

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Statistics



Bachelor Thesis

**Statistical analysis of unemployment in Vietnam and the
COVID-19 impact on its labor market**

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BACHELOR THESIS ASSIGNMENT

Quoc Thai Vo

Business Administration

Thesis title

Statistical analysis of unemployment in Vietnam and the COVID-19 impact on its labor market

Objectives of thesis

The main objective of the thesis is to characterize the unemployment rate development in Vietnam and to describe the differences in the unemployment rate by categories. Moreover, the thesis will investigate whether the COVID-19 crisis caused the increment in the unemployment rate in Vietnam and describe the unemployment trend.

Methodology

The theoretical part of the thesis is the collection of knowledge obtained from scientific articles and publications. The practical part focuses on analyzing the unemployment situation in Vietnam and the effect of the COVID-19 pandemic. In order to achieve the target of the thesis, the epidemic factor and the unemployment rate will be examined by using regression and correlation analysis. To describe the change in unemployment in Vietnam over time (including the time during the COVID-19 pandemic), time series analysis methods will be applied. The data used for this thesis is collected from the General Statistics Office of Vietnam, the Ministry of Labour, War invalids and Social Affairs of Vietnam, and the World Health Organization. IBM SPSS will be the statistical software platform used during the entire procedure.

The proposed extent of the thesis

30-40 pages

Keywords

Correlation, COVID-19, pandemic, regression, time series, unemployment rate, Vietnam

Recommended information sources

FIELD, A P. *Discovering statistics using IBM SPSS statistics*. Thousand Oaks: SAGE Publications, 2013. ISBN 978-1-4462-4917-8.

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Declaration

I declare that I have worked on my bachelor thesis titled "Statistical analysis of unemployment in Vietnam and the COVID-19 impact on its labor market" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any their person.

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Statistical analysis of unemployment in Vietnam and the COVID-19 impact on its labor market

Abstract

The Bachelor Thesis examines the growth of Vietnam's unemployment rate over time. The Literature Review section of the thesis is a compilation of information regarding the definition, classification, and causes of unemployment in Vietnam.

The practical section focuses on how unemployment in Vietnam by categories has developed over time from 2010 to 2020 and during the epidemic. Additionally, Linear Regression analysis was applied to investigate the relationship between the quarterly unemployment rate at working age in Vietnam and the number of quarterly new COVID-19 cases from 2018 to 2021. The findings of the thesis demonstrated that the number of quarterly COVID-19 new cases was statistically significant and contributed to the increment in the unemployment rate during the pandemic in Vietnam.

Keywords: COVID-19, Gender unemployment gap, Linear Regression, Rural unemployment, Unemployment, Unemployment rate, Urban unemployment, Vietnam.

Statistická analýza nezaměstnanosti ve Vietnamu a dopadu COVID-19 na jeho trh práce

Abstrakt

Bakalářská práce zkoumá růst míry nezaměstnanosti ve Vietnamu v čase. Část práce s literárním rozborem je souhrn informací týkajících se definic, klasifikací a příčin nezaměstnanosti ve Vietnamu.

Praktická část se zaměřuje na to, jak se nezaměstnanost ve Vietnamu podle kategorií vyvíjela v čase od roku 2010 do roku 2020 a během epidemie. Kromě toho byla použita lineární regresní analýza pro zkoumání vztahu mezi čtvrtletní mírou nezaměstnanosti v produktivním věku ve Vietnamu a počtem čtvrtletních nových případů COVID-19 v letech 2018 až 2021. Závěry práce prokázaly, že počet nových případů COVID-19 za čtvrtletí byl statisticky významný a přispěl ke zvýšení míry nezaměstnanosti během pandemie ve Vietnamu.

Klíčová slova: COVID-19, Genderová propast v nezaměstnanosti, Lineární regrese, Městská nezaměstnanost, Míra nezaměstnanosti, Nezaměstnanost, Venkovská nezaměstnanost, Vietnam.

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1 Introduction

Unemployment is a critical issue that affects individuals, families, and entire economies. Unemployment is an influential factor that significantly affects the job market globally, and its impact is often considered a crucial indicator of a country's economic prosperity. It does affect not only the economic perspective but also the social and psychological points of view. Losing employment can negatively affect individuals' quality of life in various ways, such as financial difficulties, limited access to education and healthcare, and instability in their personal lives. Effectively addressing the unemployment crisis requires considering numerous economic and social factors, such as education, skills development, and implementing policies promoting job creation.

In Vietnam, high unemployment rates have significant social and economic consequences. The COVID-19 pandemic has caused significant disruptions on a national level, affecting the country's economy and various industries. The pandemic's impact on Vietnam's economy has been profound, leading to a significant slowdown in economic growth and reduced economic activity. The government's efforts to prevent the spread of the virus have resulted in lockdowns and social distancing measures, causing job losses and reduced consumer spending. Moreover, several industries, such as tourism and hospitality, have been severely affected by the pandemic, resulting in significant job losses.

Thus, this thesis aims to conduct a statistical analysis of unemployment development in Vietnam, identifying the significant variables affecting the labor market and how it has impacted unemployment rate.

2 Objectives and Methodology

2.1 Objectives

The primary purpose of the thesis is to characterize the evolution of the unemployment rate in Vietnam and to describe the disparities across categories of unemployment rates. In addition, the thesis will explore whether the COVID-19 pandemic influenced the increase in Vietnam's unemployment rate.

The specific objectives are:

- Analyze the development of the unemployment rate at working age in Vietnam over time, describe the unemployment rate by region and gender, and the growth of the quarterly unemployment rate during the pandemic.
- Determine whether the number of new COVID-19 cases is statistically significant to Vietnam's unemployment rate.

2.2 Methodology

This bachelor thesis will examine the subject using different research methods, including a literature review and a practical part.

The theoretical part comprises a comprehensive review of relevant literature from scientific publications and articles across the globe.

The practical part describes data analysis of the unemployment rates by nation, region, and gender in Vietnam from 2010 to 2020 using time-series analysis. To achieve the objectives, all of the mentioned factors will be analyzed using quantitative research methods: descriptive statistics, index analysis, and linear regression, with Microsoft Excel and IBM SPSS as statistical software.

Equation 1: Multiple linear regression model

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p + \varepsilon \quad (1)$$

Where Y is the dependent variable, it is estimated in the regression analysis. β_0 is the intercept or the constant term, representing the expected value of Y when all the independent variables are equal to 0. $\beta_1, \beta_2, \dots, \beta_p$ are the regression coefficients for the independent variables x_1, x_2, \dots, x_p or the slopes, representing the change in Y corresponding to a unit change in each independent variable while holding all other independent variables constant; these coefficients measure the effect of each independent variable on the dependent variable. x_1, x_2, \dots, x_p are the independent variables used to explain or predict the value of the dependent variable. ε is the error term or the residual, representing the difference between Y's actual value and Y's predicted value based on the regression equation. (Weisberg, 2019)

In order to make predictions using equation (1), the regression coefficients ($\beta_1, \beta_2, \dots, \beta_p$) must first be estimated as they are initially unknown. Once the estimates (b_1, b_2, \dots, b_p) have been obtained, predictions can be made by applying the estimated regression equation:

Equation 2: Estimating the regression coefficients

$$\hat{y} = b_0 + b_1x_1 + b_2x_2 + \dots + b_px_p + \varepsilon \quad (2)$$

The coefficient of determination, denoted by R-squared (R^2), can be calculated using the following formula:

Equation 3: Multiple coefficients of determination

$$R^2 = \frac{SSR}{SST} \quad (3)$$

Where SSR is the sum of squares due to regression, SST is the total sum of squares.

The sum of squares due to regression (SSR) measures the amount of variation in the dependent variable (Y) that is explained by the independent variable(s) (X). In contrast, the total sum of squares (SST) measures the total variation in Y. R-squared is the proportion of the total variation in Y explained by the independent variable(s) and ranges from 0 to 1. A higher R-squared value indicates a better fit of the model to the data.

Linear regression is a commonly used statistical tool to model the association between a dependent variable and one or more explanatory variables. The primary goal of linear regression analysis is to establish a mathematical equation describing the relationship between the dependent and independent variables. In this context, it is crucial to assess whether the relationship is statistically significant or not. The F-test and t-test are two statistical tests commonly used in linear regression analysis to determine the significance of the model and individual predictor variables.

The F-test is a statistical test used to determine the overall significance of the linear regression model. The null hypothesis for the F-test states that all regression coefficients ($\beta_1, \beta_2, \dots, \beta_p$) are equal to zero, indicating no linear relationship between the dependent and independent variables. The alternative hypothesis states that at least one of the regression coefficients is not equal to zero, indicating a linear relationship between the dependent and independent variables. The F-statistic is calculated as the ratio of the variance explained by the regression model to the residual variance. The F-statistic is compared to a critical value from the F-distribution at a specified level of significance (usually 0.05) to determine whether to reject or fail to reject the null hypothesis. (Kutner, et al., 2004)

After determining that the overall model is statistically significant using the F-test, we can examine the t-test for each independent variable to assess the significance of its relationship with the dependent variable. The t-test determines whether the estimated regression coefficient for each independent variable is significantly different from zero. The null hypothesis for the t-test is that the regression coefficient is equal to zero, indicating no significant relationship between the independent and dependent variables. The alternative hypothesis states that the regression coefficient is not equal to zero, indicating a significant relationship between the independent and dependent variables. The t-statistic is calculated as the ratio of the estimated regression coefficient to its standard error. The t-statistic is compared to a critical value from the t-distribution at a specified level of significance (usually 0.05) to determine whether to reject or fail to reject the null hypothesis. (Kutner, et al., 2004)

3 Literature Review

3.1 Introduction of unemployment

3.1.1 Definition of unemployment

Depending on the level of development of the nation or region, the term "unemployment" has plenty of definitions—however, not all instances of someone not having a job qualify as being unemployed. A 6 year-old boy who does not work is not counted as unemployed, a person serving a prison sentence cannot be considered unemployed either, or a 60 year-old grandmother who is already retired is not unemployed. "Unemployment" refers to a situation where a person is employable and actively seeking a job but cannot land a job; people included in this group must be civilians in the labor force and not institutionalized (e.g., not in jail) (Cowen & Tabarrok, 2021).

