, as opposed to larger ones, to fall under credit limits. Ayyagari et al. (2021) also found that small organizations are better at tapping into the talents of their employees and creating new positions for people to fill.

Further evidence (Giuliano & Ruiz-Arranz, 2009) suggests that improving the level of financial development lessens financial limitations, which in turn is positively connected with the rate at which enterprises expand. It is also highlighted that small and medium-sized organizations could realize the related financial gains on a significantly larger scale, which exhibits an impact on the industrial expansion that entails the formation of more small firms (Beck et al., 2005). Consequently, it is demonstrated that (Friedman 1995) expansionary monetary policy can lower the unemployment rate and increase the capital base of small businesses, thus stimulating their growth. Even though economic growth might help to increase employment levels, it is crucial to be aware that inefficiencies in the credit market are stifling opportunities to create new jobs. Due to credit market inconsistencies, businesses' lack of borrowing opportunities is a significant cause of unemployment (Pagano & Pica, 2012).

Furthermore, there is mounting evidence in financial deregulation literature that a thriving financial industry contributes to high unemployment rates (Van Treeck, 2009). Subsequently, a notable economic expansion has led to a significant shift from the real sector to the financial sector. The increasing engagement of shareholders with the company's management and staff has resulted in higher returns on their investments, benefiting the shareholders.

As Van Treeck proposed, the prioritization of short-term business operations, encompassing sales, production, and market share, assumes a paramount role in profit maximization. As a result, it hampers efforts to raise money, weakens the bargaining position of employees, and ultimately reduces their remuneration and likelihood of keeping their jobs (Crotty & Lee, 2006).

According to the statistical inference of a few authors (Fukao, 1994; Hattori et al., 1975), the financial sectors employ more than 3.5% of the overall workforce; as a result, expansions in the size of the financial sector are often counterproductive to economic growth. Researchers also argue that allocating resources to recruitment operations has substantial potential benefits for high-tech businesses. The ability of these businesses to attract and retain highly knowledgeable employees who play a critical role in producing innovative products and services is critical to their success and sustainability. The ability to cultivate and attract applications effectively can be viewed as a strategic advantage that aids in acquiring and retaining new business. Furthermore, the tight labor markets create obstacles to selecting the correct person for the designated workplace role and financial restrictions, which impact capital, production, unemployment, and wealth

accumulation (Collins & Stevens, 2002). Hence, credit market imperfections adversely affect the relationship between unemployment and labor market frictions (Burdett & Hool, 1983; Mansi et al., 2020).

Furthermore, Bassanini et al. (2000) examined the relationship between pay structures and unemployment and concluded that centralizing wage negotiation significantly influenced unemployment in the Balkan nations. The author went on to say that, in contrast to other countries in the European Union (EU), unionization and pay negotiating were entirely centralized in Balkan countries. Later, Boeri & Garibaldi (2006) examined the employment-to-population ratio and looked into the informal sectors that kept employees in low-productivity positions, which had a detrimental impact on the economies' capacity to respond to adverse shocks. Layard et al. (2005) described the origins of NAIRU, a model used in new Keynesian literature to balance wages and prices and empirically assess the impact of different variables on structural unemployment. Holden & Nymoen (2002) asserted that although NAWRU is frequently accessible for OECD nations and assists policy issues, it is an imprecise indicator of structural unemployment. tough

The Western Balkan labor market's low and high unemployment rates and the adverse market circumstances observed in another research were analyzed. According to the results, the institutional makeup of labor markets, labor cost drivers, and particularly the ongoing transition process are fundamental causes of persistent labor market inadequacies in the Western Balkans. Making policy will be challenging given the labor market's poor performance (Ganić, 2019a).

Young people's meager employment rates may hinder human capital development and increase reliance on support services, reducing the countries' capacity for long-term prosperity. Finally, the High unemployment rates strain the government's resources by necessitating social payments for the unemployed, which may damage social cohesion (Bartlett, 2009).

Financial inclusion and its determinants were examined within the context of the Western Balkan nations. The effect of Internet and mobile subscriptions on financial inclusion has also been studied using pooled panel data regression analysis, along with other macroeconomic factors, including real interest rate, unemployment, and economic growth. The amount of financial inclusion strongly correlates with economic development, Internet use, and mobile usage, in particular. Empirical research has also shown a negative correlation between financial inclusion, real interest rates, and unemployment (Stakić et al., 2021).

Western Balkans and the European Union. Evaluating the Western Balkans' progress toward European Union (EU) membership relies on analyzing several labor market indicators. These indicators encompass aspects such as unemployment rates, employment rates, labor force participation rates, productivity levels, educational attainment of the working population, and other relevant factors. Although the onset of the Great Recession in 2008 hindered expectations for European Union membership, geopolitical tensions have exhibited a reasonably subdued trajectory in the past decade (Mansi et al., 2020).

An analysis was conducted on the unemployment rate and economic growth in seven countries located in the Western Balkans. In this examination of economic growth, the variables of foreign direct investment, unemployment, and migrant workers were considered as control variables. Capacity utilization, economic growth, and GDP growth are fundamental metrics that are pivotal in measuring societal advancement. The reduction in the standard of life among the population can be attributed to the underutilization of industrial capacity and the occurrence of economic stagnation. Kukaj (2018) investigated the impact of productivity on unemployment in the Western Balkans. The findings revealed a substantial correlation between these two variables.

This essay contends that the 1990s wars in the Western Balkans forced those nations into the European Union, where they experienced deindustrialization, high unemployment, racial and regional disintegration, political unrest, and instability. The disruption of integration into global commerce has resulted in imbalances in the ongoing balance of payments. The disruption of integration into global commerce has resulted in imbalances in the ongoing balance of payments. Due to limited international capital inflows and significant country risk, technological advancement and global competitiveness have been hampered. SMEs have obstacles to entrance due to an unfavorable business climate, yet at the same time, there are significant informal economies. Many nations have transitioned to labor export economies, with sizable outflows of skilled workers (Bayar & Diaconu Maxim, 2020).

The route of economic progress is one of low-skill growth. Export earnings, foreign direct investment, and labor remittances are all declining, negatively impacting the present global economic crisis. Additionally, as the transition process has continued, the gap between urban and rural regions has widened, and insufficient administrative skills have hampered the implementation of efficient local development plans to mitigate these consequences. Endogenous local growth cannot provide an alternative to more extensive involvement in the global economy.

According to the findings, the region's nations have been excluded from the process' most advantageous aspects while bearing the brunt of its most significant flaws. Local imbalances will probably worsen without a quicker EU membership procedure, and the area could stay in the super-periphery of Europe for a while (Bartlett, 2009).

Financial growth significantly reduces the unemployment rate and opportunity cost to enable more efficient resource allocation, which in turn helps create jobs and alleviate financial distress. Numerous empirical studies have pointed to the positive impact of financial development on increasing employment and decreasing unemployment rates. As Beck et al. (2005) demonstrated, deregulation of the U.S. banking sector was critical in raising the employment rate. Boustanifar (2014) demonstrated how the deregulation of the banking sector in the United States reduced unemployment at the state level. Feldmann (2006) conducted more scholarly research on high-income nations and found that credit market regulation was crucial in reducing unemployment. Dromel et al. (2010) used a private credit measure to analyze credit market imperfections and found similar results. One explanation is that for OECD states, the private credit market imperfections not only raise the unemployment rate but also cause it to endure. Levchenko et al. (2009), in turn, conducted an empirical analysis of cross-country industry-level data and proved that unemployment was reduced with improved financial development, revealing more investment opportunities.

Furthermore, Osei & Kim (2023) examined financial growth and its impact on the number of unemployed people. They performed the analysis with a sample of 49 developed and developing countries and showed that high banking concentration and higher levels of financial development increased unemployment. At the same time, however, the market-based financial system lowered unemployment. Pagano & Pica (2012) showed that PE and VC financing positively impacted single-entity business establishments' net sales and employment growth, as U.S. data shows between 1995 and 2009. In the view of Ayyagari et al. (2021), credit endowment from financial institutions provides a countervailing stimulus, and they noted that greater access to capital boosts employment, especially in the SME sector.

The consequences of external financial distress on job growth in emerging markets and developing countries were the focus of another recent analysis that looked at the working capital channel (Amin et al., 2020). According to the research, removing financial barriers had a more significant effect on employment creation in labor-intensive frameworks of smaller firms.

Furthermore, cross-country level data of US banking reforms between the 1970s and 1990s were examined by Boustanifar (2014), which led to the Conclusions that credit market efficiency increases employment growth. Moreover, the study elaborated that these banking reforms had a substantially higher impact on industries with higher labor intensity.

Staritz (2012) used data from OECD nations to examine the interaction between the financial market framework and labor legislation and its effect on the unemployment rate. The study found that the deregulated labor market positively impacts the stock market's capitalization. Moreover, lesser banking concentration also affected the rate of employment (MacLeod & Malcomson, 2023). Hence, regulation of the labor market, a high level of unionization, and increased banking depth and concentration had an adverse effect on the employment rate. Research results showed that a smaller financial sector had a more negligible impact on unemployment than a larger one. This effect was more related to the overall structure of the financial system than its size (Rahman et al., 2023).

Furthermore, it has been widely argued that financial development decreases employment in the contemporary discussion of financial development's impact on unemployment (Pagano & Pica, 2012). Another opinion also exists that financial development reduces unemployment for several reasons, such as financial development structure, labor market regulations, union density, and coordination of wage bargaining power (Staritz, 2012). In addition, Feldmann (2006) proposed discrimination between skilled and unskilled labor.

Another study also explores the fact that strict market controls and fragmentation decrease employment opportunities (Osei & Kim, 2023). To evaluate the impact of financial difficulties on a company's need for a workforce, Popov & Rocholl (2015) conducted a study in the German environment. They claim that the relationship of entrepreneurs with the credit market and banks adversely affected the employment rate and pay ratio due to the US mortgage crisis. The Lagrange multiplier (LM) cointegration test was employed by Westerlund & Edgerton (2007) to measure the determinants of labor market policies and their impact on the labor force to assess the unemployment challenges. Further, Bayar & Diaconu Maxim, 2020 reported that financial development has had little effect on the labor market.

Pagano & Pica (2012) proved that financial development's positive and significant effect on economic growth was found during the last decades of the twentieth century. Another scholar, Staritz (2012), examined OECD nations and found that stock market capitalization significantly

affected employment in tandem with a more adaptable labor market. Bank credit growth had a similar effect on the labor market, with the added caveat of making it harder for people to find work. Analysis of company contributions to society, company health, and employee skillsets revealed a significant nonlinear connection between economic growth and unemployment. The research also suggests that a stable economic climate made it easier for large and medium-sized businesses to increase their staff sizes (Aterido et al., 2011).

In the light of the above discussion, this study formulates the following research hypothesis:

H1: The level of financial development has an inverted U-shape relationship with the unemployment rate

2.3 Human Capital and Unemployment Rate

Human capital encompasses a range of characteristics that contribute to the productive capacity of individuals, such as skills, knowledge, attitudes, and other elements of production (Goode, 1959). The analysis of factors influencing earnings is explored in the labor-market success theory proposed by Bowles et al. (2001). The author argues that successful parents' children benefit in ways beyond academic achievement, material stability, and mental clarity. The impact of noncognitive personality traits, including risk tolerance, flexibility in adjusting to new circumstances, hard work, time preference on income and economic standing from generation to generation, and the monetary value of human capital, were also established.

The study conducted by Blundell et al. (2005) investigated the concept of human capital, specifically focusing on acquiring skills and competencies through formal education and training. According to Hall & Johnson (1980), the availability of labor market supply plays a significant role in shaping human capital. Another researcher has demonstrated a relationship between human capital development and income per capita. E. Becker (1964) provided a description of human capital utilizing the approach developed by Becker. Becker's influential publication in 1964 estimated the internal rate of return resulting from investments made in developing individual human capital. Based on the research undertaken by Ben-Porath (1967), the life cycle of earning streams emphasizes the dilemma individuals encounter when deciding whether to invest in enhancing their human capital or participate in labor market transactions to obtain it.

Solow (1956) employed an exogenous growth model framework and underlined the importance of technological progress in addition to labor and physical capital accumulation as a determinant of economic growth. According to the Solow-Swan framework, the growth rate in the long run is positive and equal to the rate of technological progress.

Mankiw et al. (1992), in the augmented neoclassical model, stressed a crucial role of human capital accumulation in the transition to the steady state on top of labor and physical capital endowments and accumulation. Nonetheless, within their framework, once again, the growth rate in the long run solely depended on the rate of exogenous technological change. Increasing the human capital endowment of the economy requires purposeful investments.

In turn, the endogenous growth theory, with the role of human capital in economic growth, has become a crucial factor in production, which requires educational investment (Romer, 1990; MacLeod & Malcomson, 2023). The endogenous growth model has contributed significantly to the empirical growth literature by introducing novel methods for assessing human capital's significance in long-term economic development. According to Romer, education and scientific knowledge are considered two distinct manifestations of human capital, which are anticipated to play a significant role in fostering economic advancement by employing innovation.

Another notion discussed by Dasgupta & De Cian (2018)), is based on the endogenous growth model of a dual economy and argues that through the transmission of accumulated knowledge, production infrastructure, and training opportunities, wealthy investors give a competitive edge to the underprivileged workforce (Nkemgha et al., 2023). The human capital theory states that household expenditure on education is the only way to guarantee a higher rate of return in the long run (D. R. Davis & Reeve, 1997). Moreover, the author discussed that technical and academic expertise are distinctive inputs for development. In addition, it postulates that knowledge and expertise were crucial assets that reduced unemployment in the long run.

Previous research has shown that an individual's investment in their education and acquisition of new skills and information pays dividends throughout their lifetime (Romer, 1990; Benhabib & Spiegel, 1994; Swanson et al., 1996). Education's role in boosting productivity and employment was highlighted in the literature on economic growth. The endogenous growth theory mainly expanded the neoclassical growth framework by incorporating the innovation theory, thus introducing a growth endogenization mechanism. When adequate capital and skilled labor

resources are available, the increase in average output and, thus, capital per worker (GDP per capita) is possible based on the Romer model (Bowles et al., 2001).

Buevich et al. (2020) considered human capital a key component of growth theory. The author further demonstrated that based on the endogenous growth model, rather than external causes, the fundamental drivers of economic growth are elements within the economy, such as human capital accumulation. Therefore, improving the human capital endowment has emerged as a critical factor in driving productivity and economic expansion, thus reducing unemployment.

Though other input parameters for productivity, like worker health and abilities, are similarly significant for economic growth and demonstrate a distinct effect on production, education is considered a vital need for progress. Although education cannot fix all global challenges, it is often regarded as a crucial component of any effective strategy for advancing human progress. Moreover, the researcher explored that education helps to improve prospects for gainful employment and financial support. Therefore, a high-value-added knowledge economy is expected to have beneficial externalities and spillovers for development and even sustainable development (Etim, 2023). Only a few studies have established a causal link between post-secondary education and chronic unemployment. The connection was previously been studied in the literature, but only for advanced economies. However, despite several studies indicating a beneficial association between the two, the discussion could have been more specific and conclusive.

Numerous studies on wage disparity among similarly skilled workers have proven the impact of greater education on earnings. Some authors (Freeman, 1980; Kodde, 1988; Antonio Puppim De Oliveira, 2002) have shown that higher education positively and significantly affects employee wages.

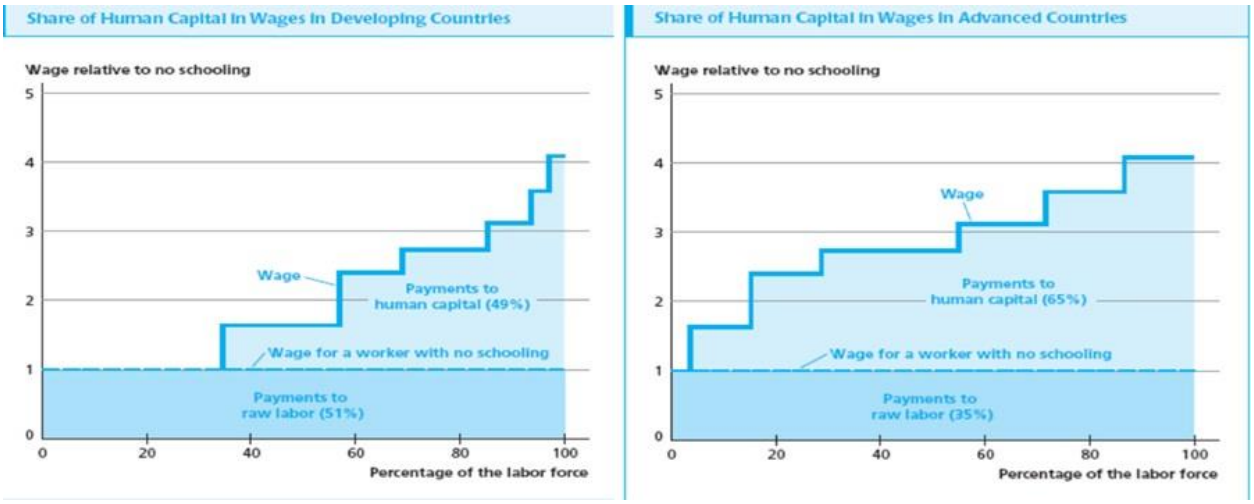


Figure 5 Impact of additional years of education (human capital accumulation) on wages in advanced versus developing countries
Source: Weil, (2005).

To understand the association between the level of education and unemployment fluctuations, Wolbers et al. (2001) conducted a study on the Netherlands–developed economy. The study concluded that higher education provides more opportunities for employment than less educated people. Another study conducted by Garcia-Espejo (2005) in Spain analyzed the effect of higher education on the unemployment rate. However, this empirical investigation showed that higher education graduates face difficulties getting hired (observed higher unemployment rates among young graduates). At the same time, Moreau & Leathwood (2006) analyzed a panel of European states that showed a negative association between higher education and unemployment. Similarly, Núñez & Livanos (2010) analyzed the association between higher education and employment using an index of 15 European countries. They revealed that higher education is essential to improve the employment rate in Europe.

Riddell & Song (2017) focused on the importance of higher education and its impact on employment during the war in Vietnam. It showed that more educated people availed themselves of better opportunities for re-employment. Qazi et al. (2017) focused, in turn, on Pakistan, trying to assess the relationship between higher education and unemployment during 1972 - 2012. The study utilized the Johansen co-integration approach and proved that higher education positively and significantly affected employment in the long run. In addition, the increase in the number of female workers shows a positive association with higher education.

Stenberg & Westerlund (2008) discussed the impact of adult education on wage earnings as a proxy for the impact on long-term employment in Sweden and showed positive associations. In addition, some researchers have found a positive correlation between higher education and employment status. However, only the developed nations were covered. According to the research by Schomburg (2000), higher education in Germany had a detrimental effect on the employment rate. Plümper & Schneider (2007) also examined the correspondence between higher education and jobless status in Germany.

Moreover, Núñez & Livanos (2010a) examined persistent and transitory unemployment in Europe. In a study encompassing a sample size of around 500,000 individuals, greater levels of education exhibited an immediate and favorable influence. Núñez & Livanos (2010), in turn, divided the higher education system in Greece into four categories: polytechnics, computer science, social science, and humanities, to examine the impact of education subcategories on employment growth.

The author discovered varying outcomes depending on the student's educational background. Empirical results demonstrated that majors in polytechnics and computer science benefitted employment prospects, while majors in the social sciences and humanities had the opposite effect. For this reason, it has been proposed that Greece's higher education system undergoes dramatic changes.

While several studies have found a positive correlation between education level and income, others have found the opposite statement to be true. Hsieh et al. (2019) research in Taiwan pointed to a negative association between income and education. When discussing the impact of higher education on employment, Chou et al. (2020) concentrated explicitly on Taiwan. The study on cross-sectional data concluded that more education led to more extended periods of unemployment. A further difficulty arises when the job market is flooded with too many fresh graduates. The over-abundance means that college graduates and high school dropouts will have more difficulty finding jobs (Dănăcică et al., 2023). Moreover, Erdem & Tugcu (2012) studied the Turkish labor market from 1960-2007. They found that higher education had a considerable positive effect on unemployment in the long and short term.

Zheng et al. (2014) reviewed literature in China to investigate the increase in higher education and the prevalence of unemployment among college graduates. The study found that the higher the education policies reach, the higher the possibility of attendance among high school

graduates. Further, China's aggressive policies led to an increase in the unemployment rate among Chinese college graduates. Therefore, recruiting more recent college graduates who can adapt quickly and are generally better skilled could reduce national unemployment.

Hanapi & Nordin (2014) suggested that individuals responsible for establishing and enhancing the area of study curriculum should conduct an in-depth investigation to determine why Malaysian graduates are unemployed. This needs to be done so that problems in implementing the research area can be found. It must be evaluated to guarantee that a particular field of study's curriculum implementation results in competent and marketable workers. Moreover, the relationship between education level and employment is highlighted by (K. W. Lee & Chung, 2015). The study was conducted on the 2010-2011 college graduates to show that employment is significantly consistent with the student-teacher ratio and educational spending per student.

and Guillen-Royo (2015) conducted a study in Spain to analyze the impact of income, unemployment, higher education, and health determinants during the recession. Subjective well-being was measured using money and material proxies. The study revealed a strong impact of education demand and earnings on fulfilling social needs.

However, income exerts a dampening influence on subjective well-being. The relationship between employment rates and subjective well-being (SWB) among individuals of the same age exhibits an adverse connection, contradicting previous research that had assumed a positive impact of shared challenging circumstances. Hence, the study's findings indicate that, instead of tightening regulations to satisfy financial markets, it is advisable for Spain's crisis management strategies to prioritize promoting employment opportunities and investment in education. International technology transfer is essential in low- and middle-income countries with limited research and development funding. This sharing is crucial for the development of new technologies and the expansion of economies. The ability of these economies to absorb imported technologies and the extent to which they are integrated economically will determine the employment impact of technology transfer. Technological transfer may exacerbate inequalities due to trade conflict if the imported technology is labor-saving and skill-biased (Cohen & Levinthal, 1989; E. Lee & Vivarelli, 2006). Low and middle-income industries are being pushed to modernize due to increased global competition brought about by market integration. As a result, human capital spending may increase, encouraging the development of defensive abilities (Thoenig & Verdier, 2003).

Goldin & Margo (1992) assert that "down-skilling" was evident within American manufacturing throughout the 1940s. There is limited uncertainty on the potential efficacy of "down-skilling" in reducing the unemployment rate among individuals with lower skill levels. Determining the overall impact of observable technological progress on the skill level of workers is a challenging task. In addition, Brixiova et al. (2009) looked at central European nations. They concluded that training and orientation sessions are beneficial for improving workers' skills and inspiring investors to launch new businesses. Bhorat et al. (2012) presented an opposing viewpoint from South Africa, arguing that initiating career counseling sessions and soft skill training for young people will help reduce unemployment rates.

The research on human capital and unemployment in Balkan nations has numerous fundamental limitations despite the growing quantity of empirical studies. Limited research has examined wage differentials and human capital in wage determination since the 1990s (Kukaj, 2018). Many Central European countries have been studied in transition economies' human capital literature. However, Balkan countries need to be more represented in wage determination research, and more needs to be known about the role of education and experience. In the Balkans, labor markets and skill-biased technological transitions are uncertain sources of economic development (Bartlett, 2009).

