The Impact of Government Restrictions on Consumer Spending in Ireland During the Covid-19 Pandemic

Colm Kenny

Department of Economics

University of Limerick

Supervisor

Dr. Rita Buckley

Final Year Project

B.Sc.. In Economics and Mathematical Sciences

April 01, 2022

Abstract

In this study I analyse the economic impacts of restrictions during the pandemic in Ireland. Daily transaction data and a restriction severity index are used to uncover trends in spending patterns from March 2020 to February 2022. Large drops in accommodation and transport spending coincided with stricter restrictions. Restrictions did not play a substantial role on retail spending, while groceries spending showed no signs of impact. Restrictions limited spending in the second half of 2020, a year later spending per day was expected to be €50,000,000 higher with much lower restrictions. Spending figures in 2022 are soaring since the dropping of all restrictions. The population responded to stricter restrictions by turning to online payment alternatives and home deliveries.

List of Figures

Table of Contents

Acknowledgements

I would like to thank the lecturers and staff of the Department of Economics and the Department of Maths and Statistics that I have engaged with over the last 4 years. I have learned a great deal from everyone which will benefit me for years to come.

Particular thanks to my supervisor Dr. Rita Buckley for giving me the pathway and insights to pursue my study. This guidance has helped me immensely throughout the year.

To my fellow colleagues in the course, thank you for all the support and friendship through the years. Finally, to my family for all their close support and assistance, especially during the tough few years since the pandemic. I could not have done this without you.

Author's Declaration

I, the undersigned, hereby declare that this submission is entirely my own work, in my own words, and that all sources used in researching it are fully acknowledged and all quotations properly identified. It has not been submitted, in whole or in part, by me or another person, for the purpose of obtaining any other credit / grade.

Student Name: Colm Kenny

Student Number: 18225012

Date: 01/04/2022

Introduction

The COVID-19 pandemic has caused disruptions to everyday life not seen in decades. Public health and economic well-being on a global scale have never looked so at risk. When news broke in late December 2019 of the dangers of a new strain of novel coronavirus, no one could have predicted the impact it would have for the months and years to follow. With the turn of the new decade, there was only one thing on everybody's minds. Looking at google trends for the year 2020, covid related topics appeared prominently in searches and news throughout the year (Google Trends, n.d.). People wanted answers on the virus would affect their job, their health, or their everyday life in general but unfortunately there were no answers at the time.

Ireland recorded its first case of the virus on the 29th of February 2020. Over the coming days cases grew slowly until the government announced on March 12th the first set of containment measures, with additional stricter restrictions following on from the 28th of March (Department of the Taoiseach, 2020a; 2020b). These measures included the closure of all schools and a two week stay at home period, where exceptions would be made for essential shopping or work circumstances. These statements also acted as an address to the nation of the dangers ahead. The Taoiseach acknowledged that there will be many more cases to come and assured that there will be plenty of resources spent to understand and cushion the impacts of this pandemic on the country. Cooperation and regular communication are needed between all parties to assess risks and work together to fight back against the virus.

Governments were faced with a very daunting task of balancing public health risks and economic downturn. Evident in Ireland, there were some very long and strict lockdowns put in place to reduce the spread of the virus, especially in the initial phase. Severe restrictions like this are not a win-win scenario unfortunately. Households will have no choice but to reduce spending, businesses will run close to bankruptcy and unemployment will rise. Although containment is a necessary measure, we must not shy away from the need to understand how it will affect our economy in the short and long run.

In this study I will answer the question how have government restrictions affected consumer spending in Ireland during the COVID-19 pandemic? I am interested in this to explain to the reader how the economy is affected by a global health disaster and which sectors and industries will be hit the hardest. By answering this I will be able to comment on the effectiveness of restrictions and suggest where they went wrong and what can be improved on for the next big pandemic. The structure of this study is as follows. I will firstly review the relevant literature to the pandemic. I will then introduce the data and methodology used. Next, I will state the results of my study and discuss these findings in detail.

Literature Review

Introduction

This study is broadly related to literature surrounding the economic consequences of the COVID-19 pandemic. Before diving straight into the impacts of COVID-19, it is important to have sufficient background information on the theory of pandemics and historical pandemics. This is not the first pandemic to occur, and it will not be the last. In recent times examples include the A/H1N1/2009 outbreak or more commonly known as the swine flu. There are plenty of different approaches or branches of economic policy to explore with regards to the pandemic. For this study I am most concerned with Keynesian economic policies. Keynesian economics is most concerned with aggregate demand and how government intervention can be used to stabilise or spur the economy

(Jahan, et al., 2014). Governments should proactively monitor shifts in aggregate demand and be able to identify when intervention is necessary. I will also explore the literature around what policies and interventions the government has already put in place. Exploring this literature should give me a basis to develop sufficient data and a comprehensive method to explore the problems faced in Ireland during the pandemic, what has been done so far to mitigate these problems and how successful the policies have been in maintaining the economy.

Defining Pandemics

Growing outbreaks of emerging diseases are normally classified using the terms epidemic or pandemic. An epidemic is used to describe a disease which infects a large amount of a population in a specific area or region (Dictionary.com, 2022). A disease is then said to be a pandemic if it affects or has spread to different countries or has reached a global scale. Governments around the world have given the responsibility of identifying and declaring a pandemic to the World Health Organisation (healthdirect, n.d.). There is an interesting section of literature surrounding the identification of pandemics. Identifying pandemics has not always been plain sailing, the term is very sensitive. Doshi (2011, p. 532) stated "the simple act of labelling a disease has enormous social, economic and political implications". This is in reference to the A/H1N1/2009 outbreak, where there was some discontent with the labelling of this as a 'pandemic'. Misunderstanding stemmed from the removal of the requisite of large numbers of deaths from the WHO description of a pandemic. The problem is that the term 'pandemic' is very ambiguous, there is no theoretical definition (Singer, et al., 2021). In certain situations, altering the term pandemic can change the probability of a pandemic occurring. However, this varied between different regions, especially regions with different rates of travel and access, where the term did not significantly affect the probability of a pandemic occurring. Furthermore, the absence of a concrete definition could lead to a situation where a disease is underestimated in its severity and therefore resulting in an absence of an appropriate response. To prevent this from happening it would be important for governments and health organisations to identify and assess different viruses before they gain traction and spread globally.

In recent years, the WHO have been reluctant to use the term pandemic (Nebehay, 2020). This changed in 2020, when they labelled the SARS-COV2 virus a pandemic (World Health Organization, 2020). The WHO acknowledges the sensitivity of the word pandemic, but with infections growing exponentially and affected countries rising, it is a reasonable call. The declaration of the virus as a pandemic is enough to cause a shock to consumers and alter spending patterns. Purchases of food and essential goods may increase for the first month as people prepare for the worst, but other sectors will suffer instantly. Although this is beyond the scope of economics, it is important to understand the implications of calling the COVID-19 virus a pandemic.

Evolution & History of Pandemic Influenza

Humans have suffered from many infectious viruses from the beginning of time (Wolfe, et al., 2007). Most diseases seen today and the modern world in general have appeared in the last 11,000 years, factors being the rise of agriculture and dense human populations. Most authors have agreed that the first pandemic influenza originated in 1580 (Potter, 2001). Illness rates and deaths were high at the time, especially in large cities like Rome. When looking at these early pandemics, it is important to note that there was a lack of quality or consistent reporting (Saunders-Hastings & Krewski, 2016). As transportation increased and advanced, this became a large vector of disease spread, not to mention the absence of public health practice. The most catastrophic influenza pandemic to date occurred in 1918, what was known as the 'Spanish flu'. Death counts have been estimated to be in the range of 50-100 million (Aassve, et al., 2020). The Spanish flu was a H1N1 virus whose origins are still being disputed. There were three distinct waves of the pandemic, the

worst being the second in the autumn of 1918. Over the last twenty years we have seen viruses that are either never seen before pathogens, or some familiar foes, such as swine or avian origin influenza (Grubaugh, et al., 2019). Looking at the re-emerging viruses, evolution often occurs in animals, before it reaches humans. This makes it very hard to track or predict the evolution of these viruses. A lot of resources globally are being spent on research for predicting the next virus. Holmes et al., (2018) flag different problems with this approach, suggesting more emphasis on surveillance of humans and analysis of the epidemics when they appear. This would suggest that to analyse a pandemic, it is more important to use fresh data instead of trying to compare or learn from past pandemics or diseases. When looking at the health and economic trade-off, it would be very amateur to base the relevant mitigation strategies solely off a previous pandemic. It is most important to explore early studies of the COVID-19 pandemic by using real time data.

