

**ACCOUNTING AND FINANCE DIVISION**

**Project Title: Evaluating the Effectiveness of Fiscal Stimulus Packages During Economic Crises: Evidence from the United States**

**3362213**

**LAU YUE HIM**

**SUBMITTED IN PART  
FULFILMENT OF THE DEGREE OF  
MSc FINANCE AND DATA ANALYTICS  
THE UNIVERSITY OF STIRLING**

**WORD COUNT : 8932**

**Dissertation Declaration**

Name: LAU YUE HIM

Registration Number: 3362213

**Submission**

**I confirm** that I have today submitted 1 electronic version in PDF format to the submissions link on canvas

**Dissertation format**

**I confirm** that the dissertation is in the format outlined in the Dissertation Notes for students. In particular, it:

√ is 1.5 or double-spaced on both sides of A4 paper

√ has margins of at least 3cm (left) and 2cm (right)

√ has pages numbered consecutively

√ **with each chapter starting on a new page**

√ **is properly referenced in Harvard notation**

includes:

√ title page

√ an abstract

√ Table of contents

√ a fully detailed bibliography **in alphabetical order by surname**

The total word count excluding bibliography is 8932

**Please tick  each item to confirm**

**I understand** that my dissertation may be placed on the University Library catalogue on line and accessed by staff and students after I have finished the programme.

**Plagiarism**

**I am aware** of the university’s policy on plagiarism, and **I certify** that this dissertation is my own work.

**I hereby authorise** the department to undertake any steps to check the veracity of this statement, including the use of any plagiarism detection software or services.

**I hereby consent** to the processing of my personal data (including my name, registration number and other necessary information) for these purposes.

Signed: LYH

Date: 15th September 2025

# ABSTRACT

This dissertation evaluates the effectiveness of fiscal stimulus packages implemented by the United States government during two pivotal 21st-century economic crises: 1) the 2008 Global Financial Crisis (GFC) and 2) the COVID-19 pandemic. Fiscal stimulus is rooted in Keynesian economic theory developed in the 1930s, which advocates for counter-cyclical government intervention to fortify against aggregate demand during downturns. The study addresses the ongoing scholarly and policy debates regarding the utility, equity, and adaptability of such measures. By comparing the design, scale, timing, and socio-economic impacts of these interventions, the research aims to assess their role in stabilizing key macroeconomic indicators—such as GDP growth, unemployment rates, and household consumption—while examining distributional outcomes across sectors and demographic groups. The analysis draws on the body of literature highlighting the interdependencies of global financial systems and the historical precedents of fiscal responses, from the history of the Great Depression to contemporary shocks, underscoring the need for empirical scrutiny of the financial collapse in 2008 versus a public health emergency in 2020.

Methodologically, the study employs a mixed methods framework to ensure robustness and comprehensiveness. Quantitative analysis integrates Vector Autoregression (VAR) models to capture dynamic interrelationships and impulse responses following fiscal shocks, Markov-Switching VAR (MS-VAR) to account for regime-dependent effects across expansionary and recessionary states, and Difference-in-Differences (DiD) isolates impacts using state-level variation in stimulus intensity. Data span quarterly U.S. macroeconomic indicators from 2000Q1 to 2022Q4, sourced from the Federal Reserve Economic Data (FRED) and supplemented by state-level metrics from the Bureau of Labor Statistics and Census Bureau. Qualitative components include a comparative review of landmark legislation, such as the American Recovery and Reinvestment Act (ARRA) of 2009, the Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020, and the American Rescue Plan Act (ARPA) of 2021, providing contextual insights into the policy’s true effectiveness in reversing the downturns in the economy.

Key findings reveal dependency on fiscal stimulus. During the GFC, infrastructure-focused ARRA ($831 billion) yielded delayed but sustained effects, with peak GDP contractions of -0.76% over four quarters and unemployment reductions lagging by six quarters, reflecting slower implementation amid financial sector turmoil. In contrast, the COVID-19 response totalling over $4 trillion through direct transfers and unemployment benefits produced swifter, more pronounced rebounds, with GDP growth peaking at 1.67% in two quarters and unemployment declining by 0.64% in three, attributable to rapid deployment and demand-side targeting. VAR and MS-VAR results indicate short-lived fiscal multipliers (dissipating within 8–10 quarters), amplified in high-volatility recessionary regimes where negative GDP growth predominates. DiD estimates confirm positive causal effects on post-crisis recovery, though short-term spending increases occasionally correlate with temporary private-sector crowding-out. Distributionally, stimulus mitigated inequality more effectively during COVID-19 via targeted aid, yet regional disparities persisted, with high-intensity states exhibiting stronger labour market gains.