Given the above discussion, we formulate the following hypothesis:

H2: Higher human capital endowment, ceteris paribus, exerts a negative impact on the registered unemployment rate.

2.4 Economic Growth and Unemployment Rate

Okun's law states that economic growth and unemployment are inversely related (Frankle, 1976). Okun law further emphasized the necessity of maintaining a constant unemployment rate by attaining real GDP growth that closely aligns with its potential expansion rate. This can be attributed to the increasing labor force participation and productivity rates. Hence, to reduce the unemployment rate, economic development must reach its potential level. In addition, an empirical analysis was executed based on Okun’s law for the United States with the sampling data for 1960-74, and a robust nexus between these two variables was found (Yang et al., 2023).

The research examined the consequences of unemployment and the influence of economic growth on the labor market structure. The notion proposed by Okun was subjected to evaluation by Opuala - Charles & Orji (2023) and revealed that GDP contributes to 48% of the parameters affecting the unemployment rate. In addition, Al-Habees & Rumman (2012) employed the simple model of Okun law to observe the connection between employment and economic growth in Arab countries and revealed that economic strategies focused on reducing unemployment rates showed the highest efficacy in countries characterized by moderate levels of economic growth. Nurudeen & Gamal (2020) utilized ARDL techniques to analyze the productivity rate and its impact on job creation opportunities with the support of Okun law in Nigeria. The study's empirical findings showed an unambiguous relationship between current account deficits and budget deficits. The results recommended strategies to reduce this deficit.

Several researchers focused on Eastern European countries to examine the growth-employment nexus and emphasized that there exists an inverse relationship between these parameters (Özgür Bayram Soylu, İsmail Çakmak, Fatih Okur)., 2018). Hussin et al. (2013) also noted similar results in Malaysia when examining the various factors that influence these variables.

On the other hand, Khaliq (2007) examined the relationship between economic-related development and job opportunities in Arab countries during 1994-2010. The study suggested that economic productivity further deteriorates employment opportunities. Using data from 1970 to 2008 in Jordan, Kreishan showed an insignificant role of economic-related development in shaping the unemployment rate. Based on OECD countries, Rahman et al. (2023) observed an insignificant association between economic development and unemployment. Likewise, using sample data from 2009-2016, Rostami et al. (2016) established the minor role of economic development in reducing the unemployment rate.

Akeju & Olanipekun (2014) utilized the Error Correction Model (ECM) approach and Autoregressive Distributed Lag (ARDL) as well as the Johansen cointegration test to analyze the productivity-unemployment nexus in Nigeria. Theoretically, the author hypothesizes that unemployment and economic development have a negative relationship following Okun’s law. Further, the author suggests empirically that there exists a long-term and short-term relationship between these two variables. Moreover, monetary policies and foreign direct investment are essential parameters to discuss to keep the labor market equilibrium in the country.

According to Freeman (1980), economic literature supports Okun's law. Okun argued that the theory is more focused on the variance from the equilibrium point than on generalizing how output reacts to fluctuations in the unemployment rate. Okun's law has demonstrated its enduring relevance in modern economics. It is frequently depicted as a fundamental principle and valued as a convenient tool for policymakers seeking to gauge the implications of GDP growth independently.

Based on Okun's law, the study by Amor & Hassine (2017) for Saudi Arabia observed the effect of economic growth and unemployment over the last 30 years. The study found a negative connection between the variables in the long term, but insignificant results were presented in the short term. Even with the country's rapid economic boom, Saudi residents needed to reap more benefits because many of the new jobs created were geared toward foreign employees. Another study by Silvapulle et al. (2004) recorded that unemployment's response to GDP varies during expansion and contraction in diverse situations.

Another study compared the factors that lead to poverty in European Union (EU) and Western Balkan (WB) countries. The statistical data utilized by the World Bank encompasses the time spanning from 2009 to 2018. Income disparity has a discernible impact on poverty levels in both the EU and the WB. However, the influence of GDP is more pronounced in the EU, while income per capita plays a relatively more significant role in the WB. Poverty reduction was achieved through educational initiatives, increased investments, and a decline in unemployment rates in both economies (Mansi et al., 2020).

Moreover, a study investigated the primary determinants and policy measures that influenced the economic growth of the Western Balkan region between the years 1994 and 2015. The researchers delivered that the determinants of financial development positively affect per capita income. On the other hand, production, labor market equilibrium, and government spending are crucial factors that have a detrimental effect on economic development. Interestingly, the research revealed a need for more association between formal education and economic development in the Western Balkans region. The study also emphasizes the importance of foreign direct investment and its potential impact on reducing corruption (Fetai et al., 2017).

Given the above discussion, we formulate the following hypothesis:

H3: Economic growth has a negative impact on the unemployment rate

2.5 Information, Communication and Technology, and Unemployment Rate

Two opposing theories were proposed while attempting to estimate the immediate consequences on the job market. The theories of substitution and compensation theory were evoked. This rise in worldwide unemployment may be traced mainly to the substitution theory's prediction that human labor would be somewhat automated (Oikonomou et al., 2023). Researchers tried to estimate how much of the labor force would be replaced by technology in the forthcoming years. In this context, Acemoglu & Autor (2011) demonstrated that the importance of ICT-enabled talent development has become a prominent concern for many firms. Technology functions as a supplementary tool to augment the capabilities of extensively trained and proficient workers. Conversely, individuals with lower skill levels within the work market encounter growing challenges in achieving financial stability during economic decline (Heathcote et al., 2020). Another study investigated the allocation of information and communication technology (ICT) assets and resource reallocations in Japan and Korea. Both economies possess significant sectors dedicated to producing ICT, although they exhibit relatively modest implications in terms of ICT usage. The potential impact of ICT usage and sustained growth may have been limited by heavy regulations and a need for more competition in public service sectors, leading to lower productivity in service industries. However, introducing labor input, namely the transition from lower-paying to higher-wage industries, yielded favorable and considerable benefits. Therefore, both economies must implement policies to enhance productivity, effectively redistribute capital input, and support long-term economic growth (Fukao, 1994).

An analysis was performed to measure the risk of automation in 21 OECD countries. The study was more descriptive and followed a task-based approach rather than analyzing the whole process within a particular occupation. The study identified that 9% of jobs would be digitalized completely and pointed to a record impact in the case of Australia and Germany, which topped at 14%. With efficient digitalization, these minor tasks do not require human hands further to perform such activities (OECD, 2016).

Bowles (2016) conducted an empirical study across the European Union and found that 47% of Sweden's and 60% of Romania's workforce risk job insecurity due to inadequate information and communication technology during the next decade. Bonin (2012) uncovered a similar figure for Germany, with 12% attributable to technical development. According to Wolters

(2020.), a decrease in employment owing to the fourth industrial revolution was predicted to be less likely to occur by 2030. So, the model that has been developed suggests that there will be a major structural shift in the industrial and service sectors. A loss of 60,000 was recorded due to these two processes running simultaneously. In addition, the manufacturing sector lost 420,000 jobs. In contrast, the service sector added 360,000, supporting the compensation theory, which argues that a decline in job losses does not necessarily lead to a rise in the unemployment rate.

Pantera's (2019) research indicated that ICT's intensity and industry employment growth have a positive relationship. Another investigation by Graetz & Doud in 17 countries during 1993-2007 highlighted the impact of robots on employment at the industry level. The study concluded that production output, compensation, and GDP rate are improved with the increased use of robots in the manufacturing sector. Further, the results of the analysis presented that low-skilled workers are adversely affected by technological incorporation, and a weaker impact is recorded on medium-skilled employees (Solleiro-Rebolledo et al., 2023).

Another important point highlighted that the ICT industry and related service sectors introduced new potential professions requiring new skill sets. Hence, another theory declares that modern technology is an added advantage to ease the enterprise's infrastructure but does not eliminate human capital. In addition, this machine change will redeploy labor steadily. However, this change will take a decade to stabilize the processes. Some comparisons might be drawn between the technological changes in the previous technological shift in the textile or steel industries (Shahkooh et al., 2008).

In addition, businesses would need to change how they handle these tasks and fill open positions with employees who possess new skills. The labor market study done in 19 OECD nations between 1990 and 2012 supports this result (Acemoglu, 2001). Either one goes even further, demonstrating that an initial uptick in employment is necessary for ICT implementation, followed by a temporary decline in employment that is ultimately positive. The results of this study are consistent with those of the one just cited (OECD, 2016).

Integration of ICT into the labor market may result in a generalized rotation of functions within an industry, as suggested by the compensation theory approach. This transition occurs due to the job's characteristics and the necessary abilities for employment. Sometimes, the lack of standard and specialized ICT skills keeps it skewed. One alternative view is that technological progress complements efforts to boost productivity and opens up new prospects for supplying

sophisticated machinery rather than removing people. Even while it has been argued that human intelligence is complex to replicate in a machine, it is possible to tweak it so that employees can learn new skills to deal with the increased efficiency of the machines. As a result, it is emphasized that a particular set of skills can be used in the analysis (Marfatia, 2023).

As a result of ICT, the report predicts a 3 to 14% transition in occupations across the global labor market. One alternative view holds that the rise in possible future careers brought about by technological advancements needs to show more adjustment for the decline in current employment. There are three causes for this compensation:

- Structural and technological expenditures can increase the rate of productivity and production of goods, hence expanding the number of possible employment opportunities.
- The low cost of the computerized system is another significant benefit that has contributed to the rise in demand for skilled labor.
- Introducing trendy ICT technologies, these innovative products increase the demand for new work responsibilities.

Other studies also agreed that technology reduced the labor market's demand but increased productivity. These innovative and game-changing products transformed the industrialist's requirements and reduced labor demand, leading to substantial economic development. Further, this effect is stronger as the smart working conditions and time-saving activities allow the investors to bear less fluctuation with the cost of input for production and less labor. Similarly, innovative products are supported to meet the competitive market at lower prices. Thus, there is an increase in product demand, which generates additional production and employment (Ford, 2013).

The World Bank report recently emphasized the impact of prevalent high-speed Internet connection on the increase in GDP. The facilitation of employment growth in the Balkan states has been attributed to the investment in information and communication technology infrastructure (World Bank, 2022). EBRD published a study recognizing the growth of Balkan countries' ICT sector. This study highlighted the noteworthy contribution of tech-related employment opportunities in reducing unemployment rates EBRD, 2022).

To achieve economic progress, a competent labor market is essential. In this context, Trpeski (2017) analyzed the Balkan region's labor market, showing that education only sometimes provides Students with the necessary skills. Ndou et al. (2019) conducted a study on digital

transformation in the economies of the Balkan region. The results indicated a need to enhance the potential of ICT and e-commerce to increase productivity and create opportunities for entrepreneurship, hence expanding various businesses. The supply of employment opportunities will facilitate the growth and prosperity of the economy. However, without a comprehensive plan that includes technical education, training, and policy formulations, the benefits of ICT for economic growth and job creation in the Balkan region will be limited.

Given the above discussion, this study formulates the following hypothesis:

H4: ICT have a negative impact on the unemployment rate

2.6 Inflation and Unemployment Rate

The existing empirical literature develops the relationship between inflation and unemployment based on the "Phillips curve," which is fundamentally denoted by classical authors (Phillips, 1958; Lipsey & Scarth, 2011). The inflation and employment nexus were investigated using the conventional Phillips curve model tests. Results found a stable and well-behaved (downward-sloping) relationship between these two variables (Crump et al., 2022).

However, the current body of literature shows that the inflation and unemployment nexus relationship has been highly inconsistent throughout the past four decades (Buthelezi, 2023). This movement in the price Phillips curve from the 1970s (during stagflation) to the 1980s and then to the 1990s (during deflation) was the subject of research (Staiger et al., 2001). Widespread disagreement surrounds the investigated relationship, suggesting that the link between inflation and unemployment is fragile. However, there are surprisingly few discussions about what might be causing inflation and unemployment to swing in opposite directions (e.g., inflation expectations, supply shocks, demographic factors, productivity fluctuations, shifts in labor market institutions/regulations). There is a place to examine this unresolved debate (H. Kim, 2023).

Based on a review of existing empirical research on the connection between inflation and unemployment, it has become clear that conventional research on the Phillips curve analysis needs to be revised, indicating a failure to distinguish between trend and cycle movements. Various methods are discussed in the literature for conducting empirical research that could produce

meaningful information and resolve problems in multiple fields. However, these techniques were only sometimes employed (Staiger et al., 2001).

Further, Phillips (1958) pioneered the empirical study to analyze the observed relationship between inflation and unemployment. The "*Phillips loops*" explain the link between these cyclical movements when trend and cycle movements are separated. Similarly, Staiger et al. (2001) agree that there is a stable negative relationship between the cyclical components of these series, while there is no consistent link between these two factors. Moreover, Abu (2019) evaluated that determining the aggregate change in the unemployment rate from its univariate trends, "explanations of movements of wages, prices, and unemployment must focus on understanding the univariate trends in the unemployment rate and productivity growth and, perhaps, the relation between the two." The labor and goods markets briefly explain the nature of inflation and unemployment. The market structure consists of enterprises, their consumers, workers, and agents who interact with each other for different business transactions and operate on several time scales at once. Therefore, integrating these two variables from different markets varies across time scales (Ali, 2023).

Another critical discussion of time scale matter is relevant to formulating economic decisions. Rather than short and long periods, other relevant time scales for the analysis are also essential. Therefore, useful analytical tools must be applied to the time and frequency domain. Wavelet tools are mathematical functions that decompose signals or data into different frequency components, facilitating analysis in both time and frequency domains simultaneously. They are characterized by their ability to capture localized features of the signal at different scales. Wavelet analysis excels at dissecting macroeconomic time series and other data into their fundamental time scale components. Authors such as Gallegati et al. (2011) have provided recent applications of wavelet analysis in economics and finance. However, there have been no attempts to apply this methodology to analyzing price and labor market variables.

The empirical studies of existing literature established the role of inflation and its effect on the unemployment rate. According to the discussion of Ball & Mazumder (2019), the connectivity between inflation and unemployment drives an inverse relationship. Using cointegration techniques, Reichel (1987) observed an inverse inflation and unemployment relationship in advanced countries such as the US and Japan. Based on sample data from 1975-2004 in Malaysia, the author analyzed the unemployment ratio as affected by inflation and explored that this effect

persists over the long term (Hayashi et al., 2010). A study of Islam (2022) focusing on North Cyprus explored the inflation and unemployment relationship given the Phillips hypothesis and supported the constructive role of inflation in reducing unemployment.

Studies support this inverse connection to explore the correlation of unemployment with the change in inflation in the long term (Bhattarai, 2016; Wolters, 2020). Moreover, the relationship between the reciprocal effect and the unemployment rate is discussed in different countries during different periods to examine the role of inflation. Similarly, determinants of unemployment were analyzed by Eita & Ashipal (2010) in Namibia from 1971 to 2007. The study followed the Philips curve to investigate the impact of inflation and economic growth on the nature of joblessness and delivered a negative correlation.

Nevertheless, few studies have supported the positive influence of inflation on unemployment. However, it did not influence the situation in the long run. According to Wright (2014), inflationary pressure and unemployment have long-term positive effects. Similarly, the arguments of Friedman (2010) further labeled that the inverse relationship between the rate of unemployment and the change in inflation exists. He further demonstrated that the negative sloped Phillips curve, which shows the trade-off between the two variables, only occurs in the short run. In the long run, the trade-off disappears as the long-run Phillips curve is vertical and intersects the horizontal axis at the natural rate of unemployment. Hence, this expectations argument Phillips curve introduced the dynamic of inflation expectations and posited that the trade-off was only temporary, disappearing as people adjusted their inflation expectations.

Therefore, we formulate the following hypothesis:
H5: Higher inflation rate exerts a negative impact on the unemployment rate.

2.7 Trade Openness and Unemployment Rate

Trade openness and the unemployment nexus have been widely studied in the extant literature. However, there is still the need to examine this relationship (Felbermayr et al., 2011). The comparative advantage theory, derived from the research studies of Ricardo (1955) and Heckscher – Ohlin acknowledges the technical differences and factors of endowment, which is necessary to examine while focusing on the impact of trade liberalization and unemployment. This

comparative advantage theory is very relevant in discussing the influence of trade openness on unemployment in different ways. The reliance on trade openness solely driven by Ricardo's theory of comparative advantage has been found to have a detrimental impact on unemployment rates. The impact of trade openness on unemployment in labor-abundant and capital-abundant countries is influenced by the principle of comparative advantage proposed by the Heckscher-Ohlin model. In labor-rich countries, trade openness tends to decrease unemployment rates, whereas in capital-rich ones, it tends to increase unemployment rates (Kim et al., 2010).

Empirically, studies also found a negative association between trade openness and unemployment. According to Felbermayr et al. (2011), high trade openness is related to lower structural unemployment in 20 OECD countries. Another analysis (Hassan et al., 2022) explored by the researcher is that trade openness increases employment opportunities in urban areas of countries with flexible labor markets with significant employment shares in net exporter industries. G7 countries are also examined to highlight the impact of unemployment and trade. The study followed the least-squares dummy variables (LSDV) technique and concluded that trade openness negatively affects the unemployment rate (Gozgor, 2014).

The Heckscher–Ohlin theory of comparative advantage was also supported by Anjum & Perviz (2016), who validated that trade has a negative impact on unemployment in labor-abundant economies. However, a positive effect is measured in capital-abundant economies. In addition, Crump et al. (2022) noted that employment increases with the increase in export business in a skilled labor-abundant economy. On the other hand, an unskilled labor-abundant economy increases the unemployment rate. Further, a Nigerian study presented that trade openness and domestic investment variables contradict each other (Onifade et al., 2021).

Conversely, the discussion that supported the opinion that trade openness increases unemployment is also identified. The viewpoint of Janiak (2006) claims that exporters gain more advantage with the line-ant trade policies, which support the use of advanced machinery and technical equipment, and ultimately, it becomes the cause of reduced labor demand. Another study conducted with 20 countries' panel data samples found that trade openness increases unemployment (Boulhol, 2008).

A similar study by Buthelezi (2023) employed a two-country model. It declared that more trading activities create barriers for the job market to reach the export sector due to labor market friction. Madanizadeh & Pilvar (2019) found similar results when observing these two variables

empirically. Observing the capital-abundant and labor-abundant within the organizations of Islamic Cooperation (OIC) countries, the asymmetric association was presented (S. Ali et al., 2020) to examine the trade and unemployment nexus. Seven out of ten labor-abundant countries showed a negative association between trade openness and unemployment. At the same time, eight out of ten capital-abundant economies indicated a positive impact of trade openness on unemployment.

Keeping in view the above discussion, this study formulates the following hypothesis.
H6: Trade openness has a negative impact on the unemployment rate.

2.8 Literature gap

The pace of growth provides a comprehensive explanation for the unemployment rate in a country. Both developing and developed economies are struggling with the effects of structural and frictional unemployment. Macroeconomic stability is also necessary for countries to create more employment opportunities for the people, which leads to sustainable economic growth. "*While bad macroeconomic policy always results in bad economic performance, good macroeconomic policy does not always result in good economic performance. Favorable economic conditions offer only a starting point in dealing with unemployment*" (OECD, 2012). Considering the extant literature, the debate related to determinants of unemployment is still inconclusive. Hence, this study examines the role of financial development, human capital, and economic growth in shaping unemployment in Europe through an array of advanced statistical techniques to provide better insights to policymakers.

2.9 Conclusions

The comprehensive review elucidates the intricate interplay between various economic factors and the unemployment rate, shedding light on the multifaceted nature of this relationship. Through analyses of financial development, human capital, economic growth, trade, ICT, and inflation, it becomes evident that economic dynamics are influenced by a multitude of factors, each contributing to the complex landscape of employment outcomes and financial development, characterized by efficient credit markets and regulatory environments, has the potential to significantly reduce unemployment by fostering business expansion and job creation (Alber, 2019). Similarly, investments in human capital, including education and skills development, play a pivotal role in driving productivity and economic growth, ultimately impacting employment levels (D. R. Davis & Reeve, 1997). Moreover, Okun's law underscores the enduring relevance of economic development in shaping unemployment trends, albeit with nuanced interpretations across different regions and contexts. These insights underscore the importance of targeted policy interventions tailored to diverse economic realities, emphasizing the need for empirical testing to inform evidence-based policymaking (Silvapulle et al., 2004).

The interconnectedness of financial development, human capital, and unemployment can be understood through the lens of integrated economic theories. For instance, endogenous growth theory suggests that financial development and human capital are key drivers of economic growth, which in turn affects unemployment. Efficient financial systems mobilize savings and allocate them to productive investments, fostering business expansion and job creation. Concurrently, investments in human capital enhance labor productivity and innovation, further driving economic growth and employment (Alam & Murad, 2020).

Moreover, financial development and human capital are mutually reinforcing. Improved financial systems can facilitate investments in education and health by providing credit to households and governments. Enhanced human capital, in turn, leads to higher economic productivity, which supports the growth of financial markets. This synergistic relationship creates a feedback loop that promotes economic growth and reduces unemployment (Ehrenberg et al., 2021).

Addressing high unemployment rates in the Balkan region requires a holistic approach that integrates financial development and human capital investments. Policies aimed at improving

access to finance, enhancing educational outcomes, and fostering economic diversification can create a conducive environment for sustainable job creation. For example, promoting entrepreneurship through microfinance and vocational training can simultaneously address financial constraints and skill mismatches, reducing unemployment (Knezović et al., 2020).

In Conclusions, the theoretical perspectives on the nexus between financial development, human capital, and unemployment highlight the intricate and multifaceted relationships between these variables. A comprehensive understanding of these interconnections is essential for formulating effective policies to promote economic growth and reduce unemployment, particularly in regions like the Balkans (Dzafic, 2014).

To empirically test the relationships highlighted in this review, researchers can conduct comparative analyses across developed and developing countries, considering the unique socio-economic contexts at play. By examining how financial development, human capital investment, and economic growth interact with unemployment rates in diverse settings, researchers can identify common trends and disparities, offering valuable insights for policymakers (Bartlett, 2013). Furthermore, empirical studies can explore the effectiveness of specific policy interventions, such as financial deregulation, education reform, and labor market initiatives, in addressing unemployment challenges (Ndou et al., 2019). By leveraging empirical evidence from both developed and developing countries, policymakers can formulate targeted strategies to foster sustainable economic growth, enhance labor market outcomes, and promote inclusive prosperity.

CHAPTER 3
EMPIRICAL VERIFICATION OF THE RESEARCH HYPOTHESES AND DISCUSSION OF THE RESULTS

3.1 Introduction

This chapter presents the sample framework, sources of data, and measurement of dependent variables. In addition, this section measures the exogenous variables such as financial development, human capital, economic growth, inflation, information communication and technology (ICT), and trade openness.

Building upon the theoretical foundations and literature review outlined in previous chapters, this analysis employs a robust methodological framework to test the hypotheses derived from classical and contemporary economic theories. By leveraging a comprehensive dataset encompassing various economic indicators across multiple countries and periods, we aim to uncover the nuanced dynamics and causal linkages that drive economic performance (Adelman, 1965). Through detailed statistical analyses, including regression models and time-series analyses, we seek to provide a granular understanding of how these key variables interact, ultimately informing policy recommendations that can foster sustainable economic growth and stability (Hussin et al., 2013).