3.1.2 How is unemployment measured?

The Ministry of Labour and Social Affairs is in charge of measuring unemployment. The competent authorities publish data on unemployment and other aspects of the labor market on a monthly basis, including job types, average workweek length, and duration of unemployment. Each adult (aged sixteen and older) is afterward classified into one of three categories based on survey responses (Mankiw, 2020):

- Employed: a noninstitutionalized adult civilian with a job
- Unemployed: adults who are jobless but working for work
- Not in the labor force: A person categorized in neither of the first two categories (Cowen & Tabarrok, 2021).

The labor force is defined as the sum of the unemployed and the employed.

Equation 4: Labor force

$$\mathbf{Labor\ force = Number\ employed + number\ of\ unemployed \quad (4)}$$

The unemployment rate is defined as the percentage of the labor force that is unemployed.

Equation 5: Unemployment rate

$$\textit{Unemployment rate} = \frac{\textit{Number of unemployed}}{\textit{Labor force}} \times 100 \quad (5)$$

3.1.3 The natural rate of unemployment

The natural unemployment rate is the rate of unemployment that occurs when the market is in equilibrium (demand equals supply in the labor market). There will be either a surplus in demand and job vacancies or a surplus of supply and unemployment. Labor market factors determine the rate, for instance, the availability of opening vacancies, the adaptability of workers (corresponding to their qualifications and skill), the ratio between frictional and seasonal unemployment, the duration of unemployment, and the possibility of retraining. (Taylor, 2011) The natural rate of unemployment does not remain constant. It varies globally, and its rate in the chosen country changes over time (Mankiw, 2020). The rate is influenced by variables such as individuals' motivation to seek a new job opportunity; the duration and level of job seeker's allowance; and the labor force's demographic structure, which includes age, gender, and education level (Stricker, 2020).

3.2 Classification of unemployment

There are three main types of unemployment distinguished by economists: frictional, structural, and cyclical unemployment.

3.2.1 Frictional unemployment

"Frictional unemployment is defined as short-term unemployment caused by ordinary matching difficulties" (Cowen & Tabarrok, 2021).

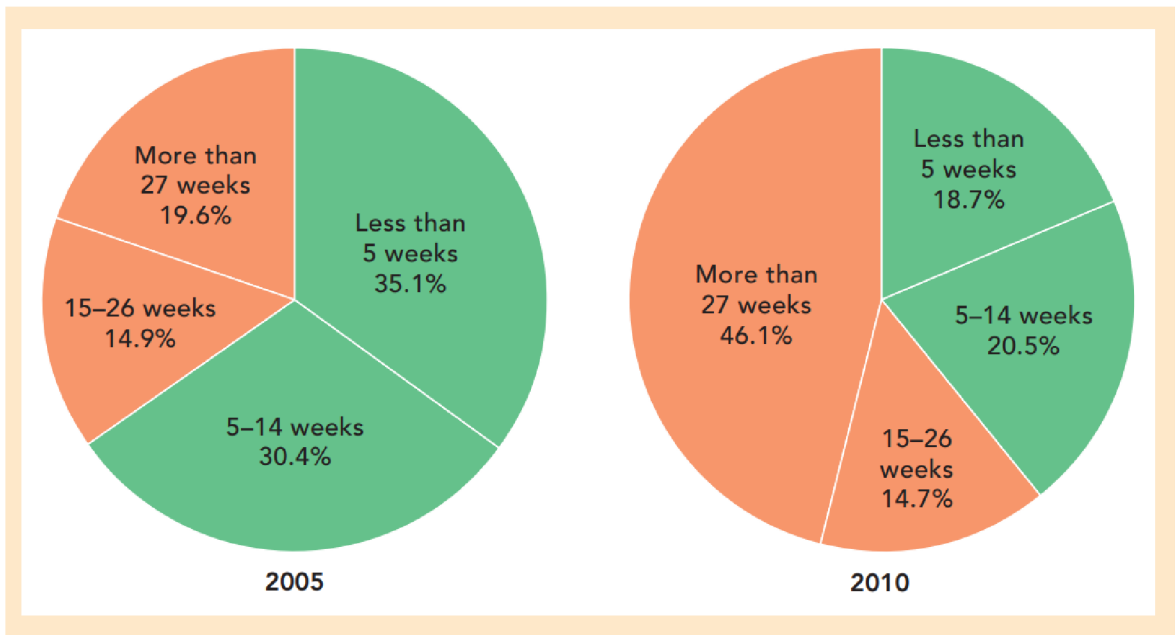
The most efficient way to sell a house would be to lower its price. Any house will sell quickly if the price is low enough. A low price enough will improve the chance of a quick sale. Selling houses will not be challenging if the seller determines a price that benefits both parties (the seller and the buyer). Likewise, it is always effortless to land a job if the job seeker is willing to work for peanuts. Conversely, job seekers have to invest time and effort to find a job they want at a satisfying wage that the employer is willing to pay. Friction in

the labor market has increased due to the fact that people looking for jobs are not matched immediately with vacancies (Cowen & Tabarrok, 2021).

The scarcity of information is a primary reason for rising frictional unemployment, which comes from both parties; workers do not have access to all job opportunities, and employers do not approach all the candidates and their respective qualifications. The application of the Internet (such as social networks and online job boards) that allow faster information exchange will reduce the matching time between job seekers and employers and subsequently lower unemployment (Cowen & Tabarrok, 2021).

Frictional unemployment is a type of short-term unemployment. Without an economic recession, it might take a couple of weeks to land a usual job or a couple of months for specialized jobs, but not much longer. The pie charts in Figure 1 illustrate the proportion of the typical duration of unemployment in the US in 2005 (a nonrecession economy) and 2010 (in the process of recovering from the 2007-2009 Crisis). In 2005, the majority of unemployment cases were relatively short: 35.1% were idle for less than five weeks, and 30.4% were jobless for only 5 to 14 weeks. The remainder was unemployed for more than 14 weeks, which accounted for a fifth (19.6%) unemployed for more than six months. In the United States, for a non-renewal year, significant unemployment is friction. Frictional unemployment is a substantial contribution in the United States for a non-renewal year. On the contrary, most unemployment cases lasted much longer (14 weeks) in 2010 compared to 2005, especially since nearly half of the unemployed (46,1%) could not land a job for six months as a consequence of the Great Depression (Cowen & Tabarrok, 2021).

Figure 1: U.S. Unemployment Duration in 2005 and 2010 in the United States



Source: (Cowen & Tabarrok, 2021)

3.2.2 Structural unemployment

There are multiple definitions of the term "Structural unemployment."

“Structural unemployment is unemployment that results because the number of jobs available in some labor markets is insufficient to provide a job for everyone who wants one” (Mankiw, 2020).

Structural unemployment arises when the demand for specific types of labor drops due to changes in technology, international commerce, or other structural variables that cause an economic shift. Hence, people with obsolete talents may endure long-term unemployment, as it may be challenging to locate positions that match their qualifications and skills. (Gillespie, 2018)

"Structural unemployment is persistent, long-term unemployment caused by long-lasting shocks or permanent features of an economy that make it more difficult for some workers to find jobs” (Cowen & Tabarrok, 2021).

The primary root of structural unemployment is considered as adjusting to the rapidly changing economy-wide shocks, which is time-consuming for restructuring. Structural

unemployment transpires when there is a mismatch between available vacancies and people looking for work. This mismatch may ensue because jobseekers lack the required skills to perform the jobs or because the available jobs are located a long distance away from the job seekers (Cowen & Tabarrok, 2021).

Workers may lose their jobs if they work in declining industries and have skills that could be automated thanks to wide-ranging technological advances. Finding a job in another industry may be challenging, and they may need to acquire new skills or relocate to a more promising region. For instance, there has been a noticeable decline in the proportion of people employed in routine manual jobs in recent decades, with some of these jobs being automated as a result of technological advances. The manufacturing industry is an example of an industry with a high proportion of routine manual jobs, and its contribution to the economy has decreased (both in terms of production and employment) (Cowen & Tabarrok, 2021).

If structural unemployment lasts long enough, it can bring high human costs besides the loss of economic output, for instance, the increment in levels of stress, higher rates of suicide, and lower rates of measured happiness. Structural unemployment lasts longer than other types of unemployment. This issue is because it can take years for workers to acquire new skills or relocate in order to seek a job that matches their qualifications. As a result, workers who are out of work due to structural factors are more likely to be out of work for an extended period of time (for more than 12 months) (Cowen & Tabarrok, 2021).

