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Discussion on the Impact of COVID-19 on Ireland's Macroeconomic Development

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Abstract: This paper aims to discover how COVID-19 influences the development of the macroeconomy in Ireland, and help readers understand how Ireland, or even other countries or regions, should respond to a crisis such as COVID-19 to keep their business running effectively. Through the research, the relevant data of Ireland from 2019 to 2022 are quantitatively analyzed, including Gross Domestic Product (GDP), national income, people's employment and unemployment, the number of enterprises registered, Ireland's traffic conditions such as the number of passengers, the number of hotel stays and other data, the number of airline routes, hospital expenses and medical subsidies and the number of hospital inpatients. The Irish government's policies to control the spread of the epidemic will also be discussed. After analysis, COVID-19 can negatively affect employment, transportation, tourism, and the number of enterprises. However, it can raise the capital of the hospital. Therefore, Ireland and other countries and regions need to be aware of the impact of COVID-19 on economic development. This article can show the impact of COVID-19 on the macroeconomy in what aspects, and reduce the impact of disasters through appropriate fiscal policies, adequate fund preparation, and subsidies for those who lose their jobs due to disasters.

Keywords: COVID-19, macroeconomy, unemployment, financial situation, transport

1. Introduction

Since 2019, the novel coronavirus epidemic has begun to spread globally, seriously affecting the normal life of people in various countries, involving economic, political, medical, social, and other aspects. The COVID-19 pandemic has led to a global economic downturn that has hit many industries, forcing some companies to close down, and lay off workers. International trade is blocked, unemployment is growing, and the government's finances are under increasing pressure. In the wake of the global pandemic, the continuation of normal social activities has become impossible in all countries. The closure of schools and transportation has become necessary, leading to a shift from offline to online platforms for learning and work. Recreational activities have been suspended, and the adverse effects on individuals extend beyond just physical health, with mental health being impacted as well. The COVID-19 pandemic is affecting mental health, which has caused many people to suffer from depression or anxiety [1]. Medical resources have become strained, and the outbreak of the novel coronavirus has increased the pressure on the medical system and brought about the unequal distribution of social goods. Ireland has also suffered a severe impact during the COVID-19

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outbreak, with the number of patients hospitalizations reflecting the seriousness of the health problems in Ireland during the epidemic, and these problems have affected the economic development of Ireland. As of November 14, 2023, the total number of COVID-19 has reached 1,725,026, and the total number of deaths has reached 9,366. The total number of confirmed cases in men is 802,830 and the total number of confirmed cases in women is 922,009. It can be seen that the number of confirmed cases in women due to COVID-19 is 14.84% higher than that in men. The age range with the highest number of people infected with COVID-19 was between 35 and 44 years old, with 320,117 people and 68,002 hospitalizations, of which 2,942 were admitted to intensive care units, with a significant increase in hospitalizations from March 16, 2020, to November 14, 2023. There has been a slight upward trend in the number of people admitted to intensive care units, with the largest concentration of those aged 75 to 84 [2]. To contain the spread of COVID-19, Ireland has implemented some relevant policies. This paper aims to examine the effects of COVID-19 on the macroeconomy of Ireland. The conversation will cover the impact on different areas, including the economy, healthcare, education, workforce, travel, and commerce. In addition, the relationship between Ireland's policies on COVID-19 and the macroeconomy will be given. Finally, the revelation of the strategy of running a firm during a disaster like COVID-19 will be discussed.

2. Literature Review

2.1. The Impact of COVID-19 on the Firm in Ireland

It is worth noting that not many startups were as well-equipped to handle a crisis as severe as COVID-19. This is because the pandemic has affected partners, customers, and investors alike, while the economic climate has also taken a hit. Additionally, few companies have been able to properly prepare for such a crisis or have easy access to capital and distribution channels [3]. Startups, especially financially, are ill-equipped to handle disasters like COVID-19 despite finances being a vital resource. For example, the financial structure, cash flow forecast, methods of investment appraisal, and budgeting systems. These factors are what startups need to nurture and build. Initial enterprises face financial challenges throughout their life cycle, which is a global issue.