The analysis in this chapter is structured to systematically address each of the key variables, beginning with descriptive statistics to outline their basic characteristics. We then proceed to conduct correlation analyses to explore the preliminary relationships between variables. Following this, we implement more sophisticated econometric techniques, such as panel data regression and vector autoregression (VAR), to identify causal pathways and the strength of these interactions (Kao, 1999). This comprehensive approach ensures that we not only capture the direct effects but also consider the potential feedback loops and interdependencies that characterize complex economic systems. The insights gained from this analysis will be crucial for understanding the broader economic implications and for crafting policies aimed at reducing unemployment and promoting economic resilience (Freund et al., 2006a).

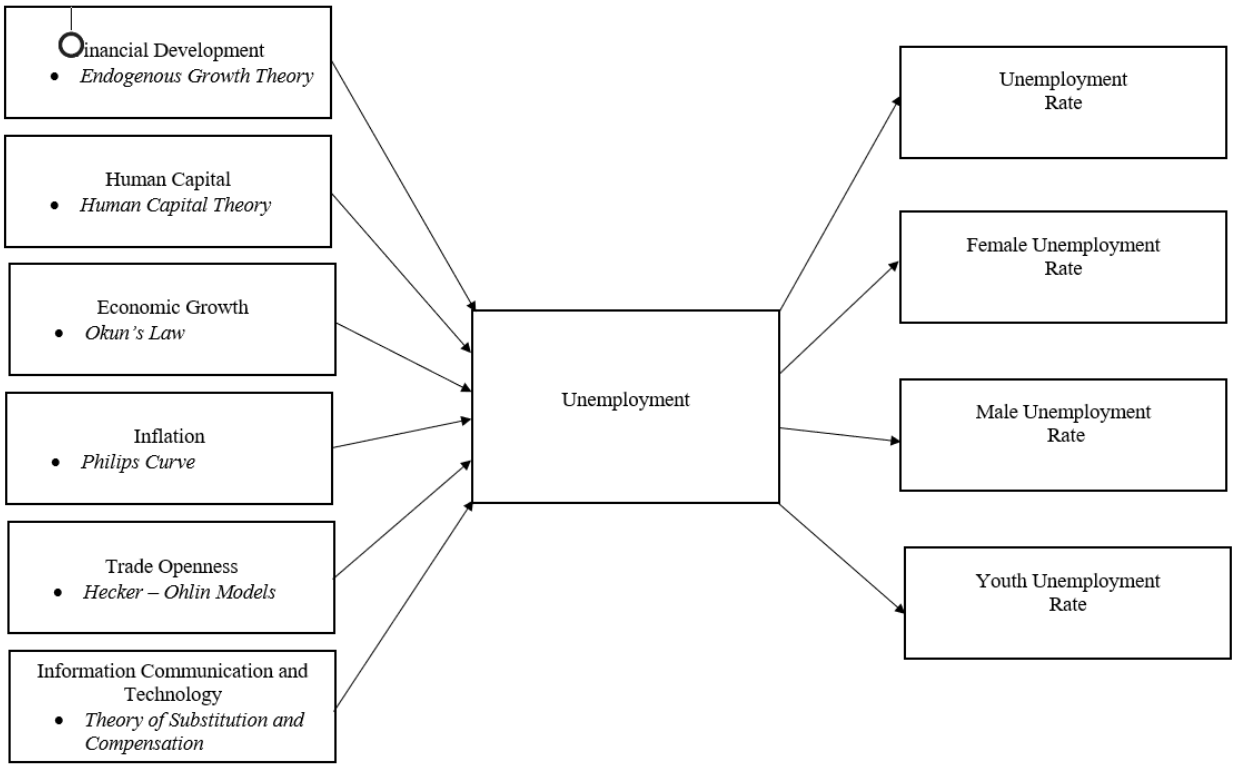


Figure 6 Conceptual Framework

3.2 Data sample and data sources

The study encompasses all countries listed by the World Bank and the United Nations, constituting the population frame under examination. The study collected data on unemployment, financial development, and other macroeconomic indicators from World Development Indicators (WDI).

The sample includes annual data from 34 European countries. Based on the IMF classification, we divide the sample into high-income countries (24 economies) and upper- and upper-middle-income economies. Furthermore, we consider the Balkan Region subgroup to provide a comparative analysis and better insights to policymakers regarding the determinants of unemployment. The sample details are provided in Table 1 below.

The study analyzed the determinants of the unemployment rate through quantitative techniques. Therefore, the research is quantitative.

The data sample includes twenty annual observations over the period 2000-21, allowing us to verify the causal effects of various factors in determining the overall unemployment rate.

The current research collected the required data on the level of financial development, human capital endowment, economic growth, unemployment rate, and other macroeconomic variables from the following sources:

- World Bank (WDI (all listed countries) https://databank.worldbank.org/source/world-development-indicators
- IMF - IMF classification, we divide the sample into high-income countries (24 economies) and upper and upper-middle economies

Table 1 Sample details

No	3-digit ISO code	Country	Income status
1	AUT	Austria	High income
2	BEL	Belgium	High income
3	HRV	Croatia	High income
4	CYP	Cyprus	High income
5	DNK	Denmark	High income
6	EST	Estonia	High income
7	FIN	Finland	High income
8	FRA	France	High income
9	DEU	Germany	High income
10	GRE	Greece	High income
11	HUN	Hungary	High income
12	IRL	Ireland	High income
13	ITA	Italy	High income
14	LVA	Latvia	High income
15	LTU	Lithuania	High income
16	LUX	Luxembourg	High income
17	MLT	Malta	High income
18	NDL	Netherlands	High income
19	POL	Poland	High income
20	PRT	Portugal	High income
21	ROU	Romania	High income
22	SVN	Slovenia	High income
23	ESP	Spain	High income
24	SWE	Sweden	High income
25	ALB	Albania	Upper & upper middle income
26	ARM	Armenia	Upper & upper middle income
27	AZE	Azerbaijan	Upper & upper middle income
28	BLR	Belarus	Upper & upper middle income
29	BIH	Bosnia and Herzegovina	Upper & upper middle income
30	BUL	Bulgaria	Upper & upper middle income
31	GEO	Georgia	Upper & upper middle income
32	MNE	Montenegro	Upper & upper middle income
33	MKD	North Macedonia	Upper & upper middle income
34	SRB	Serbia	Upper & upper middle income

Source: Own elaboration based on the classification of IMF.

3.3 Operationalization of the dependent and independent variables

The research considers unemployment to be the dependent variable (DV), and financial development, human capital, and economic growth were the variables of interest. Furthermore, inflation, ICT, and trade openness are considered control variables. Operationalization of Unemployment (Dependent Variable)

Table 2 Description of variables

S.No	Variable	Symbol	Measurement	Source	DV/IV
	Dependent Variable				
1	Unemployment	UNEMP	Unemployment, total (% of total labor force)	WDI	DV
2	Female Unemployment	UNEMP F	Unemployment, female (% of female labor force)	WDI	DV
3	Male Unemployment	UNEMP M	Unemployment, male (% of male labor force)	WDI	DV
4	Youth Unemployment	UNEMP Y	Unemployment, youth total (% of total labor force ages 15-24)	WDI	DV
	Independent Variables			WDI	
5	Financial Development	FD	Broad money (% of GDP)	WDI	IV
6	Human Capital	HC	It is constructed via three dimensions healthy life, access to knowledge &standard of living	WDI	IV
8	Economic Growth	GDP	GDP per capita (constant 2010 US$)	WDI	IV
9	Information, Communication, and Tech	ICT	Mobile subscribers (per 100 people)	WDI	IV
10	Inflation	Infl	The annual change in consumer price index	WDI	IV
11	Trade	TRD	Trade (% of GDP)	WDI	IV

Total unemployment, encompassing the entire labor force, serves as a barometer for overall labor market health, influenced by economic fluctuations and policy decisions. Female unemployment underscores the specific hurdles women encounter, from gender biases to limited access to education and work-life balance. Male unemployment, on the other hand, highlights challenges often stemming from shifts in traditionally male-dominated industries, exacerbated by technological advancements and globalization. Youth employment focuses on the struggles of young workers entering the job market, grappling with issues like lack of experience and intense competition for entry-level positions.

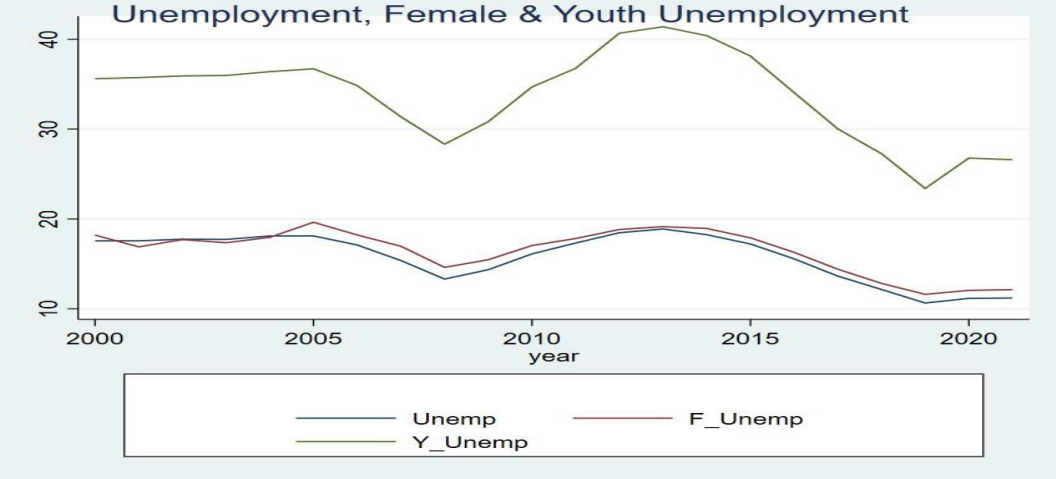
These dimensions collectively underscore the multifaceted nature of unemployment, urging policymakers to address structural inequalities, provide targeted support, and foster inclusive growth strategies to tackle the diverse array of labor market challenges.

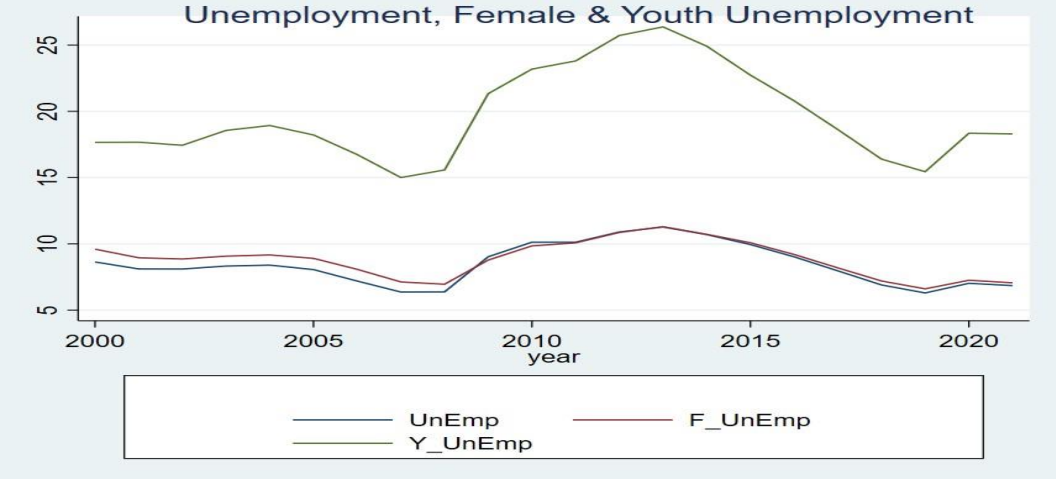
These are:

- Total unemployment (total number of unemployed as a percentage of total labor force),
- Female unemployment (total female unemployment as a ratio of female labor force),
- Male unemployment (total male unemployment as a ratio of male labor force),
- Youth employment (total number of young unemployed (defined as people aged 16 to 25) as the ratio of the young labor force.

The depressed economy specifically affects the employment status and possibilities of young people looking for different dimensions of female workers (Martin, 2013).

Despite the changes in scale, the relative trends within each subgroup remain consistent across the charts. Youth unemployment (Y_Unemp) is significantly higher than overall and female unemployment throughout the period, with noticeable peaks around 2015 and subsequent declines. The differences in the y-axis scales highlight different aspects of the data, potentially influencing how the trends are perceived.





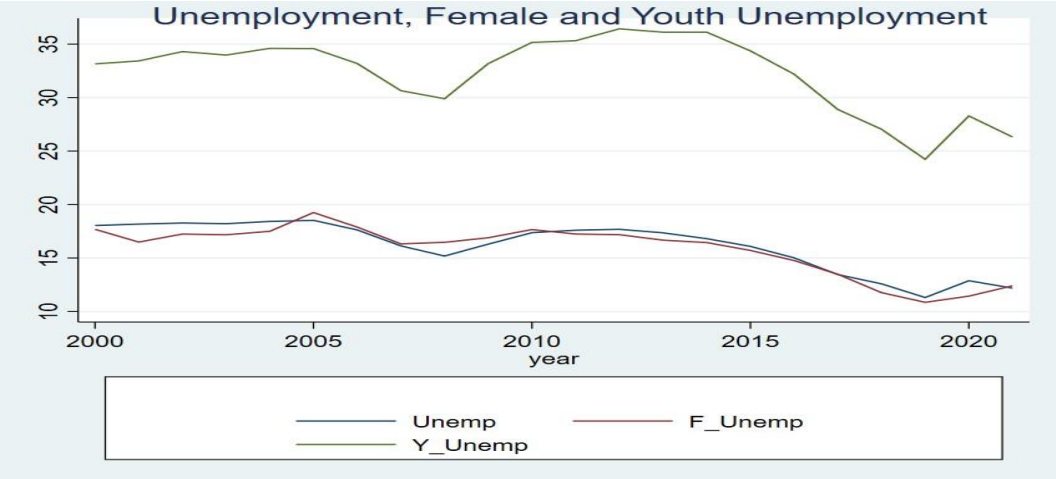


Figure 7 Dimensions of unemployment

Source: Own elaboration.

Level of financial development

In the early 1990s, wide research work was established to show the role of the level of financial development in economic expansion (Osei & Kim, 2023). The global financial crisis (GFC) of 2007-08 has had a negative impact on the subsequent economic development globally, with mean growth rates globally not returning to the pre-GFC mean levels. It further proved the role of financial development and periods of financial distress on the general economic climate both in short and at least in the mid-run.

The level of financial development significantly influences labor markets in the long run by facilitating capital allocation, promoting entrepreneurship, enhancing human capital, and providing risk management tools. Empirical evidence from various regions, including the Western Balkans, underscores the positive impact of financial development on job creation and economic growth. Thus, a significant level of financial development helps societies to succeed (Giuliano & Ruiz-Arranz, 2009).

Proxies for the level of financial development are indicators or measures utilized in empirical studies to assess the development and sophistication of financial systems within an economy. These proxies can encompass various dimensions of financial development, including the depth, access, and efficiency of financial markets and institutions.

Financial Depth can be measured by:

- Private Sector Credit to GDP: The ratio of domestic credit provided to the private sector to GDP. It is considered a measure of the extent of financial intermediation (Beck et al., 2000; Levine, 2005).
- Broad Money (M2) to GDP: The ratio of broad money supply (which includes cash, checking deposits, and easily convertible near money) to GDP (Beck et al., 2000; Levine, 2005).
- Stock Market Capitalization to GDP: The total market value of publicly traded shares to GDP, indicating the size of the equity market (Beck et al., 2000; Levine, 2005).

Financial Access can be measured by:

- Number of Bank Branches per 100,000 Adults – it indicates the accessibility of banking services to the population (Demirgüç-Kunt & Klapper, 2012). Finance, Financial Sector Policies, and Long-Run Growth. The World Bank Research Observer.
- Number of ATMs per 100,000 Adults: a measure of accessibility, reflecting the availability of cash and banking services (Demirgüç-Kunt & Klapper, 2012).

- Account Ownership at a Financial Institution (% of the population): The percentage of adults with a bank account, reflecting inclusiveness (Group, 2013).
- In turn, financial efficiency can be approximated by Mean Net Interest Margin (NIM): The difference between interest income generated and interest expenses relative to earning assets. It measures the efficiency of financial intermediation (Demirgüç-Kunt & Klapper, 2012). Determinants of Commercial Bank Interest Margins and Profitability:
- Mean Bank Cost to Income Ratio: The operating expenses of a bank as a percentage of its income, indicating operational efficiency (Claessens & Laeven, 2004). Mean Turnover Ratio (Stock Market Turnover): The value of traded shares divided by market capitalization, indicating market liquidity (Levine & Zervos, 1998).
- Financial stability proxies became particularly appealing after the GFC of 2007-08. These, for instance, could include: Non-performing Loans (NPLs) to Total Gross Loans: The ratio of non-performing loans to total gross loans, indicating the health of the banking sector (Laeven & Valencia, 2020).
- Capital Adequacy Ratio (CAR): The ratio of a bank's capital to its risk-weighted assets, reflecting the resilience of the financial system (Demirgüç-Kunt & Klapper, 2012).
- Composite indices, as usual, could be considered. For example, the Financial Development Index (FDI). It's an index developed by the IMF that combines various indicators of financial institutions and financial markets to provide a comprehensive measure of financial development (Svirydzenka, 2016).

In the present study, due to data availability issues, in particular, for the Western Balkan countries, we utilize a widely known proxy for the level of financial development (FD) broad money M2 as a percentage of GDP to examine the role of the extent of the financial development in shaping the unemployment rate in the analyzed panel of countries.

Human capital

The contemporary empirical literature uses a wide array of proxies for human capital. Some focus on educational attainment (e.g., AYS, secondary or tertiary education enrollment rates), some on quality of the educational system (e.g., literacy rates, international test scores such as the Programme for International Student Assessment (PISA), or Trends in International Mathematics and Science Study (TIMSS)), health indicators (e.g., life expectancy at birth,

infant mortality rates, Health Adjusted Life Expectancy (HALE)), labor market indicators (e.g., labor force participation rate), training and skills development (e.g., vocational training enrollment, adult education and training participation rates approximating life-long learning schemes) as well as innovation and research-related measures (e.g. general expenditures on R&D – GERD or number of researchers per million inhabitants).

A chosen proxy for human capital endowment (HC) is a complex variable that takes into account the average years of schooling (AYS) and the rate of return to education (Feenstra et al., 2015). It was utilized, for instance, by Opoku et al. (2022). It is nowadays also a preferred proxy for human capital in empirical growth literature.

It is believed that healthier lifestyles positively impact human productivity and increase the duration and quality of education, thus, skillset (Ahmed et al., 2021). We expect enhanced human capital endowment to have a favorable impact (decreasing effect) on the unemployment rate (Hina Ali et al., 2021).

Economic growth

The extant literature comprehends the relationship between economic growth and the rate of unemployment (e.g., Billi, 2020). Following the formulation of Okun's law by Okun (1962), it is postulated that the unemployment rate and the rate of economic growth show an inverse relationship. Hence, this study follows Sultanuzzaman et al. (2019) and considers the change in real GDP as a measure of economic growth (Ahmed et al., 2021) to examine the nexus between economic growth and unemployment.

3.4 Set of control variables

This study considers several control variables.

ICT

In empirical studies, Information and Communication Technology (ICT) is measured using a variety of methods that capture both the infrastructure and usage aspects of technology. One common approach is through ICT infrastructure indicators, which include metrics such as the number of broadband subscriptions, mobile cellular subscriptions, and the availability of internet servers. These indicators provide a quantitative assessment of the accessibility and capacity of ICT infrastructure in a given region (Taylor & Zhang, 2007).

Another method involves measuring ICT usage, which can be evaluated through surveys that report the percentage of individuals using the internet, frequency of internet usage, and the extent of ICT integration in businesses and households. Additionally, composite indices such as the ICT Development Index (IDI) and the Networked Readiness Index (NRI) are often used. These indices aggregate various ICT indicators into a single score, facilitating comparative analysis across different regions and periods (Biagi & Loi, 2013). Furthermore, some studies focus on the quality of ICT services by assessing the speed and reliability of internet connections, as well as the affordability of ICT services. By employing these diverse methods, researchers can obtain a comprehensive understanding of the state and impact of ICT in different contexts (Jamieson-Proctor & Finger, 2009).

Inflation

In empirical studies, inflation is measured using various methods that capture changes in the general price level of goods and services over time. One of the most common methods is the Consumer Price Index (CPI), which tracks the prices of a selected basket of consumer goods and services, such as food, housing, and transportation. The CPI indicates the cost of living and is widely used to gauge inflation from the consumer's perspective (Bryan & Cecchetti, 1993).

Another important measure is the Producer Price Index (PPI), which monitors the prices received by domestic producers for their output at different stages of production. The PPI can provide early signals of inflationary pressures in the economy as it reflects price changes before they reach the consumer level (Vilcu, 2015).

The GDP deflator is another comprehensive measure, reflecting the price changes of all goods and services included in the Gross Domestic Product (GDP). Unlike the CPI, the GDP deflator is not based on a fixed basket of goods, allowing it to account for changes in consumption patterns and the introduction of new goods and services (Church, 2016).

Additionally, empirical studies sometimes utilize the Personal Consumption Expenditures (PCE) price index, which is similar to the CPI but includes a broader range of expenditures and tends to show a lower rate of inflation due to its different weighting and inclusion of substitution effects (Clark, 1999).

Trade Openness

In empirical studies, trade openness is measured using several methods that capture the extent to which a country engages in international trade. One of the most common measures is the trade-to-GDP ratio, which calculates the sum of a country's exports and imports as a percentage of its Gross Domestic Product (GDP). This ratio provides a broad indication of the significance of international trade in the overall economy (Squalli & Wilson, 2006).
Another widely used measure is the ratio of exports to GDP and the ratio of imports to GDP, which separately examine the contributions of exports and imports to economic activity. Additionally, the degree of tariff and non-tariff barriers is assessed, with lower tariffs and fewer non-tariff barriers indicating higher trade openness. Indices such as the Trade Openness Index and the Economic Freedom of the World Index incorporate various factors, including tariff rates, quotas, and regulatory trade barriers, to provide a composite measure of trade openness (Squalli & Wilson, 2006). Furthermore, empirical studies may use the ratio of trade volume (exports plus imports) to total trade potential, comparing actual trade levels to potential trade levels under complete openness scenarios. These diverse methods allow researchers to comprehensively analyze the extent of trade openness and its implications for economic performance and policy (Squalli & Wilson, 2006).

This set of control variables helps examine the role of financial development, human capital, and economic growth against other significant factors contributing to unemployment (Ford, 2013). While the selection of factors in economic growth models is a subject of fierce discussions in the economic community, the reason for considering ICT, inflation, and trade as control variables because several recent empirical studies have advocated the substantial contribution of variables as mentioned above shaping unemployment-related development (Ganić, 2019b).

In this comprehensive analysis, we employ a seven-step methodology to evaluate our data and draw robust conclusions rigorously. Each step has been carefully selected to address specific statistical and econometric challenges associated with panel data analysis, ensuring that our findings are both reliable and valid. Here’s a detailed justification for each step taken in the analysis:

3.5 Compilation of Descriptive Statistics and Correlation Table

The initial step involves compiling descriptive statistics and a correlation table for our dataset. Descriptive statistics provide a summary of the central tendencies, dispersion, and shape of the dataset's distribution, offering a preliminary understanding of the data. Metrics such as mean, median, standard deviation, skewness, and kurtosis are calculated. This is crucial as it helps identify any anomalies or outliers that might skew the results of subsequent analyses. The correlation table, on the other hand, helps in understanding the linear relationships between the variables. By examining the correlations, we can detect multicollinearity issues early on, which could potentially bias our regression estimates if not addressed properly.