Household Income & Social Welfare

When an individual's income increases, there is more disposable income left than usual. Oppositely, if one's income disappears or decreases, we would expect a decrease in consumption. It is expected that during a pandemic or global crises in general that unemployment will increase, either temporarily or permanently. The effect of SARS on employment was found to be negative in the Hong Kong and Chinese service sectors (Lee & Warner, 2005; 2006). An initial analysis of unemployment in the US since COVID has uncovered a large decline in the employment to population ratio (Coibion, et al., 2020). Not only are people losing their jobs, but they're also not looking to find new ones. Beirne et al., (2020) simulated the effects of COVID-19 related job losses on family incomes and employment in Ireland. Without any policy response 560,000 families would see a fall in disposable income due to the pandemic. Of all who would see a decline, 69,000 would lose 60% or more of their disposable income. Bachas et al., (2020) decide that disruptions to the labour market were unlikely to have a huge impact on spending declines, rather the direct effects of the pandemic. Looking at the US, they found that the timing of rebounds in spending coincided with stimulus payments. This would make sense when looking at Ireland, as the Irish government were very quick to introduce the PUP which would significantly cushion these estimated losses. Although it may come at a large cost to the public accounts, it was deemed a necessary step in the short run to ensure the economy stays afloat and that consumption does not completely collapse. This is a good example of an effective government policy to maintain consumer spending and thus help keep the economy afloat. There is not much rationale behind analysing the effect the PUP has on spending due to the speed and effectiveness of the policy.

Consumer Fear and Spending Patterns

An Italian survey has shown that drops in spending and more saving are both impacted by the fear of contacting the virus, especially from the act of shopping (Immordino, et al., 2022). A study in the US using private sector data found that drops in consumption were higher in counties with higher infection rates (Chetty, et al., 2020). This makes sense as Goolsbee and Syverson (2021) explain that consumers will avoid, and substitute products found in highly transmissible areas. Especially in situations where there is no online alternative. High risk stores and sectors will no doubt struggle during the pandemic, especially in areas with strict and persistent restrictions. Shin et al., (2021) studied the impacts of targeted restrictions used in different areas of Seoul on the economy. Foot traffic and daily card data is used in the study. Targeted restrictions are an unorthodox and interesting approach to restrictive policies. However, the results suggest that the benefits of targeted restrictions will vary by area by many geographical factors. Justifying these restrictions in different parts of Ireland would require a study in itself. There has been significant research on the idea that consumer spending patterns could change permanently after the

pandemic. Snacking and alcohol consumption increased during the initial phase of the virus (Bakaloudi et al., 2021: Biddle et al., 2020). Some sectors affected by restrictions will come out second best during the pandemic and may be left in the dust if intervention arrives too late. Consumers are uncertain about the magnitude of the pandemic related effects on the economy (Dietrich, et al., 2022). This uncertainty among households is likely to be the largest impact on the pandemic recession. It appears necessary for governments to monitor and maintain a reasonable level of consumer confidence to ensure spending does not collapse.

Government Restrictions & Lockdowns

Nonpharmaceutical mitigation measures are usually the only option in the first wave while information is being gathered about the virus. History has shown school closures to be a popular method of limiting movement in the first wave or the peak of a pandemic. Studies point towards this having large benefits if well implemented and on time (Cauchemez 2009: Ferguson et al., 2006). However, there are doubts on school closures being cost effective, especially in cases where the virus severity is relatively low (Perlroth, et al., 2010). Most households would be at risk of contracting a new virus from young children mingling in school, a closure could reduce the initial stress on the healthcare system. In 2009, the median age distribution for the AH1N1 virus was skewed towards young people (Chowell, et al., 2011). Hong Kong closed their schools as soon as a nonimported case was confirmed in the country (Wu, et al., 2010). However, secondary schools did stay open. They operated under the condition that if there was a confirmed case emerged, the school would close immediately for 14 days. Although it cannot be the only factor, school closures in Hong Kong helped reduce attack rates in younger age groups and curb the spread of the virus. A similar study in Europe also shows that a school closure, like that during a holiday period would result in a much lower virus reproduction rate (Hens, et al., 2009). Another form of government-imposed measures would be to restrict in-store shopping to only essential stores. Although restrictions are beneficial to limiting transmission rates and case numbers, studies surrounding the economic benefits of lockdown suggest negative results. A comparative analysis was used to distinguish differences in spending explained by Sweden and Denmark's contrasting lockdown policies (Andersen, et al., 2020). It was found that fears around the virus itself explained the changes in spending instead of the restrictions. However, a more recent study by Brinke et al., (2022) used transaction data in their study to uncover changing patterns in consumption through the different waves of the pandemic. They found that during the second and third waves, the changes in consumption were caused by mobility restrictions themselves instead of consumer behaviour. Coffey et al. (2020) used a CSO household budget survey from 2015-16 to estimate the changes in consumption from different potential scenarios due to the pandemic in Ireland. The strict lockdown scenario predicts a 20% drop in spending compared to 2019. Considering Ireland has so far had some prolonged periods of heavy restrictions, it is worth digging deeper to uncover how these restrictions have impacted spending figures.

Vaccines

A successful vaccine drive is one way of providing levels of immunity to the population, which could improve consumer confidence. The vaccine situation during the A/H1N1/2009 pandemic was met with some criticism. Although production was very intense, logistics issues prevented the vaccines from reaching certain countries in time before the peaks occurred (Parihar, et al., 2021). This shortcoming occurred despite vaccines being developed within six months of the pandemic. Global cooperation regarding vaccines would be needed in any future pandemics, vulnerable and high-risk regions should be prioritised, especially in the initial rollout phase. Economic consequences of a pandemic are highly dependent on vaccination levels (Brouwers, et al.,

2009). A simulation was used to estimate the costs of the A/H1N1/2009 pandemic in Sweden for different levels of vaccination uptake. If no intervention was taken the estimated costs were found to be 5,510 million SEK. With a vaccine uptake of roughly 90%, this figure would go down to 2,971 million SEK. In the US, it was found that vaccination rates explained increases in spending and work-related mobility, especially in urban areas (Hansen & Mano, 2021). Deb et al. (2022) found that vaccines have a significant impact on economic indicators such as mobility or NO_2 emissions. It is important to note that these results depend on the level of restrictions in a country. The impact is not as large where there is a lot of restrictions in place. Using daily vaccine, incidence, and economic data, it was found that "The effect of vaccination on incidence levels is delayed but increases with time, while the effects on economic activity are immediate" (Ganslmeier, et al., 2021: 3). Agarwal and Gopinath (2021) explain that it would cost $50 billion to vaccinate 40% of the world's population by the end of 2021. However, this proposal would likely result in total global benefits of roughly $9 trillion by 2025. The arrival of vaccines for the COVID-19 pandemic should give consumers the opportunity to come out of their shell and not have to fear the virus as much as previously. The vaccine rollout has been very successful in Ireland. Ireland reached a vaccination rate of 40% halfway through 2021 with 77% of the total population being fully vaccinated by the end of the year (European Centre for Disease Prevention and Control, n.d.). This was in comparison to 69% of the full EEA. The large vaccine uptake should allow for easings of restrictions. The confidence boost from the vaccine should not be overshadowed by stricter restrictions than needed.

Similar Research

I am looking to contribute to the growing literature studying the effects of the COVID-19 pandemic on consumption, in particular the impact of government-imposed lockdowns. Initial studies were limited data-wise. The study of Coffey et al. (2020) uses potential scenarios of how the pandemic could fare out to estimate the changes in consumption by various categories. However, conclusions should be limited due to using figures from the 2015-16 Household Budget Survey. I will improve on this study of spending in Ireland by using new data captured during the pandemic. More accurate transaction data was used in the analysis of consumer spending in Sweden and Denmark (Andersen et al., 2020). A substantial reduction of 25% is predicted in both countries, while Denmark is attributed to an additional 4 percent drop which could be explained by the lockdown measures. I will also contribute to the literature by providing further research on how the restrictions affect various sectors. Transaction data is used to show that restrictions are especially tough on sectors such as transportation, entertainment, and retail while groceries spending comes out unscathed (Baker et al., 2020; Brinke et al., 2022; Coffey et al., 2020). The literature associated with lockdowns and restrictions heavily features the work of Oxford Coronavirus Government Response Tracker (OxCGRT) who have developed an index of lockdown severity in a country (Buono and Conteduca, 2020; Hao et al., 2022). One study used the index to measure the changes in household savings during different lockdown scenarios (Gropp & McShane, 2021). They found that consumption may increase after lockdown measures are removed due to pent-up demand during restrictions. This has opened an interesting alley for me to contribute to the literature by using daily card data and the lockdown severity index to investigate the impacts of government-imposed restrictions on consumption during the pandemic in Ireland.