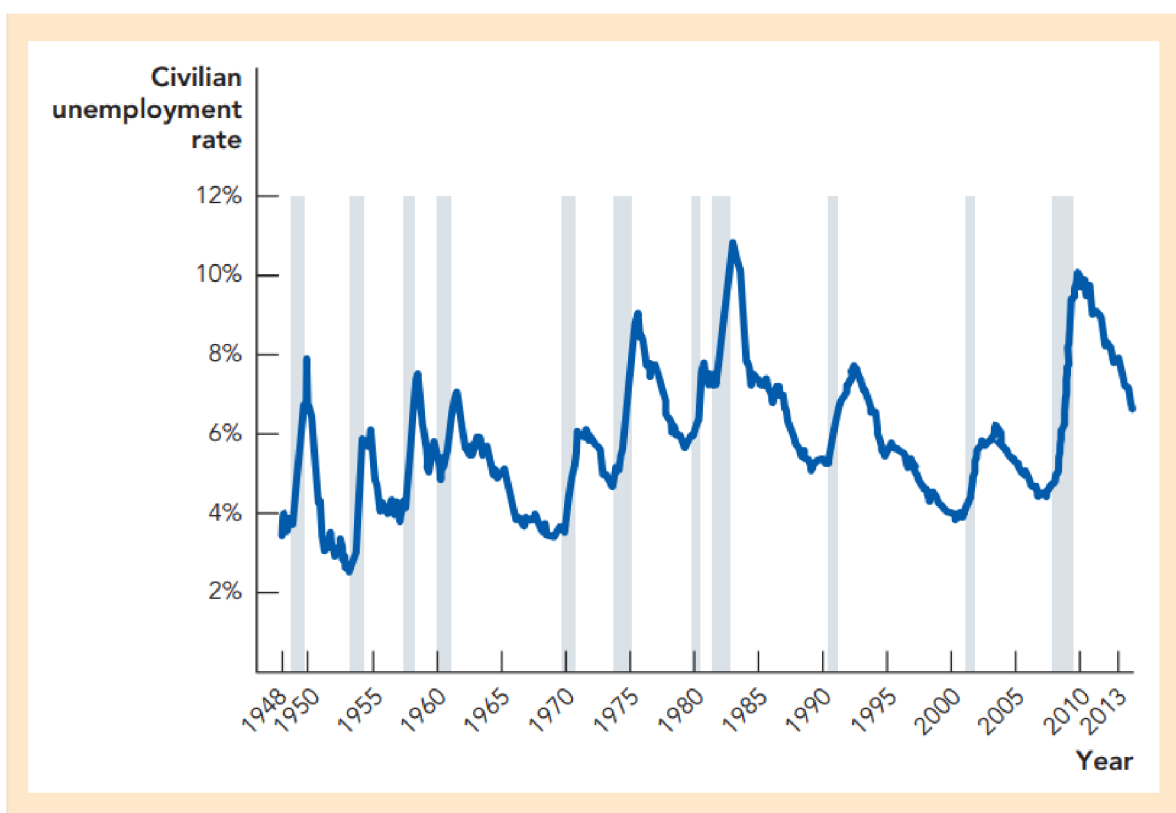
3.2.3 Cyclical unemployment

Cyclical unemployment is correlated with the economic cycle. It depends on economic factors that increase and decrease over time. Cyclical unemployment is caused by a production crisis or recession, the phase of the economic cycle marked by a significant decrease in total consumer and investment spending. As aggregate demand for goods and services falls, employment and unemployment rise. As a result, cyclical unemployment is also known as unemployment associated with a lack of demand. Typically, producers produce less because there is no demand for goods, requiring fewer workers (DWIVEDI, 2010). It increases during an economic downturn, and the opposite situation occurs if the economy operates smoothly at its potential. The duration of this type of unemployment

varies depending on the stage of the economic cycle, and it strongly impacts the entire economy (Reiff, 2017).

Figure 2 demonstrates the unemployment rate in the U.S. from the period 1948-2013. The shaded areas are recessions. From an overall perspective, it is clear from the evidence that unemployment increases dramatically during every economic downturn (Cowen & Tabarrok, 2021).

Figure 2: The Unemployment Rate Increases during a Recession: U.S. Civilian Unemployment Rate, 1948-2013

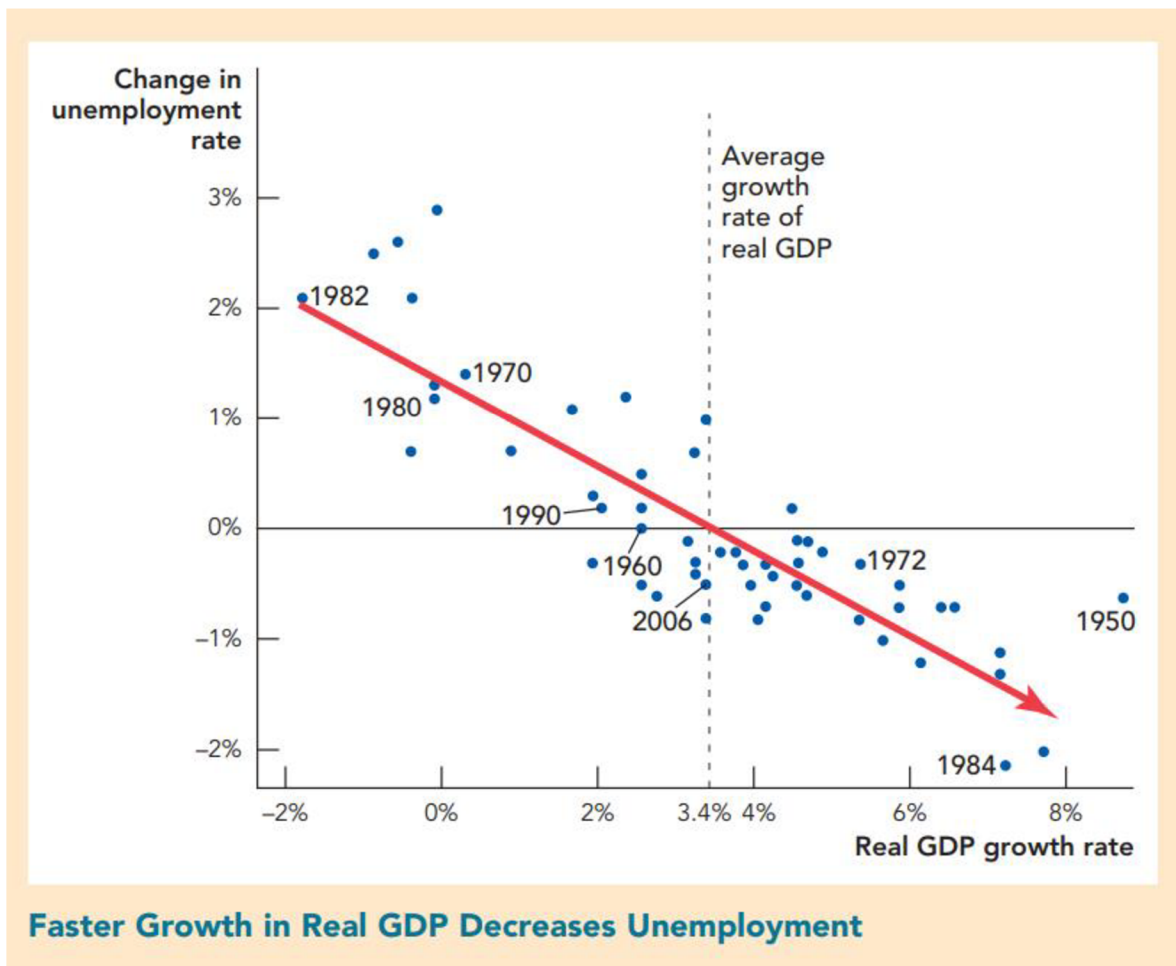


Source: (Cowen & Tabarrok, 2021)

Lower growth is commonly associated with increased unemployment for the reasons listed below. First of all, when a GDP downturn shows up, firms tend to reduce their workforce by laying off existing workers or hiring fewer new employees. Secondly, an increment in unemployment causes a shortfall in demand for goods and services. As a result, capital will be in a state of idle, which is an obstacle to economic growth, and individuals searching for employment will find it more challenging to become employed (Cowen & Tabarrok, 2021).

Figure 3 highlights the association between the unemployment rate and real GDP growth in the U.S; the vertical axis indicates the unemployment rate while the horizontal axis describes real GDP growth. As it has been pointed out from the scatter plot, there is an inverse relationship between the two variables. As a matter of fact, unemployment has an intention to decline if real GDP grows above average. Conversely, rising real GDP occurs when growth is below average. In 1982, the unemployment rate increased by 2.1% during the crisis. On the contrary, just two years later, in 1984, real GDP was proliferating at a rate of 7.2% per year, leading to a drop in the unemployment rate (Cowen & Tabarrok, 2021).

Figure 3: Faster Growth in Real GDP Decreases Unemployment



Source: (Cowen & Tabarrok, 2021)

In spite of the fact that cyclical unemployment is frequently defined as a type of unemployment related to the business cycle, this issue is a controversial topic for economists, particularly regarding the cause of business cycles. A few economists reckon that business

cycles are primarily the result of real shocks that demand a redistribution of labor across industries. For these economists, a business cycle, in other words, an unstable process of economic growth, is a sample of the frictional and structural unemployment categories (Cowen & Tabarrok, 2021).

3.3 Reasons for the always existence of the unemployed

The purpose of price adjustment in most markets is to bring supply and demand into balance for the labor market. Wages in an ideal labor market would modify to balance the demand and supply regarding employment. This wage adjustment would ensure that all workers are always fully employed. However, economies always experience unemployment. In other words, no matter how well the entire economy is doing, the unemployment rate will never fall to zero. According to numerous economists, there are four explanations for unemployment in the long run:

- The time it takes for job seekers to land jobs that best suit their qualifications.
- Minimum-wage laws
- The market power of unions
- Theory of efficiency wages (Mankiw, 2020).

3.3.1 Job search

Job searching is one of the causes why economies always have some unemployment. The process of matching workers with suitable jobs is known as a job search. Job searching would be easier and faster if all workers and all jobs corresponded with each other so that all workers were equally well suited for all vacancies. However, workers' expectations and skills range variously, and the slow speed of spreading information about job candidates and job vacancies might prevent them from job opportunities (Mankiw, 2020).

Frictional unemployment is the primary reason for long-lasting job searching. However, because the economy is constantly changing, frictional unemployment is inevitable. This transition results in a period of unemployment. Sectoral shifts refer to changes in the composition of demand across industries or regions. Sectoral shifts cause temporary unemployment because it takes time for workers to look for work in new sectors (Mankiw, 2020).

The more rapidly information about job openings and worker availability spread, the faster the economy can match workers and firms. Technologies such as the Internet may aid job search and reduce frictional unemployment. Furthermore, public policy also plays a significant role in reducing the economy's natural rate of unemployment (Mankiw, 2020).