All variables are summed up in Table 2 with their description, data sources, and their role in our models.

Tables 3A and 3B provide descriptive statistics for our dependent and independent variables.

Table 3a Descriptive statistics

High-Income Economies

VARIABLES	Obs	Mean	Min	Max
UNEMP	528	8.441	1.81	27.47
UNEMP F	528	8.813	2.17	31.35
UNEMP M	528	8.196	1.563	25.598
UNEMP Y	528	19.627	4.389	58.163

Upper Middle-Income Economies

VARIABLES	Obs	Mean	Min	Max
UNEMP	220	16.144	4.16	37.25
UNEMP F	220	15.841	0.4	38.43
UNEMP M	220	15.833	4.019	36.963
UNEMP Y	220	32.335	8.894	65.828

Balkan Region Economies

Variable	Obs	Mean	Min	Max
UNEMP	220	15.8	3.91	37.25
UNEMP F	220	16.455	3.38	38.43
UNEMP M	220	14.969	3.51	36.963
UNEMP Y	220	33.719	8.16	65.828

The summary statistics for key variables are reported in Table 3.

Table 3b Descriptive statistics

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
UNEMP	748	10.707	6.671	1.81	37.25
UNEMPF	748	10.88	6.986	.4	38.43
UNEMPM	748	10.442	6.478	1.563	36.963
UNEMPY	748	23.364	12.968	4.389	65.828
FD	748	74.493	42.008	.186	255.31
HC	748	3.119	.248	2.23	3.675
EG	748	25.218	1.79	21.709	28.912
INF	748	3.686	9.081	-4.478	168.62
ICT	748	103.262	35.669	.5	207.752
TRADE	748	111.073	57.782	22.492	388.848

Source: Own calculations in STATA.

Unemployment has a mean value of 10.707, which is greater than the mean reported values of Kim et al. (2019), suggesting that our sample has, on average, a greater unemployment rate vis-à-vis OECD countries. Furthermore, the mean value of financial development has an average value of 74.493, which is higher than the reported values of Hunjra et al. (2022) for developing countries, which shows that Europe has a solid financial system compared to developing countries. Likewise, the mean value of human capital is greater than the reported value of 1.92 in OIC countries, suggesting that European countries enjoy greater human capital (Choong et al., 2004; Ranjanee Kaliappan et al., 2009). Looking at the values of control variables, the mean and standard deviation of the ICT (M = 103.262, SD = 35.669) and trade (M = 111.073, SD = 57.782) are higher.

The higher unemployment rate reflects potential structural rigidities and economic challenges unique to certain European countries. Advanced financial development indicates well-established financial systems, robust regulatory frameworks, and high financial inclusion. The superior human capital levels suggest significant investments in education and healthcare, leading to a more educated and healthier workforce: high digital literacy and substantial public and private sector investments in technology. Lastly, the high trade openness reflects Europe's strong engagement in international trade, supported by open trade policies, regional integration, and efficient logistics. These factors collectively result in the higher average values observed in your European sample (Freund et al., 2006b).

Furthermore, in line with the empirical strategy chosen, Table 4 shows the correlation matrix between utilized explanatory variables. Intuitive insight into the robustness of bivariate connections can be derived through correlation matrices (Steiger, 1980). Results demonstrate that most explanatory factors have correlation coefficients indicative of weak to moderate correlation. Given the moderate bivariate correlations observed, multicollinearity should be manageable for the estimated model.

Table 4 provides a correlation matrix.

Table 4 Matrix of correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
UNEMP	1.000						
FD	-0.198***	1.000					
HC	-0.158***	-0.171**	1.000				
EG	-0.423**	0.350	0.117	1.000			
INF	-0.022**	-0.217	-0.008**	-0.111***	1.000		
ICT	-0.167***	0.242***	0.052**	0.170***	-0.210**	1.000	
TRADE	-0.297*	0.074***	0.084*	-0.227***	-0.035*	0.205**	1.000

Source: Own calculations in STATA.

3.6 Empirical strategy

The research focuses on the persistent causal impacts of the level of financial development, human capital endowment, and economic growth on the unemployment rate in Europe. In addition, inflation, ICT, and trade are taken into account as control variables (contributing factors).

The study used four proxies to measure unemployment:

- total unemployment rate,
- male unemployment rate,
- female unemployment rate, and
- youth unemployment rate.

By considering various measures of unemployment, the research sheds additional insights into the nuances of labor market framework conditions and the impacts of economic policies undertaken by individual states on different segments of the labor market. Moreover, the study explores gender-specific labor market trends and challenges faced by youth, allowing them to formulate policy recommendations more targeted at the disadvantaged groups in the labor market (Jarmo\lowicz & Knapińska, 2011).

The empirical analysis underscores the importance of understanding the unique challenges faced by women and youth in the labor market. By identifying the underlying drivers of their unemployment rates and designing tailored policy interventions, policymakers can work towards fostering inclusive and resilient economies that provide equal opportunities for all segments of the population (Seo et al., 2023).

Women in the Western Balkans experience higher unemployment rates compared to men, reflecting entrenched gender disparities and structural barriers in the region. Gender discrimination, limited access to education and training, and cultural norms that prioritize male employment can contribute to the elevated levels of women's unemployment. Furthermore, women are frequently concentrated in informal and low-paying sectors, exacerbating their vulnerability to economic shocks (Alam & Murad, 2020). Addressing these challenges requires targeted policies that promote gender equality, provide access to quality education and skills training for women, and support initiatives to enhance women's participation in the formal labor market. Strengthening labor market institutions and enforcing anti-discrimination laws are also essential steps towards reducing women's unemployment in the Western Balkans.

In addition, young people face disproportionately high levels of unemployment compared to the overall population. Factors such as limited job opportunities, skills mismatches, and the effects of economic transition contribute to the prevalence of youth unemployment in the region. Inadequate investments in education and vocational training systems exacerbate these challenges, leaving many young people ill-equipped to meet the demands of the labor market (Kodde, 1988).

To address youth unemployment, policymakers in the Western Balkans must prioritize initiatives that promote youth entrepreneurship, provide relevant skills training and education, and create pathways for young people to gain work experience through internships and apprenticeships. Additionally, efforts to stimulate economic growth and attract investment can help generate new job opportunities for young people in the region (Blundell et al., 2005).

The data for 34 European countries has been collected from 2000 to 2021. The temporal dimension is relatively long, with 21 observations. For many reasons, a quarterly or monthly perspective would be preferable, but adequate data sources could not have been identified. We thus have in total 21 * 34 = 714 observations. We tried to obtain balanced data to get accurate, unbiased, and robust analysis results. Further, it helps to mitigate the challenges associated with imbalanced datasets. It ensures that the model learns from a representative sample of the data, leading to better performance and more interpretable results.

Upon critical review of the econometric methodology literature, we established our empirical strategy.

Seven steps are followed in the analysis of data in accordance with the chosen empirical strategy:

(i) compilation of the descriptive statistics and correlation matrix;

(ii) a cross-sectional dependence test (Pesaran et al. (2004) is performed to check cross-sectional dependency while

(iii) unit root tests analyze the stationarity of the data;

(iv) cointegration tests by Pedroni (2004) and Kao (1999) are used to check the cointegration of the analyzed variables;

(v) Panel ARDL methodology is employed to determine the casual connection's extrinsic and intrinsic effects in the long and short term are.

(vi) The empirical direction of the causal relationship is confirmed by the Dumitrescu-Hurlin (D-H) panel causality approach.

(vii) the study applied the methods of the D-K Model, GLM Model, Arellano and Bond (hereafter AB) (1991), and Blundell and Bond (hereafter BB) for robustness checks

to produce consistent and unbiased coefficients even in the presence of autocorrelation within-group and panel-wise heteroscedasticity to verify and validate the empirical findings.

In addition, it must be stressed that the obtained results will be analyzed and critically discussed to verify the established empirical hypotheses vis-à-vis the theoretical and empirical literature in Chapters 1 and 2 of the thesis.

3.7 Choice of econometric methodology

The analysis proceeds in a series of methodological steps tailored to address the intricacies of panel data analysis, beginning with a check for cross-sectional dependence using the Pesaran et al. (2004) test. Cross-sectional dependence, a scenario where common factors or interdependencies influence individual units, is crucial to identify as it can impact the efficiency of estimates and lead to erroneous inferences. Subsequently, unit root tests, including the (Stata et al., 2023) test, Im-Pesaran-Shin (IPS) test, and Fisher-type tests, are employed to assess the stationarity of the data, a fundamental assumption in time series and panel data analysis. Cointegration testing follows, utilizing the Pedroni (2004) and Kao (1999) tests to examine the existence of long-term equilibrium relationships among variables, which is especially important when dealing with non-stationary data.

The analysis then proceeds to apply the Panel Autoregressive Distributed Lag (ARDL) methodology to explore both short-term and long-term dynamics between variables. This approach offers advantages in handling different orders of integration and provides estimates for immediate and long-term coefficients simultaneously, thus capturing the dynamic nature of relationships comprehensively. Subsequently, the study employs the Dumitrescu-Hurlin (D-H) panel causality test to ascertain the empirical direction of causal relationships, accounting for variations across cross-sections and robust to cross-sectional dependence.

To validate findings and ensure robustness, the study conducts several robustness checks using the difference GMM (D-K Model), Generalized Linear Model (GLM), Arellano-Bond, and Blundell-Bond estimators. These techniques address potential issues such as auto-correlation and heteroscedasticity, providing alternative estimation approaches that complement the main analysis. Each step in this methodological framework is meticulously chosen to navigate the complexities of panel data analysis, ensuring rigorous econometric analysis and enhancing the reliability and policy relevance of findings (Pesaran et al., 2004).

3.8 Baseline Equation

This study uses a panel data estimation framework to analyze the role of financial development, human capital, and economic growth in shaping the unemployment rate. This is done in order to verify empirically the hypotheses formally established in chapter 2 of the thesis. Panel data estimation methods are utilized. It is argued that panel regression estimation provides many advantages (Hsiao, 2022).

First, the study can employ panel estimation to control for unobserved variation. Second, when a large quantity of data is processed, the possibility of making errors is reduced. Third, using panel data partially solves the collinearity problem between the explanatory variables.

General estimated equation takes the following form:

$$y_{it} = \alpha_i z_i + \alpha_{it} x_{it} + \cdots + \varepsilon_{it} \text{ [1]}$$

Unemployment is a dependent variable (DV) represented by yit of country i and time t. Xit are explanatory variables (IV) while ε_{it} is the error term. The constant of the regression line is denoted with Zi and is affected by all observed and unobserved variables.

The following equation is formed to understand the link between human capital endowment, the level of financial development and economic growth, and the unemployment rate:

$$Unemp_{i,t} = \delta_0 + \delta_{i,t} FD_{i,t} + \delta_{i,t} FD^2{}_{i,t} + \delta_{i,t} HC_{i,t} + \delta_{i,t} EG_{i,t} + \sum_{t=1}^{t=n} \delta_{i,t}\, Controls_{i,t} + \varepsilon_{i,t} [2]$$

where, $Unemp_{i,t}$ represents one of four considered dependent variables, namely:

- total unemployment (as a percentage of the total labor force),
- female unemployment (as a percentage of the female labor force),
- male unemployment (as a percentage of the male labor force) and
- youth unemployment (as a percentage of youth labor force).

Whereas FD is measured of financial development and FD^2 is a squared term of financial development, $HC_{i,t}$ represents the human capital and EG approximates economic growth (log

diff of real GDP in dynamic sense). Whereas control variables include inflation (INF), ICT development (ICT), and trade (TRADE), etc.

We have already provided the first step of our empirical strategy by providing descriptive statistics and a correlation matrix between the key variables. Now, we are going forward to the next steps leading to the estimation of the models to verify the main research hypotheses.

3.9 Empirical Analysis

We have already provided the first step of our empirical strategy by providing descriptive statistics and a correlation matrix between the key variables. Now, we are going forward to the next steps leading to the estimation of the models to verify the main research hypotheses.

3.9.1 Cross-Sectional Dependence Tests

In Table 5, in line with the chosen empirical strategy, we present the findings of Pesaran et al. (2004) cross-section dependence tests. The current study's N = 34 > T=22 data set is an excellent example of why these tests are preferable. Cross-sectional dependence (CD) tests reveal that the abovementioned variables show their significance at the 1.00% level. Hence, we cannot accept the Ho of cross-sectional independence. Thus, sample countries provide evidence of the existence of cross-sectional correlation among all the variables. As a result, the findings supported the idea that there is a cross-sectional dependence among the variables across the entire sample.

Table 5 Results of Pesaran's (2004) cross-section dependence test

Variable	Test	P Value
UNEMP	24.77***	0.000
UNEMP F	21.72***	0.000
UNEMP M	25.83***	0.000
UNEMP Y	23.37***	0.000
FDDC	23.49***	0.000
HC	20.01**	0.000
EG	87.49***	0.000
INFL	58.09***	0.000
ICT	92.63**	0.000
TRADE	65.11**	0.000

Source: Own calculations in STATA.

3.9.2 Panel Unit Root Tests

The study employed panel unit root tests (henceforth PURT) to determine the stationarity of data and measure the integration of variables at the level I(0) or first difference I(1), which is essential to overcome the biased regression results (Granger & Newbold, 2014). Table 6 explains the output results of the PURT analysis. The analysis report expresses that the integration of the variables is shown at level I(1). However, a few are different but overall values indicate that all the factors are stationary at order one.

Table 6 Cross-sectional augmented ips (cips) unit root test

	Intercept	**Intercept and trend**
a). Level series		
UNEMP	-1.672	-2.136
UNEMP F	-2.04	-2.227
UNEMP M	-1.668	-2.165
UNEMP Y	-1.905	-2.202
FDDC	-2.587**	-3.145***
HC	-3.239***	-3.480**
EG	-1.870	-2.111
INFL	-3.848***	-3.977***
ICT	-1.95	-2.311
TRADE	-1.818	-1.983
b). First difference series		
UNEMP	-3.312***	-3.556***
UNEMP F	-3.654***	-3.842***
UNEMP M	-3.308***	-3.48***
UNEMP Y	-3.771***	-4.05***
FDDC	-4.106***	-4.061***
HC	-4.337***	-4.549***
EG	-3.194***	-3.29***
INFL	-4.797***	-4.72***
ICT	-3.454***	-3.521***
TRADE	-3.521***	-3.64***

Source: Own calculations in STATA.

For each variable, the significance of the test statistics indicates whether the variable is stationary or non-stationary at a given significance level. Additionally, it's important to note that the interpretation of the results should recognize that the variables are non-stationary but integrated at the first degree, implying the need for first differencing to achieve stationarity.

3.9.3 Cointegration Tests

We follow the next step of the chosen empirical strategy. The study employs the Pedroni (2004) test to analyze the cointegration between variables. The case of large *N* and small *T(N>T)* proves that the results are consistent. Table 7 declares the tested values, implying long-term cointegration among five tests is present. However, the remaining two tests are different. Moreover, the test results also align with the findings of the five cointegration tests, supporting the presence of long-run relationships among variables (Kao, 1999).

Table 7 Results of panel cointegration test

A). Predroni (1999; 2004)	
i). Within-Dimension Test Statistics	
V-Statistics	-1.146
Rho-Statistics	5.219***
PP-Statistics	2.165***
ADP-Statistics	6.766***
ii). Between-Dimension Test Statistics	
Rho-Statistics	7.285***
PP-Statistics	2.857**
ADP-Statistics	8.742**
B). Westerlund (2005)	
Variance ratio	3.6339***

Source: Own calculations in STATA.

3.9.4 Panel ARDL Estimates

Panel ARDL models are powerful tools for analyzing dynamic relationships in panel data. They provide insights into both short-term and long-term effects, account for cross-sectional heterogeneity, and can handle non-stationary variables with cointegration properties. It has to be stressed that panel ARDL models can be transformed into an error correction model (ECM) to directly estimate the speed of adjustment to the long-term equilibrium after a short-term shock (Hsiao, 2022).

Panel ARDL models can be estimated using techniques like Pooled Mean Group (PMG), Mean Group (MG), or Dynamic Fixed Effects (DFE) estimators. A panel ARDL testing approach helps examine the relationship between our key variables, in line with our empirical hypotheses, and the unemployment rate in the long run and for a short period.

We decide between the Pooled Mean Group (PMG) and Mean Group (MG) estimators using Hausman's test of slope homogeneity (Mensah & Boachie, 2023).

Tables 8-11 show the results of the ARDL estimates for the whole sample (Table 8) and various sub-samples considered, namely – developed states (Table 9), developing/emerging states (Table 10), and Western Balkan states (Table 11).

Overall, the results obtained point to the Conclusions that the PMG estimator brings more satisfactory results.

In the full sample, the PMG estimator infers the long-term effect of financial development on unemployment and is indicative of positive and meaningful results. On the other hand, the results indicate a negative and significant relationship between unemployment and the coefficient of financial development in the short term. Furthermore, the findings further point to the existence of an inverted U-shaped relationship between the extent of financial development and the unemployment rate.

These findings corroborate the theory (Apostolakis & Papadopoulos, 2019) that a well-developed financial sector contributes to high unemployment rates because it causes a shift in the economy from the real sector to the financial industry, leads to a rise in shareholders power vis-a-vis management and workers (affects corporate governance-related distribution of power), leads furthermore, to an increase in rentiers' profit claims, and a tightening of alignment between shareholders and managers. The result of all this is an increase in companies' reliance on short-term financial operations rather than long-term market share, sales, and productive investment for profit (Krippner, 2005; Van Treeck, 2009). It results in a decline in capital expenditures, worker bargaining strength, flat earnings, and employment (Crotty & Lee, 2006;

Hattori et al., 1975). In the longer perspective, however, financial growth reduces the cost of external financing, increases access to credit for more businesses, and boosts investment by increasing the likelihood that such businesses will succeed. The augmented capital accumulation, in turn, contributes to higher employment levels and thus lowers observed unemployment levels.

The obtained results reveal, at the same time, a negative impact of higher human capital endowment on the observed unemployment rate (Autor & Dorn, 2013).

The obtained coefficients point to a negative effect both in the long and short run, explaining that human capital endowment and unemployment are inversely related. This confirms our empirical hypothesis number 2 (De Stefano, 2015).

Thus, the results reveal that a better, better-skilled labor force efficiently reduces registered unemployment levels, whereas inferior-skilled labor can increase unemployment levels. Better skilled workers are more sought after in the labor market and are more elastic and mobile, both internally and externally (propensity to migrate) (Kuhn & Mansour, 2014).

The study's results convince us that skill development programs and worker training boost the opportunities for people at the individual (micro) level, which leads to a reduction in unemployment levels at the societal (macro) level (Vu, 2011).

The obtained results are in line with the results obtained by Nickell (1979), prevailing that the unemployment rate at the individual level is reduced with the increase in education attainment in the United Kingdom. Economic policymakers in many developing countries see a more highly qualified workforce as a key to enticing foreign investment and, by extension, creating new job possibilities. This perspective is particularly appealing to countries at the least developed stage. A low human capital base can be a source of potential developmental trap (Mankiw et al., 1992).

Empirically, the results are also consistent with D. R. Davis & Reeve (1997), who proved that education has an inverse effect on unemployment in a closed or open economy. Conversely, Wilson et al. (2004) and Kim et al. (2010) examined the effectiveness of training policies in decreasing the unemployment rate. The study concluded that changes to the labor market policy can improve labor market efficiency.

The results in Table 12 show that the coefficients on the level of economic development are negative in both the long and short run and statistically significant at 1%. The results point to the Conclusions that economic growth has a negative effect on the unemployment rate (Acemoglu, 2002).

The research infers that the presence of sustainable growth reduces the probability of joblessness. The findings are consistent with Okun's law, Amor & Hassine (2017) stating that the unemployment rate and economic growth show an inverse relationship. His efforts to illustrate the reciprocal relationship between the two analyzed variables were widely acknowledged (Chávez & Rodríguez-Puello, 2022).

Empirically, this study's results are robust, as are the results of several other studies (Abu, 2019). The author analyzed the productivity rate and its impact on job creation opportunities using econometric techniques, supporting Okun law in Nigeria. It established the connection between economic growth and unemployment.

Another study was conducted by Soylu et al. (2018) in Eastern European countries to examine the relationship between unemployment and economic development based on a sample period of 1992-2014. The study concluded that there was an inverse relationship between economic growth and unemployment.

From a theoretical and empirical point of view, the impact of ICT on unemployment could be more nuanced. On the one hand, ICT development can impact the labor market positively through job creation in ICT sectors (Vu, 2011) by impacting productivity as a generic technology and thus boosting growth perspectives (Jorgenson et al., 2008), enhanced labor market efficiency through for instance enhanced labor market matching of job seekers with job opportunities (Kuhn & Mansour, 2014) or creation of new businesses models (De Stefano, 2015). On the other hand, it could exert at least some negative impact, for instance, due to the impact of automation on job displacement (Autor & Dorn, 2013) or skill-biased technological change adversely affecting the unskilled workforce (Acemoglu, 2002).

Therefore, despite the positive net effect obtained, the result should be treated with some degree of caution as this could be related to the omittance of sectoral heterogeneity due to the limited granularity of the data. The theory of substitution is very consistent with these results. It supports the objectives of understanding the extent to which new technological equipment plays a role in replacing human labor (e.g., automation, robotization, currently IPA/RPA, and genAI in business services) (Hasija et al., 2023).

Similarly, the obtained results prove that there exists a long-term and short-term affiliation between inflation and the rate of unemployment, which is statistically significant at a 1.0% level. Overall, an increase in the inflation rate reduces the unemployment rate. The findings are consistent with the theoretical notion of the short-run Phillips curve discussed at length in Chapter One. Our results are generally in line with the empirical studies proving the existence of the nexus. For instance, Ball & Mazumder (2019) examined the connection

between inflation and unemployment and identified an inverse relationship. Using cointegration techniques, Reichel (2022) observed an inverse inflation and unemployment nexus in advanced countries such as the US and Japan. For obvious reasons, it is worth comparing the result with other empirical studies with a particular focus on the Western Balkans.

Gabeshi (2019), for instance, examining the period from 1991 to 2013 found evidence supporting the existence of a short-term Phillips Curve in Albania. The research highlighted that inflation and unemployment were inversely related during periods of economic transition. Weder et al. (2016), in turn, showed a significant but weak negative relationship between inflation and unemployment over 1996-2015 in the case of Bosnia and Herzegovina, indicative of the presence of a short-term Phillips Curve. Afzal & Awais (2010) obtained similar results for Montenegro, further affected by the adoption of the euro (euroization). Jovanović et al. (2023) obtained the same result for Serbia and (Omercevic & Nuroğlu, 2014) for North Macedonia. Results for Kosovo were mixed.

Finally, the ARDL results point to the negative impact, both in the long and short run, of international trade on the observed unemployment rate. The findings are theoretically consistent with Ricardo's work on comparative advantage.

For instance, according to Dutt et al. (2009), following the sources of comparative advantage in diverse fields, trade openness significantly affects unemployment. Dutt et al. (2009) show a negative link between trade and unemployment in a cross-country panel of data. The panel data study of Felbermayr et al. (2011) on 20 OECD nations points to the existence of a negative relationship between these two variables, as well.