The COVID-19 pandemic has led to a decrease in investments by investors, reduced business cooperation, and a lack of capital sources [4]. In addition, the novel coronavirus epidemic has triggered fluctuations in global stock markets, with sharp rises and falls in stock prices. Stock markets in different industries are affected by the epidemic differently. For example, some technology and medical industries can cope with the impact of the epidemic stably, but some industries are seriously affected by various government restrictions and people's psychology. The uncertainty of the pandemic makes investors' investment attitudes fluctuate, and investors may be more careful about investment and constantly adjust their investment portfolios. A rise in COVID-19 cases can reduce returns on corporate stocks [5]. A significant number of jobs have not been created by startups, and they have also failed to reduce the overall impact of the pandemic on employment [6]. Ireland's accommodation and video services and snacks sectors have seen the most job losses since the COVID-19 outbreak in 2019, with younger workers and those in the lower fifth of the income distribution losing their jobs more prevalent, while large companies can keep employees on the job through temporary wage subsidies [7]. In addition to the size of the company and the type of industry, there are also external factors such as commuting, and since the outbreak of COVID-19, the government has implemented a series of measures to reduce the movement of people, including blocking some air routes or suspending some modes of transportation. Stay-at-home and lockdown measures have limited people's commutes, especially for workers engaged in non-essential businesses [8].

DOI: 10.54254/2754-1169/80/20241744

2.2. The Impact of COVID-19 on Education in Ireland

The education problem has been very prominent during COVID-19, the inequality of education is gradually emerging, and the closure of schools forces students to study at home. Schools and homes are different in their ability to provide effective learning volunteers and resources. Some prostheses lack necessary learning resources, such as computers and study space, and some families have time constraints. For example, parents must go out to work every day, parents with low education cannot participate in their children's learning, and health problems caused by the epidemic prevent parents and children from effectively studying however, these problems are more severe in families with lower socioeconomic status [9]. Research suggests that families with higher levels of social class and educational attainment are more likely to have access to better resources and opportunities for their children's learning, including higher-quality educational materials and a greater capacity for parental involvement in the learning process. However, the long-term homeschooling brought about by the COVID-19 pandemic has created difficulties for children, especially those with Special Education Needs (SEN) and migrant children. Families with good economic conditions can provide children with adequate learning equipment and resources, while considering auxiliary educational activities, such as music classes, drama classes, and sports classes [10]. A study conducted by Lades et al. (2020) in Ireland found that outdoor activities, such as gardening and spending time with children, had a positive impact on individuals' well-being during the COVID-19 pandemic. However, the study also identified certain activities, such as remote meetings and home-schooling children, as particularly stressful during this time [11].

2.3. The Impact of COVID-19 on Disposable Income in Ireland

The decline in household disposable income during the COVID-19 pandemic has also led to inequality in household disposable income, with some low-income, single, and rented households spending more on necessities in their budgets. In contrast, high-income households, married and self-employed households spend more on restricted goods and services [12].

2.4. The Impact of COVID-19 on Transportation in Ireland

In addition, diseases, epidemics, seasonal influenza, and global pandemics have consistently had the most significant impact on the tourism industry [13]. The COVID-19 pandemic has led the government to impose restrictions on transportation, many air routes have been closed, and international travel, in particular, has been almost suspended, which has not only limited people's travel, but also people are unable to travel or work across borders, and the economic contribution in tourism and transportation has almost stopped. Since March 2020, Ireland has implemented traffic restrictions as a part of its pandemic control measures to slow down the infection. These measures include closing non-essential services and urging employees to work remotely whenever feasible to minimise traffic [14]. The global pandemic is being expedited through air travel, which is also playing a role in the dissemination of COVID-19 on a global scale [15]. Air travel is the main way of cross-border travel, Ireland has many multinational companies, such as Apple, Google, and Facebook, working with companies from all over the world, but the novel coronavirus epidemic has led these multinational companies to carry out cross-border business activities, so the closure of air routes has also directly affected the development of Ireland's macro economy.

3. Methodology

In this paper, the study employs quantitative research methods, utilizing the data from Eurostat which provides an all-encompassing and uniform set of statistical information on every aspect of its

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operations. This collection of data serves as an essential source of key variables that are extracted as part of the study, including economic indicators, pertinent socio-economic indicators, and statistics about unemployment, and the Central Statistics Office (CSO) of Ireland which as Ireland's national statistics agency, the CSO provides a wealth of data on the economic and social conditions of the country. Specific variables of interest for this study include the number of people receiving unemployment benefits, COVID-19 infection rates, and necessary sources of data related to air travel. The data under consideration is exclusive of the national scale. Through quantitative analysis of the data, the inter-relationships between various factors have been explored. In addition, the study pays particular attention to the number of people receiving unemployment benefits, COVID-19 infection cases, and the number of air travel cases. Regression analysis techniques have been employed to explore possible correlations and dependencies.