In conclusion, the research affirms fiscal stimulus as a vital tool for crisis mitigation, particularly when counter cyclical phrases happen, but highlights challenges in long-term sustainability and equity. Limitations include data constraints and assumptions on linearity in modelling, suggesting avenues for future inquiry’s: incorporating high-frequency micro-data, non-linear machine learning techniques, and cross-national comparisons to enhance generalizability. These insights offer evidence-based guidance for policymakers, emphasizing adaptive strategies to foster a resilient economy and inclusive recoveries in an interconnected global economy.

# TABLE OF CONTENTS

Contents

[ABSTRACT 3](#_Toc208466918)

[TABLE OF CONTENTS 5](#_Toc208466919)

[1. 0 INTRODUCTION 7](#_Toc208466920)

[1.1 Introduction 7](#_Toc208466921)

[1.2 Research Aim and Objectives 8](#_Toc208466922)

[1.3 Justification and Relevance of the Study 8](#_Toc208466923)

[1.4 Structure of the Dissertation 9](#_Toc208466924)

[LITERATURE REVIEW / SURVEY OF PRIOR RESEARCH 10](#_Toc208466925)

[2.1 Overview of Economic Crises 10](#_Toc208466926)

[2.2 Background and Context 10](#_Toc208466927)

[2.3 Theoretical Foundations: Keynesian Economics and Fiscal Stimulus 12](#_Toc208466928)

[2.4 Gaps, Challenges, and Purpose of the Study 15](#_Toc208466929)

[2.5 Empirical Evidence and Modelling Approaches 16](#_Toc208466930)

[2.6 Summary and Research Implications 18](#_Toc208466931)

[RESEARCH DESIGN 20](#_Toc208466932)

[3.1 Methodology Overview 20](#_Toc208466933)

[3.2 Quantitative Analysis 21](#_Toc208466934)

[3.2.1 Data, Variables, and Sample Selection 21](#_Toc208466935)

[Vector Autoregression (VAR) Method 22](#_Toc208466936)

[3.2.3 Markov-Switching VAR (MS-VAR) 26](#_Toc208466937)

[3.2.4 Difference-in-Differences (DiD) 27](#_Toc208466938)

[3.3. Qualitative Policy Context 29](#_Toc208466939)

[3.4. Conclusion 29](#_Toc208466940)

[Chapter 4 – Results of Research Findings and Contextual Results 30](#_Toc208466941)

[4.1 Introduction to the Results 30](#_Toc208466942)

[4.2 Quantitative Findings 31](#_Toc208466943)

[4.2.1 Crisis Characteristics: Descriptive Analysis 31](#_Toc208466944)

[4.2.2 VAR Results 32](#_Toc208466945)

[4.2.3 Difference-in-Differences Results 38](#_Toc208466946)

[4.2.4 Markov-Switching VAR model 40](#_Toc208466947)

[4.2.5 Robustness Checks 44](#_Toc208466948)

[4.3 Conclusion of findings 47](#_Toc208466949)

[Chapter 5 – Summary and Conclusions 49](#_Toc208466950)

[5.1 Summary of Key Findings 49](#_Toc208466951)

[5.2 Limitations 50](#_Toc208466952)

[5.3 Recommendations for Future Research 50](#_Toc208466953)

[Reference 52](#_Toc208466954)

# 1. 0 INTRODUCTION

## 1.1 Introduction

Economic crises have consistently reshaped the global economic order, unleashing profound disruptions across multiple labour markets, economic networks, and financial systems. These systemic shocks often result in acute contractions in output, surging unemployment, and heightened socioeconomic disparities ([Reinhart and Rogoff, 2009](https://ebookcentral.proquest.com/lib/stir/reader.action?docID=766197&c=RVBVQg&ppg=1); [Blanchard and Leigh, 2013](https://www-aeaweb-org.ezproxy-s2.stir.ac.uk/articles?id=10.1257%2Faer.103.3.117)). In response, governments frequently deploy fiscal stimulus (FS), a suite of discretionary policy interventions aimed at reviving aggregate demand through increased public expenditure, tax relief, or direct transfers [(Auerbach and Gorodnichenko, 2012](https://doi.org/10.1257/pol.4.2.1.); [IMF, 2020](https://www.imf.org/en/publications/fm?page=1)).

