

Inflation and Mental Health in Sweden: Analyzing the Impacts of Economic Instability on Healthcare Utilization

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Abstract:

This thesis examines the relationship between economic instability, particularly inflation, and the demand for mental health services in Sweden. Using fixed effects and difference-in-differences models, the study analyzes healthcare utilization trends during high inflation periods to determine how economic pressures influence psychiatric care demand and budget allocations. The research reveals significant increases in mental health service use during economic downturns, indicating a strong correlation between inflation and heightened demand for psychiatric care. Findings suggest that although regional healthcare budgets are adjusted during downturns, the increase is insufficient, leading to prolonged waiting lists and potential service inadequacies. This study deepens the understanding of how economic factors impact mental health service provision and emphasizes the need for proactive fiscal policies to sustain healthcare services during financial crises. The outcomes aim to aid policymakers in crafting strategies to bolster mental health support systems, ensuring accessibility and responsiveness during economic distress.

Keywords: Mental health, Economic instability, Inflation, Healthcare utilization, Sweden, Healthcare policy, Economic downturns, Psychiatric care demand, Healthcare budget allocation, Economic stressors.

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Table of Contents

1. Introduction	4
1.1 Background	4
1.2 Contribution	8
2 Literature Review	9
2.1 Inflation Fundamentals	9
2.2. Economic instability and Mental health	10
2.3 Policy and Budget Allocation during Crises.....	11
2.4 Empirical Studies.....	12
2.5 Hypothesis Formulation	12
3. Methodology - Data, Sample construction and Research design.	13
3.1 Sample	13
3.2 Correlation Analysis.....	15
3.3 Fixed Effect model	17
3.4 Difference-in-Difference.....	19
3.5 Assumptions of the models	21
4. Results	23
4.1 Correlation Between Dependent and Independent variables	23
4.2 Results on the impact of inflation on mental health issues in Sweden.....	26
4.3 Results in Budget Allocation towards psychiatric Needs During High Inflation in Sweden.	29
5. Discussion	30
5.1 Aim of the Study	30
5.2 Discussion around findings.....	30
6. Limitations, Suggestions for Future Research, and Conclusion.....	34
6.1 Limitations.....	34
6.2 Future Research	35
6.3 Conclusion	36
7. References	37
Appendices.....	43
Utilization of Generative AI in Research Methodology	50

1. Introduction

1.1 Background

1.1.1 Sweden's healthcare system

Sweden is often heralded as an example of the viability of a publicly funded healthcare system offering universal access to its services. The system proceeds from Sweden's welfare policy that designs public services and social transfers as rights guaranteed by citizenship or residency within the country's borders. This model has largely proved successful, and life expectancy in Sweden is among the highest in the European Union (EU) as a result of exceptional public health standards and advanced treatment methods. But a system of this kind can only be sustained with a public sector of considerable size. Sweden's public sector expenditures amount to about half of its GDP. Of this share, transfers to cover social protections (primarily relating to elders and elderly care, including pensions and the provision of services and or special accommodation) make up the biggest cost at around 38%.

Healthcare is in second place, followed by sectors such as education, other public services, and economic affairs. Overall, the share of public expenditure going towards social protection and healthcare has not been subject to any significant changes since 2011. Instead, it has been constant at a rate between 25.9% and 27.9%. While this can be seen as a testament to the robustness of the system and the reliability of its appurtenant infrastructure, workforce, and technology, it is worth considering whether larger budgetary fluctuations may be warranted in response to changes in demand—especially those with a high degree of predictability. This paper aims to investigate whether demand for psychiatric services increase in Sweden during periods of economic recession, and whether the appropriate budgetary reallocations are undertaken to combat resulting delays or other inefficiencies in the provision of care (SKR, 2024).

Despite the existence of a large, centralized bureaucratic apparatus comprised of some 300 national government agencies and public administrative bodies, Sweden's welfare system involves strong elements of subsidiarity. Many key decisions are put in the hands of local, self-governing units known as regions. These must act in accordance with general guidelines set out by the national government but are nevertheless offered a great degree of discretion. The autonomy of regions is constitutionally defined -- *Regeringsformen* guarantees self-governance of the regions and their right to levy proportional income taxes on their constituents. The 21 regions of the country do not have many responsibilities outside of

healthcare. Government functions with a more local scope are administered by the municipalities, while larger ones fall under government agencies at the national level. Elected officials at the regional level are thus mostly preoccupied with decisions over where healthcare funds should be allocated and the ways in which care should be provided. Around 80% of the regions' activities are dedicated to these matters.

1.1.3 Healthcare Administration and its Perils

The administration and delivery of healthcare services is carried out through two main channels: primary care centres (PCC) and hospitals. While hospitals are tasked with treatment of more acute conditions, the role of primary care is, according to the Health and Medical Services act, to "without delimitation in terms of diseases, age or patient groups ... respond to the population's needs for such basic medical treatment, care, preventive work and rehabilitation that do not require the medical and technical resources of hospitals or other special skills" (Hälsö- och sjukvårdslag, 2017:30). According to the act common care needs shall be met while ensuring ease of access and the provision of preventative measures based on the individuals needs and conditions. Mental illness treatment largely falls under the responsibility of PCC's due to the prolonged nature of such conditions, although instances of severe psychosis, mania or panic attacks often requires treatment using the unique resources of hospitals. Municipalities are on the other hand tasked with the treatment of substance abuse and addiction. Since regions are responsible for the financing and governing of PCC's, they are perhaps the most important actors for understanding the state of Swedish psychiatric care and how it can be better adapted to patient needs.

Mental health care in Sweden is governed by the same legal framework as the rest of the health care system, although regulatory exceptions exist for compulsory and forensic mental care. It is an area of care that warrants special attention, as mental health is deteriorating among the Swedish populace. This deviates from the development of most other public health markers. When substance abuse and addiction are included, almost one fifth of the Swedish population suffer from mental health complications. Aside from the personal tragedies that invariably arise from this, it also accounts for considerable costs to society. In direct terms, mental health treatments and benefits present substantial fiscal costs to local governments. Moreover, the mental health crisis also causes indirect costs such as those arising from the economic impacts of widespread sick leave. The findings of this paper point towards this

being a potential knock-on effect of economic recessions. The tightening of monetary policy in response to inflation presents new struggles for citizens of any country, and in many cases they stand unprepared. Among other things, cost of living crises spurred on both by surging inflation and accompanying increases of interest rate can set individuals' psychological resilience to the test. For this reason, it is plausible that more people will seek out psychiatric care during these periods. If this is true, it would cause an exacerbation of the long-run problems associated with psychiatric care in Sweden in the short to medium term.

Many of Sweden's issues pertaining to mental health care are structural in nature. Most patients with psychiatric problems are first received by primary care centres. As evidenced by the objectives of PCC's prescribed by the Health and Medical Services Act, the care they provide is of a general kind. As such, the mental health care provided by PCC's is distinct from that given by specialized psychiatric institutions. Despite this separation, the guidelines established by national agencies are modeled largely on the procedures of specialized care. Only about 20% of adults suffering from mental health issues are referred to specialized psychiatry, indicating that there is a mismatch between the structures prescribed by national policies and those that would suit the needs and desires of most patients. The main concerns are about inadequate follow-ups and a lack of coordination between primary and specialist care leading to insufficient planning and failure to conduct diagnoses in a timely manner. But perhaps the biggest vulnerability of the Swedish psychiatric care system is the minimal capacity for inpatient care. A gradual development over the past few decades has rendered the system almost entirely outpatient directed. In 2021, there were only about 34 beds reserved for psychiatric care per 100,000 inhabitants. The occurrence of a demand shock therefore risks putting the system under such stress that adequate care cannot be provided. Among those treated by inpatient care, abuse and addiction, mood disorders, and anxiety syndrome were some of the most common diagnoses. While there likely exist latent traits in people predicting the incidence of these conditions, external factors such as concerns over job stability and financial security may trigger responses of this nature. This is supported by studies examining the American healthcare system showing a strong correlation between demand for psychiatric care and economic downturns. In addition to the low capacity for inpatient care, there is also a large shortage of specialist nurses in psychiatric care which is expected to worsen over the years to come. In light of this, it is of great importance for regions to stand prepared in the face of demand shocks to a psychiatric care system which already shows signs of weakness. The local administration also makes it possible to tailor the

response to geographies most impacted by such events—a prerogative that should be used to its full extent (SKR, 2019).

1.1.4 Healthcare financing in Sweden

What mechanisms can the regions use to adapt healthcare to the needs of the local population? Firstly, the financing structure of the Swedish healthcare system shall be examined. Sweden is among the highest-spending countries in the EU in terms of healthcare, even outspending some of its neighbouring Nordic welfare states. About 86% of the funding comes from public expenditure, while the rest comes from private financing. The primary private financing channel is out-of-pocket payments, constituting 92.5% of the private funds raised. User charges apply at a flat rate with a maximum charge 1400 SEK per 12-month period, contributing to this source of income. Other out-of-pocket payments include direct payments for prescription drugs not included in the Drug Benefits Scheme and informal payments of negligible amounts. As is the case of most universal healthcare systems, taxes are used to fund most of the expenditure. Of total healthcare spending, 56% of the funding comes from taxes imposed by the regions and the municipalities. Further, the Swedish national government support the regions through grants, which is one mechanism used to ensure an equal countrywide standard of care. These account for another 25% of healthcare funding, and taxes are the primary source of finance used for the grant pay-outs. The source of the remaining 5% are other types of income from regions and municipalities such as returns on capital or sales. Since regions themselves levy many of the taxes that are used to keep the healthcare system in operation, they also possess the power to direct where the money is going. Budgets are submitted by the executive branch of the regional government (Regionsstyrelsen) and is voted on by the regional assembly (Regionsfullmäktige). In some cases, they have budgetary discretion over grants given by the national government. These are called general state grants (*generella statsbidrag*) and are mainly an instrument for equalising financial endowments between regions. Other state grants are *directed* and must be used for a particular end determined by the national government. For example, regions have since 2015 taken part in a national strategy to improve the standard for maternity care and other types of care related to women's health. Directed grants cannot be used for any other purpose than the one specified by the national government. However, most decisions over where money should be spent in the regional infrastructure is taken by the regional

government. This is also the entity with most insight into the prevailing healthcare needs because of its closer proximity to the local population.