Method

Data

To study the effects of government lockdowns on consumption in Ireland, I will use daily transaction data from the Central Bank of Ireland (n.d.). This high frequency dataset includes

expenditure from all euro credit and debit cards belonging to Irish residents. Observations include daily figures of total debit and credit card spending and ATM withdrawals. Figures in the dataset are presented in €1,000's. From October 1st, 2020, additional data includes a sectoral breakdown of spending and online versus in-store spending. There are plenty of advantages of this data in comparison to alternative sources. Daily figures help to capture changes in spending much more accurately than monthly retail trade figures. The addition of sectoral data is very insightful, it is much easier to gauge which sectors are impacted most by the restrictions and the pandemic, online spending figures helps us plot the trend of online spending as the country goes in and out of restrictions. Cash transactions are dropping as time goes on, even in times with in-store shopping available (Banking & Payments Federation Ireland, 2021). Transaction data can capture a representative sample of spending patterns. Data directly from the central bank is highly advantageous as it accounts for much of the spending in the country, as compared to other studies that use data from one bank. This dataset represents 90% of card transactions in the Irish market. This allows us to gather accurate and representative estimates of spending. Distinguishing between debit and credit transactions will not be necessary. However, I will not consider ATM withdrawal figures as they do not represent transactions spent in a store. Due to the problems with autocorrelation and non-independent residuals in relation to time series data, I will not attempt to use regression analysis in this work. Instead, I will report changes in spending over time by graphical analysis and simple quantitative analysis e.g., summary statistics.

To accompany the daily spending figures, I will use the stringency index dataset created by OxCGRT (n.d.). This daily dataset follows the restrictions in a country and gives them a ranking between 0 and 100, depending on how strict the restrictions are on that day. This is an intuitive metric to quantify restrictions, where otherwise would be a tedious task. The use of this index has proven to be very beneficial to previous studies and given the daily frequency, should pair well with the transaction data. Combining these two datasets will give us a very clear timeline of changes in restrictions and consumption as the pandemic progresses. Our next step is how to analyse this progress. When combining the data, we will use the range October 1st, 2020, to February 15th, 2022. The start date allows us to avail of the sectoral data and detailed figures. For context of how the index works, the Irish government declared some heavy restrictions to start 2021 (Department of the Taoiseach, 2020c). These restrictions resulted in a stringency index of 87.96. Some noteworthy restrictions include only essential retail open, bars and restaurants to offer take-away and delivery only, and public transport limited to 25% capacity.

The main question I must answer in this study is how do restrictions affect spending patterns in Ireland? Due to autocorrelation between daily spending figures, it is difficult to measure the relationship by linear regression. Time series data involves a long complex process of transforming non-stationary series' and formulating an accurate forecasting model. I will primarily use simple graphs to identify trends in the data, while displaying different variables and using different time frames. There are many different ways I can transform the figures in the dataset to uncover different patterns. An example of this would be to eliminate weekly or yearly seasonality by using differencing.

Spending vs Restrictions

A problem with high frequency daily transaction data is that not all transactions recorded occur on the day they are entered at due to weekends and bank holidays. Brinke et al. (2022) note this, so they aggregate the daily data to create weekly transaction data. I will use a simple 7 day moving average to plot the level of spending over time throughout the pandemic, while comparing it to the levels of restrictions in the country. The advantages of this are that it will eliminate some

weekly cyclicality in the data while also eliminating problems caused by banking delays. Spending on Mondays would be expected to be lower than that on the weekends. Each week would see a noticeable peak and trough. These constant waves in the data would make it much harder to spot actual trend in the data, it is easier to interpret a smoother line. A 7-day moving average allows us to consider that consumers may not reduce spending straight away on the day restrictions are announced. It may take a few days for shocks or fear to kick in. Our main concern here, is to answer the very general question, how did spending behave in Ireland considering the varying levels of restrictions? Spending on day t is defined by:

$$Spending_t = TotalSpending_t - ATMWithdrawals_t$$

Graphing spending on its own is worthless if we are not able to apply context of restrictions at the time. Having these two variables on the same plot, will help us identify any trends in spending over different restrictive periods. Particularly at times such as: the initial lockdown period, easing of restrictions during the summer months and the hectic Christmas period. During the most noticeable period here, the initial lockdown, it is expected that spending will drop by a large amount. The fear of the unknown will likely play a massive part in this as consumers rushed to stock up on essential items to avoid all public interaction for as long as possible. Fortunately, having lived through these restrictions I can use my own first-hand experiences to form some initial thoughts and expectations. I expect 2020 spending figures to be incredibly low. From my point of view, college was online, only essential stores were open except for during the summer, and local lockdowns were in place. In 2021 and beyond I will expect that the changes in spending from increased restrictions will not be as big as the initial stage. Consumers will have more knowledge about the virus and will have developed their own routines and spending habits to minimise risk of infection.

Sectoral Focus

The next step is to put the different sectors under the microscope. Similar to the previous section we can do this by simple graphs. Therefore, I will also use summary statistics to understand how the sectors vary whether they are subject to heavy restrictions or not. I am looking to compare the differences in spending for each sector during heavy and light restrictions. The periods I will use are January 2021 and January 2022. This is due to the major difference in restrictions at the time. 2022 started off with very little restrictions. Oppositely, case numbers at the start of 2021 were high and the country was on a strict lockdown for the entire month. There is 31 days in January, giving us a reasonable sized sample. Using the same month in successive years will remove any seasonality within the data, giving us more accurate results. It also saves a lot of time worrying about equal sample sizes. Summary statistics accompanied with indications from the graphs will allow us to measure how the spending data for each sector varies during different restrictions. If the expected value of a sector were to be significantly higher during lighter restrictions, then it could be said that this sector suffers during heavier restrictions. It is expected that restrictions will impact certain sectors more than others. I would expect to see little change in the grocery figures whereas transport and restaurants/dining will have a large impact by restrictions.

Yearly Differenced Spending

I am also concerned with spending figures after spring of 2021, due to the arrival of a successful vaccine drive. To follow the previous section, I will compare spending and restrictions to those of 364 days earlier. The start date will therefore be 28th February 2021 and the change in spending is defined as follows:

$$\Delta Spending_t = Spending_t - Spending_{t-364}$$

Andersen et al., (2020) use this 364-day differencing to combat the cyclicality of daily data. At this time, the vaccine drive was only getting started. Higher risk groups of the population were being prioritised, e.g., nursing home patients. Comparing to figures from a year earlier helps us identify possible shifts in consumer confidence from the vaccine. An increase to consumer confidence is a monumental advantage for aggregate demand in the country, especially if fiscal policy is used specifically to achieve this outcome. If restrictions were to hamper spending severely in a situation where consumer confidence is high, then this could be a larger loss to the economy while the marginal benefit to public health is lower. It is important to constantly monitor this trade-off as too much emphasis on either aspect would not benefit anyone in the short or long-run.

In-Store vs Online Spending

It is important I do not overlook the online and in-store spending figures included in the daily transaction dataset. I will use these to measure the percentage of in-store spending to total spending over the course of the pandemic. The percentage is derived as follows:

$$\frac{InStore_t}{TotalSpending_t - ATMWithdrawals_t} \; x \; 100$$

Like the previous sections, 7-day moving averages of this percentage will be used to account for banking delays and to aid the appearance of graphs. Daily figures are highly cyclical and can be tough to interpret. Uncovering patterns and trends in this percentage will help us understand how consumers alter their spending patterns over time in response to the virus situation. Although this percentage does not explain if total spending changes or not, it is important to analyse the changes for businesses and sectors which heavily rely on physical spending opposed to primarily online businesses. Online spending is growing increasingly important especially in sector such as entertainment and shopping. Food delivery and e-commerce industries should benefit massively from restrictions. Firms are trying hard to increase their online presence over the years. Regardless, physical stores and the dining industry should still suffer even if they can still complete online orders. It is difficult to judge whether there are benefits to a total online transition, but my view is that during a tough economic situation like a pandemic is not the way to go about it. Especially in a country like Ireland plenty of the population are not comfortable with or cannot access online alternatives and heavily rely on physical stores. It is possible to allow online businesses to flourish while also accommodating for physical stores to operate feasibly. This is especially the case past 2021 when fear of the virus dropped with the arrival of the vaccine.