This dissertation critically examines the effectiveness of fiscal stimulus policies in the United States during two of the most consequential global economic downturns of the 21st century: the 2008 Global Financial Crisis and the COVID-19 pandemic. Although they differ fundamentally in their origins—the 2008 crisis was a financial collapse, while the COVID-19 crisis was a public health crisis —both led to major economic disruption, prompting the U.S. government to introduce large and urgent fiscal measures ([López-Santana and Rocco, 2021](https://doi.org/10.1093/publius/pjab015)).

This study adopts a qualitative regression approach in examining the design, scale, timing, and socio-economic impacts of U.S. fiscal stimulus policies enacted during the 2008 Global Financial Crisis and the COVID-19 pandemic. Emphasis is placed on evaluating the perceived effectiveness of these interventions in stabilizing key macroeconomic indicators, addressing inequality, and enabling long-term recovery. Drawing on policy documents, academic literature, and empirical case analyses, the research contributes to ongoing debates concerning the efficacy, equity, and adaptability of countercyclical fiscal responses in the face of increasingly complex and globally interconnected economic shocks.

Fiscal stimulus (FS) refers to a strategy employed by governments to mitigate adverse effects. Although there is no universally accepted definition of FS, this essay will define it as intentional governmental actions aimed at boosting expenditure, reducing taxes, or a combination of both, thereby enhancing the demand from households and businesses for goods and services during an economic downturn, thus injecting capital into the economy [(CBPP 2020)](https://www.cbpp.org/research/fiscal-stimulus). FS serves as a lasting testament to the remarkable resilience of human creativity in the face of challenges.

Therefore, it is essential for policymakers, economists, and stakeholders to thoroughly understand the dynamics and effectiveness of fiscal stimulus in mitigating the adverse impacts of economic crises. A comprehensive evaluation of fiscal interventions enables governments to craft responsive and adaptive strategies that not only address immediate economic disruptions but also lay the groundwork for long-term recovery and sustainable growth. By learning from past crises such as the 2007–2008 financial meltdown and the COVID-19 pandemic, nations can better prepare for future economic shocks, ensuring more equitable outcomes and reinforcing economic stability in an increasingly interconnected world.

The United States serves as an ideal research subject owing to its detailed fiscal and economic records, widespread academic and policy attention, and its status as the world’s largest economy by nominal GDP. These factors enable a robust examination of fiscal stimulus policies and their broader implications for both domestic and global economic stability.

## 1.2 Research Aim and Objectives

Research Aim:

To evaluate the effectiveness of fiscal stimulus policies in stabilizing the U.S. economy during the 2008 Global Financial Crisis and the COVID-19 pandemic, with a focus on their economic impact, policy design, and distributional outcomes.

Research Objectives:

1. To compare the design, magnitude, and implementation of stimulus policies during the two crises.
2. To assess the impact of fiscal stimulus on key economic indicators such as GDP, employment, and business industry performance.
3. To evaluate the distributional effects across sectors and social groups.
4. To identify policy lessons that can inform future crisis responses.

## 1.3 Justification and Relevance of the Study

This research is both academically and practically relevant. **Academically**, it contributes to ongoing debates in macroeconomics and public policy regarding the utility and efficiency of fiscal stimulus during economic crises. **Practically**, it informs policymakers by evaluating the real-world outcomes of past stimulus efforts in the U.S., offering evidence-based insights into whether fiscal stimulus is an effective tool not only for short-term economic relief but also for fostering long-term recovery and resilience during future economic downturns.

This research contributes to prior academic literature by offering a nuanced, long-term analysis of fiscal stimulus effectiveness across multiple crises, while providing empirically grounded insights that can guide more equitable and resilient economic policymaking, ultimately benefiting society through useful policy making and inclusive recovery strategies. This paper delves into the qualitative approach of the 2007–2008 financial crisis and the COVID-19 pandemic, presenting an examination of U.S. FS responses and their outcomes within differing global economic environments.

## 1.4 Structure of the Dissertation

The following sections provide background and context for the proposed research (1.0) Introduction , (2.0) Literature Review , (3.0) Research Design , (4.0) Results of Research , (5.0) Summary and Conclusions .