1.1.5 The Care Guarantee

The matter of delivering care in time is made more salient by the so-called care guarantee (Vårdgaranti). The care-guarantee is a principle enshrined in law specifying the maximum waiting periods patients should experience in their search for health care. It stipulates that all patients seeking treatment for an ailment should be put into contact with primary care functions within one day. A medical assessment should be carried out within three days after the first point of contact. If a patient is referred to specialist care, the first meeting should take place within 90 days. If a decision is made about a treatment or operation, the patient should be notified about scheduling for these procedures after no more than 90 days. If any of the thresholds are exceeded, the region has a legal responsibility to offer the patient care at some other PCC, hospital, or specialist clinic within its control. But for psychiatric care in particular, the care guarantee is routinely failing to be delivered in many parts of the country. However, it should be noted that both time-variant and cross-regional fluctuations exist, underlining the importance of further study of the underlying patterns determining demand for psychiatric care (SKR, 2019).

1.2 Contribution

This paper examines the impact of economic downturns on the demand for psychiatric care and investigates whether regional budget alterations occur in response to an expected demand shock for mental health services. Similar studies have been conducted elsewhere, most notably in the United States. For example, Modrek and Cullen (2013) explored the effects of job insecurity during recessions on survivors' work stress. Additionally, Forbes and Krueger (2019) analyzed the broader impacts of the Great Recession on mental health in the United States. Further comparisons can be drawn with the study by Kentikelenis et al. (2011), who documented the severe health effects of the financial crisis in Greece.

However, there are multiple reasons for extending the same inquiry to the Swedish context. Firstly, it gives policymakers insights into demand patterns of psychiatric care. This can help inform future budgeting decisions at the local and national levels. Secondly, it can contribute to understanding whether Sweden's decentralized healthcare system is more responsive in its

resource allocation. Political leaders have in the past emphasized the importance of ‘closeness’ in the administration of healthcare, but recently there have been calls for increased centralization, particularly from the political right. If regions are proved to be effective in placing tax money where it is most needed, this speaks to the advantages of the current Swedish model. Conversely, if regions consistently fail to adequately fund the psychiatric care system during times of pressure, it might be worth reevaluating whether much is gained by adhering to the principle of subsidiarity.

2 Literature Review

2.1 Inflation Fundamentals

Inflation is generally defined as a sustained increase in the general price level of goods and services in an economy over a period. When the general price level rises, each unit of currency buys fewer goods and services; consequently, inflation reflects a reduction in the purchasing power per unit of money—a loss of real value in the medium of exchange and unit of account within the economy.

In exploring the broader economic context of inflation, it is crucial to consider the theoretical impacts of monetary policies on both the economy and society. Inflation, a sustained increase in the general price level of goods and services, can significantly influence economic stability and societal well-being. According to Bourne (2024), central banks play a pivotal role in stabilizing economies by managing inflation through monetary policies. The book emphasizes how targeted monetary interventions can prevent economic uncertainties that often lead to social stress and adverse mental health outcomes.

Further, Mitra et al. (2024) discuss the effects of inflation on income growth, highlighting how inflationary pressures can impact different sectors variably, potentially leading to economic growth or instability. Such economic fluctuations are crucial for understanding societal impacts as they can lead to stress and mental health issues among affected populations.

2.2. Economic instability and Mental health

2.2.1 Economic Instability and Public Health

Research such as that conducted by McKee, Basu, and Stuckler (2011) clearly illustrates the detrimental effects of financial crises and austerity across Europe, linking these economic disruptions directly to increases in mental health issues like stress, anxiety, and depression. This correlation is especially pronounced when healthcare systems face cuts in funding, exacerbating the mental health struggles of the population. Their comprehensive study is pivotal as it demonstrates the direct impact of economic policy and health funding on public mental health. Further insight into the global impact of recessions on health is provided by Modrek and Cullen (2013), who synthesized responses to the Great Recession, observing that countries with robust healthcare infrastructures were better equipped to manage the negative health impacts associated with economic downturns. Their findings emphasize the importance of maintaining, if not bolstering, mental health services during times of economic crisis to mitigate adverse outcomes.

2.2.2 The Role of Economic Stability in Mental Health

Furthermore, papers conducted by Kentikelenis et al. (2011) vividly illustrate the detrimental effects of financial crises and austerity across Europe, directly linking economic disruptions to increased mental health issues like stress, anxiety, and depression. This correlation is notably pronounced when healthcare systems face funding cuts, exacerbating the mental health struggles of the population. Their study is pivotal as it demonstrates the direct impact of economic policy and health funding on public mental health. Further insights into the global impact of recessions on health are provided by Marmot et al. (2012), who synthesized responses to the Great Recession, observing that countries with robust healthcare infrastructures were better equipped to manage the negative health impacts associated with economic downturns. Their comprehensive review emphasizes the importance of maintaining, if not bolstering, mental health services during times of economic crisis to mitigate adverse outcomes.

2.3 Policy and Budget Allocation during Crises

2.3.1 Budget allocation mid-crisis

Karanikolos et al. (2013) provide a comprehensive analysis of how austerity measures and financial crises have led to substantial reductions in healthcare funding across Europe. Their study highlights the direct correlation between budget cuts and worsening health outcomes, including mental health crises. The research points out that countries that maintained or increased healthcare spending, despite economic downturns, were able to mitigate some of the adverse effects on public health. This evidence suggests that proactive and protective budget allocations for healthcare, particularly mental health services, are crucial during economic crises to maintain public health standards and prevent long-term detrimental effects.

2.3.2 Effectiveness of Healthcare Responses

The World Health Organization's report on the impact of economic crises on mental health underscores the importance of effective healthcare responses during economic downturns. The report details how governments' ability to sustain or adapt health services in response to increased demands significantly affects the overall mental health of the population. Effective responses include maintaining access to mental health services and ensuring that these services are equipped to handle increased stress within the population due to economic insecurity (World Health Organization, 2011).

Marmot et al. (2012) further explore the implications of economic downturns on health inequalities, emphasizing the role of government policies in either exacerbating or alleviating these disparities. Their findings indicate that effective healthcare responses are not only about sustaining funding but also about adapting services to meet the needs of the most vulnerable populations. This adaptation is crucial in preventing the widening of health divides, particularly in terms of access to mental health services during and after crises.

Together, these studies illustrate the pivotal role of government action in healthcare during economic crises. They argue for the necessity of maintaining or even increasing healthcare budgets, specifically for mental health services, during economic downturns. Moreover, they emphasize the need for healthcare systems to be adaptable and responsive to the changing needs of the population, highlighting how governmental policies can either buffer or exacerbate public health challenges during such times.

2.4 Empirical Studies

2.4.1 Empirical studies

In 'Economic downturns and population mental health: research findings, gaps, challenges, and priorities' by Zivin, Paczkowski, and Galea (2011), the effects of economic stressors on mental health are comprehensively reviewed. The study suggests that economic downturns consistently correlate with adverse mental health outcomes across different populations. This link is crucial in understanding how inflation, as a stressor, can exacerbate mental health issues, although the study calls for more specific research on inflation itself.

Karanikolos et al. (2013) further this discussion by examining how austerity measures during the European financial crisis impacted health outcomes, including mental health. The austerity measures, often a response to high inflation and economic downturns, were found to lead to significant reductions in healthcare access and increased reports of mental health problems. This serves as a direct example of how policy responses to economic conditions can impact mental health.

2.5 Hypothesis Formulation

Drawing upon the comprehensive literature review that has elucidated the multifaceted impacts of economic factors, particularly inflation, on mental health and healthcare systems, we now proceed to articulate our research hypotheses. These hypotheses are grounded in the observed trends and theoretical insights discussed, focusing only on the context of Sweden.

H0: Increase in Mental Health Issues and Service Utilization During High Inflation in Sweden

This hypothesis posits that periods of high inflation correlate with an increase in mental health issues and the utilization of mental health services in Sweden. The relationship between economic stressors, such as inflation, and mental health outcomes has been extensively documented in the reviewed literature. Studies such as those by Zivin, Paczkowski, and Galea (2011), which provide empirical support for the notion that economic downturns adversely affect population mental health, are crucial to our understanding. Their paper details significant findings in this area. Moreover, it is highlighted how economic crises and the subsequent austerity measures can exacerbate mental health crises by limiting access to necessary healthcare services (Karanikolos et al., 2013). Our research will test this

hypothesis by analyzing trends in mental health service utilization in relation to inflation rates, employing statistical models to establish any significant correlations.

H1: Discrepancy in Budget Allocation to Mental Health Needs During High Inflation in Sweden

Our second hypothesis contends that there is a discrepancy in the allocation of budgets for mental health services during periods of high inflation, which does not adequately meet the increased needs for these services in Sweden. This hypothesis is motivated by findings from the WHO (2011) and Marmot et al. (2012), which emphasize the crucial role of government action in ensuring effective healthcare responses and adapting policies to safeguard vulnerable populations during economic crises. Preliminary data, as will be detailed in Appendix 5, suggest that despite rising inflation rates, the increase in budget allocation for mental health has not been commensurate with the growing demand for mental health services. Our method will involve a detailed analysis of government budget allocations versus trends in mental health issues, employing econometric techniques to explore the adequacy of funding responses to inflationary pressures.