Due to the temporal nature of the data, employing time series analysis is imperative to investigate the trends and patterns that emerge over different periods. This analytical approach offers a unique opportunity to gain insights into the dynamics of the variables under investigation. By carefully examining the data, one can uncover valuable information that may be otherwise difficult to discern. Therefore, utilizing time series analysis is vital in achieving a comprehensive understanding of the underlying patterns and trends of the data. The article uses relevant data from Eurostat between 2017 and 2021 or 2022, including employment, education, related spending, GDP, transportation, and other indices, and takes the two years before the COVID-19 pandemic as the control years. In the regression analysis, the data from CSO between March 2020 and April 2021 will be used. This article will collect some macroeconomic data and show the change trend of these data from 2017 to 2021 or 2022 in the form of line charts, especially focusing on the change trend of each data after 2019 when the COVID-19 outbreak began. By analyzing its trend, this study can indicate the impact of COVID-19 on this data after the outbreak of COVID-19 in 2019, and analyze the impact of this change on Ireland's macro economy.

In addition, regression analysis can guide the changes in the selected independent variables. A multiple regression model will be used. In the regression analysis of this paper, the number of people receiving pandemic unemployment payments between March 2020 and April 2021 is selected as the dependent variable, and the number of COVID-19 infections and the number of people choosing public transportation travel are selected as the independent variables. How the changes in the number of COVID-19 infections and the number of people choosing public transportation travel affect the number of people receiving epidemic unemployment benefits on the selected date is analyzed. The significance of the variable is judged by analyzing the value of the regression result, and whether the variable will significantly affect the change of the dependent variable in the selected period is judged. Then, by observing the coefficient, the change of the unit dependent variable can be determined by increasing the independent variable by one unit.

4. Results

4.1. GDP

Figure 1 and Figure 2 show Ireland’s real GDP growth rate and GDP value at market price between 2017 and 2022. According to the data from Eurostat (2023), from 2017 to 2022, Ireland's GDP is in a continuous growth trend, Ireland's GDP in 2017 was 298,528.3 million euros, and in 2022, it was 506,282.4 million euros, of which in 2019 when the novel coronavirus outbreak began, Ireland's GDP was 35,6357.4 million euros. From the chart of Ireland's GDP growth rate from 2017 to 2022, it can be seen that from 2017 to 2019, Ireland's GDP growth rate continued to decline, from 9.3% in 2017 to 5.3% in 2019, reaching the lowest GDP growth rate in the past six years. The decline in GDP

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growth was most dramatic between 2018 and 2019, with Ireland's GDP growth rising from 2019 to 2021 and falling again from 2021 to 2022 [16] [17].

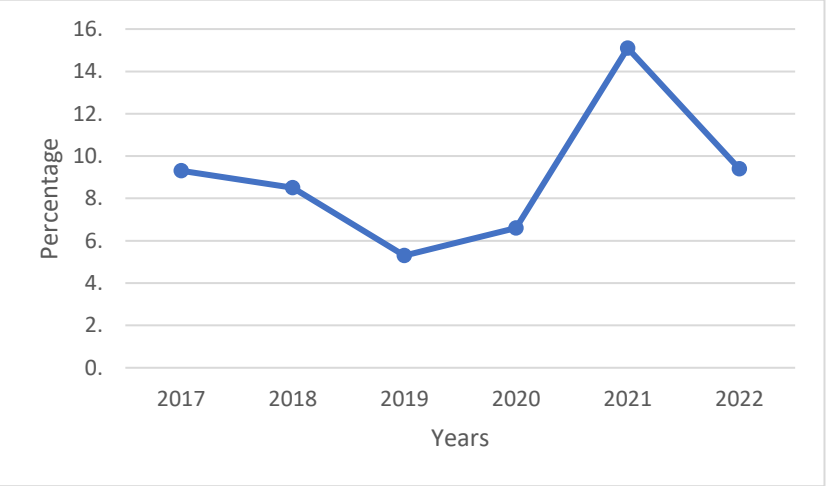

Figure 1: Real GDP growth rate of Ireland between 2017 and 2022.