Dutt et al. (2009) note that trade and Ricardian comparative advantage theory are closely intertwined; in this context, there is a chance of achieving trade through deregulation, leading to increased employment in the nation.

Conversely, Heckscher-Ohlin-based comparative advantage provides a path for trade liberalization to affect employment rates, particularly in labor-abundant economies, positively. The Heckscher-Ohlin model predicts that countries will specialize in producing goods that utilize their abundant factors of production. Furthermore, according to the related Stolper-Samuelson theorem (Stolper & Samuelson, 1941), this specialization leads to an increase in the real income of the abundant factor (e.g., labor) and a decrease in the real income of the scarce factor. Similarly, more modern theoretical approaches can accommodate the existence of the relationship as well. The so-called New Trade Theory, which includes models by (Krugman, 1979), emphasizes the role of economies of scale and network effects. It suggests

that international trade can lead to increased efficiency and innovation, potentially creating jobs in industries where a country has a comparative advantage.

Obviously, the interplay between trade and unemployment can be more nuanced and complex. Trade liberalization leading to greater trade intensity, can lead to structural adjustments in the labor market. While it can create jobs in export-oriented industries, it may also lead to job losses in industries that face increased competition from imports, especially in the short term, due to the displacement of workers in import-competing industries (Goldberg & Pavcnik, 2007). The net effect on unemployment depends on the ability of the labor market to reallocate resources efficiently (Davidson, C., & Matusz, S. J. (2004). What we observe in the present analysis is a net macro-level effect, as the study is done at macro and not mezzo or sectoral levels.

3.9.5 Analysis of subsamples (high-income, upper-middle-income countries, and the Balkan Region)

The impact of the level of financial development, human capital, and economic growth on unemployment in subsamples of high-income, upper-middle-income countries and the Western Balkan region is analyzed in Tables 8-12. The analysis reveals that a non-linear relationship between the extent of financial development and the unemployment rate exists in the case of the group of high-income as well as the WB region.

However, the results point to a weak non-linear nexus between financial development and the unemployment rate in upper-middle countries. The evidence supports the belief that financial development success is aligned with a strong financial system that can lower the cost of investing potential by increasing the prospects of generating and pooling savings, leading to better job creation (Beck et al., 2005). As a result, these factors support expanding the business world and increasing labor demand. Labor investors would be encouraged more, leading to sustainable production processes and chances of more job creation. Further analysis of developed and developing nations from the study highlighted that financial development is vital to increasing unemployment. However, a strong market-oriented financial system decreases the unemployment rate (D.-H. Kim et al., 2010).

Furthermore, the results revealed that human capital benefits upper-middle economies vis-à-vis high-income countries and the Balkan region. The results are supported by the idea of Wang & Yao (2003) research, who believed that economic productivity is highly dependent

on human capital. Investment in skill development programs is crucial to increasing skilled labor, which leads to the economic development of the countries (Aghion et al., 1999).

Likewise, the subsample analysis reveals the negative impact of economic development on unemployment in the short and long run for developed nations, upper-middle income, and the Balkan region. However, the results are more pronounced in middle-income economies and the Balkan region.

Table 8 The results of ARDL model (full sample)

	Total unemployment	Female unemployment	Male unemployment	Youth unemployment
Dependent Variable: ΔUNEMP				
FD	0.00702***	0.00664***	0.00646***	0.00404***
	(0.00115)	(0.00139)	(0.00118)	(0.00143)
HC	-0.399***	-0.539***	-0.324**	-0.376**
	(0.138)	(0.164)	(0.145)	(0.150)
EG	-1.653***	-1.427***	-1.697***	-0.656***
	(0.192)	(0.219)	(0.205)	(0.194)
INF	-0.0254***	-0.0220***	-0.0285***	-0.0206***
	(0.00409)	(0.00490)	(0.00402)	(0.00304)
ICT	-7.57e-05	-0.00116	0.00116	3.60e-05
	(0.000856)	(0.00109)	(0.000809)	(0.00103)
TRADE	-0.0184***	-0.0187***	-0.0197***	-0.0166***
	(0.00244)	(0.00281)	(0.00250)	(0.00260)
Short-run				
Error correction	-0.207***	-0.211***	-0.223***	-0.243***
	(0.0265)	(0.0221)	(0.0298)	(0.0243)
ΔFD	-0.00273***	-0.00937***	-0.00354***	-0.00341**
	(0.00105)	(0.00124)	(0.00121)	(0.00167)
ΔHC	-0.00309	0.114	0.0290	0.0405
	(0.0568)	(0.0771)	(0.0331)	(0.0403)
ΔEG	-1.952***	-1.919***	-2.221***	-2.373***
	(0.278)	(0.356)	(0.311)	(0.319)
ΔINF	-0.0120***	-0.0112***	-0.0122***	-0.00494
	(0.00343)	(0.00364)	(0.00369)	(0.00451)
ΔICT	-0.00354***	-0.00279***	-0.00400***	-0.00341***
	(0.000982)	(0.000975)	(0.00110)	(0.00107)
ΔTRADE	0.00533***	0.00603***	0.00532***	0.00651***
	(0.00148)	(0.00148)	(0.00162)	(0.00155)
CONS	9.819***	8.847***	10.81***	5.480***
	(1.267)	(0.927)	(1.452)	(0.542)
Number of observations	748.0	748.0	748.0	748.0
Number of countries	34.0	34.0	34.0	34.0
Hausman test	0.90875	0.11502	0.86900	0.04601

Notes: ARDL model results show the long-run and short-run effects of various economic factors on total, female, male, and youth unemployment. Significant variables include FD, HC, EG, INF, ICT, and TRADE, with consistent coefficients indicating their impact across different unemployment categories.

Source: Own calculations in STATA.

Table 9 The results of the ARDL model (high-income economies)

	Total unemployment	Female unemployment	Male unemployment	Youth unemployment
Dependent Variable: ΔUNEMP				
FD	0.00664***	0.00612***	0.00541***	0.00647***
	(0.00113)	(0.00141)	(0.00115)	(0.00121)
HC	-0.334**	-0.334**	-0.265*	-0.351***
	(0.132)	(0.153)	(0.140)	(0.121)
EG	-1.748***	-1.990***	-1.684***	-0.799***
	(0.201)	(0.223)	(0.215)	(0.150)
INF	-0.0205***	-0.0146	-0.0230***	-0.0162***
	(0.00599)	(0.00894)	(0.00575)	(0.00203)
ICT	-0.000406	3.02e-06	0.00108	-0.000160
	(0.000790)	(0.00128)	(0.000713)	(0.000903)
TRADE	-0.0176***	-0.0174***	-0.0205***	-0.00552***
	(0.00255)	(0.00289)	(0.00266)	(0.00176)
Short-run				
Error Correction	-0.238***	-0.212***	-0.255***	-0.337***
	(0.0345)	(0.0252)	(0.0409)	(0.0437)
ΔFD	-0.00170	-0.000232	-0.00280**	-0.00206
	(0.00110)	(0.00107)	(0.00141)	(0.00172)
ΔHC	0.0480	0.0404	0.0459	0.00810
	(0.0356)	(0.0390)	(0.0368)	(0.0487)
ΔEG	-2.213***	-1.921***	-2.531***	-2.345***
	(0.313)	(0.284)	(0.369)	(0.378)
ΔINF	-0.0173***	-0.0162***	-0.0178***	-0.0129**
	(0.00450)	(0.00464)	(0.00490)	(0.00577)
ΔICT	-0.00528***	-0.00445***	-0.00603***	-0.00445***
	(0.00120)	(0.00111)	(0.00137)	(0.00125)
ΔTRADE	0.00710***	0.00739***	0.00715***	0.00724***
	(0.00181)	(0.00179)	(0.00211)	(0.00205)
CONS	11.99***	12.00***	12.41***	8.399***
	(1.729)	(1.441)	(1.974)	(1.076)
Number of Observations	528.000	528.000	528.000	528.000
Number of Countries	24.000	24.000	24.000	24.000
Hausman Test	0.31378	0.32072	0.85595	0.56596

Notes: ARDL model results show the long-run and short-run effects of various economic factors on total, female, male, and youth unemployment. Significant variables include FD, HC, EG, INF, ICT, and TRADE, with consistent coefficients indicating their impact across different unemployment categories.

Source: Own calculations in STATA.

Table 10 The results of the ARDL model (developing countries)

	Total unemployment	Female unemployment	Male unemployment	Youth unemployment
Dependent Variable: ΔUNEMP				
FD	0.00265	0.00225	0.477	0.00406
	(0.00855)	(0.00561)	(0.787)	(0.00441)
HC	-4.159***	-3.045***	-48.45	-2.238*
	(1.382)	(0.894)	(81.39)	(1.224)
EG	-4.167***	-0.754***	3.490	0.375**
	(0.600)	(0.220)	(6.493)	(0.173)
INF	0.00787	0.0287**	0.248	0.00860
	(0.00790)	(0.0143)	(0.441)	(0.00766)
ICT	0.0159***	0.00628***	-0.0653	0.00206*
	(0.00300)	(0.00171)	(0.111)	(0.00111)
TRADE	-0.0340***	-0.0336***	-0.458	-0.0134***
	(0.00857)	(0.00536)	(0.732)	(0.00191)
Short-run				
Error Correction	-0.0930***	-0.244**	-0.00886***	-0.230**
	(0.0313)	(0.0971)	(0.00310)	(0.0917)
ΔFD	-0.000423	-0.244**	-0.00222	-0.00424
	(0.00331)	(0.0971)	(0.00200)	(0.00373)
ΔHC	-0.159	0.00575	0.0801	0.240*
	(0.227)	(0.00807)	(0.0634)	(0.138)
ΔEG	-0.911*	0.346*	-1.450***	-1.474**
	(0.489)	(0.195)	(0.441)	(0.695)
ΔINF	0.000582	-0.820	-0.000291	0.000831
	(0.00163)	(1.318)	(0.00195)	(0.00214)
ΔICT	-0.00192*	-0.00510**	6.38e-05	0.000886
	(0.00102)	(0.00209)	(0.00118)	(0.00150)
ΔTRADE	0.000332	0.000536	0.00173	0.00117
	(0.00219)	(0.00199)	(0.00182)	(0.00258)
CONS	10.86***	7.720***	0.877***	0.567**
	(3.663)	(2.988)	(0.300)	(0.230)
Number of Observations	220.000	220.000	220.000	220.000
Number of Countries	10.000	10.000	10.000	10.000
Hausman Test	0.67899	0.36071	0.81739	0.92134

Notes: ARDL model results show the long-run and short-run effects of various economic factors on total, female, male, and youth unemployment. Significant variables include FD, HC, EG, INF, ICT, and TRADE, with consistent coefficients indicating their impact across different unemployment categories.

Table 11 The results of the ARDL model (Balkan Region)

	Total unemployment	Female unemployment	Male unemployment	Youth unemployment
Dependent Variable: ΔUNEMP				
FD	0.0322***	0.00193	0.0235***	0.00536***
	(0.00391)	(0.00250)	(0.00347)	(0.00128)
HC	-0.349*	-0.607***	-0.138	-0.152
	(0.209)	(0.213)	(0.225)	(0.0964)
EG	-0.630*	-2.937***	-0.905**	-2.225***
	(0.364)	(0.281)	(0.362)	(0.146)
INF	-0.0330***	0.00585	-0.0345***	-0.00340
	(0.00291)	(0.0135)	(0.00335)	(0.00904)
ICT	-0.0116***	0.00675***	-0.00730***	0.00238*
	(0.00168)	(0.00241)	(0.00179)	(0.00133)
TRADE	-0.0277***	-0.0200***	-0.0248***	-0.0121***
	(0.00338)	(0.00366)	(0.00365)	(0.00196)
Short-run				
Error Correction	-0.200***	-0.188***	-0.238***	-0.268***
	(0.0583)	(0.0403)	(0.0593)	(0.0700)
ΔFD	-0.00964**	-0.188***	-0.0107**	-0.00436*
	(0.00427)	(0.0403)	(0.00438)	(0.00260)
ΔHC	0.0792**	0.00391	0.0818***	0.0231
	(0.0359)	(0.00449)	(0.0263)	(0.0424)
ΔEG	-1.807***	0.0396	-2.079***	-1.918***
	(0.550)	(0.0856)	(0.524)	(0.653)
ΔINF	-0.00418	-1.233*	-0.00324	0.00347
	(0.00337)	(0.666)	(0.00274)	(0.00441)
ΔICT	-0.000407	-0.00375	9.18e-05	-0.00333*
	(0.00125)	(0.00344)	(0.00110)	(0.00201)
ΔTRADE	0.00684***	-0.00420***	0.00780***	0.00369
	(0.00262)	(0.00137)	(0.00264)	(0.00292)
CONS	4.305***	14.61***	6.498***	16.03***
	(1.290)	(3.309)	(1.647)	(4.349)
Number of Observations	220.000	220.000	220.000	220.000
Number of Countries	10.000	10.000	10.000	10.000
Hausman Test	0.37750	0.37506	0.56463	0.53273

Notes: ARDL model results show the long-run and short-run effects of various economic factors on total, female, male, and youth unemployment. Significant variables include FD, HC, EG, INF, ICT, and TRADE, with consistent coefficients indicating their impact across different unemployment categories.

Panel Causality Results

Furthermore, our tests explore the pairwise causality of parameters in the panel setting through the Dumitrescu and Hurlin (2012) or the D-H test. The Dumitrescu and Hurlin (2012) test is a panel data causality test used to detect causality in the Granger sense in heterogeneous panel datasets. This test extends the traditional Granger causality test to panel data, accommodating both cross-sectional dependence and heterogeneity among panel units.

The results are provided in Table 12. The H_o of the test supports the non-existence of unidirectional causal relationships among individual variables in the panel data. Due to a short data span, in our study, we employed lag order one taken from the study of Zivkovic et al. (2020). The results of the D-H test reveal a unidirectional relationship between financial development, human capital, economic growth, and the unemployment rate. Still, the opposite does not hold for the whole sample.

Table 12 Results for d-h Granger causality test

X → Y	UNEMP	FD	HC	EG	INF	ICT	TRADE
UNEMP	-	√	√	√	√	√	√
FD	√	-	√	√	√	√	√
HC	√	√	-	×	×	√	√
EG	√	√	×	-	√	×	√
INF	√	√	√	√	-	×	√
ICT	√	×	×	×	×	-	√
TRADE	√	×	×	×	×	×	-

Source: Own calculations in STATA.

3.9.6 Analysis of whole and subsamples based on static panel estimation model

Table 13-20 report the results utilizing static panel estimation techniques such as Driscoll-Kraay (D-K) and Generalized Linear Models (GLM) estimators. These are applied to produce consistent and efficient results even in the presence of cross-sectional dependency. The Driscoll-Kraay estimator provides a robust method for adjusting standard errors in panel data models, accounting for both cross-sectional dependence and serial correlation. It is best suited for linear setups. The D-K estimator provides robust standard errors that account for cross-sectional dependence, serial correlation, and heteroskedasticity. It is typically used with linear panel data models, such as fixed effects (FE) or random effects (RE) models. It performs well in finite samples, making it suitable for practical applications with limited data (Driscoll & Kraay, 1998).

GLMs can handle various types of dependent variables and distributions, including binary, count, and continuous outcomes. It is suitable for different types of models beyond linear, including testing non-linear relationships or when the DV follows a non-normal distribution. It is worth noting that both methods can address heterogeneity, but they do so in different ways. The D-K estimator provides robust standard errors, while GLMs can include random effects or use robust standard errors to address heterogeneity.

In the full sample (Table 13), the sign on the level of financial development is positive. At the same time, the coefficient on the squared term is negative, pointing to a non-linear inverted U-shaped relationship between the level of financial development and the unemployment rate. Figure 8 in the Appendix also suggests the non-linear nexus between unemployment and financial development.

The results are consistent with the notion of Y. E. Kim (2022), who briefly discussed that financial development is correlated with labor demand. Credit market inconsistency reduced the chances of borrowing for businesses, which increased the hurdles for entrepreneurs to manage their capital, and they would only offer a few jobs. At an early stage, financial development is not consistent with job hiring. However, it positively affects job creation in the later years. Consequently, the overall employment level would be improved.

Further, the results suggest that the impact of human capital endowment (accumulation) is statistically significant in the case of DK and GLM estimators, with few exceptions. The findings are aligned with the results of the study of Qazi et al. (2017), who observed the sampling data from Pakistan from 1972 to 2013 with the Johansen cointegration approach. The

study found the impact of higher education on unemployment and proved that human capital accumulation significantly reduced unemployment in the long run. Similar results were identified in the study by Hina Ali et al. (2021) while analyzing the impact of female labor force participation with increased education.

Similarly, the coefficients on economic growth are statistically significant at 1% across four proxies of unemployment, suggesting a strong negative impact of economic growth on joblessness opportunities. The results are consistent with the theoretical notion of literature that the relationship between economic growth and the unemployment rate is inverted (Billi, 2020). Following the formulation of Okun's law (Okun, 1962), it has been discovered theoretically that the unemployment rate and economic growth show an inverse relationship. His efforts to illustrate the reciprocal relationship between two variables were widely acknowledged (Chávez & Rodríguez-Puello, 2022). Similarly, Chand et al.(2018) argued that increasing the economic rate and productive labor force supports enhancing the employability rate in a country. Likewise, Al-Habees & Rumman (2012) employed the simple model of Okun law to observe the connection between employment and economic growth in Arab countries.

In the case of subsamples, the results supported the previous findings, suggesting a strong non-linear relationship between financial development and unemployment rate in high-income economies and the Balkan region. Meanwhile, there is a weak association in upper middle markets. Human capital shows a statistically significant relationship with unemployment. However, the robustness tests suggest this relationship could be more consistent across subsamples and estimation models. Similarly, economic growth has persistent behavior across four proxies of unemployment and subsamples. For instance, the coefficient value of (β = -0.167, p <.01, respectively) in the full sample suggests that one unit change in economic growth increases unemployment by 0.167 units. The negative coefficient value indicates that the variable moves in the opposite direction. In other words, economic growth reduces the unemployment rate.

Overall, this study's findings are consistent with the notion that financial development has a non-linear relationship with unemployment. Furthermore, the findings also revealed an inverse relationship between human capital and joblessness opportunities in full and subsamples of European countries. Similarly, the results are consistent with the notion that economic development positively reduces the unemployment rate in a full sample and high-income and upper-middle economies.

Table 13 D-K results (full sample)

VARIABLES	l_UNEMP	l_UNEMP_F	l_UNEMP_M	l_UNEMP_Y
FDDC	0.00956***	0.00463*	0.00625**	0.00569**
	(0.00192)	(0.00239)	(0.00280)	(0.00242)
FDDC2	-0.440***	-0.134*	-0.131	-0.174**
	(0.0750)	(0.0667)	(0.0825)	(0.0670)
HC	-0.257**	-0.125	-0.0284	-0.0971
	(0.0984)	(0.0982)	(0.121)	(0.102)
l_EG	-0.167***	-0.807***	-0.977***	-0.581**
	(0.00920)	(0.281)	(0.273)	(0.232)
INF	-0.00359	-0.00574	-0.00274	-0.00153
	(0.00338)	(0.00371)	(0.00241)	(0.00232)
ICT	-0.000761	0.000511	0.00232*	0.00192
	(0.000509)	(0.00136)	(0.00132)	(0.00120)
TRADE	-0.00477***	0.00139	0.00341**	0.00196**
	(0.000400)	(0.00126)	(0.00123)	(0.000910)
CONSTANT	7.125***	22.40***	25.82***	17.12***
	(0.381)	(6.800)	(6.580)	(5.568)
R-squared	0 .417	0.360	0.354	0.312
F-Stats (p-value)	0.0000	0.0000	0.0000	0.0000
Observations	748	748	748	748
Number of groups	34	34	34	34

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Notes: Driscoll-Kraay (D-K) regression results for the full sample, indicating the effects of FDDC, FDDC2, HC, l_EG, Infl, ICT, and Trade on total, female, male, and youth unemployment. Significant variables include FDDC, FDDC2, l_EG, and Trade, with R-squared values and F-Stats confirming the model's explanatory power.

Table 14 D-K results (high-income countries)

VARIABLES	l_UNEMP	l_UNEMP_F	l_UNEMP_M	l_UNEMP_Y
FDDC	0.00750**	0.00593**	0.00880**	0.00851***
	(0.00275)	(0.00235)	(0.00320)	(0.00274)
FDDC2	-0.176**	-0.147**	-0.198**	-0.248***
	(0.0715)	(0.0576)	(0.0867)	(0.0719)
HC	-0.0378	-0.109	0.0222	-0.0580
	(0.132)	(0.119)	(0.149)	(0.128)
EG	-1.586***	-1.480***	-1.727***	-1.059***
	(0.224)	(0.235)	(0.221)	(0.250)
INFL	-0.0253**	-0.0229***	-0.0272**	-0.0253**
	(0.00970)	(0.00798)	(0.0115)	(0.0101)
ICT	0.000460	-0.000273	0.00135	0.000536
	(0.00110)	(0.00113)	(0.00111)	(0.00128)
TARDE	0.00769***	0.00668***	0.00863***	0.00579***
	(0.00111)	(0.000983)	(0.00138)	(0.00102)
CONSTANT	41.75***	39.60***	44.89***	29.14***
	(5.702)	(5.903)	(5.702)	(6.366)
R-squared	0.3752	0.353	0.376	0.289
F-Stats (p-value)	0.000	0.000	0.000	0.000
Observations	528	528	528	528
No. of Countries	24	24	24	24

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Note: Driscoll-Kraay (D-K) regression results for high-income countries indicate the effects of FDDC, FDDC2, HC, l_EG, Infl, ICT, and Trade on total, female, male, and youth unemployment. Significant variables include FDDC, zee_FDDC2, l_EG, and Trade, with R-squared values and F-Stats confirming the model's explanatory power.

Table 15 D-K results (upper and upper-middle-income countries)

VARIABLES	l_UNEMP	l_UNEMP_F	l_UNEMP_M	l_UNEMP_Y
FDDC	-0.0113***	0.00842	-0.0108***	-0.0123***
	(0.00338)	(0.00564)	(0.00337)	(0.00349)
FDDC2	0.547	-1.096**	0.550	0.517
	(0.385)	(0.394)	(0.395)	(0.303)
HC	0.0342	-0.0949	0.0146	0.0473
	(0.238)	(0.218)	(0.241)	(0.216)
l_EG	-0.528***	-0.487**	-0.561***	-0.330**
	(0.151)	(0.194)	(0.180)	(0.152)
INF	0.000905	-0.00308	0.000617	0.00151*
	(0.000762)	(0.00280)	(0.000781)	(0.000826)
ICT	0.00175*	0.000971	0.00213*	0.00236**
	(0.000979)	(0.00136)	(0.00111)	(0.00104)
TRADE	-0.00125	-0.00428*	-0.000466	-0.000710
	(0.00242)	(0.00241)	(0.00246)	(0.00220)
CONST	15.74***	13.55**	16.43***	11.66***
	(3.601)	(4.904)	(4.174)	(3.542)
R-squared	0.2589	0.2347	0.2058	0.1320
F-Stats (p-value)	0.000	0.000	0.000	0.000
Observations	220	220	220	220
No. of Countries	10	10	10	10

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Note: Driscoll-Kraay (D-K) regression results for upper and middle-income countries, indicating the effects of FDDC, FDDC2, HC, l_EG, Infl, ICT, and Trade on total, female, male, and youth unemployment. Significant variables include FDDC, FDDC2, l_EG, and Trade, with R-squared values and F-Stats confirming the model's explanatory power.