3. Methodology - Data, Sample construction and Research design.

3.1 Sample

3.1.1 Data Collection

Research has indicated that the relationship between the inflation rate, economic downturns, and mental health issues can vary significantly by country due to distinct national characteristics such as mortgage conditions, social safety nets, and debt-to-income ratios (Finocchiaro et al., 2016). The notion that analyses conducted within a single country tend to be more reflective of actual conditions than those that aggregate data across multiple countries is supported by Pathum Sookaromdee and Viroj Wiwanitkit, 2023. Consequently, this research focuses on Sweden, a country where the differential response to economic stressors has been underexplored, thereby addressing a gap in the existing literature.

3.1.2 Choosing Sweden

The choice of Sweden is further supported by the Principle of Public Access to Information, a cornerstone of Swedish governance, which facilitates the accessibility of data through governmental channels. Our analysis utilizes panel data sourced from Swedish governmental bodies, including The National Board of Health and Welfare (Socialstyrelsen), Statistics Sweden (Statistiska Centralbyrån), The Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Regioner), and The Swedish Public Employment Service (Arbetsförmedlingen). This data, reported monthly from 2008 to 2022, is structured to allow regional as well as national-level assessments, providing a comprehensive view of the impacts across various localities. All data used in this study have been collected on an aggregated level, with monthly and regional breakdowns only. No personal information about individuals has been gathered; instead, all variables are presented as aggregated totals. This approach ensures compliance with GDPR regulations, as the data cannot be used to identify any individual directly or indirectly.

3.1.3 Selection of Variables

The selection of variables for this study is informed by frameworks and methodologies used in prior research, specifically aiming to replicate findings of Forbes and Krueger (2019), however with a model formulation based on several other research papers. The primary dependent variable is the number of mental health issue visits, which, due to its dependence on regional patient counts, is adjusted for total regional patient numbers to ensure accurate assessment of trends in mental health service utilization.

Additionally, the number of visits for cancer treatment is included for dual purposes: Firstly, it serves as a control within the Fixed Effect model, based on the assumption that cancer rates do not correlate with inflation, as stated by Levit and Balogh (2013), thus providing a baseline for non-economic impacts on health services. Secondly, in the Difference-in-Difference analysis, it helps isolate the effect of economic shocks by acting as a comparison group against which the impact on mental health services can be measured.

Expanding beyond the scope of Levit and Balogh (2013), this study also incorporates the interest rate set by the Swedish central bank and waiting lists for mental health services. This is because we want to assess how fluctuations in borrowing costs, mortgage rates, business investments, and macroeconomic policies influence financial stability, housing security, employment levels, and overall economic health, thereby affecting mental well-being (Guerra

& Eboreime, 2021). The latter is particularly significant as it offers insights into potential bottlenecks in service provision that might exclude specific groups from receiving timely care due to regional approval constraints, especially for a nation with a high debt-to-income ratio such as Sweden (Finocchiaro et al., 2016).

Following the analysis of Zavras et al. (2013), which examines the impact of the economic crisis and other demographic and socio-economic factors on self-rated health in Greece, and the study by Vandoros et al. (2013), which explores health trends in Greece during the financial crisis, it becomes essential to also control for population number. This adjustment is crucial due to the need to account for population changes during the decade under review (Vandoros, 2013). Additionally, similar to the findings of Drydakis (2014), which detail the effects of unemployment on health and mental health in Greece during the financial crisis, and the study by Kondo et al. (2008) on the relationship between economic recession and health inequalities in Japan, controlling for unemployment is validated. Both studies have identified significant correlations between unemployment and mental health issues, leading to its inclusion as a controlling variable in our analysis.

3.1.4 Lost Variables

A significant constraint in the process of replicating prior studies involves the collection of demographic variables. Specific categories such as education level, income level, age, and gender are not included in our analysis. The exclusion of these variables is due to their unavailability at a regional and monthly resolution in the datasets used. As a result, our analysis, while robust, offers a more generalized and simplified depiction of reality compared to the nuanced research conducted by Forbes & Krueger, (2019). This limitation may affect the granularity of our findings and should be considered when interpreting the results and comparing them to studies that incorporate these demographic factors.

3.2 Correlation Analysis

3.2.1 Correlation Analysis

Our analysis begins with the use of correlation analysis as an initial step to understand the relationships between variables, given our inability to replicate the exact method utilized by Kruger and Forbes due to data limitations. This approach aligns with methodologies employed in prior research, such as the study conducted by Thomson, Basu, and Stuckler

during the 2008 recession. Their research employs a correlation analysis to identify key relationships and establish a direction for further investigation (Thomson, Basu, & Stuckler, 2013).

In our study, we utilize a correlation matrix to examine the relationships among four specific variables: the total number of mental health issue visits, the inflation rate, the waiting list for accessing mental health care, and the interest rate. Previous research, such as the study by Thomson, Basu, and Stuckler (2013), primarily focused on the first two variables. However, given our previous discussion on the link between the interest and inflation rates, as well as the association between waiting lists and the total number of mental health visits, we found the inclusion of the latter two variables essential. This addition aims to capture broader impacts and ensure that relevant groups affected by these economic factors are not overlooked.

This matrix is crucial for determining whether the same positive relationships observed between economic downturns and mental health outcomes, as reported in Forbes & Krueger, (2019) are present within our Swedish dataset. By including these variables, we enhance our ability to understand the comprehensive effects of economic conditions on mental health within Sweden.

3.2.2 Testing for significance, T-test

Our analysis employs t-tests to strengthen our initial findings from the correlation analysis. The t-test is a statistical tool used to determine whether there is a significant difference between the means of two groups. In our study, these groups are defined as periods of high inflation compared to the overall average conditions from 2008 to 2022. This approach is particularly suitable in our context because it allows us to assess the impact of economic fluctuations—specifically inflation—on the utilization of mental health services.

By comparing the average number of mental health visits and the size of waiting lists during periods of high inflation to their respective overall averages, we aim to understand the magnitude of the correlations previously identified. This method follows the precedent set by studies comparing results from other cross-sectional data and correlation analysis regarding the connection between inflation and mental health (Uutela, 2010).

3.3 Fixed Effect model

3.3.1 Rationale of model choice

Although recent research, such as that by Ojokoh, Olaku, Sarumi, and Olotu (2021), has elucidated the relationship between economic downturns and mental health using AI and machine learning—thus enhancing the validity and reliability of their conclusions—in this paper, we face limitations due to insufficient training data and a lack of complex demographic details. Consequently, we find that a traditional fixed effect model will suffice for the broad and simplified model we aim to run, as supported by Yao, Wang, and Liu (2022). The benefit of this model lies in its ability to control for unobserved heterogeneity across entities within the data, making it well-suited for our purposes. Moreover, following the methodology used by Kromydas, Thomson, Pulford, Green, et al. (2021), we incorporate the unemployment rate as a controlling variable to assess its impact on mental health.

3.3.2 Model Formations

While the choice of the variables has already been mentioned, in the first model we set to evaluate our first hypothesis:

H0: Increase in Mental Health Issues and Service Utilization During High Inflation,

Thus, our base model is:

Model 1: Base model

$$\begin{aligned} \text{TotalVisits_MentalHealth}_{it} &= \beta_0 + \beta_1 \text{Inflation_Rate}_{it} + \beta_2 \text{No.Patients_Illness_Treatment}_{it} \\ &+ \beta_3 \text{TotalVisits_AllPatients}_{it} + \beta_4 \text{No.Patients_Cancer_Treatment}_{it} \\ &+ \beta_5 \text{Population}_{it} + \beta_6 \text{Unemployment_Rate}_{it} + \mu_i + \epsilon_{it} \end{aligned}$$

While the previous mentioned researched seem to find that economic downturn does have a negative impact on mental health, we can draw the following expected impact that each variable might have on the mental health issues in Sweden.

The variables 'Number of Patients for Illness Treatment' and 'Number of Patients for Cancer Treatment' serve as crucial indicators not only of the population's health but also of the healthcare system's capacity and effectiveness in addressing both physical and mental health

needs. Research by Luitel, Mall, et al. (2019), and Coombs, Meriwether, Caringi, et al. (2021), suggests that higher rates of general health visits are likely associated with better health outcomes, including mental health, due to enhanced delivery of healthcare services and interventions. Thus, if significant in our model, the coefficients for these variables should be negative.

Meanwhile, the effects from variables such as 'Total Visits, All Patients' and the 'Population' are more challenging to predict. While larger populations may lead to higher absolute numbers of people needing mental health services, the rate per capita might decrease if infrastructure, resources, and access do not scale appropriately, as noted by Basu (2011). Additionally, larger populations may encounter more significant and diverse barriers to accessing mental health services, influenced by socio-economic and geographic factors, as highlighted by Packness et al. (2017). Their comprehensive study examines the impact of socioeconomic position and distance on mental health care utilization. Therefore, these relationships are complex and difficult to predict.

For the second hypothesis, to explore the question of how budget allocations to mental health services are influenced during periods of high inflation, employing a fixed effects (FE) model is particularly appropriate due to several factors highlighted in relevant studies. One pivotal study, Koenig et al. (2003), notably applies a fixed effects approach to examine how economy-wide inflation impacts healthcare expenditures. This study provides a methodological foundation for addressing similar economic variables in the context of mental health spending.