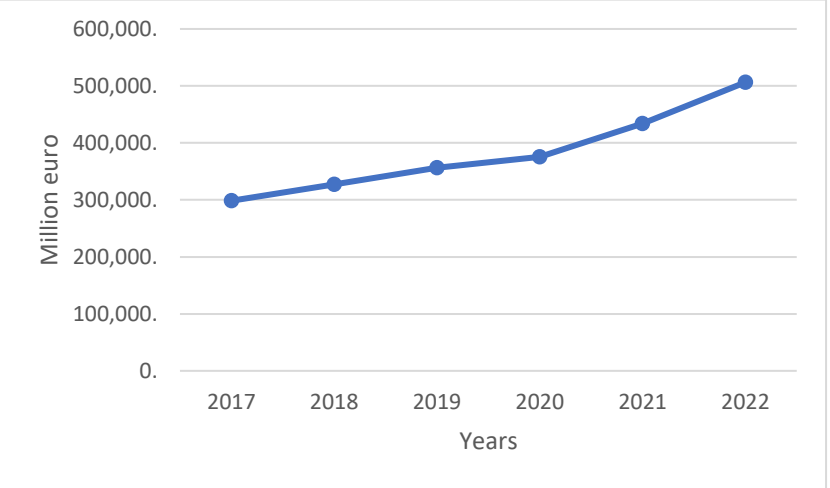

Figure 2: Ireland's Gross domestic product at market prices between 2017 and 2022.

4.2. Unemployment

Figure 3 shows the unemployment value in Ireland from 15 to 74 years old between 2017 and 2022. According to data from Eurostat (2023), Ireland's male unemployment people decreased from 90.2 thousand to 68.4 thousand between 2017 and 2019. Between 2019 and 2021, the unemployment of male people increased from 68.4 thousand persons to 84.9 thousand persons and falling again from 2021 to 2022. The trend of unemployment of females in Ireland is the same as that of males. Between 2017 and 2022, the number of female unemployed declined from 67.7 thousand to 52.6 thousand. The unemployment rate of women in 2019 was more significant than that of men in 2018, reflecting that the unemployment problem of women caused by the outbreak of COVID-19 is more serious than that of men. Between 2019 and 2021, the unemployment of females increased from 52.6 thousand persons to 72.8 thousand persons and decreased again from 2021 to 2022 [18]. Due to the impact of COVID-19, the unemployment problem of Irish people has become a social concern, especially in 2019; people's lack of preparedness for the new coronavirus epidemic has led to many people losing

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their jobs, and based on the available statistical data, it is evident that the number of unemployed men in Ireland exceeds that of women.

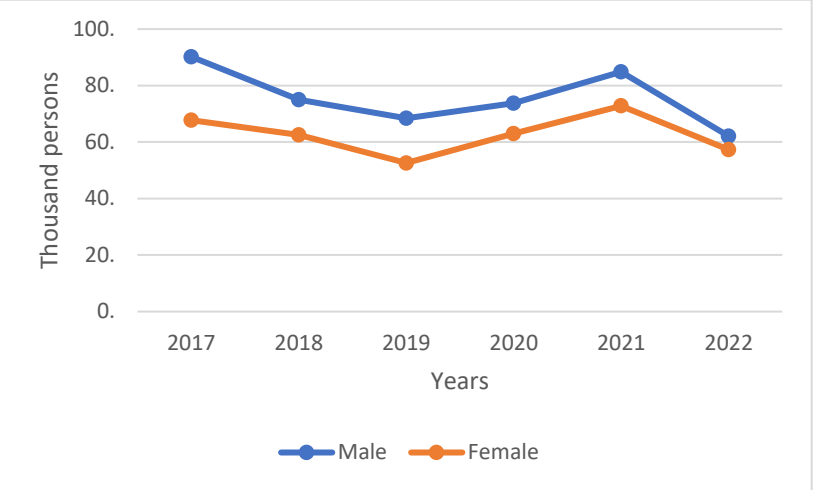

Figure 3: Unemployment in Ireland from 15 to 74 years old between 2017 and 2022.

4.3. Education

Figure 4 shows the number of mobile students from abroad enrolled by education level in Ireland between 2017 and 2021. According to the data from Eurostat (2023), between 2017 and 2019, the number of mobile students from abroad enrolled by education level had increased trends. Between 2019 and 2020, the number of mobile students from abroad in tertiary education, bachelor's or equivalent level, and short-cycle tertiary education decreased. The number of international students in tertiary education fell the most, from 6,540 in 2019 to 5,778 in 2020, and the number of international students in short-cycle tertiary education fell the least, from 381 in 2019 to 223 in 2020. The number of students with master's or equivalent level and doctoral or equivalent level increased slightly from 2019 to 2020. Still, the increase was not significant, with the number of students with a master's or equivalent level rising from 1,606 in 2019 to 1,634 in 2020, and the number of doctoral or equivalent degrees rose from 1,129 in 2019 to 1,179 in 2020. Therefore, in general, the COVID-19 pandemic has discouraged international students from coming to Ireland to study, resulting in a decline in the number of international students in Ireland, and from 2020 to 2021, the number of international students in Ireland will start to rise slightly [19].