Table 16 D-K results (Western Balkan Region)

VARIABLES	l_UNEMP	l_UNEMP_F	l_UNEMP_M	l_UNEMP_Y
FDDC	-0.00754**	-0.00264	-0.00810*	-0.00602*
	(0.00349)	(0.00396)	(0.00443)	(0.00334)
FDDC2	1.320***	1.195***	1.181***	0.958***
	(0.301)	(0.374)	(0.356)	(0.232)
HC	-0.0679	-0.0625	-0.0996	0.0903
	(0.123)	(0.161)	(0.120)	(0.114)
EG	-0.376***	-0.357***	-0.381***	-0.252***
	(0.0215)	(0.0296)	(0.0235)	(0.0202)
INF	-0.00522***	-0.00288	-0.00601***	-0.00747***
	(0.00180)	(0.00177)	(0.00158)	(0.00170)
ICT	-0.00134*	-0.00181**	-0.00121**	-0.000255
	(0.000739)	(0.000753)	(0.000537)	(0.000613)
TRADE	-0.00772***	-0.00859***	-0.00687***	-0.00926***
	(0.00101)	(0.00114)	(0.000923)	(0.000968)
Constant	13.83***	13.19***	13.85***	10.93***
	(0.597)	(0.873)	(0.688)	(0.573)
R-squared	0.335	0.380	0.365	0.372
F-Stats (p-value)	0.000	0.000	0.000	0.000
Observations	220	220	220	220
No. of Countries	10	10	10	10

Note: Driscoll-Kraay (D-K) regression results for the western Balkan region, indicating the effects of FDDC, zee_FDDC2, HC, l_EG, Infl, ICT, and Trade on total, female, male, and youth unemployment. Significant variables include FDDC, FDDC2, l_EG, and Trade, with R-squared values and F-Stats confirming the model's explanatory power.

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 17 GLM results (full sample)

	l_UNEMP	l_UNEMP_F	l_UNEMP_M	l_UNEMP_Y
FDDC	0.00956***	0.0118***	0.00964***	0.00805***
	(0.00118)	(0.00138)	(0.00123)	(0.00123)
FDDC2	-0.440***	-0.497***	-0.456***	-0.432***
	(0.0477)	(0.0557)	(0.0496)	(0.0494)
HC	-0.257***	-0.345***	-0.155**	-0.487***
	(0.0651)	(0.0761)	(0.0678)	(0.0675)
EG	-0.167***	-0.165***	-0.173***	-0.125***
	(0.0100)	(0.0117)	(0.0104)	(0.0104)
INF	-0.00359**	-0.0168***	-0.00188	-0.00380**
	(0.00177)	(0.00206)	(0.00184)	(0.00183)
ICT	-0.000761	-0.00171***	-0.000367	0.000778
	(0.000477)	(0.000557)	(0.000497)	(0.000494)
TRADE	-0.00477***	-0.00512***	-0.00470***	-0.00402***
	(0.000290)	(0.000338)	(0.000301)	(0.000300)
CONSTANT	7.125***	7.362***	6.883***	7.458***
	(0.286)	(0.334)	(0.298)	(0.296)
OBSERVATIONS	748	748	748	748
NO. OF COUNTRIES	34.000	34.000	34.000	34.000

Note: Generalized Linear Model (GLM) results highlight the impact of FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. Significant variables include FDDC, FDDC2, HC, EG, INF, and TRADE, with standard errors reported in parentheses and significance levels indicated.

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 18 GLM results (high-income countries)

VARIABLES	L_UNEMP	L_UNEMPF	L_UNEMPM	L_UNEMPY
FDDC	0.00785***	0.00785***	0.00797***	0.00616***
	(0.00120)	(0.00122)	(0.00129)	(0.00131)
FDDC2	-0.371***	-0.356***	-0.388***	-0.365***
	(0.0465)	(0.0472)	(0.0500)	(0.0508)
HC	-0.316***	-0.441***	-0.198***	-0.558***
	(0.0604)	(0.0613)	(0.0649)	(0.0659)
EG	-0.0816***	-0.0659***	-0.0966***	-0.0657***
	(0.0129)	(0.0131)	(0.0138)	(0.0140)
INF	-0.0309***	-0.0334***	-0.0290***	-0.0238***
	(0.00555)	(0.00563)	(0.00596)	(0.00605)
ICT	-0.00252***	-0.00341***	-0.00171**	-0.000257
	(0.000673)	(0.000683)	(0.000723)	(0.000734)
TRADE	-0.00346***	-0.00323***	-0.00364***	-0.00310***
	(0.000306)	(0.000311)	(0.000329)	(0.000334)
Constant	5.296***	5.385***	5.201***	6.314***
	(0.371)	(0.376)	(0.398)	(0.404)
Observations	528	528	528	528
No of Countries	24	24	24	24

Note: Generalized Linear Model (GLM) results highlight the impact of FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. Significant variables include FDDC, FDDC2, HC, EG, INF, and TRADE, with standard errors reported in parentheses and significance levels indicated.

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 19 GLM results (upper and upper middle-income countries)

VARIABLES	l_UNEMP	l_UNEMP_F	l_UNEMP_M	l_UNEMP_Y
FDDC	0.00508	0.0311***	0.00458	0.00433
	(0.00470)	(0.00638)	(0.00481)	(0.00502)
FDDC2	0.339	-1.453***	0.396	0.385
	(0.396)	(0.538)	(0.406)	(0.423)
HC	0.296	0.467	0.0852	0.310
	(0.291)	(0.396)	(0.298)	(0.311)
EG	-0.353***	-0.374***	-0.339***	-0.248***
	(0.0348)	(0.0472)	(0.0356)	(0.0371)
INF	0.000854	-0.00821***	0.00149	9.05e-05
	(0.00185)	(0.00251)	(0.00189)	(0.00197)
ICT	-3.29e-05	0.000330	-0.000249	0.00114*
	(0.000615)	(0.000836)	(0.000630)	(0.000657)
TRADE	-0.00361***	-0.0152***	-0.000874	-0.00450***
	(0.00134)	(0.00183)	(0.00138)	(0.00143)
CONSTANT	10.36***	9.078***	10.49***	8.594***
	(1.237)	(1.681)	(1.267)	(1.321)
Observations	220	220	220	220
No. of Countries	10	10	10	10

Note: Generalized Linear Model (GLM) results highlight the impact of FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. Significant variables include FDDC, FDDC2, HC, EG, INF, and TRADE, with standard errors reported in parentheses and significance levels indicated.

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 20 GLM results (Western Balkan Region)

VARIABLES	l_UNEMP	l_UNEMP_F	l_UNEMP_M	l_UNEMP_Y
FDDC	-0.00754**	-0.00264	-0.00810**	-0.00602*
	(0.00342)	(0.00366)	(0.00353)	(0.00328)
FDDC2	1.320***	1.195***	1.181***	0.958***
	(0.256)	(0.274)	(0.264)	(0.245)
HC	-0.0679	-0.0625	-0.0996	0.0903
	(0.155)	(0.166)	(0.160)	(0.148)
EG	-0.376***	-0.357***	-0.381***	-0.252***
	(0.0201)	(0.0215)	(0.0208)	(0.0193)
INFL	-0.00522*	-0.00288	-0.00601**	-0.00747***
	(0.00271)	(0.00290)	(0.00280)	(0.00260)
ICT	-0.00134**	-0.00181***	-0.00121*	-0.000255
	(0.000647)	(0.000693)	(0.000668)	(0.000620)
TRADE	-0.00772***	-0.00859***	-0.00687***	-0.00926***
	(0.00118)	(0.00126)	(0.00122)	(0.00113)
CONSTANT	13.83***	13.19***	13.85***	10.93***
	(0.692)	(0.742)	(0.715)	(0.663)
OBSERVATIONS	220	220	220	220
NO. OF COUNTRIES	10	10	10	10

Note: Generalized Linear Model (GLM) results highlight the impact of FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. Significant variables include FDDC, FDDC2, HC, EG, INF, and TRADE, with standard errors reported in parentheses and significance levels indicated.

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

3.9.7 Analysis of the whole sample and the subsamples based on the Dynamic Panel Estimation Methods

Hsiao (2022) suggested several advantages of employing panel regression estimation. The first benefit of this estimation is to account for unobserved heterogeneity. Secondly, a large number of observations provide more degrees of freedom. Thirdly, using a panel framework allows non-observable country-specific features that may be correlated with the exogenous variables (Renzhi & Baek, 2020). Persistence observed in many macro variables cannot be fully addressed when we utilize only static estimation techniques. Thus, following dynamic panel data estimation techniques (Anjum & Perviz, 2016), for instance, allows us to obtain unbiased and efficient results.

Therefore, as a robustness check for the results utilized so far, we will now utilize dynamic panel data estimation techniques – namely, difference GMM and system GMM. These are well-suited for models where the dependent variable is influenced by its past values (dynamic models). This is the case in the present study. A high unemployment rate in one period makes a high rate in the following periods more likely.

Difference GMM transforms the model by taking the first differences of the variables to eliminate time-invariant unobserved heterogeneity. Introduced by Arellano & Bond (1991), it helps address potential biases arising from unobserved heterogeneity, endogeneity, and the dynamic nature of the panel data.

The transformation removes individual-specific effects but introduces potential endogeneity if the lagged differences are correlated with the differenced error term. Lagged levels of the endogenous variables are used as instruments for the differenced endogenous variables. When the series is highly persistent, however, the lagged levels may be weak instruments for the differenced variables, leading to biased and inefficient estimates. Differencing, as is always the case, can lead to a loss of long-term information and reduce the variation available for estimation.

System Generalized Method of Moments (System GMM) is nowadays a popular estimation technique used for dynamic panel data models. It addresses potential biases arising from endogeneity, unobserved heterogeneity, and dynamic panel data characteristics. System GMM combines the differenced equations with the original level equations to form a system of equations. This approach uses both levels and the first differences to improve efficiency.

System GMM effectively deals with endogeneity by using internal instruments derived from the lagged values of the dependent and independent variables (Arellano & Bond, 1991). By

differencing the equations, System GMM removes time-invariant unobserved heterogeneity, which might otherwise bias the results (Blundell & Bond, 1998). The technique uses both level and differenced equations, enhancing the efficiency of the estimator by increasing the number of valid instruments.

By using lagged instruments, System GMM can also mitigate biases arising from measurement errors in the explanatory variables. At the same time, system GMM assumes no second-order serial correlation in the error terms. Violation of this assumption can lead to inconsistent estimates. This requires robust diagnostic testing (e.g., the Arellano-Bond test) to verify (Arellano & Bond, 1991). The results of System GMM are sensitive to the choice of instruments and the specification of the model. Incorrect specification can lead to biased results, making it crucial to carefully consider the model structure and instrument validity (Windmeijer, 2005).

Tables 21-28 present the estimation results of the dynamic panel models. The post-estimation tests reveal that the models are appropriately specified, and there is no issue with second-order serial correlation. The results once again support the notion that financial development has a non-linear impact on the unemployment rate. At the same time, consistent with previous findings, difference GMM (Tables 21-24) and system GMM results (Tables 25-28), the results reveal a non-persistent negative impact of human capital accumulation and economic growth on unemployment.

Table 21 Difference GMM results (full sample)

	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
Ll_UNEMP	0.773***			
	(0.0250)			
L.l_UNEMP_F		0.672***		
		(0.0275)		
L.l_UNEMP_M			0.747***	
			(0.0265)	
L.l_UNEMP_Y				0.693***
				(0.0306)
FDDC	0.00367***	0.00419***	0.00414***	0.00417***
	(0.000487)	(0.000483)	(0.000523)	(0.000353)
FDDC2	-0.0420*	-0.123***	-0.0543*	-0.0647***
	(0.0247)	(0.0292)	(0.0293)	(0.0207)
HC	0.0666***	0.0813***	0.0694***	0.0525***
	(0.0182)	(0.0120)	(0.0184)	(0.0174)
EG	-0.230***	-0.360***	-0.309***	-0.143**
	(0.0728)	(0.0861)	(0.0772)	(0.0614)
INF	-0.00188**	-0.00997***	-0.00171**	-0.00188***
	(0.000817)	(0.00130)	(0.000759)	(0.000458)
ICT	0.00122***	0.000706***	0.00182***	0.000797***
	(0.000351)	(0.000258)	(0.000304)	(0.000269)
TRADE	-0.00348***	-0.00253***	-0.00379***	-0.00310***
	(0.000492)	(0.000494)	(0.000623)	(0.000565)
CONST	6.060***	9.490***	8.039***	4.339***
	(1.800)	(2.151)	(1.892)	(1.557)
Wald Test(p-value)	0.000	0.000	0.000	0.000
AR (1)	0.04753	0.10932	0.04361	0.05984
AR (2)	0.08380	0.32602	0.32516	0.94019
Hensen Test	0.92481	0.06038	0.02324	0.01075
Observations	748	748	748	748
Number of ids	34	34	34	34

Note: Difference Generalized Method of Moments (GMM) results, examining the influence of various factors on total, female, male, and youth unemployment. Significant variables include lagged unemployment (L.l_unemp), FDDC, FDDC2, HC, EG, INF, ICT, and TRADE, with all models passing the Wald test and standard errors provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. . L. stands for lagged values.

Table 22 Difference GMM results (developed countries)

	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
Ll_UNEMP	0.716***			
	(0.0353)			
L.l_UNEMP_F		0.702***		
		(0.0487)		
L.l_UNEMP_M			0.707***	
			(0.0255)	
L.l_UNEMP_Y				0.620***
				(0.0291)
FDDC	0.00430***	0.00361***	0.00386***	0.00363***
	(0.000913)	(0.000805)	(0.000973)	(0.00102)
FDDC2	-0.0699*	-0.0746	-0.0469	-0.0380
	(0.0383)	(0.0570)	(0.0421)	(0.0503)
HC	0.0625	0.0913	0.175	0.170
	(0.105)	(0.124)	(0.137)	(0.174)
EG	-0.389***	-0.471***	-0.438***	-0.269**
	(0.136)	(0.143)	(0.0905)	(0.132)
INF	-0.0176***	-0.0153***	-0.0167***	-0.0187***
	(0.00232)	(0.00214)	(0.00312)	(0.00243)
ICT	0.000872	0.000394	0.00197***	0.000671
	(0.000757)	(0.000345)	(0.000723)	(0.000660)
TRADE	-0.00224***	-0.00105	-0.00267***	-0.00162*
	(0.000863)	(0.000725)	(0.000627)	(0.000907)
CONST	10.31***	12.40***	11.18***	7.399**
	(3.593)	(3.778)	(2.416)	(3.579)
Wald Test(p-value)	0.0000	0.0000	0.0000	0.0000
AR(1)	0.06358	0.06497	0.06128	0.04049
AR(2)	0.73846	0.02679	0.34188	0.75274
Hensen Test	0.96919	0.56301	0.89768	0.37168
Observations	480	480	480	480
Number of ids	24	24	24	24

Note: Difference Generalized Method of Moments (GMM) results, examining the influence of various factors on total, female, male, and youth unemployment. Significant variables include lagged unemployment (L.l_unemp), FDDC, FDDC2, HC, EG, INF, ICT, and TRADE, with all models passing the Wald test and standard errors provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. L. stands for lagged values.

Table 23 Difference GMM results (developing countries)

VARIABLES	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
L.L_UNEMP	-0.199			
	(0.601)			
L.L_UNEMP_F		0.0885		
		(0.633)		
L.L_UNEMP_M			-0.476	
			(0.809)	
L.L_UNEMP_Y				0.829***
				(0.0731)
L2.L_UNEMP_Y				-0.137**
				(0.0639)
FDDC	0.0175	0.00707	0.00817	0.00259
	(0.0116)	(0.00872)	(0.0225)	(0.00172)
FDDC2	-1.849*	-1.059	-1.243	-0.0402
	(1.031)	(0.852)	(1.507)	(0.128)
HC	1.291**	1.555	2.760	-0.0102
	(0.632)	(1.258)	(2.837)	(0.129)
EG	-0.0132	-0.545	-0.0535	-0.114
	(0.546)	(1.370)	(1.071)	(0.0706)
INF	0.00285	0.00128	0.00632	0.00203
	(0.00184)	(0.00612)	(0.00663)	(0.00147)
ICT	-0.000429	0.000636	0.000425	0.000565
	(0.00125)	(0.00204)	(0.00212)	(0.000476)
TRADE	-0.00257	-0.00659	-0.00245	-0.00424***
	(0.00190)	(0.00565)	(0.00359)	(0.000764)
Constant	-2.172	9.892	-4.362	3.941**
	(13.93)	(32.44)	(25.49)	(1.701)
Wald Test(p-value)	0.000	0.000	0.000	0.000
AR(1)	0.058683	0.207334	0.099598	0.297518
AR(2)	0.656260	0.814824	0.449531	0.258014
Hensen Test	0.442754	0.188019	0.509715	0.718685
Observations	200	200	200	200
Number of ids	10	10	10	10

Note: Difference Generalized Method of Moments (GMM) results, examining the influence of various factors on total, female, male, and youth unemployment. Significant variables include lagged unemployment (L.l_unemp), FDDC, FDDC2, HC, EG, INF, ICT, and TRADE, with all models passing the Wald test and standard errors provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. . L. stands for lagged values.

Table 24 Difference GMM (Western Balkan Region)

VARIABLES	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
L.L_UNEMP	0.301			
	(0.431)			
L.L_UNEMP_F		-0.500		
		(0.741)		
L.L_UNEMP_M			0.293	
			(0.290)	
L.L_UNEMP_Y				0.716***
				(0.0434)
FDDC	-0.0197	0.000359	-0.00191	0.00299**
	(0.0235)	(0.0198)	(0.00975)	(0.00149)
FDDC2	2.182	-0.0779	0.332	0.0179
	(2.335)	(2.015)	(0.943)	(0.131)
HC	-1.503	0.132	-0.705	0.00595
	(1.404)	(1.371)	(0.771)	(0.0706)
EG	-2.452	0.572	-2.740*	-0.229**
	(1.545)	(1.441)	(1.480)	(0.105)
INF	-0.0102*	0.000477	-0.00903**	-0.00312**
	(0.00571)	(0.00560)	(0.00410)	(0.00157)
ICT	0.00190*	-0.00330*	0.00216**	0.000705
	(0.00115)	(0.00191)	(0.00100)	(0.000505)
TRADE	0.00252	-0.00264	0.00427	-0.00451***
	(0.00462)	(0.00513)	(0.00568)	(0.000887)
CONST	67.40	-9.719	69.80*	6.669***
	(43.72)	(40.45)	(38.42)	(2.500)
Wald Test(p-value)	0.0000	0.0000	0.0000	0.0000
AR(1)	0.34820	0.87061	0.82548	0.62778
AR(2)	0.42576	0.91420	0.83360	0.36251
Hensen Test	0.87628	0.55023	0.94271	0.54775
Observations	200	200	200	200
Number of ids	10	10	10	10

Note: Difference Generalized Method of Moments (GMM) results, examining the influence of various factors on total, female, male, and youth unemployment. Significant variables include lagged unemployment (L.l_unemp), FDDC, FDDC2, HC, EG, INF, ICT, and TRADE, with all models passing the Wald test and standard errors provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. L. stands for lagged values.

Table 25 Difference GMM (full sample)

	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
L.L_UNEMP	0.824***			
	(0.0161)			
L.L_UNEMP_F		0.731***		
		(0.0206)		
L.L_UNEMP_M			0.818***	
			(0.0173)	
L.L_UNEMP_Y				0.752***
				(0.0222)
FDDC	0.00456***	0.00543***	0.00474***	0.00486***
	(0.000440)	(0.000689)	(0.000488)	(0.000566)
FDDC2	-0.0523**	-0.117***	-0.0445*	-0.0859***
	(0.0208)	(0.0324)	(0.0234)	(0.0259)
HC	-0.00193	0.0339	-0.0454	-0.0207
	(0.0421)	(0.0643)	(0.0473)	(0.0504)
EG	-0.0666***	-0.0410	-0.112***	-0.0906***
	(0.0184)	(0.0259)	(0.0212)	(0.0206)
Infl	-0.00347***	-0.00989***	-0.00384***	-0.00325**
	(0.00110)	(0.00142)	(0.00124)	(0.00132)
ICT	-0.000273	-0.00108***	0.000308	-0.000215
	(0.000221)	(0.000339)	(0.000249)	(0.000274)
Trade	-0.00325***	-0.00324***	-0.00394***	-0.00247***
	(0.000300)	(0.000410)	(0.000350)	(0.000310)
Constant	2.128***	1.612**	3.430***	3.045***
	(0.503)	(0.694)	(0.567)	(0.570)
Wald Test(p-value)	0.000	0.000	0.000	0.000
AR(1)	0.77166895	0.73062552	0.73043531	0.88162711
AR(2)	0.19594883	0.46789232	0.66160871	0.47969509
Hensen Test	0.53147104	0.69215172	0.61957344	0.38205249
Observations	748	748	748	748
Number of ids	34	34	34	34

Note: System (GMM) results indicate the effects of lagged unemployment, FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. The results of the Wald test and Hansen test confirm model validity, and standard errors are provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. . L. stands for lagged values.

Table 26 System GMM results (high-income countries)

VARIABLES	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
L.L_UNEMP	0.759***			
	(0.0169)			
L.L_UNEMP_F		0.772***		
		(0.0193)		
L.L_UNEMP_M			0.760***	
			(0.0182)	
L.L_UNEMP_Y				0.691***
				(0.0252)
FDDC	0.00642***	0.00592***	0.00640***	0.00650***
	(0.000460)	(0.000475)	(0.000531)	(0.000602)
FDDC2	-0.124***	-0.124***	-0.115***	-0.137***
	(0.0205)	(0.0216)	(0.0240)	(0.0262)
HC	0.0289	0.0811*	-0.00401	0.0305
	(0.0436)	(0.0450)	(0.0497)	(0.0526)
EG	-0.0642***	-0.0693***	-0.0566***	-0.0644***
	(0.0176)	(0.0167)	(0.0198)	(0.0169)
Infl	-0.0218***	-0.0181***	-0.0236***	-0.0192***
	(0.00270)	(0.00282)	(0.00311)	(0.00338)
ICT	-0.00157***	-0.00185***	-0.000869**	-0.00131***
	(0.000311)	(0.000319)	(0.000363)	(0.000387)
Trade	-0.00203***	-0.00163***	-0.00289***	-0.00173***
	(0.000308)	(0.000278)	(0.000377)	(0.000330)
Constant	1.990***	1.953***	1.913***	2.323***
	(0.499)	(0.482)	(0.559)	(0.502)
Wald Test(p-value)	0.0000	0.0000	0.0000	0.0000
AR(1)	0.30166667	0.40976242	0.26620619	0.36689707
AR(2)	0.00281064	0.51562618	0.26232067	0.7637328
Hensen Test	0.8828158	0.49114994	0.66363884	0.30312457
Observations	528	528	528	528
Number of ids	24	24	24	24

Note: System (GMM) results indicate the effects of lagged unemployment, FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. The results of the Wald test and Hansen test confirm model validity, and standard errors are provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. L. stands for lagged values.