Model 2:

$$\begin{aligned} \text{SpecializedPsychiatricCare_Costs}_{it} &= \beta_0 + \beta_1 \text{Inflation_Rate}_{it} + \beta_2 \text{TotalVisits_AllPatients}_{it} \\ &+ \beta_3 \text{No.Visits_Mental_Health_Issues}_{it} \\ &+ \beta_4 \text{Total_Healthcare_Cost_per_capita}_{it} + \beta_5 \text{No.Visits_Cancer_Treatment}_{it} \\ &+ \beta_6 \text{Unemployment_Rate}_{it} + \mu_i + \epsilon_{it} \end{aligned}$$

Like the study by Koenig et al. (2003), this research aims to analyze the impact of macroeconomic variables, specifically inflation, on healthcare spending using a fixed effects model. This model helps control for unobserved heterogeneity across entities, which may

influence the dependent variable—in our case, the allocation of budgets to mental health services. While Koenig et al. focus on healthcare expenditures influenced by medical inflation, our study specifically examines mental health services during periods of high inflation. Martin and Leslie (2003) note that inflation tends to increase mental health costs by raising overall healthcare expenditures.

Regarding the variable of total visits, Leslie and Rosenheck (1999) found that an increase in healthcare visits generally elevates healthcare spending, including for specialized services like psychiatric care. Their findings demonstrate how variations in healthcare service usage impact overall expenditure. However, the impact of unemployment on mental health spending is more complex. Patel and Kleinman (2003) suggest that unemployment indirectly raises healthcare costs by exacerbating mental disorders due to socio-economic stress. Their work provides a thorough examination of how economic hardships contribute to the prevalence of mental health issues. Conversely, Cummins (2018) illustrates how austerity measures, often associated with high unemployment, can paradoxically reduce funding for mental health services despite growing needs. This shows that broader economic policies significantly influence the relationship between unemployment and healthcare funding, underlining the complexity of predicting these effects in economic downturns.

3.4 Difference-in-Difference

3.4.1 Rationale of choosing the model

Due to our inability to evaluate the first hypothesis using machine learning or AI, and the complexities involved in replicating the model by Forbes & Krueger (2019), we introduced a novel approach not found in previous research by incorporating a Difference-in-Differences (DiD) model. Although DiD models have been used to assess the impact of economic downturns on mental health, as seen in the study by Cui and Han (2022), our data structure does not permit comparing two regions with differing inflation or interest rates.

Consequently, we differentiated our control and treatment groups based on the type of care sought. Given that the demand for cancer treatment is assumed to remain stable during economic downturns, we used this group as a control. Conversely, visits for mental health issues, likely sensitive to inflation rates, served as the treatment group, thus focusing on the nominal difference in the number of visits between these groups.

3.4.2 Model formation

We identified economic shocks between 2008 and 2022 by calculating a threshold defined as the average inflation rate plus one standard deviation over the same period. This calculation is expressed as:

$$Threshold = Inflation \times (1 + SD)$$

Economic downturns were identified whenever inflation exceeded this threshold, pinpointing three specific economic shocks within our dataset:

1. First Economic Shock: 2008 Financial Crisis
2. Second Economic Shock: 2011 Debt Crisis
3. Third Economic Shock: 2021-2022 Pandemic and Economic Issues

After implementing the model with these economic shocks as the treatment periods, we analyzed the net difference in the impact on mental health visits compared to cancer treatment visits. The DID model is as follows:

Model 3: Dif-in-Dif

No.Visits_Mental_Health_Issues_{it}

$$\begin{aligned} &= \beta_0 + \beta_1 No.Visits_Cancer_Treatment_{it} + \beta_2 Treatment_FirstShock_{it} \\ &+ \beta_3 Post_FirstShock_{it} + \beta_4 Interaction_FirstShock_{it} \\ &+ \beta_5 Treatment_SecondShock_{it} + \beta_6 Post_SecondShock_{it} \\ &+ \beta_7 Interaction_SecondShock_{it} + \beta_8 Treatment_ThirdShock_{it} \\ &+ \beta_9 Post_ThirdShock_{it} + \beta_{10} Interaction_ThirdShock_{it} + \varepsilon_{it} \end{aligned}$$

The variable "Number of Visits for Cancer Treatment" serves as a control variable to adjust for changes in healthcare utilization that are not related to economic conditions but could affect the volume of mental health visits. "Treatment" and "Post" indicators capture the periods before and after each economic shock. "Interaction" terms provide the differential effects of the post-shock period in the treatment group compared to the control group, directly estimating the impact of economic shocks on mental health visits. The error term

represents the random deviation from the observed dependent variable value from the value predicted by the model.

3.5 Assumptions of the models

3.5.1 Fixed effect models

In validating the assumptions underpinning the fixed effects models, several diagnostic tests were carried out to ensure the robustness and appropriateness of the model specification. These included the Hausman test to decide between fixed effects and random effects models, the Breusch-Pagan-Godfrey test for heteroskedasticity, the Pesaran-Baltagi test for cross-sectional independence, and the Variance Inflation Factor test for multicollinearity. Following the detection of apparent multicollinearity between the population and total healthcare cost, a decision was made to either adjust the model by using the aggregated ratio of healthcare cost per capita or to remove this variable. The rationale for the chosen modification is detailed prior to each model presentation. After resolving the multicollinearity issue, the results of all tests indicated that the fixed effects model was suitable for the data, with no significant issues of heteroskedasticity, autocorrelation, or multicollinearity remaining. Details of these tests and their outcomes are comprehensively documented in Appendix 7-12.

3.5.2 Difference-in-Difference model

In applying the Difference-in-Differences (DiD) model, the reliability of the analysis hinges on several critical assumptions. First, the parallel trends assumption is visually affirmed by data shown in Appendix 13, illustrating that prior to the economic shocks, the trajectories for both mental health visits and cancer treatment visits remained stable, suggesting that in the absence of shocks, these trends would have likely continued in a similar fashion. Secondly, the irreversibility of treatment is evident as economic shocks—stemming from significant financial or geopolitical events—fundamentally and permanently alter economic landscapes, impacting variables such as employment rates and consumer confidence.

Moreover, the treatment in this study, characterized by external economic shocks, is exogenous to the individual characteristics within the dataset. These shocks, derived from broad financial crises or global economic downturns, ensure that the timing of treatment is not influenced by the subjects' behaviours or characteristics. Additionally, the assumption of no anticipation holds since the unpredictability of economic shocks precludes significant

anticipatory actions by the subjects, a claim supported by observing stable pre-shock trends in both the treatment and control groups.

Finally, the Stable Unit Treatment Value Assumption (SUTVA) is reasonable in this context as the shocks are presumed to affect only the designated groups without spillover effects on others within the study. The consistency in these economic downturns across the treated units confirms that there are no variations in the form of treatment being administered.

These assumptions collectively validate the use of the DiD model, allowing for a rigorous examination of how economic downturns impact mental health services utilization compared to more stable areas such as cancer treatments. This methodological approach enhances the credibility of the findings by ensuring that observed differences are attributable to the economic shocks and not to other confounding factors.

4. Results

In this part of the paper, we present the results from our analysis with the purpose of shedding lights on our two hypotheses:

H0: There is an increase in Mental Health Issues and Service Utilization During Periods High Inflation in Sweden.

H1: There is a discrepancy in Budget Allocation to Mental Health Needs During High Inflation in Sweden.

As previously stated in the methodology part, the first step in our analysis was to evaluate the correlation magnitude which our four key variables have between each other. These findings provide a first step and insight into the further execution of the model and signal on whether the result may be supporting our hypothesis.

4.1 Correlation Between Dependent and Independent variables

4.1.1 Correlation Matrix between variables

Firstly, there is a moderate positive correlation of 0.356 between the inflation rate and total visits to mental health services. This suggests that as inflation increases, there is a moderate increase in the number of visits to mental health services. Additionally, the inflation rate has a stronger positive correlation of 0.671 with waiting lists for mental health issues, indicating that higher inflation could be associated with longer waiting lists.

Figure 1: Correlation Analysis of Economic Indicators and Mental Health Metrics

Key Variables	Inflation Rate	Total Visits MentalHealth	Interest Rate	Waitinglist For Mental Health Issues
Inflation Rate	1.0000000			
Total Visits MentalHealth	0.3560823	1.0000000		
Interest Rate	0.4905400	-0.2324922	1.0000000	
Waitinglist For Mental Health Issues	0.6717143	0.2288065	0.7207076	1.0000000

Note: The values shown in this matrix represent Pearson correlation coefficients, which measure the linear relationship between variables. A positive value indicates a direct relationship, where increases in one variable are associated with increases in another, while a negative value indicates an inverse relationship. Values closer to 1 or -1 represent stronger correlations, whereas values closer to 0 indicate weaker relationships.

The interest rate shows a moderate positive correlation of 0.491 with the inflation rate, implying that as inflation rises, government interest rates also tend to increase. However, there's a negative correlation of -0.232 between government interest rates and total visits for mental health, suggesting that higher interest rates may coincide with fewer visits to mental health services. Lastly, there is a strong positive correlation of 0.721 between government interest rates and waiting lists for mental health issues.

4.1.2 Testing for significant difference during periods of high inflation

The t-tests conducted investigate the difference in the mean number of total visits to mental health services and the size of waiting lists during periods of significantly high inflation, compared to the overall averages.

Figure 2: One-Sample t-Test on Total Visits to Mental Health Services During High Inflation Periods.