Results

Figure 1 shows the timeline of spending and restrictions from March 2020 to February 2022. A 7-day moving average (black line) is used to make the time series easier to interpret and to accommodate for banking delays. The red line plots the level of restrictions during the time frame. There is a severe drop in spending instantly as soon as the first restrictions are announced. This is the lowest it reaches in the time range, almost dipping below €100,000,000 per day. After a few weeks spending reacted positively to the high restrictions, until halfway through the year staggering even with a drop in restrictions. Spending increases rapidly around December to a level of €250,000,000 even with restrictions over 60. To start 2021, spending drops to levels not seen since March 2020. This coincided with a rise in restrictions reaching a level over 80. There is an upward trend in spending for most of 2021. The second half of 2021 saw much lower restrictions than the previous year, hovering around a level of 50. The December peak was higher than that of 2020. The trough after the Christmas period was higher in 2021. 2022 started with an unravelling of restrictions. Spending instantly picks up to levels seen in the summer months of 2021.
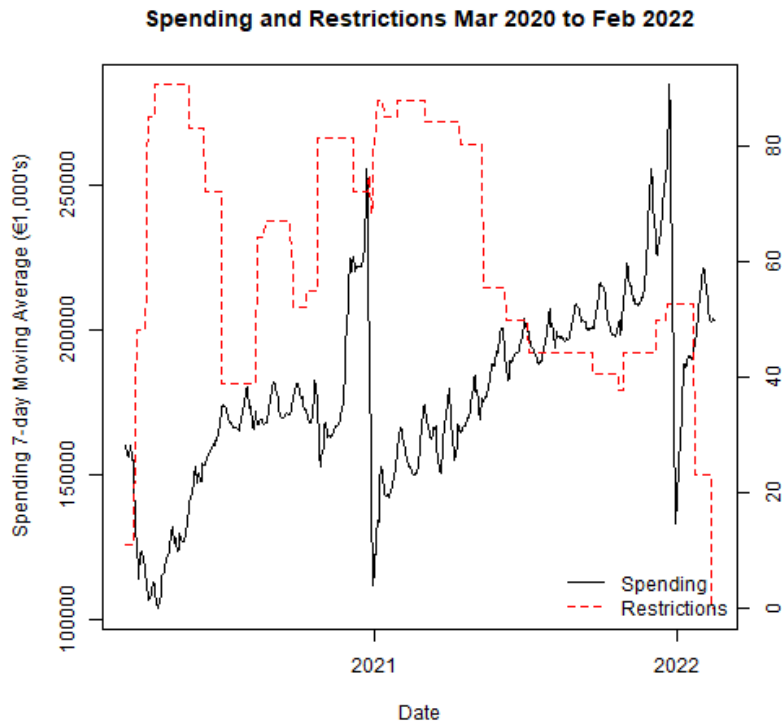
Figure 1: Spending 7-day Moving Average (€1,000's) and restrictions from Mar 2020 to Feb 2022

Figure 2 plots the timeline of the 6 different sectors from October 2020 to February 2022. In each plot, the black line represents the 7-day moving average of spending in the given sector. The dashed grey line represents the level of restrictions. Spending figures in each plot are represented in €1,000's. Groceries spending does not vary much throughout the restrictions. There is a peak, followed by a trough at both Christmas periods. Looking at retail, figures are quite high going into the winter months of 2020. After a drop in the new year, spending rises gradually as restrictions are still high through the first half of 2021. A sharp hike is seen in the second half of the year when restrictions are eased. It begins to stagnate very quickly until the busy Christmas period. Spending is higher at the start of 2022 than 2021. Moving on to the transport plot, figures were considerably low for quite some time. The spending numbers recovered when restrictions began to ease halfway through 2021. There is a considerable rise in transport spending from the start of 2022, when the majority of restrictions were lifted. The accommodation graph is very similar to the previous, there is a noticeable rise in spending in 2021 coinciding with the lifting of restrictions. Transport spending has seen a slight downward trend since the initial lifting of restrictions. There is a peak at Christmas for restaurant and dining spending. Once again, dining spending sees a large increase once restrictions are eased in 2021. There is a slight drop in spending after Christmas, which recovers quickly in the new year. Other spending expectedly plummets after Christmas in 2020. There is a slight upward trend in spending for all of 2021, which restrictions does not seem to be a significant factor. The peak of this graph comes once restrictions are lifted in 2022.
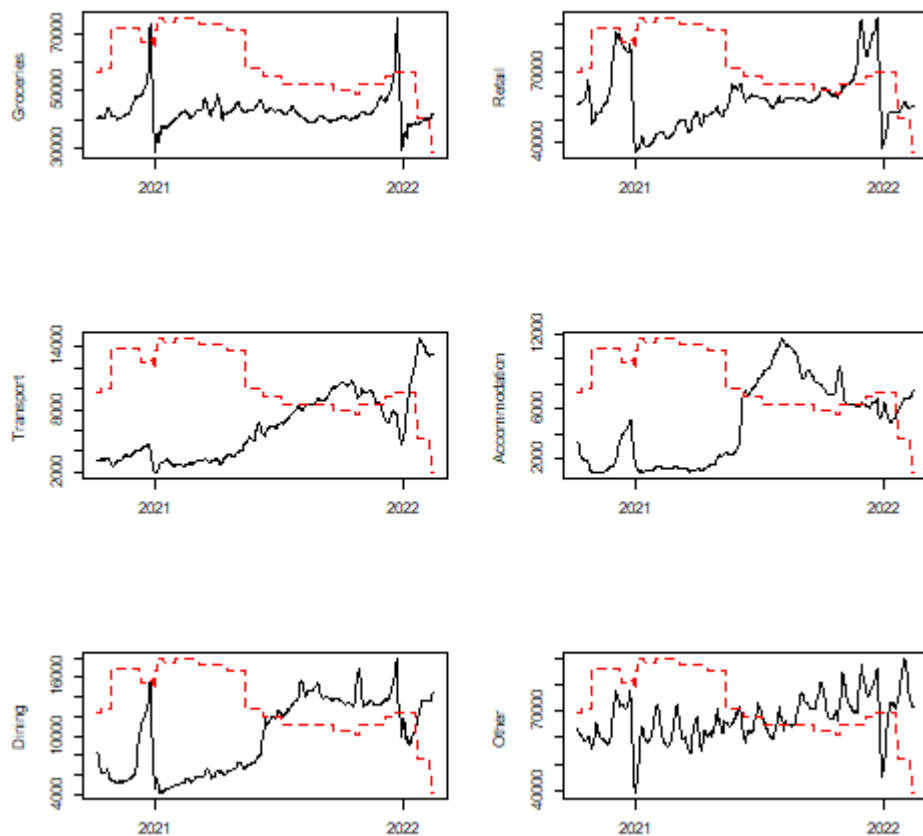
Figure 2: Spending by sector in €1,000s

```
Groceries/ Perishables  Other Retail    Transport      Accommodation   Restaurants/ Dining    Other
Min.   :-17357.0        Min.   : -748   Min.   : 3135   Min.   :3279    Min.   : 1621    Min.   :-29925
1st Qu.:  -565.0        1st Qu.: 6924   1st Qu.: 6518   1st Qu.:3930    1st Qu.: 4116    1st Qu.:  1254
Median :  2058.0        Median :11409   Median : 9009   Median :4481    Median : 5556    Median : 12480
Mean   :   220.1        Mean   :12363   Mean   : 8896   Mean   :4707    Mean   : 6579    Mean   : 12620
3rd Qu.:  5442.0        3rd Qu.:16712   3rd Qu.:10992   3rd Qu.:5146    3rd Qu.: 8169    3rd Qu.: 23890
Max.   :  8398.0        Max.   :29441   Max.   :14590   Max.   :6772    Max.   :17641    Max.   : 58599
```