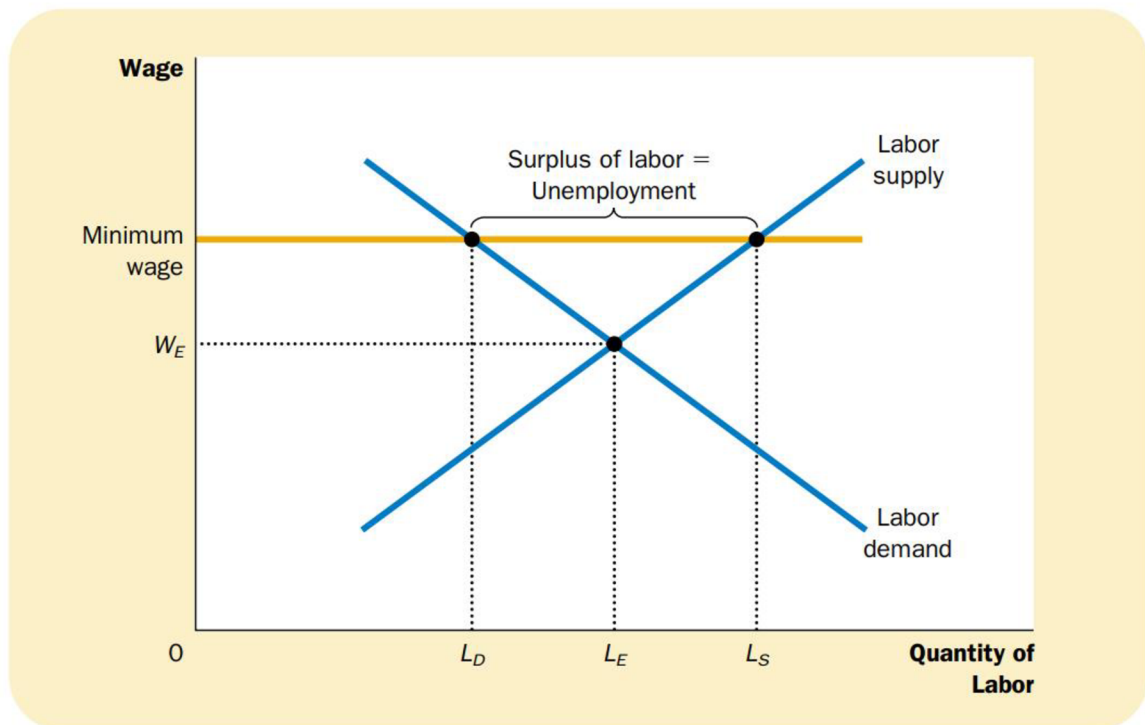
Unemployment insurance is one government program intended to protect workers from job loss; however, it unintentionally increases frictional unemployment. Unemployment benefits are only paid to those laid off because their previous employers no longer required their skills; this program does not apply to those who quit their jobs, were fired for cause, or have recently entered the labor force. While unemployment insurance reduces the hardship of unemployment, it also increases the amount of unemployment. Because unemployment benefits stop when a worker takes a new job, the unemployed devote less effort to job search and are likelier to turn down unattractive job offers (Mankiw, 2020).

3.3.2 Minimum-wage law

How do minimum-wage laws lead to unemployment? Minimum wages are not the main cause of unemployment in the economy because they typically apply to the least skilled and experienced labor force members, such as teenagers; therefore, minimum-wage laws only explain the existence of unemployment among these workers. Nevertheless, they still substantially impact certain groups with predominantly high unemployment rates. Additionally, the analysis of minimum wages can be used to elaborate on some of the other causes of structural unemployment (Mankiw, 2020).

Figure 4 illustrates the foundational economics of a minimum wage. W_E is the labor market's wage at which supply and demand balance. The quantity of labor supplied, and the quantity demanded equal L_E at this equilibrium wage. When the wage is forced to remain above the minimum level that balances supply and demand, the quantity of labor supplied rises to L_S , and the quantity of labor demanded falls to L_D . It increases labor supply and decreases labor demand compared to the equilibrium level. Following that, there is a surplus of labor. More people will be willing to work than jobs available; thus, some workers will be unemployed. Figure 4 also demonstrates a broader point: unemployment occurs when wages remain above the equilibrium level for any reason (Mankiw, 2020).

Figure 4: Unemployment from a wage above the equilibrium level



Source: (Mankiw, 2020)

Not the same as frictional unemployment, which is caused by the job search process, structural unemployment is caused by an above-equilibrium wage. The need for job search is not due to the failure of wages to balance labor supply and labor demand. When job search is the explanation for unemployment, workers seek jobs that best match their qualifications and benefit them. On the contrary, when the wage is above the equilibrium level, the quantity of labor supplied exceeds the quantity of labor demand. Workers become unemployed since they are waiting for job openings (Mankiw, 2020).

3.3.3 Unions and collective bargaining

A labor union is an organization founded by employees in a specific trade, industry, or company to enhance conditions affecting their work. A labor union represents workers' collective interests by attempting to negotiate with employers on concerns, for instance, work hours, wages, benefits such as sick leave, and health insurance. Workers' interests will be protected if the union successfully reaches an agreement with employers. On the contrary, a strike may occur depending on the union's actions. A strike harms the company's profit;

thus, employers intend to pay higher when dealing with a strike threat. Economists estimate that union workers earn 10 to 20 % more than non-union workers (Mankiw, 2020).

Raising the wage above the equilibrium level from a union causes an increment in the quantity of labor supplied and a fall in quantity demanded, resulting in unemployment. Jobless people have to face the disadvantages of higher wages. As a matter of fact, unions are commonly considered the leading cause of conflict between different groups of workers and between the workers who benefit from high wages and the jobless ones who do not belong to the union (Mankiw, 2020).

It is an undeniable fact that the existence of a union brings plenty of benefits for workers regarding their concerns, such as wages, hours of work, overtime, vacations, sick leave, health benefits, promotion schedules, job security, etc. However, aforementioned, union leads to unemployment and the reduction of the wages in the rest of the economy, and the outcome of it is considered both inefficient and inequitable. According to economists, the operation of a union has both advantages and drawbacks; its influence is likely to be beneficial in some situations and detrimental in others (Mankiw, 2020).

3.3.4 The theory of efficiency wages

The theory of efficiency wages is the fourth reason unemployment always exists in the economy, besides job search, minimum-wage laws, and unions. This theory claims that the operation of a company will be more efficient if wages are above the equilibrium level. Accordingly, even if a labor surplus occurs, a company might earn profit to keep wages high (Mankiw, 2020).

In some ways, this decision may seem odd, for wages are a large part of firms' costs. Typically, the strategy of the company in order to maximize profit is to keep costs and wages as low as possible. However, the insight of this theory indicates that if employers maintain high wages, they might also improve the workforce's efficiency. Based on the theory, high wages can better the following factors (Mankiw, 2020):

- Worker health: This efficiency-wage theory emphasizes the relationship between wages and worker health. Better-paid workers can afford a more nutritious diet, resulting in healthier and more productive, which is more profitable for the company. This type of theory, however, is more applicable to firms in less developed countries.

Concerns about nutrition may explain why firms do not cut wages despite a labor surplus (Mankiw, 2020).

- Worker turnover: The second type of efficiency-wage theory demonstrates the association between wages and worker turnover. There are various reasons workers quit their jobs, but primarily because of the benefits from the new vacancies. It always costs time and money for the company to hire and train newcomers. Therefore, paying employees a high wage reduces worker turnover, which means improving workers' benefits. The more a company pays its employees, the less likely they are to leave (Mankiw, 2020).
- Worker effort: Workers have discretion over how hard they work in many jobs. As a result, firms closely monitor their workers' efforts, but monitoring them is high-budget and imperfect; moreover, not all shirkers are caught immediately. Paying wages above the equilibrium level is the way A firm can do to address this issue. High wages make workers more eager to keep their jobs, providing an incentive to put forth their best effort and not shirk their responsibilities (Mankiw, 2020).
- Worker quality: The final type of efficiency-wage theory emphasizes the relationship between wages and worker quality. When a company searches for new workers, it cannot perfectly evaluate the quality of all its candidates. One way to catch the attention from high-qualified and skilled applicants is to pay a high wage (Mankiw, 2020).