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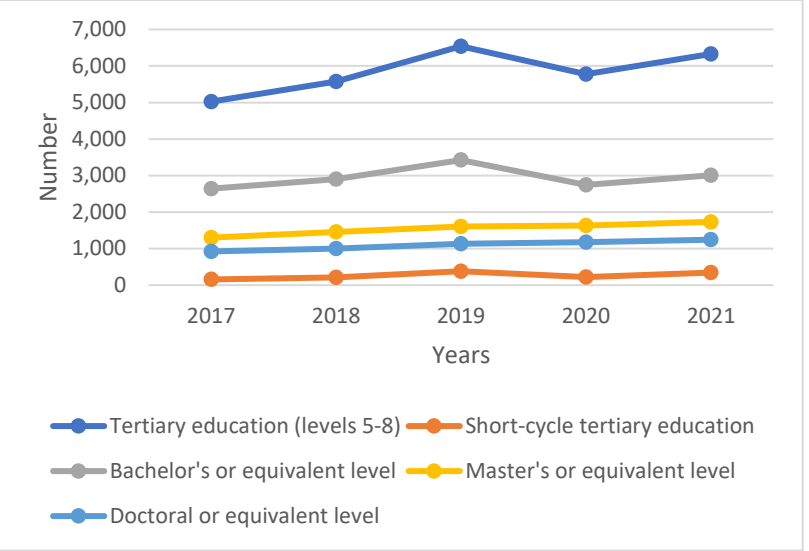

Figure 4: Irish mobile students from abroad enrolled by education level between 2017 and 2021.

4.4. Expenditure

Figure 5 shows the total expenditure of the Irish government as a percentage of GDP from 2017 to 2022. According to the data from Eurostat (2023), the percentage of general government expenditure of GDP decreased from 26.1% to 24.3% between 2017 and 2022. Between 2019 and 2020, the percentage of general government expenditure of GDP increased from 24.3% to 27.2% and declined again from 27.2% to 21.2% between 2020 and 2022. Between 2017 and 2022, the spending on Social Security funds as a percentage of GDP rose and fell similarly to total government spending. From 2017 to 2019, the expenditure of social security funds showed a slight downward trend, from 3.1% in 2017 to 2.8% in 2019. After 2019, the epidemic of novel coronavirus made the Irish government begin to implement a series of security measures for the society and invest a lot of money. From 2019 to 2020, Social Security funds as a percentage of GDP rose from 2.8% to 3.7%, and then from 2020 to 2022, Social Security fund spending as a percentage of GDP fell from 3.7% to 2.4% [20].

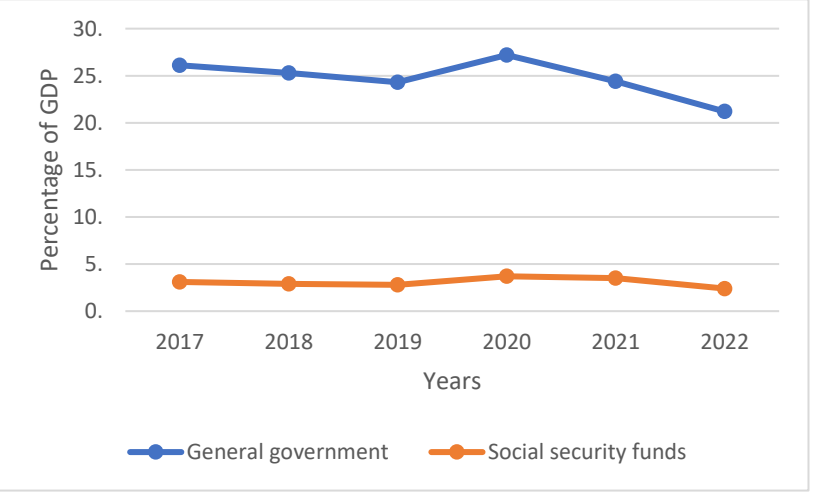

Figure 5: Total general government expenditure of Ireland between 2017 and 2022.

Figure 6 shows the current healthcare expenditure in Ireland between 2017 and 2022. According to the data from Eurostat (2023), the expenditure on healthcare continuously increased from

DOI: 10.54254/2754-1169/80/20241744

21,216.34 million euros to 30,509.88 million euros between 2017 and 2022. After calculation, from 2019 to 2020, the growth rate of expenditure on healthcare has significantly increased from 6.55% to 10.76%. After 2020, the growth rate of healthcare expenditure began to decrease [21].