Table 1: Summary Statistics for January 2022 – January 2021

Table 1 includes the summary statistics for the differences of January 2022 and January 2021 spending figures by sector. All the means are positive, this could imply that spending in each sector is expected to be higher in January 2022 than on the same day in January 2021. Groceries has the lowest mean, followed by a negative 1st quartile. This could explain what was expected, that grocery spending has not been affected by restrictions as any other sector. The other category has the lowest minimum entry. However, I see this is as quite inconclusive due to the mean and max figures being quite high. There is a lot of variability in this category. Retail has a high max and mean, while also possessing a negative minimum figure. This minimum is likely an outlier, as spending in the retail sector appears to be significantly impacted by the restrictions. On a given day in January 2022, retail spending is expected to be €12,363,000 better off than that of January 2021. The results for the remaining three sectors appear similar. All three sectors: transport, accommodation and dining appear to be affected by the restrictions. Each possesses positive means, with transport and dining having considerably high max figures. The accommodation spending has very low variability. 75% of days in January 2022 are higher than the corresponding date in January 2021 by at least €3,930,000 and no more than €6,772,000.
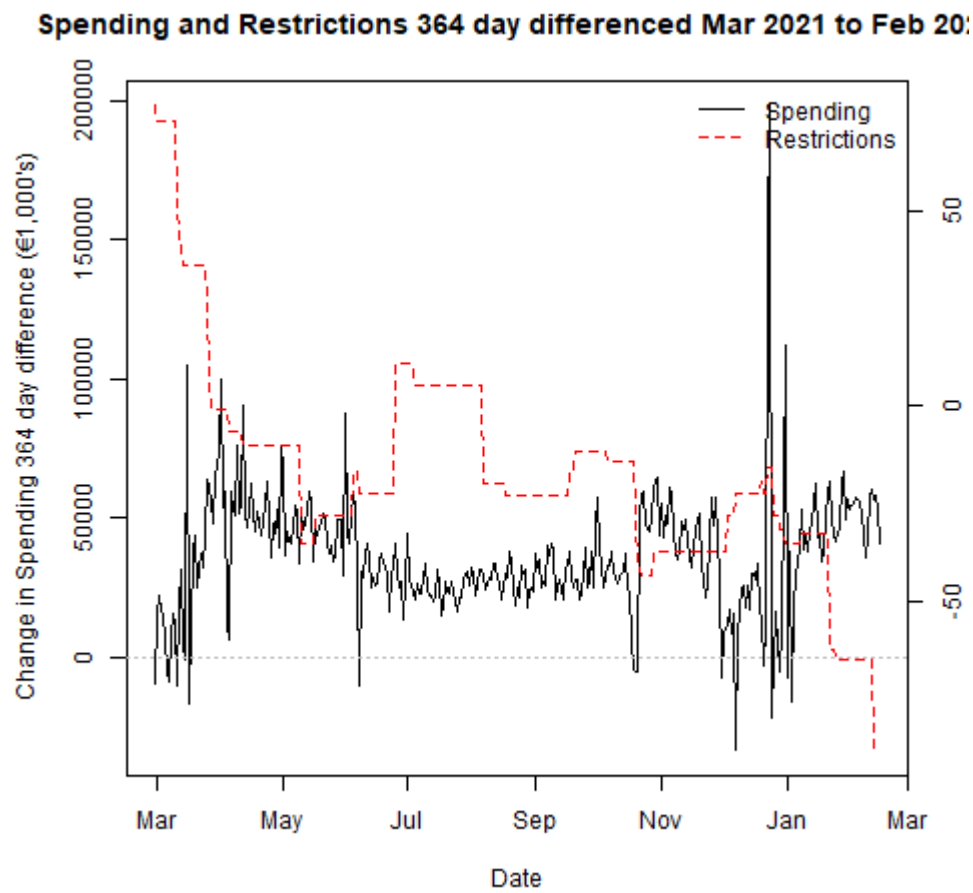
15

Figure 3: Spending 364-day differenced from March 2021 to February 2022

Looking at figure 3, we can see how spending and restrictions behaved when we subtract the corresponding figures from 364 days earlier. This series is more stationary than figure 1 due to the differencing. Spending is higher after March 2021 than the year before. After April 2021, restrictions are lower. For any day after March 2021 comparing to 364 days earlier, it is expected that restrictions will be roughly lower by a level of 25, while spending will increase by roughly €40,000,000. The greatest variability in spending appears at the Christmas period of 2021. There are occasional dips below 0, but not for lengthy periods of time.
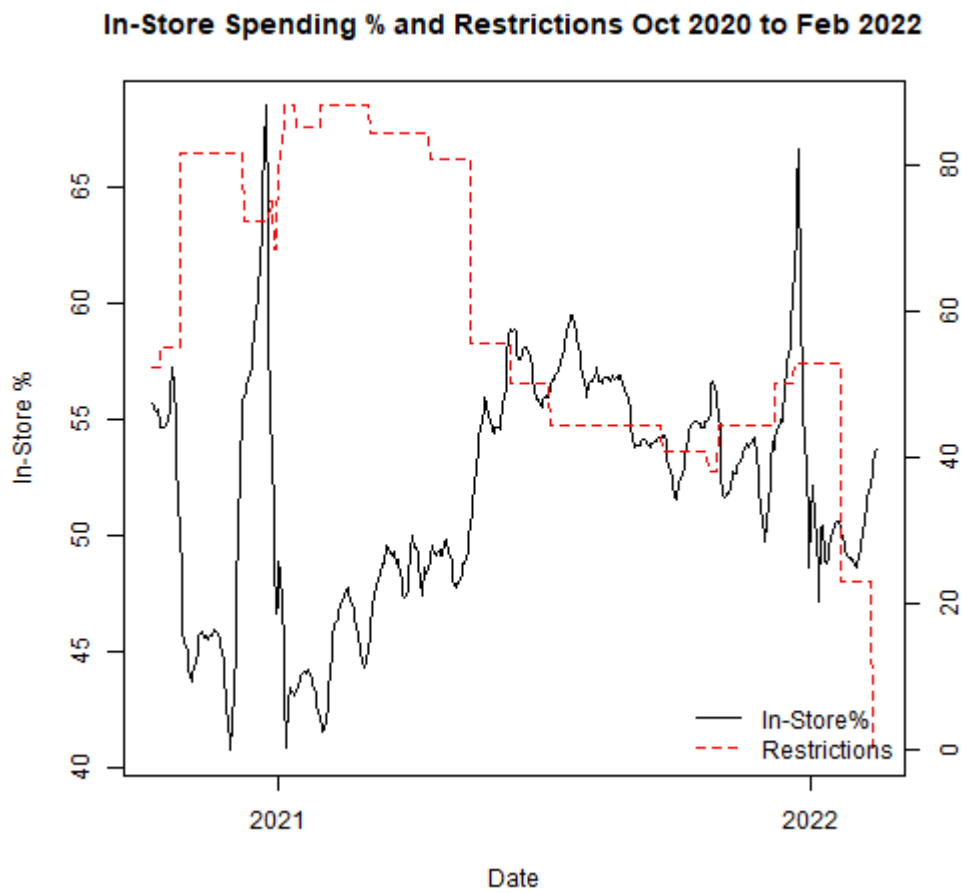
In-Store Spending % and Restrictions Oct 2020 to Feb 2022

Figure 4: In-Store Spending % from October 2020 to Feb 2022

Figure 4 illustrates the change in the percentage of in-store spending over time. The red dashed line which plots the changing level of restrictions in Ireland helps us interpret how the percentage behaved during different lockdown periods. our data begins in October 2020, restrictions at this point are sitting at roughly 50. When restrictions are increased to 80, the percentage does not take long to drop to 45%. This is followed directly by a peak at Christmas, where in-store spending reaches over 65%. Restrictions are once again increased to start 2021, the in-store spending crashes back to pre-Christmas levels. There is a clear upward trend in the percentage, as restrictions are incrementally eased in the spring months, with a sharp rise coinciding with a relaxing of restrictions from level 80 to below 60. After this, the in-store level begins to stagger and even trend downwards. This happens even with relatively lower restrictions levels. However, there is a big spike in the percentage before our data ends in February when the restrictions are completely scrapped.