Table 27 System GMM results (upper and upper-middle-income countries)

	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
L.L_UNEMP	0.872***			
	(0.0287)			
L.L_UNEMP_F		0.662***		
		(0.0418)		
L.L_UNEMP_M			0.875***	
			(0.0312)	
L.L_UNEMP_Y				0.743***
				(0.0364)
FDDC	0.00361***	0.00840***	0.00450***	0.00237
	(0.00119)	(0.00310)	(0.00132)	(0.00147)
FDDC2	0.00711	-0.354	-0.0638	-0.0792
	(0.0980)	(0.248)	(0.107)	(0.118)
HC	0.00350	-0.0868	-0.0375	0.0650
	(0.0917)	(0.246)	(0.0999)	(0.108)
EG	-0.0547*	-0.145**	-0.110***	-0.0654*
	(0.0298)	(0.0697)	(0.0330)	(0.0361)
Infl	9.40e-05	-0.00875***	9.41e-05	0.000221
	(0.000926)	(0.00215)	(0.00101)	(0.00105)
ICT	0.000146	0.000146	0.000552*	0.000539*
	(0.000267)	(0.000634)	(0.000301)	(0.000317)
Trade	-0.00531***	-0.00849***	-0.00465***	-0.00521***
	(0.000504)	(0.00126)	(0.000549)	(0.000625)
Constant	1.935***	4.778***	3.184***	2.484***
	(0.731)	(1.757)	(0.832)	(0.899)
Wald Test(p-value)	0.0000	0.0000	0.0000	0.0000
AR(1)	0.8483	0.2372	0.0476	0.0467
AR(2)	0.0111	0.3558	0.8978	0.1329
Hensen Test	0.6993	0.5130	0.4638	0.2530
Observations	210	210	210	210
Number of ids	10	10	10	10

Note: System (GMM) results indicate the effects of lagged unemployment, FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. The results of the Wald test and Hansen test confirm model validity, and standard errors are provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. L. stands for lagged values.

Table 28 System GMM results (Balkan region)

VARIABLES	L_UNEMP	L_UNEMP_F	L_UNEMP_M	L_UNEMP_Y
L.L_UNEMP	0.854***			
	(0.0250)			
L.L_UNEMP_F		0.799***		
		(0.0313)		
L.L_UNEMP_M			0.857***	
			(0.0271)	
L.L_UNEMP_Y				0.749***
				(0.0353)
FDDC	0.00301***	0.00184	0.00443***	0.00254*
	(0.00106)	(0.00144)	(0.00121)	(0.00137)
FDDC2	0.114	0.301***	0.0198	0.0981
	(0.0918)	(0.116)	(0.104)	(0.120)
HC	0.0407	-0.00116	0.0712	-0.000313
	(0.0550)	(0.0778)	(0.0605)	(0.0690)
EG	-0.0355*	-0.0570**	-0.0649***	-0.0512**
	(0.0207)	(0.0243)	(0.0233)	(0.0246)
Infl	-0.00352***	-0.00427***	-0.00360***	-0.00382***
	(0.00117)	(0.00163)	(0.00131)	(0.00145)
ICT	8.60e-06	-0.000180	0.000563	0.000188
	(0.000320)	(0.000414)	(0.000353)	(0.000398)
Trade	-0.00676***	-0.00664***	-0.00716***	-0.00631***
	(0.000461)	(0.000648)	(0.000506)	(0.000566)
Constant	1.634***	2.602***	2.091***	2.582***
	(0.595)	(0.680)	(0.674)	(0.699)
Wald Test(p-value)	0.000	0.000	0.000	0.000
AR(1)	0.9705	0.9615	0.0853	0.2539
AR(2)	0.3240	0.4379	0.8851	0.5944
Hensen Test	0.0420	0.7304	0.6422	0.9887
Observations	210	210	210	210
Number of ids	10	10	10	10

Note: System (GMM) results indicate the effects of lagged unemployment, FDDC, FDDC2, HC, EG, INF, ICT, and TRADE on total, female, male, and youth unemployment. The results of the Wald test and Hansen test confirm model validity, and standard errors are provided in parentheses.

Source: Own elaboration in STATA. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. L. stands for lagged values.

3.10 Conclusions

In the realm of econometric and panel data analysis, achieving robust and reliable results necessitates a meticulous and systematic approach. The intricate nature of panel data, characterized by its multidimensional structure encompassing both time series and cross-sectional dimensions, introduces countless statistical and econometric challenges. Addressing these challenges effectively requires a comprehensive methodology that ensures the validity and credibility of the findings. Each step in this process plays a critical role in addressing potential pitfalls and ensuring that our conclusions are both trustworthy and actionable.

The first step lays the foundation for our analysis by summarizing the central tendencies, dispersion, and shape of our dataset's distribution. Calculating descriptive statistics such as mean, median, and standard deviation provides an initial understanding of the data's characteristics. Additionally, the correlation table helps identify linear relationships between variables, enabling early detection of multicollinearity issues that could bias regression estimates.

In the second step, we employ the Pesaran et al. (2004) test to check for cross-sectional dependence, a scenario where individual units are influenced by common factors or exhibit interdependencies. Recognizing and accounting for cross-sectional dependence is crucial, as ignoring it can lead to inefficient estimates and misleading inferences. The Pesaran CD test is particularly suitable for large panels, guiding us on the need for robust estimation techniques that accommodate these dependencies.

Establishing the stationarity of our data in the third step is fundamental, as non-stationary data can lead to spurious regressions. We utilize unit root tests such as the Levin-Lin-Chu (LLC) test, Im-Pesaran-Shin (IPS) test, and Fisher-type tests to determine whether our variables are stationary at level or require differencing. This step is essential for subsequent analyses like cointegration testing and dynamic panel modeling.

The fourth step involves checking for cointegration among the variables using the Pedroni (2004) and Kao (1999) tests. Cointegration tests are vital when dealing with non-stationary data, as they help determine whether a long-term equilibrium relationship exists. Identifying cointegration confirms that despite short-term fluctuations, there is a stable long-term relationship among the variables, which is crucial for accurate modeling and inference.

In the fifth step, we use the Panel Autoregressive Distributed Lag (ARDL) approach to explore the variables' long-term and short-term dynamics. The ARDL methodology is advantageous because it can handle different orders of integration and simultaneously estimate short-run and

long-run coefficients. This step captures the dynamic nature of the relationships, providing a comprehensive understanding of causal effects over different time horizons.

To confirm the empirical direction of the causal relationships, the sixth step employs the Dumitrescu-Hurlin (D-H) panel causality approach. This test is robust to cross-sectional dependence and allows for variations in individual causality directions, offering a nuanced understanding of causality in a heterogeneous panel context. Establishing causality is crucial for understanding the directional influence between variables and for policy implications.

Finally, in the seventh step, we apply several robustness checks using the Difference-GMM (D-K Model), Generalized Linear Model (GLM), Arellano and Bond (1991) estimator, and Blundell and Bond estimator. These methods address potential issues such as autocorrelation within groups and panel-wise heteroscedasticity. By validating our empirical findings through these robustness checks, we ensure that our results are consistent and unbiased, confirming the reliability of our conclusions.

Together, these steps form a rigorous and comprehensive framework for panel data analysis, addressing the specific statistical and econometric challenges associated with such data. This structured approach not only enhances the reliability and validity of our findings but also ensures that our conclusions are well-supported and robust, providing a solid foundation for policy recommendations and further research.

Moreover, the results from the Panel ARDL approach informed us about the nature and extent of the causal effects, ensuring that we understood the full spectrum of interactions over different time horizons. By employing the Dumitrescu-Hurlin panel causality test, we rigorously examined the empirical direction of the causal relationships between the variables in our panel data.

The test confirmed the direction of causality, indicating that the variables influence each other and the nature of these influences across different cross-sections. This was crucial for understanding the directional impacts and for deriving meaningful policy implications.

The results from these robustness checks validated the empirical findings of our primary analyses. Difference-GMM (D-K Model) confirmed that our results were robust to endogeneity and autocorrelation issues. This method helped ensure that our coefficients were consistent and unbiased. In addition, the GLM approach confirmed that our findings were held under different data distributions and model specifications, providing additional validation of our results. Similarly, Arellano and Bond Estimator confirmed the consistency and reliability of our coefficients in the presence of dynamic relationships and potential endogeneity.

Hence, Blundell and Bond Estimator also confirmed the robustness and efficiency of our results by utilizing additional moment conditions to improve estimation accuracy.

Overall, the robustness checks verified that our results were not artifacts of specific model assumptions or estimation techniques. Each method confirmed the consistency and reliability of our findings, ensuring that the conclusions drawn from our analysis were robust and dependable. This analysis was crucial in reinforcing the credibility of our study, providing confidence that our results are accurate and can be relied upon for policy implications and further research.

Among the methods utilized, System GMM stands out as the most convincing due to its comprehensive approach to handling the challenges of dynamic panel data analysis. Its ability to use both difference and level equations as instruments provide robust and efficient estimates, making it superior to other methods like difference-GMM and Arellano-Bond in terms of reliability and precision. This method's robust handling of endogeneity and autocorrelation issues, combined with its efficiency in using additional moment conditions, ensures that the results are both consistent and unbiased, providing the desired level of confidence in our empirical findings.

Table 29 Results for overall unemployment (full sample)

	ARDL	PMG	D-K	GMM	System GMM	Hypothesis descriptions
√ - confirmed, x – rejected – result statistically insignificant.						
H1	√	√	√	√	√	Financial development positively impacts the unemployment rate. Hypothesis one is confirmed.
H2	√	√	√	√	√	Human capital endowment matters for the unemployment rate – ceteris paribus, skillful labor reduces unemployment, whereas non-productive labor increases unemployment. Hypothesis two is confirmed.
H3	√	√	√	√	√	There is an inverse relationship between economic growth and unemployment. Growth in the overall level of development, as measured by the growth of real GDP per capita, dampens the unemployment rate, confirming our hypothesis 3.
H4	√	√	√	√	√	The objective of understanding the extent to which new technological equipment plays a role in replacing human labor (e.g., automation, robotization, currently IPA/RPA and genAI in business services) (Hasija et al., 2023). Hypothesis four is confirmed.
H5	√	√	√	√	√	An increase in the inflation rate reduces the unemployment rate. The findings are consistent with the theoretical notion of the short-run Phillips curve. Our results are generally in line with the empirical studies proving the existence of the nexus and identifying an inverse relationship. Hence, Inflation and unemployment have an inverse relationship. Hypothesis five is confirmed.
H6	√	√	√	√	√	The analysis confirms the hypothesis that trade openness negatively impacts the unemployment rate, consistent with the nuanced understanding of trade liberalization's effects on the labor market. Trade liberalization can lead to structural adjustments, where job creation in export-oriented industries offsets job losses in import-competing industries.

Source: Own elaboration based on the analysis of obtained results.

The overall results support the claim that financial development has an inverted U-shaped relationship with the unemployment rate. The results supported the idea that the unemployment rate first increases in the level of development of the financial sector. It can be that financial operations and the cost of financial activities transform the real sector, which leads to a rise in shareholder wealth. Moreover, this change also impacts management and workers' interests and increases profit claims. As a result, enterprises focus on profit maximization in the short term, so in the short run, capital investment and workers' demand decline and increase the rate of unemployment (Krippner, 2005; Van Treeck, 2009).

However, at a later stage, by easing financial constraints, financial development decreases the cost of external finance. Therefore, businesses benefit from accessing borrowing opportunities and chances of raising investment. Likewise, capital and workers are primary production factors; therefore, the employment rate is adjusted again due to the rise in capital (Hattori et al., 1975; Crotty & Lee, 2006), which also impacts the unemployment rate. Hypothesis one is confirmed.

Similarly, the obtained results prove that human capital endowment matters for the unemployment rate – ceteris paribus, skillful labor reduces unemployment, whereas non-productive labor increases unemployment. The findings are consistent with the notion that chances of working opportunities increase for trained (more skilled) people at the individual (micro) level and, at the same time, support the reduction of unemployment at the aggregate (macro) level. H2 has been confirmed.

Finally, the findings align with Okun's law, demonstrating an inverse relationship between economic growth and unemployment. Economic growth, as measured by the increase in real GDP, reduces the unemployment rate, thereby confirming our hypothesis 3.

For high-income countries, the findings emphasize the role of a well-developed financial system and continued investment in human capital to sustain low unemployment rates and foster inclusive growth. In upper-middle-income countries, policies should focus on balancing financial development with efforts to enhance human capital, recognizing the potential for synergies between these factors in driving employment creation and economic prosperity. In the Western Balkans region, the results underscore the importance of targeted interventions to improve both financial sector efficiency and human capital development, as these factors are crucial for reducing unemployment and promoting sustainable development in the region.

Overall, the analysis highlights the complex interplay between financial development, human capital, economic growth, and unemployment across different income groups and regions. By understanding these dynamics, policymakers can tailor interventions to address specific challenges and leverage opportunities for inclusive and sustainable economic growth.

CHAPTER 4
CONCLUDING REMARKS AND POLICY IMPLICATIONS

4. 1 Summary of major results and contribution of the study

The determinants of unemployment have been studied intensively in the last few decades (Afzal & Awais, 2010; Billi, 2020; Dutt et al., 2009; Nickell, 1979). Different studies identified various pre-dominant macroeconomic determinants of unemployment. However, the issue related to the determinants of unemployment is still debatable both theoretically and the results of empirical studies are inconclusive. This is particularly the case for Western Balkan countries due to their specific circumstances.

The labor market currently faces many challenges related to structural changes related to geo-political shifts (e.g., the economic transformation of CEE states post-1989) or major technological advancements such as the impact of the genAI revolution (Ford, 2013; Makridakis, 2017; Dwivedi et al., 2021; Hasija et al., 2023). The impact of technological advancements is likely to increase in the forthcoming years. The significance of the issue does not lie solely with the transformation itself but with the rapid pace at which it currently occurs. This is a particular challenge for economies at subdued levels of economic development, with diminished labor market efficiency and overall weaker institutional setup (Feldmann, 2006).

The primary issue is the labor market's incapacity to supply adequately skilled professionals capable of meeting the requirements of a digitally focused economy. Consequently, individuals lacking specific skills comprise a pool of workers with diminished prospects. Skills-biased technological change discussed in the theoretical and empirical literature and observed in stylized facts could further amplify the problem.

The observed and persistent increase in youth unemployment rates in developed and developing countries raises significant concerns regarding its extensive adverse impacts on particular individuals and society as a whole. Given the above circumstances, it is imperative to revisit the extent of research results on the underlying factors contributing to unemployment. In the present thesis, we focused on a particularly interesting case of the Balkan States.

The Western Balkans region, with its unique blend of challenges and opportunities shaped by its historical, political, and socio-economic context, is a focal point of this research. The region's journey towards European integration, overcoming challenges, and realizing its full potential necessitates tailored policy interventions, regional cooperation, and sustained

efforts to promote peace, stability, and inclusive development. The importance of addressing structural reforms, fostering economic growth, and enhancing social cohesion in this context cannot be overstated (Ganić, 2019b).

This empirical study, conducted on a panel of 34 European states from 2000-21, takes a unique approach. It uses selected proxies for the level of financial development, human capital endowment, and economic growth as exogenous variables, with proxies for ICT development, inflation rates, and openness to international trade as control variables. The study's focus on the causal relationships of these variables with various subgroups of the labor market, such as total unemployment, youth unemployment, male unemployment, and female unemployment, offers a fresh perspective and the potential to uncover new insights (Jarmolowicz & Knapińska, 2011).

This study underlines the pressing necessity of incorporating behavioral elements, empirical research, and interdisciplinary perspectives into labor market theories. Traditional labor market models, relying solely on assumptions of rational decision-making, are limited in capturing the complexities of human behavior and the impact of technological advancements (Acemoglu & Autor, 2011). The emergence of behavioral economics highlights the influence of cognitive biases and social effects on job search behavior. At the same time, the ubiquitous impact of automation and digitalization reshapes employment structures and skill requirements. As such, there is an urgent need for new theoretical frameworks that account for these dynamic interactions (Knezović et al., 2020). Additionally, human capital development emerges as a critical factor in lowering unemployment rates, emphasizing the importance of education and training programs in aligning skills with market demands. Evaluating the robustness and generalizability of theoretical frameworks across different economic circumstances and testing hypotheses through empirical studies are essential steps in advancing our understanding of labor market dynamics (Brixiova et al., 2009). This review underscores the multifaceted nature of labor market theories and the importance of adapting them to reflect the evolving realities of the modern labor market.

Furthermore, prior studies review delve into the intricate relationships between financial development, human capital investment, and unemployment, highlighting their interconnectedness and the nuanced impact they have on employment outcomes. Through theoretical perspectives and empirical insights, the review emphasizes the importance of tailored policy interventions to address unemployment challenges, particularly in regions like the Balkans (Bartlett, 2013; Fetai et al., 2017; Kukaj, 2018). By integrating financial development and human capital initiatives, policymakers can create an enabling environment

for sustainable job creation and economic growth. Empirical studies across diverse socio-economic contexts are essential for identifying effective policy strategies and promoting inclusive prosperity.

This comprehensive empirical study investigates the intricate relationships between financial development, human capital, economic growth, and unemployment across Europe, with a focus on the Western Balkans. Utilizing a robust empirical strategy and panel data analysis, the research provides valuable insights into the nuanced dynamics shaping labor market outcomes. The findings highlight the significance of financial development, human capital investment, and economic growth in influencing unemployment rates, revealing both short-term and long-term effects. Moreover, the study underscores the importance of tailored policy interventions to address gender-specific and youth unemployment challenges, emphasizing the need for inclusive strategies to foster resilient and equitable economies (Blanchard & Diamond, 1994; J. Lee, 2023). Overall, the study contributes to both theoretical understanding and empirical evidence, offering valuable implications for policymakers aiming to promote sustainable economic growth and reduce unemployment in diverse socio-economic contexts.

In contrast to previous studies focusing on Western Balkans, the present study employed advanced econometric methodologies to address concerns such as concealed heterogeneity, endogeneity, and simultaneity. The present study, in line with the adopted empirical strategy, utilized the autoregressive distributed lag (ARDL) approach. The panel was then divided into subsamples to test the robustness of the obtained results with the Dumitrescu-Hurlin panel causality test. We rigorously examined the empirical direction of the causal relationships between the variables in our panel data.

As the next step, dynamic panel data methods (difference GMM and system GMM) were utilized to verify the hypotheses further. The study's findings using both static and dynamic (e.g., system GMM) panel data frameworks can contribute to decision-makers understanding of the various factors influencing the unemployment rate (labor market efficiency), providing them with a more comprehensive perspective. Among the methods utilized, system GMM stands out as the most convincing due to its comprehensive approach to handling the challenges of dynamic panel data analysis. Its ability to use both difference and level equations as instruments provide robust and efficient estimates, making it superior to other methods like difference-GMM and Arellano-Bond in terms of reliability and precision. This method's robust handling of endogeneity and autocorrelation issues, combined with its

efficiency in using additional moment conditions, ensures that the results are both consistent and unbiased, providing the desired level of confidence in our empirical findings.

The analysis proved the existence of a statistically significant and non-linear, U-shaped relationship between the level of financial development and unemployment. The obtained results, point to the existence of a more complex, non-linear relationship between the level of financial development and the unemployment rate in Europe, both for advanced and less-developed states. Specifically, the obtained results show that a higher level of financial development can temporarily increase unemployment in the short term. Still, in the long term, it declines with the rising level of financial development.

The findings corroborate the hypothesis that the initial stages of economic development and related initial stages of financial development can increase the unemployment rate. Subsequently, enhanced financial development (related to the overall level of economic development) leads to a subsequent decrease in the observed unemployment rates. Hypothesis 1, the nexus of financial development and unemployment, thus has been positively verified.

Further, the higher endowment of human capital lowers the unemployment rate, and this impact is persistent across four dimensions of unemployment considered in the present thesis: overall unemployment, male and female unemployment, and youth unemployment. The negative sign suggests that the superior skillset reduces the probability of being unemployed in Europe. The results are consistent with the theoretical notion of human capital theory, suggesting that skillful labor positively contributes to economic development, further increasing employment opportunities. Hypothesis 2 has been positively confirmed.

Similarly, the results suggest a negative impact of economic growth on the unemployment rate, suggesting a positive role of economic growth in shaping employment opportunities. The result is consistent with the theoretical notion of Okun's law (Okun 1962), which states that the unemployment rate and economic growth show an inverse relationship. This study concludes that financial development has a nonlinear relationship with unemployment based on whole and subsamples. In contrast, both human capital endowment and economic growth exert a negative impact on the unemployment rate in Europe. Hypotheses 2 & 3 have thus been positively confirmed.

Therefore, despite the positive net effect obtained, the result should be treated with some degree of caution as this could be related to the omittance of sectoral heterogeneity due to the limited granularity of the data. The theory of substitution is very consistent with these results. It supports the objectives of understanding the extent to which new technological

equipment plays a role in replacing human labor (e.g., automation, robotization, currently IPA/RPA, and genAI in business services) (Hasija et al., 2023).

Similarly, the obtained results prove that there exists a long-term and short-term affiliation between inflation and the rate of unemployment, which is statistically significant at a 1.0% level. Overall, an increase in the inflation rate reduces the unemployment rate. The findings are consistent with the theoretical notion of the short-run Phillips curve discussed at length in Chapter One. Our results are generally in line with the empirical studies proving the existence of the nexus. For instance, Ball & Mazumder (2019) examined the connection between inflation and unemployment and identified an inverse relationship. Using cointegration techniques, Reichel (2022) observed an inverse inflation and unemployment nexus in advanced countries such as the US and Japan. For obvious reasons, it is worth comparing the result with other empirical studies with a particular focus on the Western Balkans.

Last but not least, the ARDL results point to the negative impact, both in the long and short run, of international trade on the observed unemployment rate. The findings are theoretically consistent with Ricardo's work on comparative advantage. For instance, according to Dutt et al. (2009), following the sources of comparative advantage in diverse fields, trade openness significantly affects unemployment. Dutt et al. (2009) show a negative link between trade and unemployment in a cross-country panel of data. The panel data study of Felbermayr et al. (2011) on 20 OECD nations points to the existence of a negative relationship between these two variables, as well.

Dutt et al. (2009) note that trade and Ricardian comparative advantage theory are closely intertwined; in this context, there is a chance of achieving trade through deregulation, leading to increased employment in the nation.

Obviously, the interplay between trade and unemployment can be more nuanced and complex. Trade liberalization leading to greater trade intensity, can lead to structural adjustments in the labor market. While it can create jobs in export-oriented industries, it may also lead to job losses in industries that face increased competition from imports, especially in the short term, due to the displacement of workers in import-competing industries (Goldberg & Pavcnik, 2007). The net effect on unemployment depends on the ability of the labor market to reallocate resources efficiently (Davidson, C., & Matusz, S. J. (2004). What we observe in the present analysis is a net macro-level effect, as the study is done at macro (aggregate) and not mezzo or sectoral levels.

The research provides a comprehensive analysis of the persistent causal impacts of financial development, human capital endowment, and economic growth on unemployment rates across Europe. By considering various measures of unemployment, the study sheds light on the nuanced dynamics within the labor market framework and the impacts of economic policies on different segments of the population. Through meticulous empirical analysis and econometric modeling, the study underscores the importance of understanding the unique challenges faced by women and youth in the labor market, highlighting the need for tailored policy interventions to foster inclusive and resilient economies.