# LITERATURE REVIEW / SURVEY OF PRIOR RESEARCH

## 2.1 Overview of Economic Crises

According to [Raddant and Kenett (2016),](https://doi.org/10.2139/ssrn.2848348) the global financial system constitutes a complex network characterized by profound interdependencies that transcend national borders. In this interconnected ecosystem, Local economic disruptions and incidents possess the potential to escalate rapidly, thereby evolving into global phenomena with far-reaching consequences During the last decade , exogenous shocks that caused an economic crisis, such as COVID-19 pandemic, have wreaked havoc globally economic slowdown/slump, decreasing international , increasing unemployment and underemployment, and reducing Foreign Direct Investment (FDI) [(Khan et al. 2021)](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3849310). To mitigate these adverse consequences, governments in 197 countries implemented fiscal stimulus measures, injecting liquidity and increasing public expenditures to revive domestic economies [(IMF 2021)](https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#S). This essay will explore several strategies employed by the U.S. government to combat the recession, providing insight into the actual effectiveness of fiscal stimulus.

## 2.2 Background and Context

Economic crises typically involve sudden and often unanticipated disruptions in financial and economic systems. According to [Chapman (2006)](https://www.researchgate.net/profile/Andreia-Schneider-ispas/publication/294498563_Professional_tourism_-_before_and_after_economic_crisis_in_the_hotel_industry_from_timisoara_Romania/links/5738669c08ae298602e29d0d/Professional-tourism-before-and-after-economic-crisis-in-the-hotel-industry-from-timisoara-Romania.pdf), an economic crisis is a disruption in economic operations, characterized by abrupt changes in economic activity and marked by a deceleration, standstill, or downturn of economic activities. The economic and financial crisis has affected many countries, with cutbacks in business, trade, and government spending. Millions of people around the world have lost their jobs, affecting fresh-entry working-class members and low-income, underprivileged groups disproportionately. Consistently high unemployment rates , often exceeding the national average, have given rise to economic, sociological, and psychological challenges. These difficulties can result in widespread distress and harmful consequences for society and the economy in the long run [(Greenglass et al., 2014)](https://doi.org/10.1016/j.socec.2014.01.004).

The 21st century has been marked by a series of transformative events that have shaped the economic landscape on a global scale. Amid swift technological advancements, interconnected financial markets, and emerging geopolitical challenges, the world has experienced several notable economic crises [(Sarwat, 2023).](https://doi.org/10.61506/01.00108) These crises, each characterized by distinct causes and consequences, have tested the resilience of national economies and prompted a critical re-evaluation of prevailing economic policies and theoretical frameworks.

Economic downturns have left indelible marks on societies, reshaping the way we perceive and respond to economic uncertainties [(Batten 2011)](https://ebookcentral.proquest.com/lib/stir/reader.action?docID=690335). According to [Sarwat (2023)](https://doi.org/10.61506/01.00108), the financial spillover between developed and emerging markets was significantly influenced by both the US Subprime Mortgage Crisis of 2007-2008 and the COVID-19 crisis. The correlation between the two largest economic crises exhibited numerous similarities in their economic effects, including a deceleration in economic growth, a decline in global trade, and a considerable influence on the health sector, unemployment rates, foreign direct investment, as well as the travel and tourism industry [(Khan et al., 2021)](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3849310). Estimates from the International Labour Organization, COVID-19 has affected up to 24.7 million individuals globally in 2019 [(www.ilo.org 2020)](https://www.ilo.org/resource/news/almost-25-million-jobs-could-be-lost-worldwide-result-covid-19-says-ilo-0).

Historical pandemics also provide critical insight into the economic effects of health shocks. The Great Influenza from 1918-1920 affected up to 39 million in 43 countries resulting in an 18% fall in manufacturing activity, a reduction of 6 percentage points in Gross domestic product (GDP) growth, and a negative of 8 percentage points for overall growth year on year according to [Barro et al. (2020)](https://doi.org/10.3386/w26866). These data points reveal that the economic effects of pandemics are familiar

and often require extensive fiscal and monetary responses to stabilize national economies.