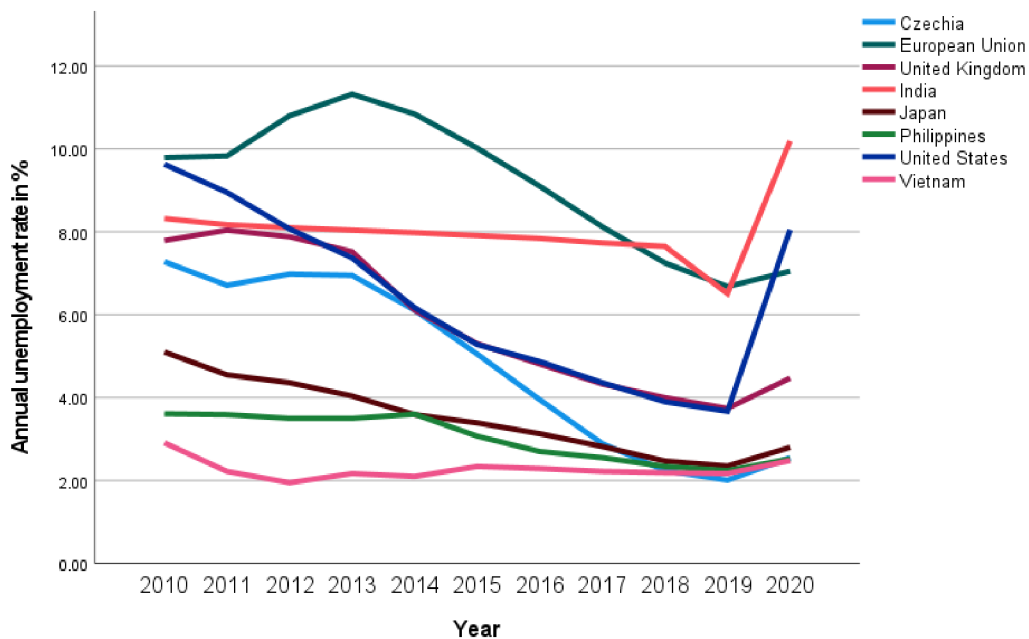
4 Practical Part

4.1 Unemployment in Vietnam

Vietnam's labor market has evolved significantly in recent years, transitioning from a centrally planned economy to a market-oriented economy. This transformation has been accompanied by a shift towards labor-intensive industries, particularly manufacturing, which has driven employment growth. Despite this overall positive trend, several challenges still face the labor market in Vietnam. One significant issue is the high proportion of workers in the informal sector, which comprises a substantial portion of the workforce. These workers are not officially recognized and may need access to social protection programs or other benefits provided to formal sector workers. This lack of formalization also makes collecting accurate data on employment trends more challenging, particularly in rural areas. Another challenge is the prevalence of low-skilled jobs in the economy. Although the government has made significant efforts to promote education and training, there is still a mismatch between graduates' skills and employers' needs. This has led to high levels of underemployment, particularly among young people. In recent years, there has also been a trend towards a more flexible labor market, with the growth of non-standard forms such as temporary contracts and part-time work. While these arrangements offer greater flexibility for workers and employers, they may also lead to greater job insecurity and lower wages. To address these challenges, the Vietnamese government has implemented several policies to promote formalization, improve education and training, and provide greater social protection for workers. They include raising the minimum wage, boosting social insurance coverage, and offering training and vocational education programs. Overall, while Vietnam's labor market has made significant progress in recent years, much work must be done to ensure that all workers have access to decent work and social protection. Addressing the challenges facing the labor market will be critical to achieving sustainable economic growth and development in the future. However, it is essential to note that the Covid-19 pandemic has had an impact on the Vietnamese economy and labor market. The unemployment rate has increased slightly recently, particularly in the tourism and hospitality sectors. The government has implemented various measures to support the economy and protect jobs, such as providing financial assistance to affected businesses and workers.

Figure 5 presents the annual unemployment rates in different countries/regions from 2010 to 2020. In particular, the data highlights the comparison between Vietnam and other countries/regions, such as America, India, Japan, etc. in terms of their unemployment rates. Throughout the years, Vietnam's unemployment rate has remained relatively low. The unemployment rate in Vietnam was 2.48% in 2020, much lower than America's 8.05%.

Figure 5: Annual unemployment rate by country, region from 2010 to 2020



Source: World Bank, own work

A variety of factors may cause this relatively low unemployment rate:

- Economic growth: Vietnam has experienced rapid economic growth in recent years, with an average annual growth rate of around 6-7%. Several factors, including increased investment in infrastructure, industrialization, urbanization, and the development of the services sector, have driven this growth. As an outcome, Vietnam has created numerous jobs, particularly in the manufacturing and service sectors. (Tran, 2019)
- Demographic trends: Vietnam's population is relatively youthful and rising, with a median age of about 31. This means that a large pool of people in the working-age range are available to enter the labor force. In addition, the government has

implemented policies to encourage people to participate in the labor force, such as increasing the retirement age and promoting female participation in the workforce.

- Government policies: The Vietnamese government has implemented various policies to promote job creation and reduce unemployment. For example, it has invested heavily in infrastructure, such as roads, bridges, and airports, which has created jobs in the construction sector. The government has also supported small and medium-sized enterprises (SMEs) through measures such as tax incentives and access to credit.
- Migration: Many Vietnamese workers have migrated to other countries, such as the United States, Japan, and other countries in Southeast Asia, in search of better job opportunities. This has helped to reduce the pressure on the domestic labor market and bring in remittances that help support the economy.
- Informal economy: Vietnam has a large informal economy, which includes self-employment and small-scale businesses. This sector provides employment opportunities for many people needing access to formal employment. In addition, the government has launched policies to support the informal economy, such as reducing regulatory burdens and facilitating access to capital. (Lehmann, et al., 2017)

Table 1: Annual unemployment rate in % in Vietnam by Region, by gender from 2010 to 2020

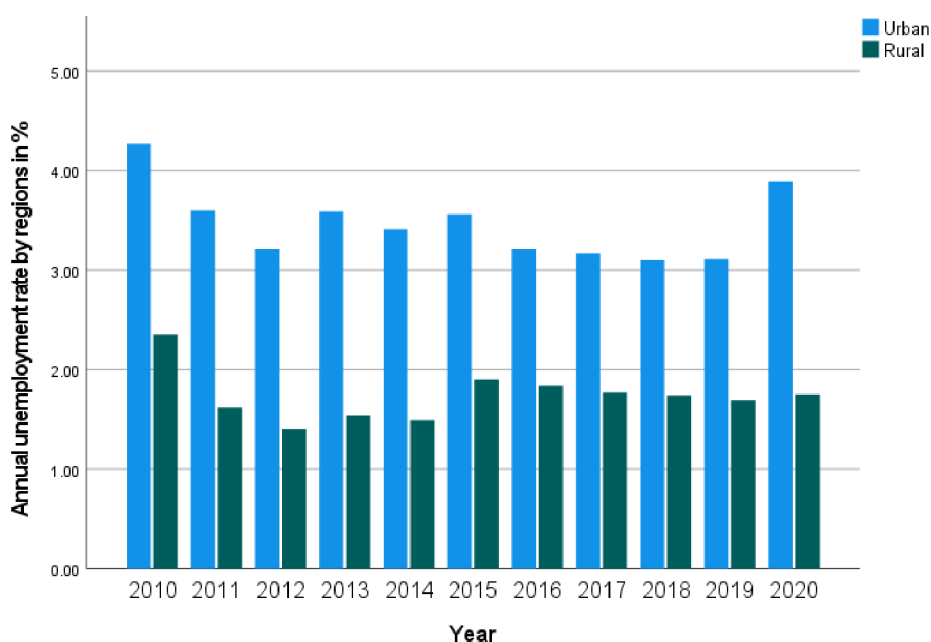
Year	The whole country	URBAN AREA	RURAL AREA	Male	Female
2010	2.91	4.27	2.35	2.42	3.45
2011	2.22	3.6	1.62	1.77	2.74
2012	1.95	3.21	1.4	1.66	2.29
2013	2.17	3.59	1.54	2.13	2.22
2014	2.1	3.41	1.49	2.1	2.1
2015	2.34	3.56	1.9	2.4	2.26
2016	2.29	3.21	1.84	2.36	2.19
2017	2.22	3.17	1.77	2.35	2.08
2018	2.19	3.1	1.74	1.97	2.45
2019	2.17	3.11	1.69	2.09	2.26
2020	2.48	3.89	1.75	2.01	3.05

Source: General Statistics Office of Vietnam, own work

Table 1 presents information regarding Vietnam's unemployment rate from 2010 through 2020. The data are presented in several different categories, including the entire nation, urban areas, rural areas, males, and females. The followings are some insights and observations gleaned from the data:

Overall, the unemployment rate in Vietnam has remained relatively low and stable over the past decade, with a slight increase in 2020. Nevertheless, there are significant disparities between urban and rural regions and between men and women.

Figure 6: Annual unemployment rate by region in Vietnam from 2010 to 2020

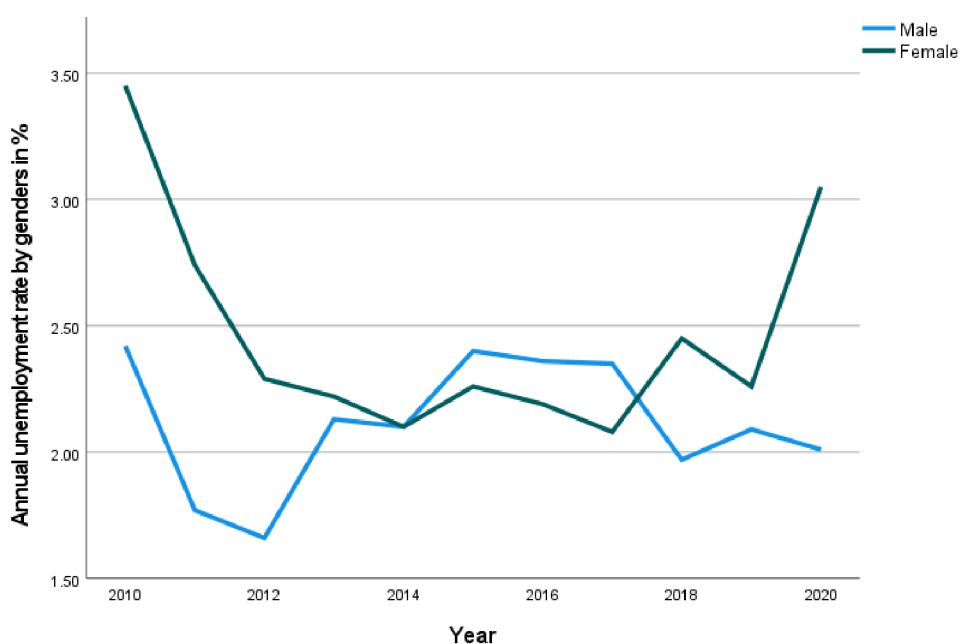


Source: General Statistics Office of Vietnam, own work

The data from Table 1 provides information on the unemployment rates in urban and rural areas in Vietnam from 2010 to 2020. This data allows for an analysis of the differences in unemployment rates between these two regions and the changes that have occurred over the past decade. From 2010 to 2020, the average unemployment rate in urban areas was 3.47%, while in rural areas, it was 1.74%. Figure 6 shows that urban and rural areas experienced fluctuations in their unemployment rates over ten years. In the first few years (2010-2012), urban unemployment was higher than in rural areas. However, by 2013, the situation had worsened; the unemployment rate in urban areas was 3.59%, while in rural areas, it was only 1.54%. This trend continued until 2020. However, from 2018 to 2020, the unemployment rate in both areas increased, but the rise was more significant in urban areas. In 2020, the unemployment rate in urban areas was 3.89%, while in rural areas, it was 1.75%. This increase in unemployment rates is attributable to several factors, including the COVID-19 pandemic, which significantly influenced the labor market. The nature of these regions' economies and labor markets can explain the lower unemployment rate in rural areas. Rural areas are predominantly agricultural, and farming activities provide a source of employment for a large number of people. Additionally, many rural residents engage in small-scale businesses and self-employment, which also help to reduce the unemployment rate. In

contrast, urban areas are more industrialized, and the job market is more competitive. Many people migrate to urban areas in search of employment, which puts pressure on the labor market, resulting in a higher unemployment rate. Additionally, the COVID-19 pandemic has severely impacted urban areas, especially in sectors such as tourism, hospitality, and retail, leading to job losses and rising unemployment rates. The persistent gap in unemployment rates between urban and rural areas suggests there may still be inequalities in access to job opportunities and resources between these regions. To address these inequalities, policies can be implemented to support job creation and skill development in rural areas, as well as to promote investment in these regions. This could potentially lead to a further decrease in the unemployment rate and a more equitable distribution of job opportunities between urban and rural areas. Policymakers must develop strategies to address the rising unemployment rates, especially in urban areas, to promote economic growth and reduce poverty.