Data Source	High Inflation Periods at. Total Vists For Mental Health Issues
T-value	6.2535
Degrees of Freedom (df)	20
P-value	4.169e-06
Alternative Hypothesis	True mean is not equal to 57409.6
Confidence Interval (95%)	64291.23 - 71180.16
Sample Estimates	
Mean of x	67735.69
Note: The one-sample t-test is used to determine whether the mean of a single sample differs significantly from a known or hypothesized population mean. It evaluates the direction and strength of the difference between the sample mean and the population mean under the assumption of normal distribution.	

For the total visits to mental health services, the t-test results show a t-value of 6.2535 with 20 degrees of freedom and an extremely small p-value of approximately 4.169e-06. This indicates a statistically significant difference between the average number of visits during high inflation periods (67,735.69) compared to the overall average (57,409.6). The 95% confidence interval for the mean number of visits during high inflation periods ranges from 64,291.23 to 71,180.16, which does not include the overall average.

Figure 3: One-Sample t-Test on Waiting List Sizes During High Inflation Periods

Data Source	High Inflation Periods at. Number of People Waiting for Mental Health care.
T-value	4.6718
Degrees of Freedom (df)	20
P-value	1.467e-06
Alternative Hypothesis	True mean is not equal to 7807.404
Confidence Interval (95%)	7901.327 - 8052.862
Sample Estimates	
Mean of x	7977.094
Note: The one-sample t-test is used to determine whether the mean of a single sample differs significantly from a known or hypothesized population mean. It evaluates the direction and strength of the difference between the sample mean and the population mean under the assumption of normal distribution.	

For the waiting lists, the t-test results also show a significant difference with a t-value of 4.6718 and a p-value of 0.0001467. The mean waiting list size during high inflation periods is 7,977.094, compared to the overall average of 7,807.404. The 95% confidence interval for the waiting list size during high inflation periods is from 7,901.327 to 8,052.862. Again, this interval does not encompass the overall average, signifying that the waiting lists are significantly longer during periods of high inflation.

4.2 Results on the impact of inflation on mental health issues in Sweden

4.2.1 Model 1: Fixed-Effect Model

Starting with the coefficient of the Inflation_Rate, which is notably positive and highly statistically significant, the model estimates that a one percentage point increase in the inflation rate is associated with an increase of approximately 55 in total mental health visits. The variable No.Visits_AllPatients also shows a significant positive association, indicating that an overall increase in patient visits correlates with more visits for mental health issues specifically. Each additional visit among all patients is associated with a decrease of about -0.28 visits for mental health.

Figure 4: Fixed Effects Model of Mental Health Visits in Response to Economic and Demographic Factors

Variables	Fixed Effect Model
Inflation Rate	55.10293413*** (2.74115112)
No.Visits: All Patients	-0.28958693*** (0.04357474)
No.Visits: Cancer Treatment	-1.54179311*** (0.20826565)
No.Visits: All Patients	0.16838*** (0.00117602)
Unemployment Rate	53.46377503*** (7.45001515)
Population	-0.00330689*** (0.00030303)
Adj. R-Squared	0.46224
R-Squared	0.46472

Note: This table presents the results of a fixed effect model analyzing factors influencing total visits for mental health services. Fixed effect models are used to control for time-invariant variables within the data, effectively isolating the impact of variables that change over time. Each coefficient in the model represents the estimated change in the dependent variable (total visits for mental health) associated with a one-unit change in the predictor variable, holding all other predictors constant. Standard errors are provided in parentheses below each coefficient, which measure the average distance that the observed values fall from the regression line. A significant coefficient (indicated by asterisks) suggests a strong likelihood that the observed effect is not due to random chance. The model's goodness of fit is indicated by the R-squared values, with Adjusted R-squared adjusting for the number of predictors in the model. An increase of one unit in the inflation rate or unemployment rate is associated with an increase of 0.1% in total visits for mental health services. Additionally, the total visits in mental health are anchored around the mean average of 2822.8, representing the average monthly visits per region in Sweden.

The No.Patients_Cancer_Treatment variable is significantly negatively associated with mental health visits ($p < 0.001$). The Population variable, which also has a statistically significant negative coefficient ($p < 0.001$), suggests a small decrement in mental health visits as population increases. Furthermore, the Unemployment_Rate shows a significant positive coefficient ($p < 0.001$).

The R-squared value of 0.46472 indicates that about 46.47% of the variability in mental health visits is explained by the model.

4.2.2 Model 3 – Difference-in-Difference

Figure 5: Difference-in-Differences Analysis of Economic Shocks on Mental Health Visits Versus Cancer Treatment Visits.

Variables	Net Difference (Mental Health Issues - Cancer Treatment)
(Intercept)	-92.16244*** (16.95551)
No. Patients: Cancer Treatment	1.11295*** (0.00673)
Treatment_FirstShock	61.09248** (18.84611)
Post_FirstShock	28.11571 (17.37534)
Interaction_FirstShock	-123.38621*** (30.67920)
Treatment_SecondShock	85.50092*** (24.20866)
Post_SecondShock	45.33181*** (4.74550)
Interaction_SecondShock	-76.29388* (34.04765)
Treatment_ThirdShock	23.34098*** (6.95988)
Post_ThirdShock	31.03192*** (7.21726)
Interaction_ThirdShock	-191.52999*** (25.76957)
Multiple R-squared:	0.7815
Adjusted R-squared:	0.7813

Note: This analysis employs a Difference-in-Differences (DID) approach to estimate the net effects of specific treatments on mental health visits compared to cancer treatment visits (control group). The DID methodology is designed to capture the differential impact of interventions by comparing changes in outcomes over time between a treatment group and a control group. It effectively isolates the effect of the intervention by controlling for common trends that would affect both groups, thus providing a clearer estimate of the intervention's impact. The coefficients presented are the net differences, indicating how the factors such as economic shocks influence mental health visits relative to cancer treatment visits, while accounting for the general average of 2822.8 visits for mental health issues.

The results of the (DID) analysis indicate various significant effects of inflation shocks on mental health issues, as measured by the number of visits for mental health issues. The model accounts for three distinct inflation shocks and includes controls for the number of visits for cancer treatment.

The coefficient for "No.Visits_Cancer_Treatment" is highly significant and positive, indicating a strong and consistent positive relationship between the number of visits for cancer treatment and the number of visits for mental health issues.

For the "First Shock", the "Treatment_FirstShock" coefficient is positive and significant suggesting that the treatment group exposed to the first shock exhibits a significant increase in mental health visits compared to the control group. The "Post_FirstShock" coefficient is not significant, indicating no overall change in mental health visits after the first shock across

the groups. However, the interaction term "Interaction_FirstShock" is significantly negative, which implies a significant decrease in mental health visits in the treatment group after the first shock relative to the control group.

For the "Second Shock", the "Treatment_SecondShock" coefficient is positive and significant, and the "Post_SecondShock" coefficient is also positive and highly significant, indicating increases in mental health visits both in the treatment group and after the second shock. The interaction term "Interaction_SecondShock" shows a significant negative effect, again suggesting a relative decrease in mental health visits for the treatment group post-second shock compared to controls.

Regarding the "Third Shock", all coefficients are significant: "Treatment_ThirdShock", "Post_ThirdShock" and "Interaction_ThirdShock". The positive coefficients for the treatment and post-period suggest an increase in mental health visits, whereas the negative interaction term indicates a significant decrease in the treatment group's mental health visits post-shock relative to the control group.

The model shows a good fit with a high Multiple R-squared value of 0.7815, indicating that approximately 78.15% of the variability in mental health visits is explained by the variables included in the model. The F-statistic is highly significant, confirming the model's overall significance.

4.3 Results in Budget Allocation towards psychiatric Needs During High Inflation in Sweden.

4.3.1 Model 2 – Fixed Effect model

Figure 6: Fixed Effect Model Analysis of Factors Influencing Specialized Psychiatric Care Cost

Variables	Description of Variables
Inflation Rate	3.66088474* (1.47998955)
No. Visits: All Patients	-0.00512715*** (0.00029786)
No. Visits: Cancer Treatment	1.68418042*** (0.08271685)
No. Visits: Mental Health Issues	-0.01552802 (0.03161165)
Total Healthcare Cost	0.10304994*** (0.00044394)
Unemployment Rate	-9.02332678* (3.88579402)
Adj. R-Squared	0.93879
R-Squared	0.93919

Note: This table presents the results of a fixed effect model analyzing factors influencing costs of specialized psychiatric care. Fixed effect models are utilized to control for time-invariant variables within the data, effectively isolating the impact of variables that change over time. Each coefficient in the model represents the estimated change in the dependent variable (costs of specialized psychiatric care) associated with a one-unit change in the predictor variable, while holding all other predictors constant. Standard errors, provided in parentheses below each coefficient, measure the average distance that the observed values fall from the regression line. A significant coefficient (indicated by asterisks) suggests a strong likelihood that the observed effect is not due to random chance. The model's goodness of fit is indicated by the R-squared values, with the Adjusted R-squared adjusting for the number of predictors in the model. An increase of one unit in the inflation rate or unemployment rate is associated with an increase of 0.1% in specialized psychiatric care costs. Additionally, the total costs in specialized psychiatric care are anchored around the mean average of 1634 tkr, representing the average monthly costs per region in Sweden.

The model is statistically robust, as evidenced by the very high F-statistic (9818.09) and a corresponding p-value, indicating that the model is highly significant. This robustness is further underscored by the high R-squared value of 0.93919, suggesting that approximately 93.92% of the variability in specialized psychiatric care costs is explained by the predictors included in the model.

Starting with the coefficient of the Inflation Rate, which is positively valued at 3.6609 and statistically significant, the analysis indicates that an increase in the inflation rate is associated with a rise in specialized psychiatric care costs. The coefficient for Total Visits All Patients is negative and highly significant, indicating that as total visits increase, there is a slight decrease in the costs per visit for specialized psychiatric care. For the variable Number of Visits for Mental Health Issues, the coefficient is negative (-0.0155) but not statistically significant.