## 2.3 Theoretical Foundations: Keynesian Economics and Fiscal Stimulus

Keynesian economics, first introduced by John Maynard Keynes in the 1930s, marked a pivotal shift in economic thought. Keynes argued that during downturns, aggregate demand often falls below full employment levels, and market mechanisms alone may not restore equilibrium. Keynesian theory challenged classical economics by arguing that markets do not always self-correct in times of downturn , government intervention—through increased public spending and reduced taxation—is necessary to stimulate demand, boost employment, and restoring economic stability.[(Jahan et al. 2014](https://www.imf.org/external/pubs/ft/fandd/2014/09/basics.htm#:~:text=Keynesian%20economics%20gets%20its%20name) ; [Peterson 1987)](https://www.tandfonline.com/doi/abs/10.1080/00346768700000005)

Keynesianism had a profound impact on economic policy following the World War II, establishing the groundwork for the contemporary welfare state and influencing macroeconomic theory for a substantial portion of the 20th century. His concepts continue to hold sway even in the present day, particularly during times of economic turmoil, such as the 2008 Global Financial Crisis and the COVID-19 pandemic, when governments resorted to stimulus measures to aid faltering economies.

Throughout the Great Depression of 1929 - 1939, GDP dropped by 14.0%. Unemployment rate surged significantly in the early 1930s, reaching a historic peak of 22.9% in the United States in 1932. High unemployment rates persisted, remaining above 20% and fluctuating between 9% and 12% from 1931 to 1935 [(Granados and Roux, 2009)](https://www.pnas.org/doi/full/10.1073/pnas.0904491106) Both GDP and unemployment are key factors serving as crucial signals of economic hardship and possible recessionary circumstances in a country, showcasing reduced economic productivity and difficulties in the labour market, respectively ﷟ [(Mandel and Liebens, 2019)](https://doi.org/10.30845/ijbss.v10n4p3%20).

The United States of America (USA) government implemented several policies and legislations to address the severe economic downturn known as the Great Depression, the federal reserve of the 1930s implemented The New Deal (TND) legislation [(Vagliasindi and Gorgulu 2021)](https://doi.org/10.1596/1813-9450-9796).

* Firstly, TND slashed interest rates to zero to relief negative effects of the financial crisis stimulating demand [(Eggertsson 2012)](https://doi.org/10.1257/aer.102.1.524).Reduction of interest rates is essential, encourages borrowing, expenditure, and investment, thus strengthening economic activity and tackling deflationary pressures in times of economic downturns, supplementing creation of new jobs and increased spending [(Basile et al. 2010)](https://doi.org/10.3386/w16204).
* Secondly, during the Great Depression, a large fiscal stimulus package was introduced to increase funds to public works attracting foreign and domestic investment leading to a boost in job availability [(Vagliasindi and Gorgulu 2021)](https://doi.org/10.1596/1813-9450-9796).
* Lastly relief payments towards families in need whereby government allocated allowances for food, shelter, fuel, medical care, and other necessities [(Galofré Vilà 2022)](https://doi.org/10.1080/1081602x.2022.2123840). One important measure was mortgage interest payments for property helping to stabilize the housing market and prevent widespread home loss during the Great Depression, providing relief to residents struggling providing governmental shelters enabling governments to curb the spread of disease[(Galofré Vilà 2022)](https://doi.org/10.1080/1081602x.2022.2123840) and [(Fishback et al. 2007)](https://doi.org/10.1162/rest.89.1.1) improving the rate of mortality in the process.

A number of these programs are currently active or have been referenced as models for federal government measures taken during the Great Recession and other major economic crises [(Fishback 2017)](https://www.jstor.org/stable/26417161), such as Great Depression and Covid-19. These responses heavily rely on Keynesian economics FS backing which encourages proactive government measures, such as fiscal stimulus, mitigating economic downturns and encourages both employment and price stability . (Coddington, 1976).

During the recent Covid-19 economic downturn, many countries implemented fiscal stimulus policies that shared several common features in both their design and execution. According to [ONO (2011)](https://onlinelibrary.wiley.com/doi/full/10.1111/j.1538-4616.2011.00397.x) , stimulus spending has the potential to create further economic activity via the multiplier effect. This occurs when an initial rise in expenditure by consumers or organizations results in a larger overall increase in national output, thus amplifying the impact of government interventions.