Figure 7: Annual unemployment rate by gender in Vietnam from 2010 to 2020

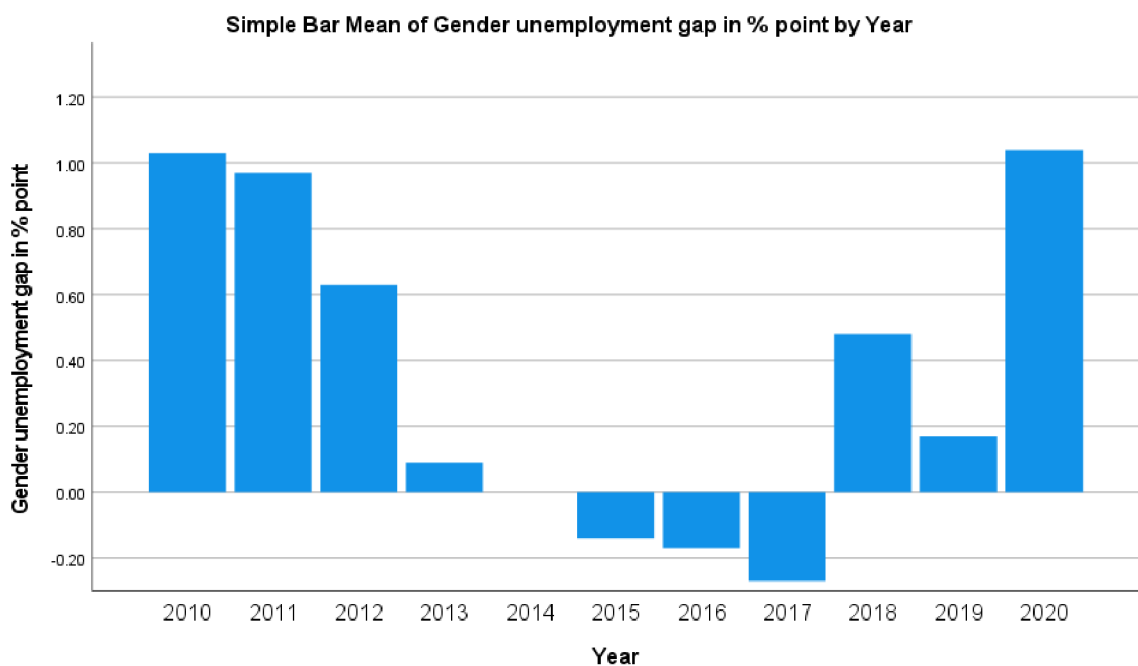


Source: General Statistics Office of Vietnam, own work

Figure 7 displays the changes in male and female unemployment rates in Vietnam over the ten years from 2010 to 2020. The graph shows a general decline in unemployment rates for both genders, which indicates an overall improvement in the Vietnamese labor market. However, the female unemployment rates were persistently higher than the male rates throughout the period, and the gap between the two remained relatively stable.

Figure 8 presents the Gender Unemployment Gap in Vietnam from 2010 to 2020 – defined as the difference between the female and male unemployment rates, which indicates the difference between male and female unemployment rates. In 2010, the gap was 1.03 percentage points, however, the gap decreased significantly over the next few years, reaching its lowest point in 2014, where it was zero. This indicates that the unemployment rate for males and females was the same in that year. However, the gap increased again in 2015 and continued to fluctuate until 2020, when it reached 1.04 percentage points.

Figure 8: Gender unemployment gap in Vietnam from 2010 to 2020

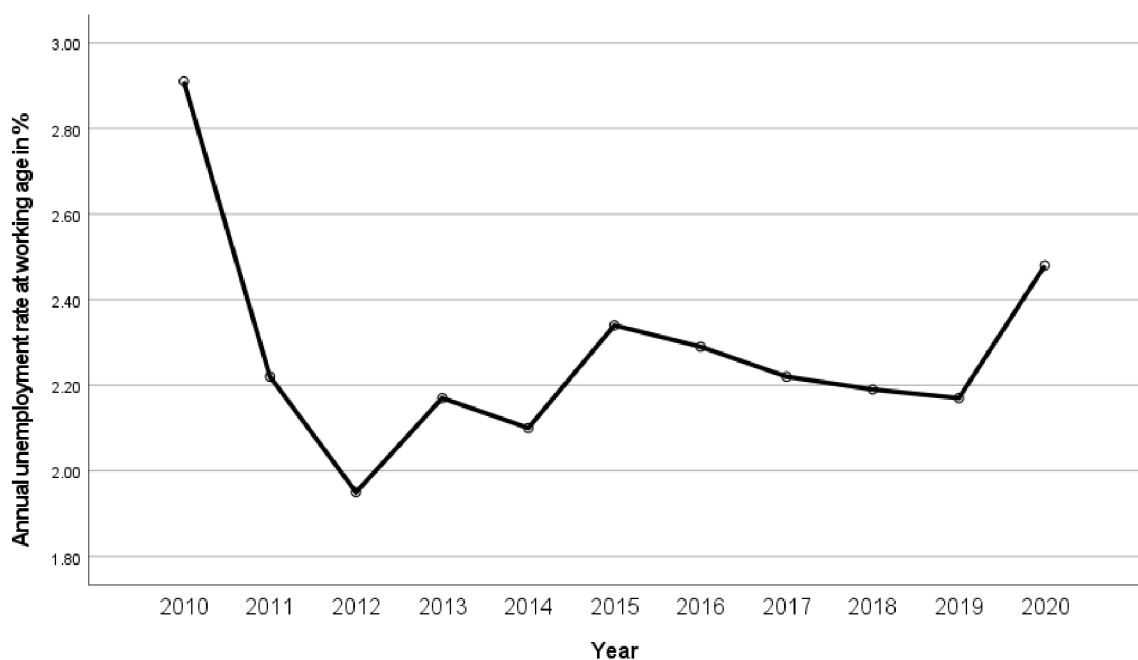


Source: General Statistics Office of Vietnam, own work

The gender gap in unemployment was particularly pronounced in 2010, with the female unemployment rate being significantly higher than the male rate, with a difference of 1.03 percentage points. From 2011 to 2013, the gender gap narrowed slightly but widened again in 2014 and remained stable until 2020. The female unemployment rates were more volatile, with fluctuations from year to year, while male unemployment rates were relatively stable. In spite of the decline in unemployment rates for both genders, the gender gap remained relatively constant, with a difference of 1.04 percentage points in 2020. This persistent gender gap highlights the need for policies that address the structural barriers that lead to discrimination against women in the labor market, such as unequal access to education, training, and job opportunities. In terms of gender, the female unemployment rate tends to

be higher than the male unemployment rate, suggesting that women may face more barriers to employment in Vietnam. This identified gender-based job discrimination, wage disparities, and limited access to education and training opportunities as factors contributing to higher unemployment among women. In Vietnam, women tend to work in less stable industries and are more vulnerable to economic downturns, such as the garment and textile industry. Moreover, cultural and societal expectations for women to take on caretaker roles, such as looking after children or elderly family members, often limit their ability to seek and maintain employment. Besides that, discrimination and biases against women in the workplace, such as gender pay gaps and limited opportunities for career advancement, can also contribute to higher female unemployment rates. The data indicates a persistent gender gap in unemployment rates in Vietnam, with women consistently experiencing higher unemployment rates than men. While there has been an improvement in the labor market over time, the gender gap in employment opportunities must be addressed to reduce discrimination against women and promote gender equality in the workforce.

Figure 9: Annual unemployment rate in Vietnam from 2010 to 2020



Source: General Statistics Office of Vietnam, own work

Figure 9 depicts Vietnam's unemployment rate over 11 years, from 2010 to 2020; units are measured in percentage. Overall, the unemployment rate fell over the period, especially at the beginning. It began at 2.91 and fell quite dramatically compared to other periods from

2010 to 2020 and reached 1.95, the lowest rate in those 11 years. After seven years of rising by 11% in 2013, due to COVID-19, Vietnam's unemployment rate increased by 14.29% for the first time in 2020. There is some year-to-year variation in the unemployment rate, but the overall trend has been one of stability and low unemployment. This is likely partly due to Vietnam's strong economic growth in recent years, which has created jobs and reduced unemployment. In general, the data suggest that Vietnam has been prosperous over the past decade in keeping unemployment at low and stable levels, despite rapid economic growth and urbanization. This is although the country has been rapidly urbanizing. Nonetheless, there are still several obstacles to be overcome to bring the unemployment rate in urban areas and among certain groups, such as women, down to a more manageable level.

4.2 Index analysis

Table 2 provides the unemployment rate in Vietnam from 2010 to 2020, along with the first difference and chain base index. The first difference represents the change in the unemployment rate from the previous year, while the chain base index measures the percentage change in the unemployment rate relative to the previous year.