The Total Healthcare Cost variable shows a positive coefficient (0.1030) with high statistical significance, indicating a strong relationship where increases in total healthcare costs are

correlated with significant increases in specialized psychiatric care costs. The coefficient for the Number of Visits for Cancer Treatment is positive (1.6842) and very significant. Lastly, the Unemployment Rate presents a negative coefficient (-9.0233) with a significant p-value.

5. Discussion

5.1 Aim of the Study

The primary aim of this thesis was to investigate whether economic downturns, characterized by periods of high inflation, impact the mental health of Swedish citizens. This analysis was conducted using a foundational correlation matrix that linked key variables: visits for mental health issues, waiting lists for mental health services, the inflation rate, and the interest rate set by the central bank. The significance of these correlations was validated using Welch's T-test, followed by analyses using a fixed-effect model and a difference-in-differences model. The results from our study indicate substantial support for the hypothesis that economic downturns negatively affect mental health in Sweden. The internal validity and the sources of these findings will be discussed in the following section.

The second objective of this thesis was to evaluate whether regional allocations of monetary resources during high inflation periods are sufficient to meet the increased need for mental health services, and whether the inflation rate can be used as a predictive tool for future resource requirements. The findings suggest that although more resources are allocated during economic downturns, the waiting lists for mental health care services remain significantly longer, indicating that the current increases in funding may not adequately address the surge in demand. This issue, along with the implications of using inflation as a forecasting tool for health service resource allocation, will be further explored in the subsequent analysis.

5.2 Discussion around findings

5.2.1 Relationship between economic downturn and mental health issues

The results from our fixed-effects and difference-in-differences models corroborate the findings from Basu et al. (2013) and Modrek et al. (2013), which highlighted the adverse effects of economic disruptions on public mental health and the importance of robust

healthcare infrastructures in mitigating these effects. Similarly, our findings emphasize the increased demand for mental health services and elongated waiting lists during periods of high inflation, underscoring the strain on mental health services when economic policies fail to buffer against such economic shocks.

Our analysis also supports observations made by the World Health Organization (2011) and Marmot et al. (2012), which linked economic downturns to heightened mental health issues due to increased stress from financial insecurity. This relationship is particularly evident in our results, where high inflation rates significantly correlated with increased visits to mental health services. These findings suggest that economic stability plays a critical role in maintaining public mental health, highlighting the need for policies that prioritize mental health funding during economic crises.

The case of the financial crisis in Greece, as studied by Kentikelenis et al. (2011), presents a parallel scenario to our findings. Just as severe cuts in healthcare funding during the Greek crisis led to public health emergencies, our results indicate that despite increased budget allocations for mental health during high inflation periods in Sweden, the resources remain insufficient to meet the growing demand, evidenced by the lengthening waiting lists.

Our findings from the fixed-effects and difference-in-differences models significantly corroborate the research conducted by Basu et al. (2013) and Modrek et al. (2013), which documented the adverse effects of economic disruptions on public mental health and the crucial role of robust healthcare infrastructures in mitigating these effects. Similarly, our analysis underscores the increased demand for mental health services and the elongation of waiting lists during periods of high inflation, highlighting the strain on mental health services when economic policies fail to buffer against such economic shocks.

Moreover, our results resonate with observations made by the World Health Organization (2011) and Marmot et al. (2012), linking economic downturns to heightened mental health issues due to increased stress from financial insecurity. This relationship is particularly evident in our findings, where high inflation rates significantly correlated with increased visits to mental health services, as indicated by the correlation matrix results (Section 4.1.1) and the t-test outcomes (Section 4.1.2). These results suggest that economic stability is integral to maintaining public mental health, emphasizing the need for policies that prioritize mental health funding during economic crises.

The theoretical framework of our study, largely drawing from the methodologies of Forbes and Krueger (2019), allowed for a detailed examination of the impact of inflation on mental health service utilization. The inclusion of variables such as interest rates and waiting lists for mental health services, not commonly incorporated in previous studies, provided a broader perspective on how economic factors influence mental health beyond direct healthcare funding. Particularly, the fixed-effect model elucidated how variables such as the unemployment rate (Section 4.2.1) significantly impact mental health visits, with a notable positive coefficient indicating that as unemployment rises, so does the demand for mental health services. This finding aligns with the broader literature that links economic distress with worsening mental health conditions, as noted by Patel and Kleinman (2003).

Furthermore, the fixed-effect model analysis revealed several expected and unexpected relationships among the variables. Notably, the positive significant effect of the inflation rate on mental health visits strongly supports the hypothesis that economic instability leads to increased demand for mental health services. Conversely, the negative association between the population variable and mental health visits suggests that denser populations might experience diluted individual effects or better dispersion of mental health service demand, a finding that requires further exploration to understand regional disparities. The variable 'No.Visits_Cancer_Treatment,' used as a control, showed a significant negative association with mental health visits, indicating that areas with higher cancer treatment visits do not necessarily correlate with increased mental health service utilization. This result underscores the importance of contextualizing health service demands based on specific medical fields.

5.2.2 Budget allocation from Swedish regions towards mental health issues

In specific case studies and theoretical frameworks, the financial crisis in Greece, as studied by Kentikelenis et al. (2011), offers a parallel scenario to our findings. Just as severe cuts in healthcare funding during the Greek crisis led to public health emergencies, our results indicate that despite increased budget allocations for mental health during high inflation periods in Sweden, the resources remain insufficient to meet the growing demand, as evidenced by the lengthening waiting lists. This scenario is mirrored in the fixed-effect model results (Section 4.2.1).

5.2.3 Model Overview and Statistical Significance

Our fixed-effect model analysis, illustrated in Figure 6, evaluates the impact of economic and healthcare-related variables on the cost of specialized psychiatric care. The model shows robust statistical significance, indicating that the variables selected are strongly predictive of psychiatric care costs.

5.2.4 Inflation and Healthcare Cost Dynamics

Significantly, the model reveals a positive association between the inflation rate and specialized psychiatric care costs, with an inflation rate coefficient of 3.6609 ($p = 0.01342$). This finding supports the hypothesis that high inflation contributes directly to increased psychiatric care costs, aligning with previous studies that have noted the stress inflation places on healthcare budgets.

5.2.5 Variable Interactions and Implications

Other notable results from the model include a significant negative coefficient for total visits (-0.0051 , $p < 2e-16$), suggesting that an increase in total healthcare visits paradoxically reduces the cost per visit for specialized psychiatric care, possibly due to economies of scale or efficient resource allocation during high-demand periods, or the signal of omitted variables in the model. Furthermore, a significant positive coefficient for total healthcare costs (0.1030 , $p < 2e-16$) indicates that overall healthcare spending is a strong predictor of increased psychiatric care costs. Lastly, the variable for unemployment rate showed a negative impact on psychiatric care costs (-9.0233 , $p = 0.02028$), which could reflect reduced healthcare spending or access during high unemployment periods. This finding is consistent with the research by Drydakis (2014), which demonstrated that in Greece, periods of high unemployment during the financial crisis were associated with a significant increase in mental health issues, possibly leading to increased demand but reduced individual financial capacity to afford psychiatric care. Similarly, Kondo et al. (2008) found that economic recessions, marked by rising unemployment, exacerbated health inequalities in Japan, suggesting that unemployment could diminish public and personal healthcare spending. These studies underscore the complex relationship between unemployment and healthcare utilization, indicating that while the demand for mental health services may increase with

unemployment, the economic constraints it imposes could result in decreased spending on such services, aligning with the negative coefficient observed in our model. This aligns with broader literature, emphasizing the need for policies that safeguard mental health services accessibility during economic downturns, ensuring that budget allocations are responsive to increased mental health needs amidst rising unemployment rates.

These findings underscore the complex interplay between economic factors and healthcare spending, particularly in specialized sectors like psychiatric care.

5.2.6 Comparative Analysis with Prior Studies

Our findings echo the concerns raised by Karanikolos et al. (2013) regarding the adverse effects of austerity measures on healthcare outcomes during financial crises. Similar to the European context they studied, our results indicate that inflation significantly impacts healthcare budgets, which in turn affects the availability and cost of psychiatric services.

6. Limitations, Suggestions for Future Research, and Conclusion

6.1 Limitations

Our study faced significant methodological challenges, primarily due to the limited availability of demographic data such as gender, income level, education, age, and household characteristics. The lack of these variables restricted our ability to understand the nuanced effects of economic conditions on various demographic groups comprehensively.

Additionally, the process of obtaining data from government officials was cumbersome and time-consuming, taking weeks to months despite the data supposedly being publicly accessible. This delay in data acquisition could potentially affect the timeliness and relevance of our research findings, which is crucial given the rapid changes in mental health dynamics that can occur during economic fluctuations.

The use of simplified models, particularly the Fixed Effects (FE) model, provided robust control for unobserved heterogeneity by considering only within-unit variations over time. However, this approach also introduced notable limitations, especially related to omitted variable bias. The FE model inherently assumes that any unobserved factors are constant over time, an assumption that might not hold true in dynamic economic contexts. This limitation

could lead to biased estimates if important variables that fluctuate over time, such as policy changes or sudden economic events, are omitted from the model.

Furthermore, our methodology primarily focused on quantitative models, which might overlook qualitative aspects such as patient satisfaction, psychological resilience factors, or community support systems that play crucial roles during economic downturns. The use of aggregated data also limits the granularity of the insights, potentially masking localized trends or anomalies that are critical for informed policy formulation.