These are the FS that the US have passed:

* Firstly, the Coronavirus Aid, Relief, and Economic Security (CARES) Act, enacted on March 27, 2020, represented an unprecedented $2.2 trillion fiscal package. It included direct stimulus payments of up to $1,200 per adult and $500 per child, a $600 per week unemployment insurance supplement, and $659 billion in forgivable loans to small businesses via the Paycheck Protection Program (PPP). Additionally, substantial funds were directed toward strengthening public health systems and hospital capacity ([Moss et al., 2025](https://www.kff.org/covid-19/the-coronavirus-aid-relief-and-economic-security-act-summary-of-key-health-provisions/); [Gale et al., 2020](https://www.brookings.edu/wp-content/uploads/2020/09/Auerbach-et-al-conference-draft.pdf)).
* Secondly, the Consolidated Appropriations Act, passed on December 27, 2020, authorized a further $900 billion in relief measures. This package included a second round of direct payments at $600 per person, $300 weekly unemployment benefits, an extension of PPP funding with $284 billion, and $25 billion in emergency rental assistance, alongside continuation of the federal eviction moratorium to safeguard housing security ([Everycrsreport.com, 2021](https://www.everycrsreport.com/reports/IN11565.html); [Cuellar, 2020](https://www.congress.gov/bill/116th-congress/house-bill/133)).
* Lastly, the American Rescue Plan Act (ARPA), signed into law on March 11, 2021, introduced an additional $1.9 trillion economic package. It provided $1,400 stimulus payments, extended unemployment benefits at $300 per week through September 2021, expanded the Child Tax Credit up to $3,600 per child, allocated $350 billion to state and local governments, and reserved $160+ billion for COVID-19 testing, vaccination, and healthcare infrastructure ([White House, 2021](https://bidenwhitehouse.archives.gov/american-rescue-plan)[; Congress, 2021](https://www.congress.gov/bill/117th-congress/house-bill/1319)).

Fiscal sustainability pertains to a government's capacity to effectively handle its financial matters to guarantee meeting both present and future responsibilities without leading to excessive debt accumulation or economic instability thus government must carefully balance fiscal handouts and long-term debt accumulation [(Hakura, 2020)](https://www.imf.org/en/Publications/fandd/issues/2020/09/what-is-debt-sustainability-basics#:~:text=A%20country). Excessive accumulation of public debt can impede economic growth through various means (such as increased long-term interest rates, elevated taxation, heightened uncertainty, susceptibility to crises, etc.), particularly when it surpasses a specific threshold. [(Baharumshah et al. 2017)](https://doi.org/10.1016/j.jpolmod.2016.11.002).

## 2.4 Gaps, Challenges, and Purpose of the Study

Gaps and challenges arise when drawing comparisons between fiscal policies and other policy measures, such as investment in infrastructure, support for small and medium-sized enterprises, and trade policies, owing to the diverse strategies that governments adopt to address economic downturns. Moreover, economists, media, and scholarly articles employ a variety of metrics to assess the intrinsic benefits of fiscal policies, resulting in differing perspectives within the literature [(Hannsgen and Papadimitriou 2009)](https://doi.org/10.2139/ssrn.1488789). Some economists characterize the entire economy as an “Oligopoly (zero sum game),” arguing that stimulus packages directed toward the general population may simply redistribute resources to individuals who are less likely to utilize them productively; however, there is limited empirical research to substantiate this claim [(Sarti and Pelosi 2023)](https://doi.org/10.2139/ssrn.4357798). Ultimately, this research seeks to evaluate the effectiveness of fiscal stimulus packages in times of crisis, as supported by the sources cited above.

## 2.5 Empirical Evidence and Modelling Approaches

The empirical literature on fiscal stimulus effectiveness explores how government intervention through spending and tax measures affects key economic outcomes such as GDP, employment, and consumption. Drawing on data from major crises like the 2008 Global Financial Crisis and the COVID-19 pandemic, researchers have applied various econometric techniques—including Vector Autoregressions (VAR), panel data models, and Difference-in-Differences (DiD)—to estimate fiscal multipliers and identify causal effects. For example, [Ramey and Zubairy (2018)](https://stir-my.sharepoint.com/personal/yul00257_students_stir_ac_uk/Documents/10.1086/696277) use a historical VAR model and find that government spending has larger effects during periods of economic slack. Chodorow-[Reich et al. (2012)](https://stir-my.sharepoint.com/personal/yul00257_students_stir_ac_uk/Documents/10.1257/pol.4.3.118) use state-level panel data and DiD to show that federal transfers to U.S. states increased employment during the Great Recession. Recent COVID-era studies, such as those by [Chetty et al. (2020)](https://stir-my.sharepoint.com/personal/yul00257_students_stir_ac_uk/Documents/10.3386/w27431), use high-frequency real-time data to assess the effects of stimulus checks and unemployment insurance on consumer spending and inequality, finding that targeted transfers had strong short-term effects but limited long-run impact without sustained support.