Table 2: Index Analysis of unemployment rate in Vietnam from 2010 to 2020

Year	Unemployment rate for the entire country in %	1st difference	Chain base index
2010	2.91		
2011	2.22	-0.69	0.76
2012	1.95	-0.27	0.88
2013	2.17	0.22	1.11
2014	2.1	-0.07	0.97
2015	2.34	0.24	1.11
2016	2.29	-0.05	0.98
2017	2.22	-0.07	0.97
2018	2.19	-0.03	0.99
2019	2.17	-0.02	0.99
2020	2.48	0.31	1.14

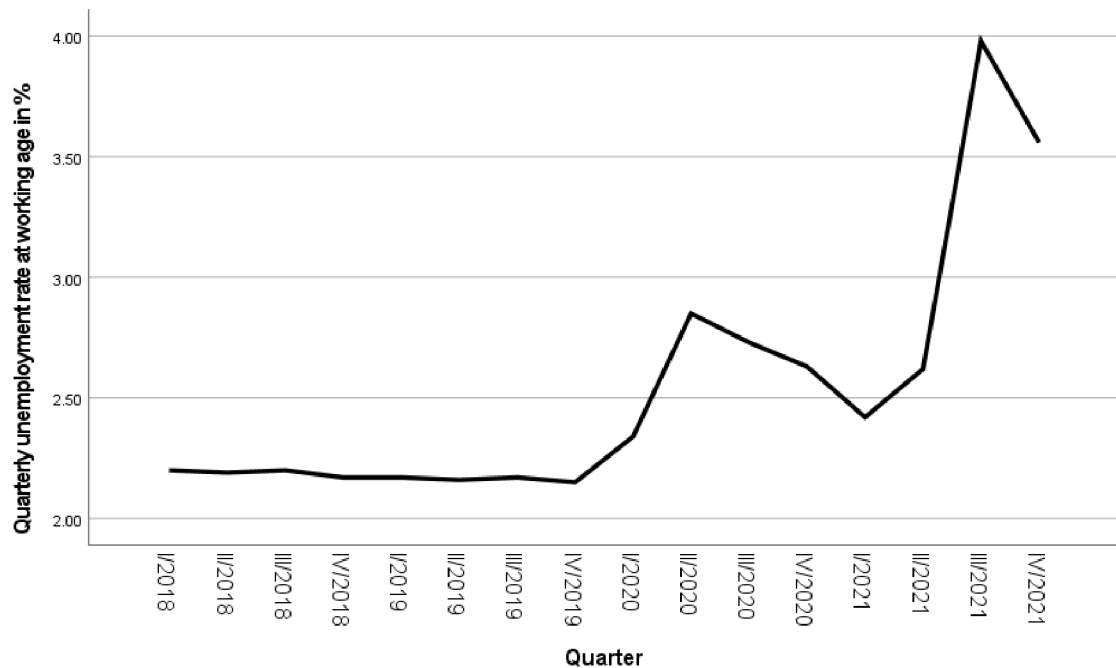
Source: General Statistics Office of Vietnam, own work

Table 2 indicates a decrease from 2010 to 2012, then maintained above 2 from 2013 to 2020; it is evident that the unemployment rate fluctuated over the years, but the changes were generally small. The most significant increase in the unemployment rate occurred in 2020, rising 0.31 compared to 2019, with a 14% increase, while the most significant decrease occurred in 2011, with a 24% decrease from the previous year, it was 2.91% in 2010 and decreased to 2.22% in 2011, a decrease of 0.69%. The unemployment rate has been relatively low and stable over the years, with a slight increase in 2020. The first difference column shows that the unemployment rate decreased in some years and increased in others, but the changes were generally small. The chain base index column shows that the percentage change in the unemployment rate relative to the previous year was also small, with most values around 1.0.

The chain base index column is beneficial for comparing changes in the unemployment rate over time. For example, in 2011, the unemployment rate decreased by 0.69 percentage points from the previous year, corresponding to a chain base index of 0.76. This means the unemployment rate in 2011 was 24% lower than in the previous year (2010). In 2015, the unemployment rate increased by 0.24 percentage points from the previous year, corresponding to a chain base index of 1.11. This means the unemployment rate in 2015 was

11% higher than in the previous year (2014). The slight increase in the unemployment rate in 2020 may be attributed to the COVID-19 pandemic and the subsequent economic downturn.

Figure 10: Quarterly unemployment rate in Vietnam from 2018 to 2021



Source: General Statistics Office of Vietnam, own work

The data from Figure 10 shows a general trend of low unemployment rates from 2018 to early 2020, followed by a sharp increase in the third and fourth quarters of 2020, likely due to the COVID-19 pandemic and some level of recovery in the first half of 2021. In 2018, the unemployment rate remained stable, hovering around 2.20% for the first three quarters before slightly dropping to 2.17% in the fourth quarter. The stable unemployment rate during this period suggests a relatively stable labor market in Vietnam. In 2018, the unemployment rate of working-age people in Vietnam was generally relatively low, which can be attributed to the country's status as an agricultural economy. Moreover, due to the country's low economic development, the population's living standard is low, and social security needs to be improved. Hence, workers often accept any type of work, including those with low pay, precariousness, and unsafe working conditions, in order to support themselves and their families.

The quarterly unemployment rate typically has seasonal components. The economy tends to experience cyclical patterns throughout the year, which can result in changes in the demand for labor and fluctuations in unemployment rates. However, the degree of seasonality in the unemployment rate can vary depending on factors such as the industry composition of the economy, the timing of holidays and other events, and the effectiveness of government policies to stabilize the labor market. Vietnam seems to be in this case since it is easily seen that its quarterly unemployment rate in Vietnam in 2018 does not have a clear seasonal component. It is due to several reasons, for instance: Economic structure, Tourism industry, Government policies and Data quality.

The unemployment rate remained stable in the first half of 2019, ranging from 2.15% to 2.17%. However, the unemployment rate increased in the second half of 2019, reaching 2.17% in the third and 2.15% in the fourth quarters. This slight increase in unemployment was due to the slower economic growth in Vietnam during this period. In the first quarter of 2020, the unemployment rate increased to 2.34%, which could have been influenced by the economic slowdown caused by the COVID-19 pandemic. The second quarter of 2020 saw a significant increase in the unemployment rate to 2.85%, indicating that the pandemic significantly impacted the labor market in Vietnam.

The unemployment rate remained high in the third quarter of 2020, at 2.73%. Many businesses were forced to shut down and reduce their operations during that time, leading to job losses and increased unemployment. This was especially true for industries heavily affected by the pandemic, such as tourism, hospitality, and manufacturing. In addition, the third quarter of 2020 was also the peak season for agricultural and fishery production in Vietnam, which are typically labor-intensive sectors. However, due to the pandemic, there were disruptions in the supply chain, transportation, and distribution channels, which led to reduced demand and lower prices for agricultural products. This resulted in reduced employment opportunities in the agricultural and fishery sectors. However, the government of Vietnam implemented various policies and measures to support businesses and workers during the pandemic. These measures included providing financial assistance to affected businesses, offering tax breaks, and increasing public investment in infrastructure and other projects to create more jobs. As a result, the unemployment rate dropped slightly to 2.63% in the fourth quarter of 2020, indicating some signs of recovery in the labor market.

In the first half of 2021, the unemployment rate remained relatively stable, with rates of 2.42% in the first quarter and 2.62% in the second quarter. During the third quarter of 2021, however, there was a significant increase of 3.98 percent. The complicated progression of the Covid-19 epidemic has precipitated a precipitous decline in employment. During the third quarter of 2021, unemployment and underemployment rates reached an all-time high. The fourth outbreak of the Covid-19 epidemic has exerted significant pressure on the Vietnamese economy and labor market. Plenty of negative records have been established, millions of workers have lost their jobs, and their incomes have decreased. Employment opportunities have become more challenging than ever before. The country experienced a surge in COVID-19 cases and outbreaks in the third quarter of 2021, leading to widespread restrictions on mobility and economic activity, particularly in major cities such as Ho Chi Minh City and Hanoi. These restrictions have had a significant impact on industries such as tourism, hospitality, and retail, which are major employers in the country. The government had to implement strict measures to contain the spread of the virus, such as social distancing measures and travel restrictions, resulting in a significant impact on businesses and the labor market. Many companies had to reduce their workforce, resulting in job losses and increased unemployment. Furthermore, the pandemic has also had an impact on the demand for labor. Many businesses were forced to change their operations or shut down, resulting in decreased labor demand. Moreover, the shift towards remote work and online business has changed the nature of work, resulting in increased competition for jobs, particularly in the technology and digital sectors.

4.3 Regression model

For running the regression model in IBM SPSS, the quarterly unemployment rate in Vietnam from 2018 to 2021 is chosen as the dependent variable in SPSS in the regression task. The independent variable is the number of quarterly new COVID-19 cases in the same period. A dummy variable is added to the regression model to estimate the difference in the unemployment rate between the pre-pandemic period (where the dummy variable is 0) and the pandemic period (when the dummy variable is 1), controlling for the number of COVID-19 cases. The aim of using a linear regression model for the given data is to examine whether there is a relationship between the number of quarterly new COVID-19 cases and the quarterly unemployment rate in Vietnam during the pandemic; if so, how statistically

significant this association is. The linear regression analysis on the data can also estimate the slope of the line (i.e., the regression coefficient) that represents the change in the unemployment rate for every unit increase in the number of Covid cases. The following is the regression model:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$$

Where:

y = *Quarterly unemployment rate at working age*

β_0 = *Y – intercept*

x_1 = *Number of quarterly new COVID – 19 cases*

x_2 = *Dummy variable*

ε = *Residual*

Table 4 depicts the correlation coefficient ($r=0.954$), suggesting a strong linear relationship between the variables. The figure also includes the result of the coefficient of determination, R-squared, which measures the proportion of variability in the dependent variable explained by the independent variable in a regression model. In this case, the R-squared value is 0.909, indicating that 90.9% of the variation in the quarterly unemployment rate at working age can be explained by the number of quarterly new COVID-19 cases. This relatively high R-squared value suggests that the regression model provides a good fit for the data and is a helpful tool for predicting the quarterly unemployment rate based on the number of COVID-19 cases. However, it is essential to note that the R-squared value does not indicate the causal relationship between the independent and dependent variables but only the extent to which the variation in the dependent variable can be explained by the independent variable(s) in the model. Other factors not included in the model, such as government policies or economic conditions, may also impact the quarterly unemployment rate in Vietnam.