6.2 Future Research

Future research could significantly benefit from incorporating detailed demographic data to dissect the differential impacts of economic conditions on various population segments. This approach would allow a more comprehensive analysis of vulnerability and resilience factors across demographics. Integrating qualitative assessments with quantitative models could provide a more holistic view of the mental health landscape during economic shocks. Qualitative data could include patient narratives, healthcare provider insights, and community mental health evaluations.

Advancements in data collection methodologies, such as real-time data tracking and analysis, could significantly enhance the responsiveness and relevance of research findings. This would be particularly beneficial in rapidly evolving economic situations. Long-term studies that track mental health responses over multiple economic cycles could provide invaluable insights into long-term trends and triggers. Including detailed economic indicators like consumer confidence, debt levels, and detailed employment data could help in understanding the intricate relationships between economic indicators and mental health.

Experimental or quasi-experimental designs, such as natural experiments provided by policy changes, could be utilized to establish causal relationships more firmly. These methods could provide clearer insights into how economic policies directly impact mental health outcomes and service utilization.

6.3 Conclusion

The findings from our study underscore the complex interplay between economic conditions, such as inflation and economic downturns, and mental health. These economic factors are not just background conditions but potent forecasters that can significantly influence budget allocations within mental health care. Understanding these dynamics is crucial for developing proactive mental health policies that can withstand economic adversities.

Our research highlights the need for comprehensive data access and methodological diversity in exploring how economic stressors impact mental health. As we delve deeper into the layers of economic impacts on mental health, it becomes increasingly clear that integrating more detailed demographic data, qualitative insights, and advanced analytical techniques will be essential. Such integrations will not only enhance the robustness of our findings but also equip policymakers with the knowledge to craft effective interventions that are both responsive and pre-emptive. This comprehensive approach will be vital in shaping mental health policies that are not only reactive but also anticipatory, preparing healthcare systems to manage and mitigate the mental health repercussions of future economic downturns effectively.

7. References

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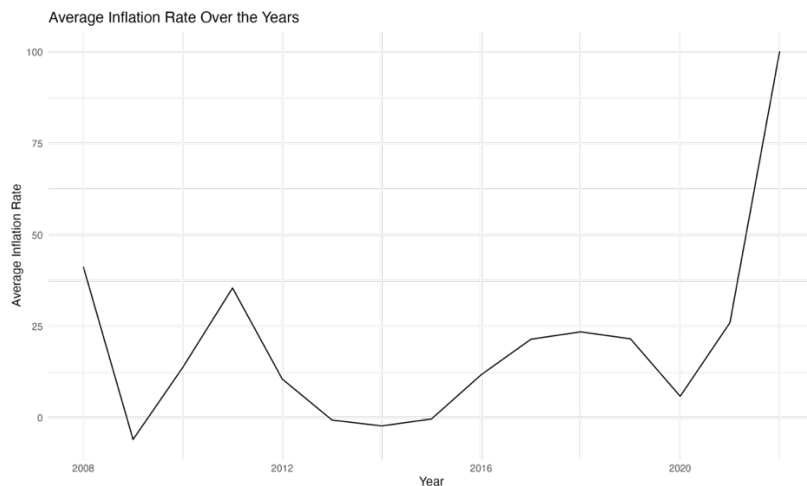
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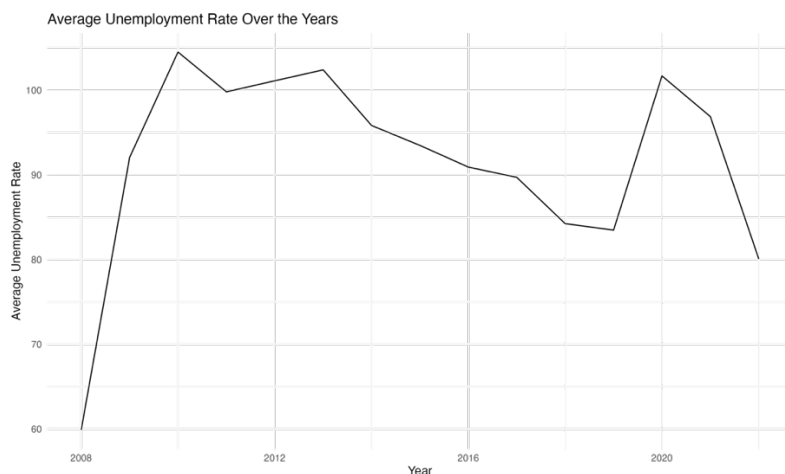
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Appendices

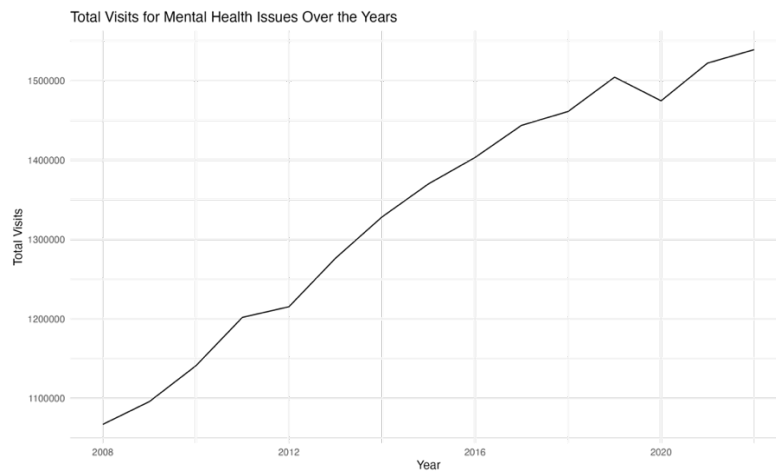
Appendix 1: Average inflation rate between 2008-2023. Source: <https://www.riksbank.se>



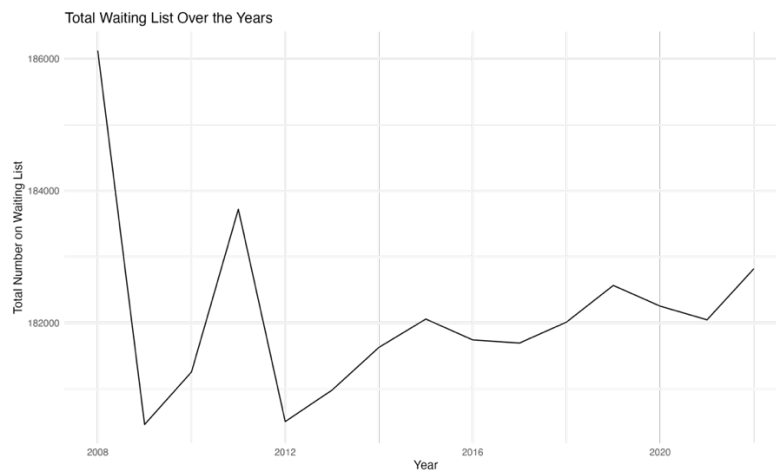
Appendix 2: Average unemployment rate between 2008-2023. Source: <https://arbetsformedlingen.se>



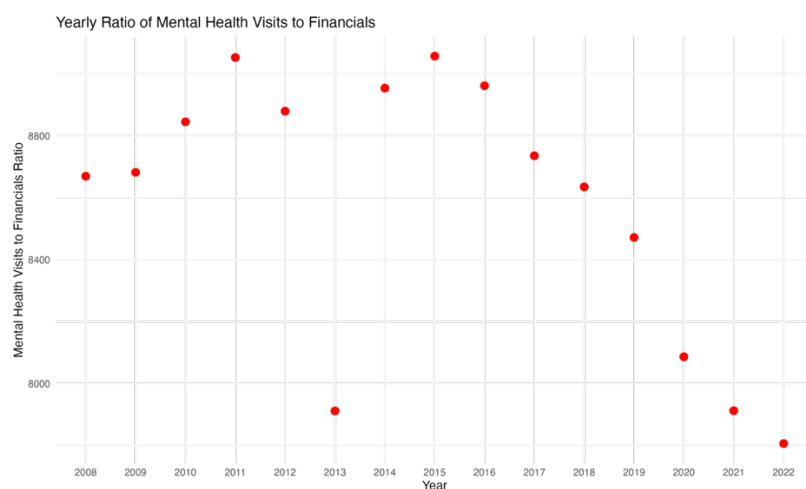
Appendix 3: Total visits for mental health issues, Sweden between 2008-2022. Source: Socialstyrelsen



Appendix 4: Total waiting list for mental health issues, Sweden, 2008-2022. Source: Sveriges Kommuner och Regioner (SKR).



Appendix 5: Ratio of mental health visits / divided of total cost for mental health in Sweden between 2008-2022. Source: Socialstyrelsen & Sveriges Kommuner och Regioner (SKR).



Appendix 6: Variables collected and clarified.

Variables	Description of Variables
No.Visits Total Visits	Total number of visits to all healthcare services recorded.
No.Visits Illness Treatment	Number of healthcare visits specifically for treating general illnesses.
No.Visits Cancer Treatment	Number of healthcare visits specifically for cancer treatment.
No.Visits Mental Health Issues	Number of visits to healthcare services for mental health issues.
Population	The total population count within the studied region or period.
Inflation Rate	The percentage rate at which the general level of prices for goods and services is rising, indicating the purchasing power of currency.
Total Healthcare Cost	The total expenditure on healthcare within the studied area over a specified period.
Interest Rate	The proportion of a loan charged as interest to the borrower, expressed as an annual percentage of the loan outstanding.
Waiting List	The number of people waiting for mental healthcare at a given time, indicative of demand and service accessibility.
Unemployment Rate	The percentage of the labor force that is jobless and actively looking for employment.
Specialized Psychiatric Care Costs	The costs associated specifically with psychiatric care services, reflecting expenditures on mental health treatments.