4.2 General policy recommendations

Addressing unemployment requires a multifaceted approach that considers the specific economic, social, and demographic conditions of a country or region. The results of the study generally support the standard set of policy recommendations. These include stimulating economic growth and addressing macroeconomic stability to boost investment and job creation, applying active labor market policies (ALMPs) and enhancing labor market flexibility, and continuously improving educational systems to ensure that the workforce's skillset meets current requirements (which, in turn, reduces challenges related to skills-biased technological change). Additionally, promoting lifelong learning principles, supporting SMEs and entrepreneurship directly through subsidies and indirectly by reducing regulatory and tax burdens, as well as stimulating innovation, adapting to technological change, and increasing enterprises' adaptive capacity to adverse shocks are all crucial measures.

Specifically, to mitigate the potentially adverse effects of trade on employment, governments can implement active labor market policies (ALMP). These policies include job training programs, unemployment benefits, and job search assistance, which can help displaced workers transition to new employment opportunities (Kluve, 2010). By investing in ALMPs, policymakers can provide crucial support to individuals affected by changes in the labor market due to increased trade, helping them acquire new skills and find alternative employment opportunities. This proactive approach can help mitigate the negative impact of trade on unemployment and ensure a smoother transition for workers.

Furthermore, as emphasized throughout the thesis, investing in education and skill development is crucial for enhancing the employability of the workforce. In the context of a small open-economy market influenced by international trade and globalization, ensuring that

workers have the skills needed in a changing labor market becomes even more imperative (Autor et al., 2003). Policymakers should prioritize investments in education and vocational training programs to equip workers with the skills demanded by emerging industries and technologies. By fostering a skilled and adaptable workforce, governments can enhance the competitiveness of their economies and position workers to succeed in a globalized marketplace.

In addition to ALMPs and investments in education, policymakers should also focus on creating an enabling environment for entrepreneurship and innovation. Encouraging the growth of small and medium-sized enterprises (SMEs) can stimulate job creation and economic growth, particularly in sectors that are poised to benefit from international trade. Providing support for startups, streamlining regulatory processes, and facilitating access to finance can help nurture a vibrant entrepreneurial ecosystem, creating opportunities for new businesses to thrive and expand their operations both domestically and internationally (Aterido et al., 2011). Moreover, fostering collaboration between government, industry, and educational institutions is essential for aligning skill development initiatives with the evolving needs of the labor market. By engaging stakeholders from multiple sectors, policymakers can ensure that education and training programs are tailored to industry demands, thereby enhancing the relevance and effectiveness of workforce development efforts. This collaborative approach can facilitate the creation of industry-relevant training programs, apprenticeships, and internships that equip workers with the practical skills and experience needed to succeed in the modern economy (Bassanini et al., 2000).

Our study specifically considers the situation of disadvantaged individuals in the labor market. Governments should stimulate the development of inclusive labor markets by promoting diversity and inclusion and reducing informal employment, particularly among youth. They should implement policies that ensure equal opportunities for all, including women, minorities, and disabled individuals, by promoting diversity and inclusion in the workplace. Informal employment should be formalized through regulatory measures and incentives, ensuring that workers in the informal sector have access to social protection and labor rights.

For youth, governments should implement targeted programs to address youth unemployment, such as apprenticeships, internships, and job placement services. They should also adjust educational and training programs, encourage entrepreneurship among young people through education and support programs, and create fiscal support mechanisms for

companies employing young people. Additionally, career development and support programs could be introduced in the education system.

In line with the augmented Washington Consensus (Herr & Priewe, 2005), efficient social safety nets should be established. These include unemployment benefits and an effective social security system, which should encourage active job-seeking rather than dependency on the system. Furthermore, internal geographic mobility should be encouraged to address the problems of disadvantaged regions. This can be strengthened by sectoral policies addressing the specific needs of key economic sectors, which vary significantly between states.

Overall, a multifaceted approach that combines active labor market policies, investments in education and skill development, support for entrepreneurship, and stakeholder collaboration is essential for addressing the challenges posed by international trade and globalization. By implementing targeted policies and fostering partnerships across sectors, governments can promote inclusive economic growth, reduce unemployment, and enhance the resilience of their labor markets in the face of evolving global trends.

4.3 Policy Implications for the Balkan Region

Many Balkan countries, such as Bosnia and Herzegovina, Kosovo, and North Macedonia, have high unemployment rates compared to the European Union average. Youth unemployment is particularly pressing, with rates often significantly higher than general unemployment. Additionally, the informal economy plays a significant role in the labor markets of many Balkan countries, with informal employment ranging from 20% to over 50% of total employment in some areas. This includes unregistered businesses, undeclared work, and other forms of informal employment.

Significant migration flows, both internal and external, also affect the Balkan labor market. Many young and skilled workers emigrate to Western Europe in search of better job opportunities, leading to a major challenge of brain drain. This is only partially offset by remittances from the diaspora, which form an essential part of the economies in the region. In the context of skills-biased technological change, there is often a mismatch between the skills provided by the education system and the needs of the labor market in specific Balkan countries. From this perspective, reforming the educational system and increasing the efficiency of vocational training and lifelong learning opportunities are critical areas for improvement.

The findings of the study hold particular relevance for the Balkan region, where entrenched gender disparities and structural barriers contribute to higher unemployment rates among women compared to men. Cultural norms, limited access to education and training, and concentration in low-paying sectors exacerbate the vulnerability of women to economic shocks. Addressing these challenges requires targeted policies that promote gender equality, enhance access to education and skills training, and support initiatives to increase women's participation in the formal labor market. Strengthening labor market institutions and enforcing anti-discrimination laws are crucial steps toward reducing women's unemployment in the Balkans (Rees, 2022). Similarly, young people in the Balkans face disproportionately high levels of unemployment due to limited job opportunities, skills mismatches, and the effects of economic transition. Inadequate investments in education and vocational training further compound these challenges, leaving many young people ill-equipped to meet the demands of the labor market (Anyanwu, 2013).

To address youth unemployment, policymakers in the Balkans must prioritize initiatives that promote youth entrepreneurship, provide relevant skills training and education, and create pathways for young people to gain work experience through internships and apprenticeships. Additionally, efforts to stimulate economic growth and attract investment can help generate new job opportunities for young people in the region. By implementing targeted policies aimed at addressing the specific challenges faced by women and youth in the labor market, Balkan policymakers can work towards building more inclusive and resilient economies that provide equal opportunities for all segments of the population.

Many Balkan countries have undertaken labor market reforms as part of their EU accession processes or other international agreements. This is a positive development. The reforms focus on improving labor market flexibility, enhancing social protection systems, and promoting active labor market policies (ALMPs). The results of our study support the direction of these reforms.

4.4 Limitations of the study

The main constraint faced in the present study was data availability both in cross-sectional and temporal dimensions. The final panel utilized was balanced. The countries with missing data for more than five years were excluded from the data set, which minimized the sample size to 34 European countries. Further, the number of countries considered was restricted to 34 European countries only with the upper middle, upper, or high-income status.

Secondly, the study utilizes annual data while the labor market clearly shows seasonal patterns in reality – the use of quarterly or even better monthly time series would not only allow us to include controls for seasonal components. Still, it would allow us to use even more robust econometric methods due to increased temporal dimension. This can only be overcome in the future when more granular and larger data sets can be obtained. This could allow, for instance, to test the robustness of the obtained results for Europe to be applied to different continents and countries with even more inferior developmental setups, including least-developed states (LDCs).

Thirdly, the analysis has been performed at the macro level, while the results at the sectoral level could be much more nuanced and complex. For example, trade liberalization could lead to job gains in exporting sectors and at least temporary job losses in import-competing industries.

Fourthly, we utilized only chosen proxies for considered key variables, while we have shown an array of potential options for each. Therefore, in the future, the robustness of results to the use of other proxies for the level of financial development or human capital should be considered, potentially leading to more nuanced results and better policy implications.

4.5 Suggestions for future research

A sample of data from 34 European countries have been taken to investigate this relationship. Further studies should focus on the individual country following the same techniques and measures to evaluate the relationship between financial development, human capital, economic growth, and unemployment rate. A mixed sample of countries is the most commonly used technique to identify the problems and issues related to the determinants of unemployment and achieve better results.

The parametric models used in this investigation do not capture the non-linearity in human capital. Adopting entirely nonparametric data-driven models may be helpful if the actual image of human capital's features is to be disclosed.

The parametric models used in this investigation do not capture the non-linearity in economic growth. Future studies may incorporate squared terms of economic development to provide better insights to policymakers.

This study demonstrates that human capital coefficients vary depending on the estimating method. Compared to simple regression models, the partially linear model is more straightforward. Using smoothing semi-parametric techniques to gain a deeper understanding of the nonlinear functional development of human capital within the context of economic growth.

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APPENDIX

Table 30 Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
UNEMP-F	1.000						
DF	-0.146	1.000					
HC	-0.196	-0.171	1.000				
EG	-0.358	0.350	0.117	1.000			
INF	-0.089	-0.217	-0.008	-0.111	1.000		
ICT	-0.185	0.242	0.052	0.170	-0.210	1.000	
TRADE	-0.329	0.074	0.084	-0.227	-0.035	0.205	1.000

Table 31 Matrix of correlations

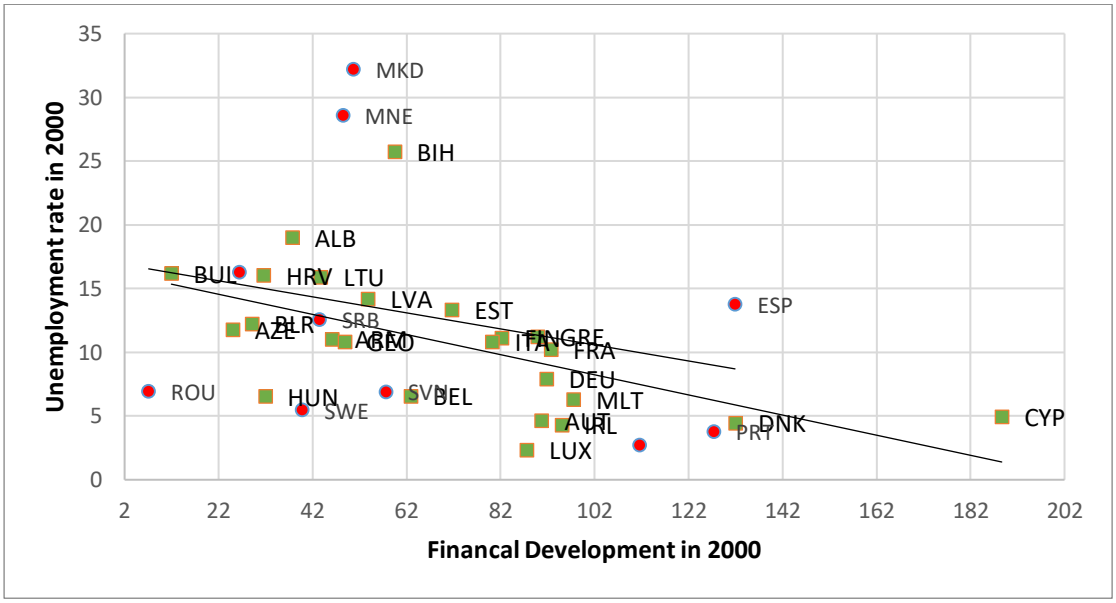
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
UNEMP-M	1.000						
DF	-0.216	1.000					
HC	-0.126	-0.171	1.000				
EG	-0.446	0.350	0.117	1.000			
INF	-0.001	-0.217	-0.008	-0.111	1.000		
ICT	-0.157	0.242	0.052	0.170	-0.210	1.000	
TRADE	-0.270	0.074	0.084	-0.227	-0.035	0.205	1.000

Table 32 Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
UNEMP-Y	1.000						
DF	-0.191	1.000					
HC	-0.210	-0.171	1.000				
EG	-0.328	0.350	0.117	1.000			
INF	-0.039	-0.217	-0.008	-0.111	1.000		
ICT	-0.079	0.242	0.052	0.170	-0.210	1.000	
TRADE	-0.310	0.074	0.084	-0.227	-0.035	0.205	1.000

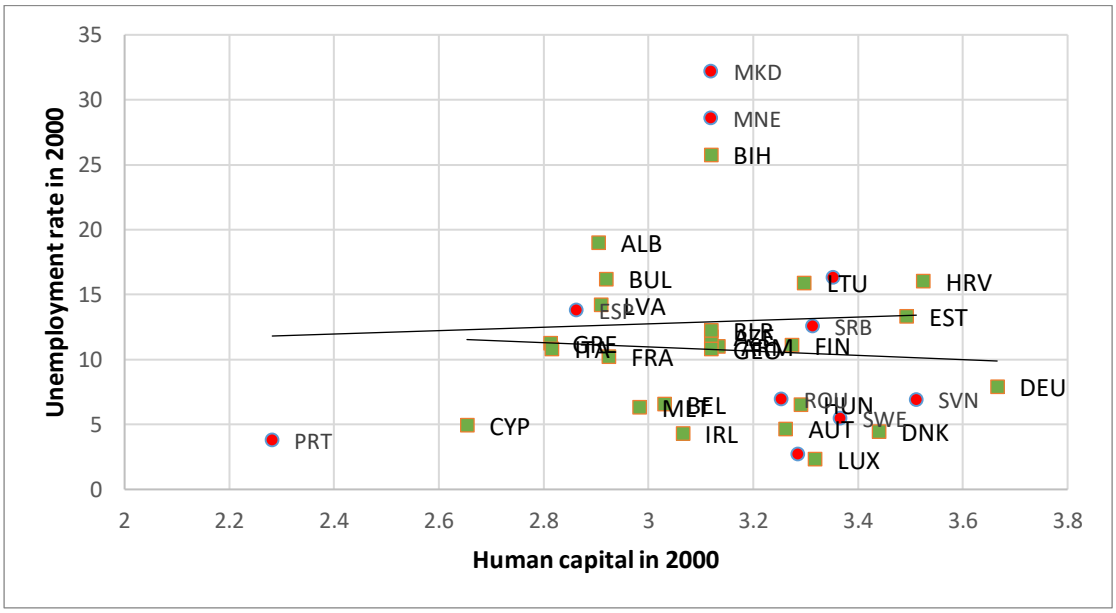
Source: Own elaboration.

Figure 8 Non-linear relationship between financial development and unemployment



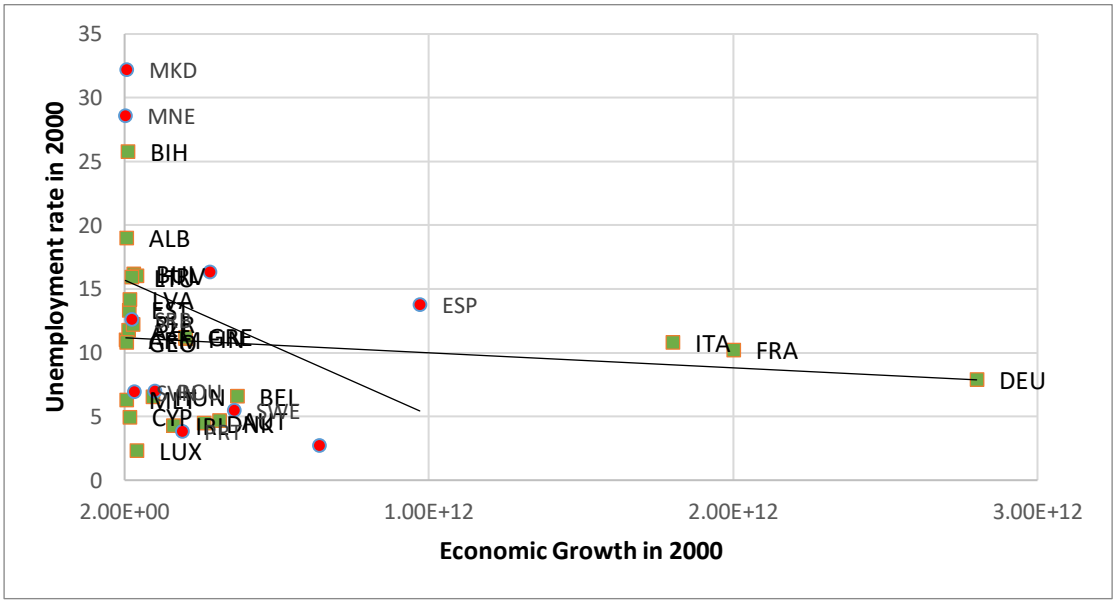
Source: Own elaboration.

Figure 9 Relationship between human capital and unemployment



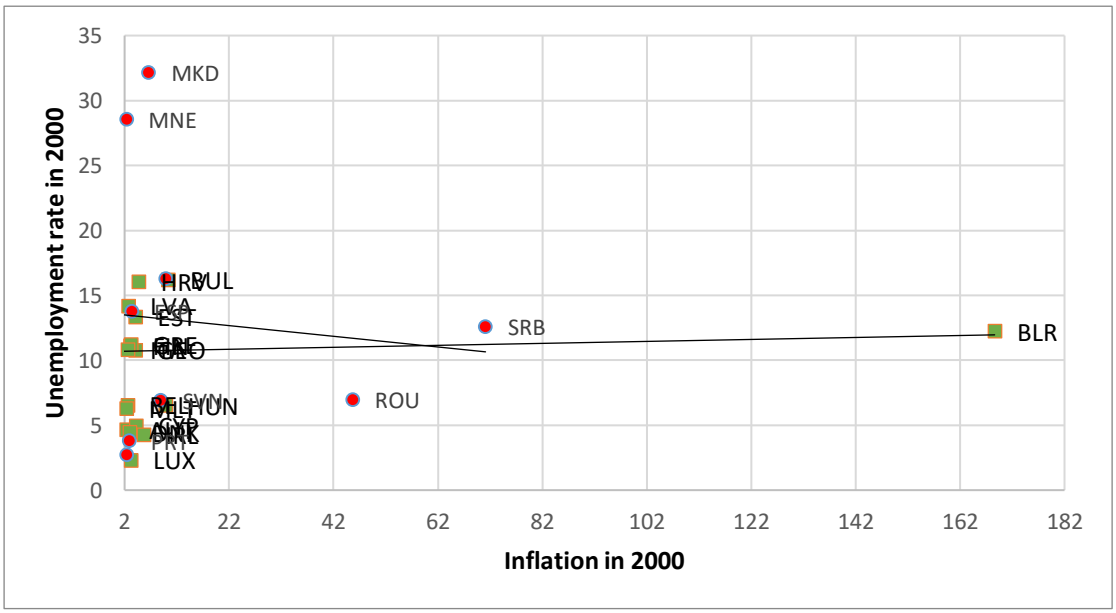
Source: Own elaboration.

Figure 10 Relationship between economic growth as measured by real GDP and unemployment



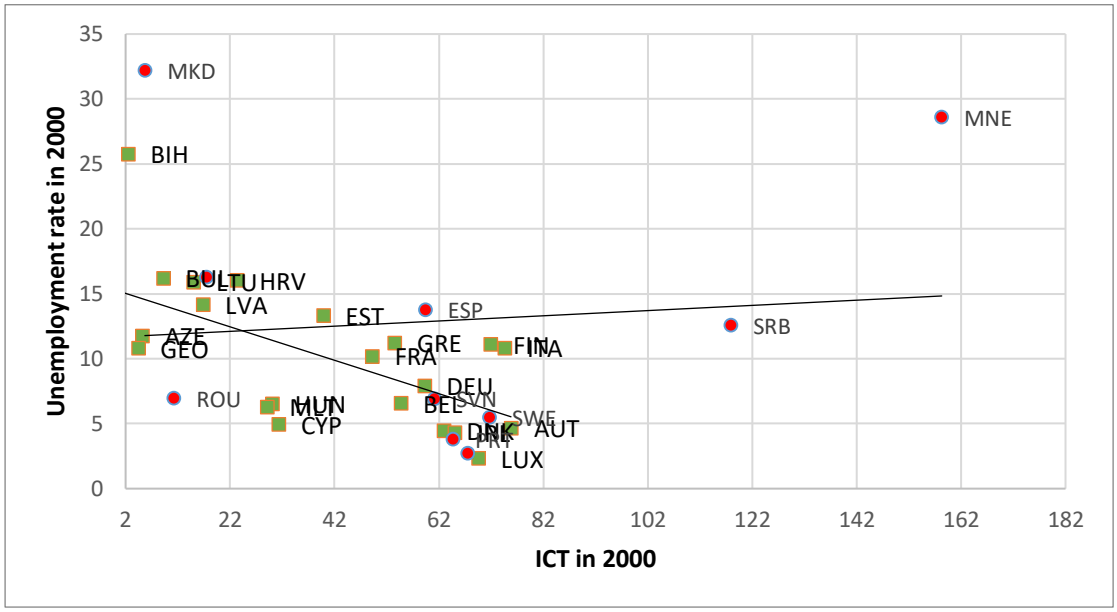
Source: Own elaboration.

Figure 11 Relationship between inflation and unemployment



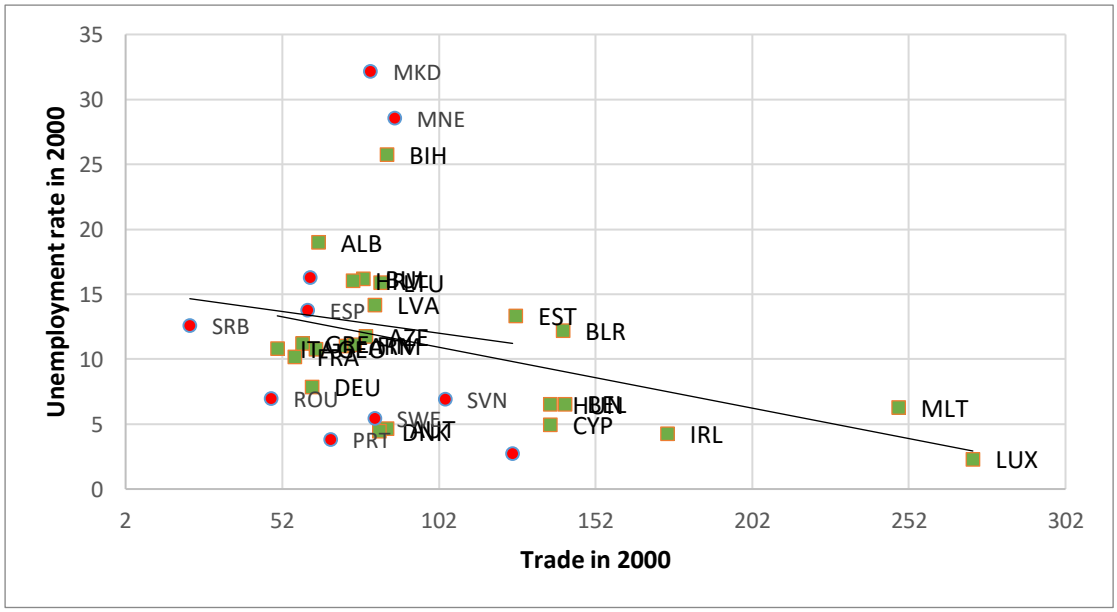
Source: Own elaboration.

Figure 12 Relationship between ICT development and unemployment



Source: Own elaboration.

Figure 13 Relationship between trade and unemployment



Source: Own elaboration.