Discussion

Throughout this study I have been concerned with the impact of government restrictions on consumer spending in Ireland during the COVID-19 pandemic. The results suggest that restrictions did impact changes in spending. Spending hit rock bottom when the restrictions were first announced. Spending showed signs of improvement as restrictions went on, this trend was flattened in late 2020 when stricter restrictions were put in place. Transport and accommodation spending suffered the most from the heaviest restrictions whereas groceries spending was constant

17

throughout different restrictions. In terms of quantifying the impacts on each sector, retail spending had the highest benefit from lower restrictions in January 2022. 2021 did not appear to be affected by restrictions. 2021 showed constant upward trajectory all year round regardless of restrictions. 2022 opened with incredibly optimistic spending figures from the complete removal of restrictions and a sign that consumer spending may be on its way back to normal. The amount spent in store as opposed to online exhibits downward trend throughout 2021, although being elastic to lower restrictions. I will discuss each section of the results in detail. I will then comment on the implications of the results, my recommendations for solving the problem and finally explain possible areas of research to follow up from this study.

Fear was ripe in the initial stage in Ireland, people were scared of contracting a virus which they have heard nothing about. The WHO declared the COVID-19 virus a pandemic on March 11th 2020. This announcement alone was enough to cause spending to drop due to the concern attached to the word itself. Similar to previous pandemics, announcements of school closures and a nationwide lockdown were the first measures to be put in place. Knowing little about the virus also affected governments who could not make accurate judgements and identify sufficient mitigation measures to curb the spread and economic impact of the virus. What is an attempt to cut out all channels of physical social interaction will of course have large economic impacts. However, it is tough to argue against the justification of the initial measures regardless of the economic impact. Consumers' initial fear coupled with incredibly limiting restrictions meant spending hit disastrously low levels. Consumers would fear the worst about the pandemic and immediately look to save their income for what they expect to be a bumpy ride. From my personal experience, my family made sure we spent enough on groceries and essential items to get us through the difficult stage. We did not know when or how these restrictions would end. There was no justification to spending significant amounts on discretionary items. The initial month or two on the graph shows the restrictions go up and the spending figures drop. Unfortunately, at this time there were too many factors which could affect the drop in spending. We have no noteworthy evidence that the restrictions caused the initial crash.

Spending began to show an upward trend even within heavy restrictions. This only took a month or two after the introduction of restrictions. People became more comfortable in their lockdown routine and maybe increased their discretionary online spending whether online entertainment or e-commerce. Spending increased even more when restrictions dropped to a level of 40. Restrictions being eased in the summer was a perfect opportunity for consumers to go out and spend their saved income from the previous months. This spending staggered during the autumn months, with restrictions not playing much effect on this having increased above 60.

Both Christmas periods see the highest spending figures. This is something we can all expect regardless of restrictions. An important observation in Christmas 2020 is that there was a slight dip in the restrictions before Christmas. This could be to allow the temporary return of physical shopping to ease the pressure of online retailers. Spending spiked even higher when this drop in restrictions was put in place. When compared to Christmas 2021, it was lower in spending with higher restrictions. The lower restrictions could explain a portion of the greater spending especially when you consider this could accommodate higher spending in restaurants and pubs. Which is not surprising during the festive period. A dip at new year's was also evident both years.

Throughout 2021 there was a uniform increase in spending up until December. This is surprising considering the first half of the year was spent with very strict restrictions in place. This could suggest much better consumer confidence, potentially from news of the vaccine. When the restrictions dropped during summer, there is only a slight jump in spending numbers. Consumers

could have already been comfortable with their current spending patterns, with only a few tweaks when the restrictions were lifted e.g., dinners out and public transport. Restrictions did not impact spending significantly in 2021. However, we can look at this from a different angle and compare to the path of spending in 2020. 2021 spending was constantly moving upwards whereas spending struggled in the autumn months of 2020. When we compare the restrictions, to no surprise we see that an increase in restrictions coincides with the staggering of the data.

All changes in spending after March 2021 look optimistic when comparing to a year earlier. Our results hold enough evidence to back up this claim. Even when restrictions were higher, spending was always greater. This could suggest that consumers and governments fears of the virus at the time were different. The government would increase restrictions to limit social mixing and reduce transmission. Consumers would respond by sticking to a lifestyle and spending pattern similar to that with lower restrictions. There are only sporadic occasions when spending is better off than a year earlier. Consumers appear to be more confident spending their income on luxury items or leisure. The economic effects of the vaccine were stated to be immediate which makes sense in Ireland's case. Vaccine uptake was always incredibly high which shows the population is happy to cooperate and find a solution to the pandemic. Vaccinated consumers may feel more confident in high-risk areas they would have previously avoided. The positive vaccine response could provide leeway for the government to reduce the need for heavy restrictions regardless of dangers of high case numbers. The public health and economic trade-off can now be re-evaluated. Restrictions higher than necessary could push spending back down if consumers begin to fear the worst. The constant lowering of restrictions throughout the graph could help us believe the pandemic is completely behind us.

2022 starts with an incredible rise in spending, to a level of €200,000,000. There is no doubt that the complete drop in restrictions contributed to this. In the last two years spending only reached a level of €200,000,000 in the second half of the year. It only took the current year two months, which shows the country is currently on a promising trajectory to improve aggregate demand and leave the crashes in spending in the past. While it may be necessary to continually monitor public health and case numbers, a pessimistic outlook could reset all the positive progress seen since the second half of 2021.

The results support the idea that the impacts of restrictions vary by different sectors. An obvious observation is that groceries was the least affected by restrictions due to it being essential. From our results you can see that variance in grocery spending over time was very low. There are large peaks and troughs at the Christmas periods, but this is expected. Consumers stock the shelves for the Christmas period, the new year will follow with much less spending on groceries due to excess food or alternatively new year's resolutions to lose weight. This is in line with the findings in the literature, groceries were not highly impacted in comparison to other sectors. The summary statistics back up this claim, the expected change in spending from January 2022 to January 2021 was €220,100 with the lowest 25% of the differences being in favour of 2021. Minimum and maximum appear to be quite high in both the positive and negative direction, but this is not conclusive as they may just be outliers. This could arise from days of the week differing on each observation. As a result, certain statistics are not as accurate and should not be used to make any serious claims unless backed up by literature and the graphs. The demand for groceries stays relatively constant regardless of consumer confidence or restrictions in place. In reality, grocery spending should decrease when restrictions are eased due to the return of dining and hospitality. However, there is no evidence of this in our results or in the literature.

The retail spending results do not come out as expected. However, it was expected that there would be a rise in retail spending at the end of 2020. This coincides directly with a slight drop in restrictions but the increase in spending can be mainly attributed to Christmas shopping. Spending picks up in 2021 regardless of the restrictions and even flattens when restrictions are eased. Brinke et al. (2022) found that clothing stores were affected badly by heavy restrictions. Under the branch of retail, it might be expected for us to achieve the same results. How do our results differ? An explanation to this may be the transition of retailers to more online-based transactions and deliveries. This could explain the rise in retail spending during the early lockdown phase of 2021. Businesses pushed online sales and deliveries to mitigate the losses from no in store shopping. Constant sales and lower prices would draw consumers to spend more during the lockdowns reducing the built-up demand for clothes and other items once restrictions were lifted. There is a noteworthy difference in spending at the start of 2022 to the beginning of 2021. This could be explained by the lower restrictions in 2022. Consumers feel confident spending more money on discretionary items than before. This is backed up in the summary statistics where the findings show substantial evidence of spending being better off in 2022. However, it is not enough evidence to claim that retail has been badly affected by the restrictions. In comparison to other sectors, it was the only sector to show constant upward trend during heavy restrictions.

The Accommodation and dining findings were very similar. These two sectors suffered heavily during heavy restrictions. Both graphs have noticeable rises at the same point in the middle of 2021 when restrictions were eased. Consumers rushed to make the most of these sectors as soon as they could from being unable to do so for too long. Accommodation especially boomed during the summer months of 2021. Although international travel was open, some people may have felt the testing processes to be too much hassle and it would be safer to go for an Irish holiday or weekend away. The peak of accommodation was in this period, spending simmered down once families were back to school and normal working life. However, they did not reach levels as low as during the heavy restrictions. Unlike accommodation, dining saw its peaks occur during the Christmas periods, although the spending figures were still quite high during the summer months. Christmas is a vital time for restaurant and bar trade. In the weeks approaching Christmas 2020, dining spending increased by roughly €10,000,000. This is interesting when looking at the incredibly low-level spending is on a few weeks beforehand. Although there was a high level of restrictions at the time, the government announced that socially distanced indoor dining would be allowed under certain circumstances. There is an even bigger peak the following year. The idea of built-up demand does not come into play here as restrictions were quite low for months leading up to Christmas 2021. The higher peak could be explained by the idea that people were now more comfortable in higher risk areas, or out socialising in larger groups. Office Christmas dinners and extended family nights out would have been more likely in 2021.