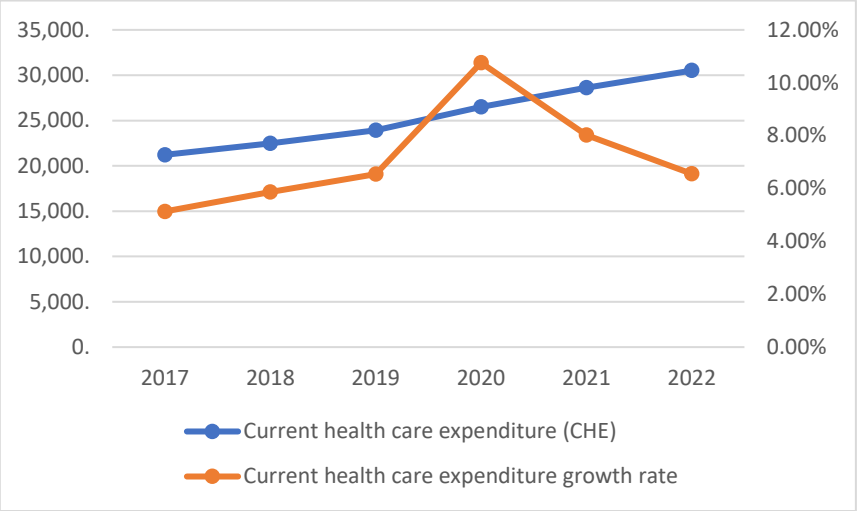

Figure 6: Current healthcare expenditure in Ireland between 2017 and 2022.

4.5. Air Transport

Figure 7 indicates the change in the amount of air transport of goods in Ireland between 2017 and 2022. Between 2017 and 2020, the amount of goods transported by air decreased from 163,123.2 tonnes to 136,802.6 tonnes. It increased from 136,802.6 tonnes to 156,941.3 tonnes between 2020 and 2022, and the increase between 2021 and 2022 is slight [22].

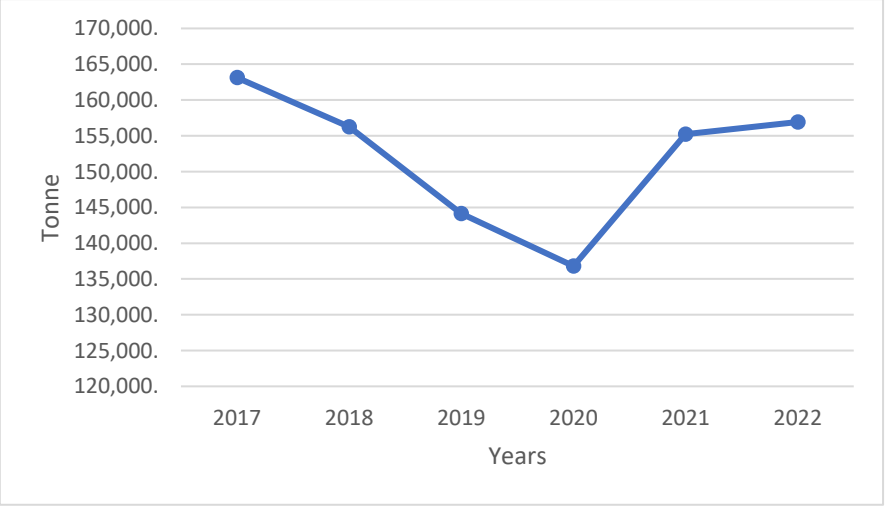

Figure 7: Air transport of goods in Ireland between 2017 and 2022.

Figure 8 measures the change in the number of passengers travelling by air between 2017 and 2022. According to the data from Eurostat (2023), the number of passengers who travel by plane increased from 34,271,771 to 37,947,510 between 2017 and 2019. From 2019 to 2020, there was a sharp drop in the number of people choosing to travel by air, from 37,947,510 in 2019 to 8,268,297 in 2020, a drop of less than 30 million people in a single year. From 2020 to 2021, the number of air travel did not increase significantly, only increased by less than one million people, but from 2021 to

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2022, the number of people who chose air travel had a significant rise, from 9,097,359 in 2021 to 32,405,890 in 2022. That is close to the level seen in the year before the COVID-19 outbreak [23].