Appendix 7-8: Hausman test.

The Hausman Test

Data Source	Model 1
Chi-square (chisq) statistic:	16346
Degrees of freedom (df)	5
P-value	< 2.2e-16

Note: The Hausman test is utilized to decide between Fixed Effects (FE) and Random Effects (RE) models in panel data analysis. This test checks if the unique errors (ui) are correlated with the regressors in the model. A significant test result (p-value < 0.05) supports the use of the Fixed Effects model, indicating that the differences in errors are systemically related to the predictors and ignoring them could lead to biased results. Conversely, a non-significant result (p-value > 0.05) suggests that the Random Effects model is adequate, assuming no correlation between the individual effects and the independent variables, which leads to more efficient estimates than FE model if true.

$$\begin{aligned}
 \text{TotalVisits_MentalHealth}_{it} &= \beta_0 + \beta_1 \text{Inflation_Rate}_{it} + \beta_2 \text{No.Patients_Illness_Treatment}_{it} \\
 &+ \beta_3 \text{TotalVisits_AllPatients}_{it} + \beta_4 \text{No.Patients_Cancer_Treatment}_{it} \\
 &+ \beta_5 \text{Population}_{it} + \beta_6 \text{Unemployment_Rate}_{it} + \mu_i + \epsilon_{it}
 \end{aligned}$$

The Hausman Test

Data Source	Model 2
Chi-square (chisq) statistic:	14784
Degrees of freedom (df)	5
P-value	< 2.2e-16

Note: The Hausman test is utilized to decide between Fixed Effects (FE) and Random Effects (RE) models in panel data analysis. This test checks if the unique errors (ui) are correlated with the regressors in the model. A significant test result (p-value < 0.05) supports the use of the Fixed Effects model, indicating that the differences in errors are systemically related to the predictors and ignoring them could lead to biased results. Conversely, a non-significant result (p-value > 0.05) suggests that the Random Effects model is adequate, assuming no correlation between the individual effects and the independent variables, which leads to more efficient estimates than FE model if true.

$$\begin{aligned}
 \text{SpecializedPsychiatricCare_Costs}_{it} &= \beta_0 + \beta_1 \text{Inflation_Rate}_{it} + \beta_2 \text{TotalVisits_AllPatients}_{it} \\
 &+ \beta_3 \text{No.Visits_Mental_Health_Issues}_{it} \\
 &+ \beta_4 \text{Total_Healthcare_Cost_per_capita}_{it} + \beta_5 \text{No.Visits_Cancer_Treatment}_{it} \\
 &+ \beta_6 \text{Unemployment_Rate}_{it} + \mu_i + \epsilon_{it}
 \end{aligned}$$

Appendix 9-11: The Breusch–Godfrey test for autocorrelation in the errors of the models.

Breusch-Godfrey/Wooldridge Test for Serial Correlation

Data Source	Model 1
Chi-square (chisq) statistic:	3078
Degrees of freedom (df)	192
P-value	0.16

The Breusch-Godfrey/Wooldridge test is employed to check for the presence of serial correlation in the idiosyncratic errors within panel data models. Serial correlation occurs when error terms in a time series or panel data model are correlated across time, which can lead to inefficient estimates and bias inferences about the model parameters. This test produces a Chi-squared statistic, where a significant p-value (typically less than 0.05) indicates the presence of serial correlation, suggesting that adjustments may be needed for reliable model estimation.

$$\begin{aligned}
 \text{TotalVisits_MentalHealth}_{it} &= \beta_0 + \beta_1 \text{Inflation_Rate}_{it} + \beta_2 \text{No.Patients_Illness_Treatment}_{it} \\
 &+ \beta_3 \text{TotalVisits_AllPatients}_{it} + \beta_4 \text{No.Patients_Cancer_Treatment}_{it} \\
 &+ \beta_5 \text{Population}_{it} + \beta_6 \text{Unemployment_Rate}_{it} + \mu_i + \epsilon_{it}
 \end{aligned}$$

Breusch-Godfrey/Wooldridge Test for Serial Correlation

Data Source	Model 2
Chi-square (chisq) statistic:	3143.9
Degrees of freedom (df)	192
P-value	1.4

The Breusch-Godfrey/Wooldridge test is employed to check for the presence of serial correlation in the idiosyncratic errors within panel data models. Serial correlation occurs when error terms in a time series or panel data model are correlated across time, which can lead to inefficient estimates and bias inferences about the model parameters. This test produces a Chi-squared statistic, where a significant p-value (typically less than 0.05) indicates the presence of serial correlation, suggesting that adjustments may be needed for reliable model estimation.

$$\begin{aligned}
 \text{SpecializedPsychiatricCare_Costs}_{it} &= \beta_0 + \beta_1 \text{Inflation_Rate}_{it} + \beta_2 \text{TotalVisits_AllPatients}_{it} \\
 &+ \beta_3 \text{No.Visits_Mental_Health_Issues}_{it} \\
 &+ \beta_4 \text{Total_Healthcare_Cost_per_capita}_{it} + \beta_5 \text{No.Visits_Cancer_Treatment}_{it} \\
 &+ \beta_6 \text{Unemployment_Rate}_{it} + \mu_i + \epsilon_{it}
 \end{aligned}$$

Breusch-Godfrey/Wooldridge Test for Serial Correlation

Data Source	Model 3
Chi-square (chisq) statistic:	6705.2
Degrees of freedom (df)	384
P-value	0.8

The Breusch-Godfrey/Wooldridge test is employed to check for the presence of serial correlation in the idiosyncratic errors within panel data models. Serial correlation occurs when error terms in a time series or panel data model are correlated across time, which can lead to inefficient estimates and bias inferences about the model parameters. This test produces a Chi-squared statistic, where a significant p-value (typically less than 0.05) indicates the presence of serial correlation, suggesting that adjustments may be needed for reliable model estimation.

No.Visits_Mental_Health_Issues_{it}

$$\begin{aligned} &= \beta_0 + \beta_1 \text{No.Visits_Cancer_Treatment}_{it} + \beta_2 \text{Treatment_FirstShock}_{it} \\ &+ \beta_3 \text{Post_FirstShock}_{it} + \beta_4 \text{Interaction_FirstShock}_{it} \\ &+ \beta_5 \text{Treatment_SecondShock}_{it} + \beta_6 \text{Post_SecondShock}_{it} \\ &+ \beta_7 \text{Interaction_SecondShock}_{it} + \beta_8 \text{Treatment_ThirdShock}_{it} \\ &+ \beta_9 \text{Post_ThirdShock}_{it} + \beta_{10} \text{Interaction_ThirdShock}_{it} + \epsilon_{it} \end{aligned}$$

Appendix 12: VIF-test

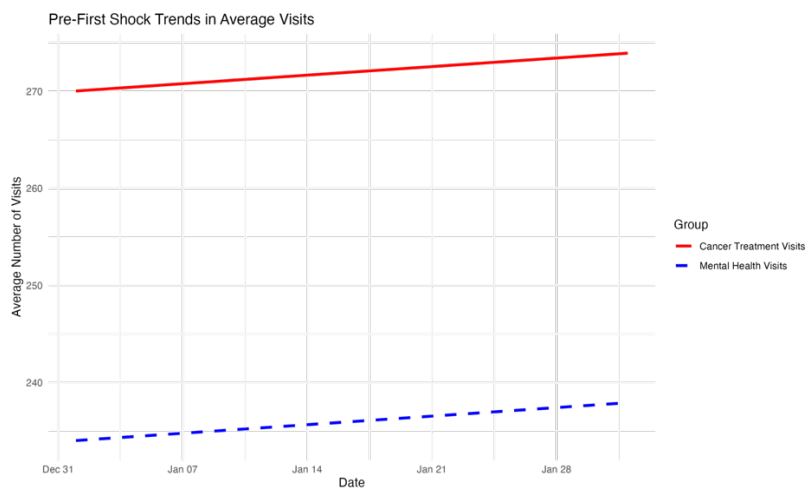
Variance Inflation Factor (VIF)

Test Explanation:

Variabel	Result
Inflation Rate	1.001586
Population	20.640943
Total Healthcare cost	20.635932

Note: The Variance Inflation Factor (VIF) test is used to identify multicollinearity among predictors in a regression model, where a VIF value of 1 indicates no correlation, values between 1 and 5 suggest minimal correlation, values between 5 and 10 indicate moderate correlation, and values over 10 signify high multicollinearity which may distort regression outcomes and necessitate model adjustments. This test helps ensure the reliability of regression analysis by pinpointing variables that excessively influence each other's presence in the model.

Appendix 13: Trends of Cancer treatment vs Mental health visits before first economic downturn.



Utilization of Generative AI in Research Methodology

In the execution of this thesis, advanced generative AI technologies were employed to enhance the research process and increase efficiency in data analysis and problem-solving. Specifically, the generative AI service ChatGPT-4 from OpenAI was utilized to assist with coding in R Studio, a critical component of our data analysis framework. This AI tool significantly contributed to refining our coding techniques, troubleshooting errors, and managing data-related challenges. Its integration into our workflow facilitated a more streamlined and effective analysis, allowing for the intricate handling of complex datasets and the execution of sophisticated econometric models. The use of ChatGPT-4 ensured that computational tasks were performed with high accuracy, and it provided instant solutions to technical problems, thereby reducing the time required for manual corrections and adjustments. This application of generative AI underscores our commitment to employing cutting-edge technology to enhance research accuracy and efficiency.