The transport sector was also severely impacted by heavy restrictions. Results in the literature also found this. It is quite self-explanatory, when put into context. As previously mentioned, Irish transport services were limited to 25% capacity during heavy restrictions. This immediately reduced the number of passengers able to avail of buses and trains. There was only a small bump in transport spending at Christmas 2020. Other sectors exhibited larger rises, but transport is one area where people may have stayed a lot more cautious. Sacrifices could have been made to avoid higher risk public transport in favour of walking of driving individually. At this time, we are not sure if the low numbers are down to the capacity issue or public trust. The spending figures start to rise in 2021 when restrictions are lifted, an additional spike in spending into the start of 2022. Capacity had returned back to normal at this point. Transport spending has found a new lease of life now that the restrictions are over.

Roughly over half of all money spent using cards from October 2020 to Feb 2022 were spent in a physical store. The percentage crashes when restrictions are increased in late 2021. Consumers have no choice but to seek online alternatives to stores for food delivery, clothes, or entertainment purposes. The percentage reaches 65% at Christmas 2020. There is a slight drop in restrictions at this time. The opening of physical retail shops to allow for Christmas shopping could explain this very sharp rise. Restrictions were increased even higher than before for the new year. Businesses with little online presence would have likely suffered during these heavy restrictions. Looking at the nightclub industry as an example, it is to no surprise that a substantial amount had to close down for good before they were able to reopen. Rural areas of Ireland would have no doubt suffered also where combinations of poor internet infrastructure, bad roads and older populations would have relied heavily on physical shopping. Restrictions were quite high for the first few months of 2021, but this did not stop the percentage from trending upwards. When combined with the sector graphs, only groceries and retail spending increase at this time. This is surprising but could be attributed to marginal unravelling of certain restrictions. Alternatively, consumers who prefer physical shopping would accept the risks of contacting the virus although social distancing measures were in place in many stores. Consumers appeared to be missing physical shopping, the in-store level rose close to 60% when a large drop in restrictions happened in halfway through the year. In the summer months people were happy to move around, try on clothes in store and ditch the food delivery services for dining out. After the summer months the percentage began to tick downwards. this was strange due to restrictions also going down. A potential answer for this may be that people preferred only preferred to be moving about freely and spending in stores when it suits them. A perfect example of that being the summer. When autumn kicks in and school starts back, trips to the shopping centre or a family meal out would become less frequent. When the weather gets colder and home delivery is available at a few taps on a phone, consumers will grow back into what may be a more comfortable habit. There is still plenty of people who will spend their money in store predominantly and with lower restrictions since May 2021, they are more than capable of doing so at their leisure. The percentage is quite limited, it would be more beneficial if the data for in-store spending was provided for each sector.

Conclusion

To answer the question set out in the very beginning of this study, restrictions impacted consumer spending in Ireland during the pandemic. Impacts were especially apparent in the second half of 2020 when spending struggled for a few months in comparison to the same period a year later. When spending is broken down into each sector, it is clearer to see which sectors are more impacted by high restrictions. Transport and accommodation suffered the most from high restrictions while retail spending surprised us by not having as significant a change. Groceries spending saw no significant changes in spending throughout the pandemic. Similar to Brinke et al., (2022) we find that the crash from the initial wave is not linked to the restrictions themselves, rather consumers fear of the virus. It is only after this period that stricter restrictions cause consumers to reduce spending. The amount spent in physical stores does not play a large role in explaining changes in spending, although it does appear to be quite responsive to levels of restrictions.

Governments have a hard task maintaining aggregate demand in the country, and during a pandemic is no different. The results of this study have helped us understand more about the benefits and costs to the economy of different levels of restrictions. Heavy restrictions seem to cause a lot of harm to consumption in the country, especially if they are not in line with the publics fear of the virus. Light restrictions did not have as much as an effect on spending, which suggests the public may have felt comfortable with their spending patterns in this climate. Consumers were not

afraid of the virus after 2021 and this is seen in the spending figures. For any future situations it could be useful for the government to assess the costs and benefits of keeping a max restriction level of 50 and improving health infrastructure such as contact tracing and isolation schemes. The increase in government spending could be a boost to aggregate demand by keeping consumption at a stable level.

When studying such an extraordinary period of time there will always be limitations to the work, especially when the problem is not over yet. We have presented our findings primarily on the basis of graphical presentation of trend in the time series data. While this can be useful in identifying observed patterns in the data, we do not know if there is a significant relationship between the variables, or whether there are more factors to be considered. It is beyond the scope of this study to quantify the effects of time on spending. In comparison to Brinke et al., (2022), there was a lack of sectoral data. Although we are able get a rough guide as to how restrictions impacted sectors such as transport and accommodation a broader range of sectors would have been more beneficial in our discussion. For example, if retail sales were split up, we could give a better indication of which retail industries benefitted from home deliveries. Additionally, the data for spending by sector was only available after October 2020, which does not give us a fair representation of how these sectors were impacted in the initial stage of this virus.

As more data becomes available it will always be important for further study. Firstly, to accompany the methodology used in this study, survey data could be used to quantify consumer confidence and expectations during different stages of the pandemic. This paired with restriction levels would do a better job explaining changes in spending. Alternatively, linking the restrictions timeline to the number of people vaccinated could also provide greater explanation to the changes in spending. In-depth monthly retail trade data could be used to further analyse the impacts on a broader range of sectors. Alternatively, a more complex approach could be produced to estimate an appropriate duration of lockdowns to minimise economic losses while maintaining public health. For an international approach, a cross-sectional study comparing spending and restrictions in different countries at a given time would be beneficial to understand how different countries coped with the pandemic.

References

Aassve, A., Alfani, G., Gandolfi, F. & Le Moglie, M. (2020) Epidemics and trust: The case of the Spanish Flu. *Health economics,* 30(4), pp. 840-857.

Agarwal, R. & Gopinath, G. (2021) A Proposal to End the COVID-19 Pandemic. *Staff Discussion Notes,* 2021(4).

Andersen, A. L., Hansen, E. T., Johannessen, N. & Sheridan, A. (2020) *Pandemic, Shutdown and Consumer Spending: Lessons from Scandinavian Policy Responses to COVID-19,* s.l.: s.n.

Bachas, N. et al. (2020) *Initial impacts of the pandemic on consumer behavior: Evidence from linked income, spending, and savings data,* s.l.: National Bureau of Economic Research.

Bakaloudi, D. R., Jeyakumar, D. T., Jayawardena, R. & Chourdakis, M. (2021) The impact of COVID-19 lockdown on snacking habits, fast-food and alcohol consumption: A systematic review of the evidence. *Clinical Nutrition.*

Baker, S. R. et al. (2020) How Does Household Spending Respond to an Epidemic? Consumption during the 2020 COVID-19 Pandemic. *The Review of Asset Pricing Studies,* 10(4), pp. 834-862.

Banking & Payments Federation Ireland (2021) *BPFI Payments Monitor Summary Q1 2021* [online] Available at: https://bpfi.ie/wp-content/uploads/2021/05/BPFI-Payments-Monitor-Summary-Q1-2021-for-web.pdf [Accessed 31 March 2022]

Beirne, K. et al. (2020) *The potential costs and distributional effect of COVID-19 related unemployment in Ireland,* Dublin: Economic & Social Research Institute.

Biddle, N., Edwards, B., Gray, M. & Sollis, K. (2020) *Alcohol consumption during the COVID-19 period: May 2020,* s.l.: The Australian National University.

Brinke, A., Fadejeva, L., Siliverstovs, B. & Vilterts, K. (2022) *Consumer Spending in the Covid-19 Pandemic: Evidence from Card Transactions in Latvia,* s.l.: Latvijas Banka.