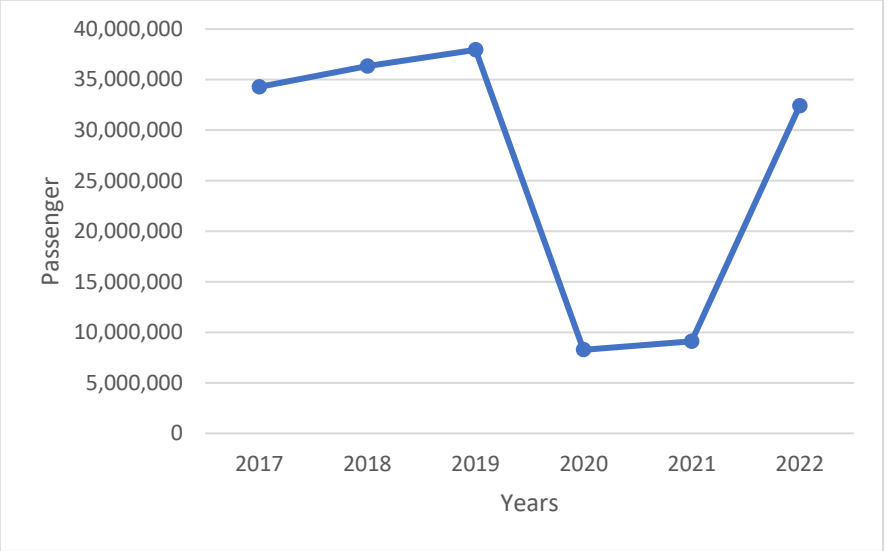

Figure 8: Air transport of passengers in Ireland between 2017 and 2022.

4.6. OLS Regression Analysis

Table 1: The relationship between the number of persons in receipt of PUP [24] and Passenger journeys by public transport [25] and the total COVID-19 cases [26].

Source	SS		df	MS	Number of obs=	59
					F(2, 56)=	3.04
Model	6.6921e+10		2	3.35E+10	Prob > F=	0.0557
Residual	6.1603e+11		56	1.10E+10	R-squared=	0.098
					Adj R-squared=	0.0658
Total	6.8295e+11		58	1.18E+10	Root MSE=	1.00E+05
CumulativeNum~n	Coefficient	Std. err.	t	P>t	[95% conf.interva]	
PassengerJour~s	0.0335388	0.0243161	1.38	0.173	-0.0151722	0.0822499
Totalcase	4.914127	2.162406	2.27	0.027	0.5823067	9.245948
_cons	667943.3	41777.97	15.99	0	584252	751634.6

Table 2: Explanation of variables.

Variable	**Unit**
Cumulative number of Persons in receipt of the PUP (Pandemic Unemployment Payment)	Number
Passenger journeys (all public transport, excluding LUAS (Dublin light rail system))	Number
Total case	Number

Taking the cumulative number of people receiving unemployment benefits from the pandemic as the dependent variable, the total number of COVID-19 infections and the number of people choosing public transportation as the independent variable, the relationship between the dependent variable and the independent variable was detected by regression method. According to the results, the constant

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was 667,943.3. The coefficients of “Passenger journeys” and “Total case” are 0.03 and 4.91. According to the results, when no one is infected with COVID-19, and there are no passengers transported by public vehicles, the number of people receiving pandemic unemployment payments is 667,943.3. For each additional COVID-19 infection case and the number of people who are transported by public transportation remains unchanged, the number of people receiving pandemic unemployment payments will increase by 4.91, respectively. If there is no change in the number of people infected with COVID-19, each additional person travelling on public transport will increase the number of people receiving pandemic unemployment benefits by 0.03. The p-values of the two independent variables are 0.173 (> 0.05), which is statistically insignificant and 0.027 (< 0.05), which is statistically significant.

5. Discussion

5.1. The Impact of COVID-19 on GDP

Since the outbreak of the new coronavirus, Ireland's macro economy has received an unprecedented blow. According to the data of Ireland's GDP from 2017 to 2022 collected by Eurostat, although the value of Ireland's GDP has been rising in the past six years, Ireland's GDP growth rate has declined since 2019, that is, the outbreak of the new coronavirus. The growth rate from 2019 to 2020 has increased, but not significantly, and it will not be until 2021 that Ireland's GDP growth rate will increase significantly compared to 2020. The government of Ireland has imposed restrictions on social contact, health care, labour, and economic activity during the COVID-19 pandemic, which has limited the development of Ireland's GDP, employment growth, people's mental health, and medical interventions and diagnoses [27].