Table 3: Summary of Statistical Model Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.954 ^a	.909	.895	.17471

a. Predictors: (Constant), Dummy variable, Number of quarterly new COVID-19 cases

Source: Own calculation, IBM SPSS

An F-test is applied to test if the regression model is statistically significant. The null hypothesis (H0) is that the regression model does not significantly explain the variation in the dependent variable, while the alternative hypothesis (H1) is that the regression model does significantly explain the variation in the dependent variable. The result is displayed in Table 5, using a significance level of 0.05, and the p-value is <0.001, which is smaller than the significance level, indicating that the null hypothesis is rejected. Therefore, the regression model is statistically significant at the 0.05 significance level.

Table 4: Analysis of Variance (ANOVA) Results

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.979	2	1.989	65.168	<.001 ^b
	Residual	.397	13	.031		
	Total	4.375	15			

a. Dependent Variable: Quarterly unemployment rate at working age
b. Predictors: (Constant), Dummy variable, Number of quarterly new COVID-19 cases

Source: Own calculation, IBM SPSS

To assess the statistical significance of the regression coefficient for the independent variable, a t-test was conducted. The t-test evaluates whether the regression coefficient is significantly different from zero. The null hypothesis (H0) is that the regression coefficients for the independent variable are equal to zero ($\beta = 0$), indicating no significant relationship between the independent and dependent variables. The alternative hypothesis (H1) is that

the regression coefficient is not equal to zero ($\beta \neq 0$), indicating a significant relationship between the independent and dependent variables.

The results of the t-tests in Table 6 indicate that the regression coefficients for both the independent and dummy variables are statistically significant at the 0.05 level. The p-values associated with the t-values are less than 0.05 ($p < 0.05$), indicating that the null hypothesis is rejected and providing the conclusion that there is a statistically significant positive relationship between the number of quarterly new COVID-19 cases and the quarterly unemployment rate at working age in Vietnam during the pandemic period, controlling for the pre-pandemic period and other factors not included in the model. The slope coefficient (b1) of 1.332E-6 indicates that for every additional new COVID-19 case per quarter, the quarterly unemployment rate at working age is predicted to increase by 0.000001 units, holding all other factors constant. Similarly, the dummy variable coefficient (b2) of 0.429 indicates that the quarterly unemployment rate at working age during the pandemic period (when the dummy variable is 1) is predicted to be 0.429 units higher than the pre-pandemic period (when the dummy variable is 0), holding all other factors constant.

Table 5: Regression Coefficients Results

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.176	.062		35.231	<.001
	Number of quarterly new COVID-19 cases	1.332E-6	.000	.719	7.959	<.001
	Dummy variable	.429	.094	.411	4.547	<.001

a. Dependent Variable: Quarterly unemployment rate at working age

Source: Own calculation, IBM SPSS

5 Results and Discussion

The analysis of the practical part shows that the annual unemployment rate at working age has been low over time compared to other states and regions. Vietnam's relatively low unemployment rate can be attributed to a range of factors such as Economic growth, demographic trends, government policies, etc.

The analysis also reveals significant differences in unemployment rates between urban and rural areas of Vietnam from 2010 to 2020, there were fluctuations in unemployment rates for both areas during the ten-year period, but the urban areas experienced higher rates than rural areas. In addition, the outcome points out an ongoing disparity in the unemployment rates between genders in Vietnam. Despite an overall improvement in the job market, women have consistently had higher unemployment rates than men. This emphasizes the necessity of remedial measures to curb gender discrimination and ensure gender parity in employment opportunities.

The fluctuation of unemployment rates in Vietnam between 2018 and 2021 was presented, focusing on the impact of the COVID-19 pandemic on the labor market. The unemployment rate was relatively stable till the first half of 2019 but increased in the second half due to slower economic growth. The labor market witnessed an increase in unemployment rates in 2020, especially in the third quarter of 2021 saw a significant increase in unemployment rates due to the impact of the COVID-19 pandemic. The quarterly unemployment rate typically exhibits seasonal fluctuations due to cyclical patterns in the economy, resulting in changes in labor demand. However, the degree of seasonality can vary depending on factors such as industry composition, the timing of holidays, and government policies. In Vietnam, the quarterly unemployment rate in 2018 lacked a clear seasonal component, which can be attributed to multiple factors:

- Economic structure: Vietnam's economy is based mainly on agriculture and manufacturing, which may have little seasonal variations. While some agricultural activities like harvesting and planting may be seasonal, they may not necessarily lead to a significant variation in the overall unemployment rate. (Le, 2010)
- Government policies and programs: The Vietnamese government has implemented various policies and programs to promote job creation and reduce unemployment.

These efforts may help to smooth out any seasonal fluctuations in the unemployment rate. (Thanh, 2019)

- Tourism industry: Despite the growth of tourism in Vietnam, its location and weather patterns may result in the industry not having a significant seasonal component as in other countries. For example, southern Vietnam, home to many popular tourist destinations, experiences relatively stable weather throughout the year.
- Data quality: The quarterly unemployment rate in Vietnam has limited available data points, resulting in a relatively short time series. Due to this, capturing the total seasonal variation in the data may not be possible. Additionally, the methods used to collect unemployment data can impact the quality of the data. In Vietnam, household surveys are used to collect quarterly unemployment rate data. If the survey sample is not representative of the entire population or if the data is subject to sampling error, the accuracy and reliability of the unemployment rate estimates may be affected.

The regression analysis was conducted using time series quarterly data. The quarterly unemployment rate for working-age individuals was treated as the dependent variable, and the number of quarterly new COVID cases and a dummy variable were considered independent variables. The results in Table 5 and Table 6 show that the p-values for both F-test and t-test of both variables are below the significance level alpha of 95%, indicating that the regression model is statistically significant and the variables are statistically significant. Additionally, a strong correlation exists between the dependent variable (quarterly unemployment rates) and the independent variable (number of quarterly new Covid cases), which suggests that the unemployment rate is predicted to increase with each rise in the number of Covid cases. The regression results reveal that the slope coefficient (b1) has a positive value of 1.332E-6, implying that with each additional new COVID-19 case per quarter, the quarterly unemployment rate for working-age individuals is estimated to increase by 0.000001 units while keeping all other variables constant. Moreover, the dummy variable coefficient (b2) has a statistically significant value of 0.429, indicating that during the pandemic period (when the dummy variable equals 1), the quarterly unemployment rate for individuals of working age is estimated to be 0.429 units higher compared to the pre-pandemic period (when the dummy variable equals 0), controlling for all other variables.

6 Conclusion

Unemployment is one of the most significant economic issues that countries face worldwide. It affects not only individuals and households but also has broader economic and social implications. High levels of unemployment can lead to reduced consumer spending, lower tax revenues, and slower economic growth. Moreover, it can adversely affect individuals' and their families' mental and physical health. The COVID-19 pandemic has resulted in unprecedented levels of unemployment globally, with many countries experiencing job losses and reduced working hours. Vietnam is no exception, and the pandemic has profoundly impacted the country's labor market, resulting in increased unemployment rates and significant challenges for workers and businesses alike. This thesis has analyzed the evolution of unemployment in Vietnam and examined the impact of the COVID-19 pandemic on the country's labor market.

The statistical analysis examined Vietnam's unemployment rate from 2010 to 2020. The findings revealed that Vietnam's unemployment rate has remained stable and low over the years, with a noticeable increase of 2.48 percent in 2020 due to the Covid-19 pandemic. The pandemic's impact on the labor market was most evident during the third quarter of 2021, with an unprecedented increase in unemployment rates. The study identified various factors contributing to Vietnam's low unemployment rate, including sustained economic growth, demographic trends, government policies, migration, and a thriving informal economy. However, there is room for improvement, especially in light of the COVID-19 pandemic's impact on the labor market. The government should explore enacting additional policies to boost job growth and expand opportunities for people in pandemic-affected industries, such as tourism and hospitality. Investing in upskilling and reskilling programs to prepare people with the new skills demanded by the evolving job market could also lessen the likelihood of long-term unemployment. In addition, increasing social safety nets to assist people affected by job loss and offering incentives for businesses to retain personnel could be investigated. Vietnam has achieved significant progress in lowering unemployment, but further efforts are necessary to guarantee that the labor market stays stable and resilient in the face of future economic shocks.

The research also indicates significant differences in unemployment rates between urban and rural areas in Vietnam. Rural areas generally have lower unemployment rates due to their

more agricultural-based economies and the prevalence of self-employment. However, the COVID-19 pandemic has impacted both urban and rural areas, with urban areas experiencing more significant job losses in tourism, hospitality, and retail industries. To address these inequalities, policymakers should implement policies to support job creation and skill development in rural areas and promote investment in these regions. Strategies should also be developed to address the rising unemployment rates, particularly in urban areas, to promote economic growth and reduce poverty. Besides, there is a persistent gender gap in Vietnam, with women consistently experiencing higher unemployment rates than men. Factors contributing to this gap include job discrimination, wage disparities, limited access to education and training opportunities, and cultural and societal expectations for women. Policies that address structural barriers to employment promote gender equality, and provide support for women in less stable industries should be implemented in order to address this issue.

The study's regression estimation analysis reveals a significant correlation between the quarterly unemployment rate and the number of new COVID cases, which suggests that the COVID-19 pandemic has contributed to the increment in unemployment in Vietnam. This finding suggests that the continuous presence of the Covid-19 pandemic harms the unemployment rate in Vietnam. However, some other factors might have affected the unemployment rate, such as government policies, economic conditions, and vaccination rates. Therefore, the results may not be generalizable to other countries or contexts. Despite the limitations, the study contributes to the literature by providing evidence of the impact of COVID-19 on the labor market and highlighting the importance of monitoring and addressing unemployment during pandemics. As of the writing of this thesis, the COVID-19 situation in Vietnam has improved significantly, with the country having successfully contained subsequent waves of infections. With vaccination efforts underway and the gradual lifting of restrictions, it is hoped that the labor market will recover and unemployment rates will return to advantageous levels.

7 References

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