Brouwers, L. et al. (2009) Economic consequences to society of pandemic H1N1 influenza 2009 – preliminary results for Sweden. *Euro Surveillance,* 14(37).

Buono, I. & Conteduca, F. P. (2020) *Mobility and Government Restrictions in the Wake of COVID-19,* s.l.: Banca D'Italia.

Cauchemez, S. et al. (2009) Closure of schools during an influenza pandemic. *The Lancet infectious diseases,* 9(8), pp. 473-481.

Central Bank of Ireland (n.d.) *Daily Credit and Debit Card Statistics.* [dataset] Available at: [Daily Credit and Debit Card Statistics | Central Bank of Ireland](#) [Accessed 31 March 2022]

Chetty, R., Friedman, J. N., Hendren, N. & Stepner, M. (2020) *The economic impacts of COVID-19: Evidence from a new public database built using private sector data,* s.l.: national Bureau of economic research.

Chowell, G. et al. (2011) Characterizing the Epidemiology of the 2009 Influenza A/H1N1 Pandemic in Mexico. *PLoS Med,* 8(5).

Coffey, C., Doorley, K., O'Toole & Roantree, B. (2020) *The Effect of the COVID-19 Pandemic on Consumption and Indirect Tax in Ireland ,* Dublin: Economic and Social Research Institute.

Coibion, O., Gorodnichenko, Y. & Weber, M. (2020) *Labor markets during the COVID-19 crisis: A preliminary view,* Cambridge: NBER Working Paper No. 27017.

Deb, P. et al. (2022) The effects of COVID-19 vaccines on economic activity. *Swiss Journal of Economics and Statistics,* Volume 158.

Department of the Taoiseach (2020a) *Statement by the Taoiseach on measures to tackle Covid-19.*
[Online]
Available at: https://www.gov.ie/en/speech/5a280b-statement-by-an-taoiseach-on-measures-to-tackle-covid-19-washington/
[Accessed 31 March 2022].

Department of the Taoiseach (2020b). *Speech of the Taoiseach Leo Varadkar TD, Government Buildings, 27 March 2020.* [Online]
Available at: https://www.gov.ie/en/speech/f27026-speech-of-an-taoiseach-leo-varadkar-td-government-buildings-27-march/
[Accessed 31 March 2022].

Department of the Taoiseach (2020c). *Ireland placed on full Level 5 Restrictions of the Plan for Living with COVID-19* [Online]
Available at: https://www.gov.ie/en/press-release/066ce-ireland-placed-on-full-level-5-restrictions-of-the-plan-for-living-with-covid-19/
[Accessed 31 March 2022].

Dictionary.com (2022) *"Epidemic" vs. "Pandemic" vs. "Endemic": What Do These Terms Mean?.*
[Online]
Available at: https://www.dictionary.com/e/epidemic-vs-pandemic/
[Accessed 31 March 2022].

Dietrich, A. M., Kuester, K., Mueller, G. J. & Schoenle, R. (2022) News and uncertainty about COVID-19: Survey evidence and short-run economic impact. *Journal of Monetary Economics.*

Doshi, P., (2011) The elusive definition of pandemic influenza. *Bulletin of the World Health Organization,* Issue 89, pp. 532-538.

European Centre for Disease Prevention and Control, (n.d.) *Covid-19 Vaccine Tracker.* [Online]
Available at: https://vaccinetracker.ecdc.europa.eu/public/extensions/COVID-19/vaccine-tracker.html
[Accessed 31 March 2022].

Ferguson, N. M. et al., (2006) Strategies for mitigating an influenza pandemic. *nature,* Volume 442, pp. 448-452.

Ganslmeier, M. et al., (2021) Vaccinate Early and Vaccinate Broadly: On the health and Economic Effects of COVID-19 Vaccines. *Research Square.*

Google Trends, (n.d) *Google's Year in Search.* [Online]
Available at: https://trends.google.com/trends/yis/2020/GLOBAL/
[Accessed 31 March 2022].

Goolsbee, A. & Syverson, C., (2021) Fear, lockdown, and diversion: Comparing drivers of pandemic economic decline 2020. *Journal of Public Economics,* Volume 193, p. 104311.

Gropp, R. & McShane, W., (2021) *Why are households saving so much during the corona recession?,* s.l.: Leibniz-Institut für Wirtschaftsforschung Halle (IWH).

Grubaugh, N. D. et al., (2019) Tracking Virus Outbreaks in the Twenty-first Century. *Nature Microbiology,* 4(1), pp. 10-19.

Hansen, N.-J. H. & Mano, R. C., (2021) COVID-19 Vaccines: A Shot in Arm for the Economy. *IMF Working Papers.*

Hao, X., Sun, Q. & Xie, F., (2022) The COVID-19 pandemic, consumption and sovereign credit risk: Cross-country evidence. *Economic Modelling,* Volume 109.

healthdirect, (n.d.) *What is a pandemic?.* [Online]
Available at: https://www.healthdirect.gov.au/what-is-a-pandemic
[Accessed 31 March 2022].

Hens, N. et al., (2009) Estimating the impact of school closure on social mixing behaviour and the transmission of close contact infections in eight European countries. *BMC Infectious Diseases,* Volume 9, p. 187.

Holmes, E. C., Rambaut, A. & Andersen, K. G., (2018) Pandemics: spend on surveillance, not prediction. *Nature,* Volume 558, pp. 180-182.

Immordino, G., Jappelli, T., Oliviero, T. & Zazzaro, A., (2022). Fear of COVID-19 contagion and consumption: Evidence from a survey of Italian households. *Health Economics,* 31(3), pp. 496-507.

Jahan, S., Mahmud, A. S. & Papageorgiou, (2014) Back to Basics: What Is Keynesian Economics? - The central tenet of this school of thought is that government intervention can stabilize the economy. *Finance & Development,* 0051(003), pp. 53-54.

Lee, G. O. & Warner, M., (2005) Epidemics, labour markets and unemployment: the impact of SARS on human resource management in the Hong Kong service sector. *The International Journal of Human Resource Management,* 16(5), pp. 752-771.

Lee, G. O. & Warner, M., (2006) The impact of SARS on China's human resources: implications for the labour market and level of unemployment in the service sector in Beijing, Guangzhou and Shanghai. *The International Journal of Human Resource Management,* 17(5), pp. 860-880.

Nebehay, S., (2020) *Reuters.* [Online]
Available at: https://www.reuters.com/article/uk-china-health-who/who-says-it-no-longer-uses-pandemic-category-but-virus-still-emergency-idUKKCN20I0PD
[Accessed 31 March 2022].

OxCGRT (n.d.) *Stringency Index.* [dataset] Available at: covid-policy-tracker/stringency_index.csv at master · OxCGRT/covid-policy-tracker · GitHub [Accessed 31 March 2022]

Parihar, S., Kaur, R. J. & Singh, S., (2021) Flashback and lessons learnt from history of pandemics before COVID-19. *Journal of Family Medicine and Primary Care,* 10(7), pp. 2441-2449.

Perlroth, D. J. et al., (2010) Health Outcomes and Costs of Community Mitigation Strategies for an Influenza Pandemic in the United States. *Clinical Infectious Diseases,* 50(2), pp. 165-174.

Potter, C., (2001) A history of influenza. *Journal of Applied Microbiology,* 91(4), pp. 572-579.

Saunders-Hastings, P. R. & Krewski, D., (2016) Reviewing the History of Pandemic Influenza: Understanding Patterns of Emergence and Transmission. *Pathogens,* 5(4), p. 66.

Shin, J., Kim, S. & Koh, K., (2021) Economic impact of targeted government responses to COVID-19: Evidence from the large-scale clusters in Seoul. *Journal of Economic Behaviour & Organization,* Volume 192, pp. 199-221.

Singer, B. J., Thompson, R. N. & Bonsall, M. B., (2021) The effect of the definition of 'pandemic' on quantitative assessments of infectious disease outbreak risk. *Scientific Reports,* 11(1).

Wolfe, N. D., Dunavan, C. P. & Diamond, J., (2007) Origins of major human infectious diseases. *Nature,* 447(7142), pp. 279-283.

World Health Organization, (2020) *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020.* [Online]
Available at: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
[Accessed 10 October 2021].

Wu, J. T. et al., (2010) School Closure and Mitigation of Pandemic (H1N1) 2009, Hong Kong. *Emerging Infectious Diseases,* 16(3), pp. 538-541.