5.2. The Impact of COVID-19 on Employment

On 27 March 2020, the Irish government issued a policy advising citizens to reduce unnecessary international travel, avoid public transport as much as possible, and encourage working and studying at home [28]. Due to some restrictive policies or measures imposed by the government, many employees cannot go to work or work normally, and working at home or online has become a common working mode. Some companies have to lay off employees or even close down to maintain the operation of the company. Secondly, the government's restrictions on transportation also affect many people who need to work across cities or countries. From the data, it can be shown that the number of unemployed people was decreasing before the COVID-19 pandemic, but from 2019 to 2021, the number of unemployed people in Ireland began to increase and did not begin to decrease until the COVID-19 pandemic eased in 2022.

5.3. The Impact of COVID-19 Education

For Irish students, COVID-19 has resulted in a shift to online teaching and has had no direct impact on transportation for students. However, the new coronavirus has a huge impact on students who plan to study in Ireland. Basically, almost all international students need to fly to Ireland, but because of the COVID-19 pandemic, the air routes of many countries have been closed, and both international students and some people who need to travel to other countries cannot go abroad by plane. Since the epidemic, the number of tertiary educations, short-cycle tertiary education, and bachelor's degrees or equivalents has begun to decrease, but the number of master's and doctor's degrees or equivalents has increased slightly, but not significantly. The epidemic has affected the number of bachelor's degrees or equivalent degrees. The influence of tertiary education and short-cycle tertiary education is relatively great.

DOI: 10.54254/2754-1169/80/20241744

5.4. Expenditure

It is evident from the data that the Irish government's expenditure on healthcare has been increasing consistently between 2017 and 2022. However, since the COVID-19 epidemic in 2019, the growth rate of healthcare expenditure in Ireland has dramatically increased, and the growth rate of healthcare expenditure in 2021 has decreased compared with that in 2020. However, it also exceeded the growth rate of health care in 2019 compared with 2018, which shows that the Irish government invests a lot in people's health and pays attention to people's health and safety. In terms of healthcare spending, its contribution to the country's macroeconomic development is more evident during the COVID-19 period.

5.5. Air Transport

Air transport of both goods and passengers has been affected during the period of COVID-19, but air transport of passengers Air transport of rubber goods has been more affected by COVID-19, and the number of passengers travelling by air has dropped sharply, due to the closure of air routes by governments of various countries, and the policies and recommendations of various countries on taking public transport and travelling abroad. Most passengers cut back on plans to fly to other countries and stopped non-essential travel. Aviation's contribution to GDP has been severely hampered during the COVID-19 era.

5.6. OLS Regression Output

Both the number of people who choose public transportation and the number of people infected with COVID-19 have a positive correlation with the number of people receiving pandemic unemployment payments that is, increasing the number of people who choose public transportation and the number of people infected with COVID-19 will increase the number of people receiving pandemic unemployment payments. However, according to the results of regression analysis, the variable of people who take public transportation is statistically insignificant. So, between March 2020 and April 2021, there is no significant relationship between the number of people receiving pandemic unemployment payments in Ireland and the number of people travelling by public transport, whereas the variable of total infections is statistically significant. Therefore, between March 2020 and April 2021, there is a significant relationship between the number of people receiving pandemic unemployment payments in Ireland and the number of people infected with COVID-19.

5.7. Recommendation

The COVID-19 pandemic has had an impact on every aspect of life. To prepare for other disasters in the future, Ireland and other countries need to absorb the experience of the COVID-19 disaster and how to deal with it, and provide financial assistance and some social benefits to those who lose their jobs because of the disaster. Government can improve the medical system, insist on spending on medical undertakings, improve the quality of the medical system, and protect people's health. For the enterprise or company, it is necessary to have sufficient funds to prepare for the occurrence of an emergency, and the appropriate reward mechanism for employees is an effective way to retain employees. Providing a variety of services, producing unique products with other enterprises, occupying market share, to having sufficient sources of capital.

6. Conclusion

As an event affecting the world in recent years, COVID-19 seriously impacts the macro economy. For Ireland, COVID-19 has reduced the GDP growth rate and increased the number of unemployed

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people, and the number of unemployed men is more than that of women. In terms of education, international students cannot study in Ireland due to the obstruction of international air routes, and the Irish government continues to invest in health care. In particular, during the period of COVID-19, the government has increased spending on health care to ensure people's health. In terms of aviation, the impact on passenger air transport is more severe than that on cargo air transport. Through regression analysis, it can be seen that the number of people infected with COVID-19 has a significant impact on the number of people receiving pandemic unemployment payments. To reduce the impact of disasters on economic development, any country needs to be well prepared to deal with other disasters like COVID-19 in the future.

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