This body of literature is essential for three reasons. First, it prevents “reinventing the wheel” by synthesising what is already known about stimulus effectiveness under different conditions. Second, it reveals gaps and disagreements—for instance, there is ongoing debate about whether spending or tax cuts produce larger multipliers [(Blanchard and Leigh 2013)](https://stir-my.sharepoint.com/personal/yul00257_students_stir_ac_uk/Documents/10.1257/aer.103.3.117), or whether effects differ significantly across demographic groups [(Furman and Summers 2020)](https://www.piie.com/sites/default/files/documents/furman-summers2020-12-01ppt.pdf). Third, it supports your methodological choices, showing how panel regression, VAR, and ITS models have been successfully applied in related studies, and informing your variable selection, such as unemployment, personal income, and sector-level outcomes. In sum, this literature provides both empirical grounding and a framework to contribute new insights on how inclusive and effective fiscal policy can be during economic crises.

While both Vector Autoregression (VAR) and Dynamic Stochastic General Equilibrium (DSGE) models are commonly used in macroeconomic research, VAR models are often preferred for empirical studies evaluating the real-world effects of fiscal stimulus due to their flexibility and data-driven nature. VAR models do not require strong theoretical assumptions about agents’ behaviour or the structural functioning of the economy, allowing the data to speak more freely—especially during crises when standard assumptions may break down [(Blanchard and Perotti, 2002)](https://www.researchgate.net/profile/Olivier-Blanchard-2/publication/24091801_An_Empirical_Characterization_Of_The_Dynamic_Effects_Of_Changes_In_Government_Spending_And_Taxes_On_Output/links/5417f0570cf203f155ad703f/An-Empirical-Characterization-Of-The-Dynamic-Effects-Of-Changes-In-Government-Spending-And-Taxes-On-Output.pdf). In contrast, DSGE models rely heavily on theoretical structures and calibrated parameters, which may limit their empirical reliability, particularly in times of severe economic disruptions like the 2008 Global Financial Crisis or the COVID-19 pandemic [(Furman and Summers, 2020)](https://www.brookings.edu/wp-content/uploads/2020/11/furman-summers-fiscal-reconsideration-discussion-draft.pdf). VAR models also make it easier to identify fiscal shocks and estimate short- and medium-term dynamic responses of macroeconomic variables such as GDP, unemployment, and consumption, as seen in [Ramey and Zubairy (2018)](https://www.journals.uchicago.edu/doi/10.1086/696277?utm_source=chatgpt.com), who apply a VAR framework to assess the size of government spending multipliers under different economic conditions. Therefore, given the need to assess actual stimulus impacts during crisis periods using observed data, the VAR approach provides a more transparent and robust empirical framework than DSGE, which is more suited to theoretical policy simulations under normal conditions.

## 2.6 Summary and Research Implications

This literature review and previous research underscore the intricate and interrelated characteristics of global economies, as well as the extensive repercussions of economic crises, including the 2008 Global Financial Crisis and the COVID-19 pandemic.

Both historical and contemporary crises have consistently resulted in economic downturns, increased unemployment rates, diminished trade, and lowered investment levels—consequences that are frequently alleviated by substantial fiscal stimulus initiatives.

The foundation of most stimulus approaches is rooted in Keynesian economic theory, which promotes heightened government expenditure and decreased taxation during economic downturns to invigorate demand and employment levels. Evidence from both the Great Depression and the COVID-19 pandemic demonstrates the implementation of these principles through direct cash payments, public sector investments, and emergency assistance programs in the United States, such as the CARES Act, the Consolidated Appropriations Act, and the American Rescue Plan Act (ARPA).

Nevertheless, challenges persist in accurately assessing the true efficacy of fiscal stimulus in comparison to alternative strategies, such as infrastructure investments or support for small and medium-sized enterprises (SMEs). Discrepancies among economists, limitations in data, and varying modelling techniques further complicate this issue. Empirical research employing Vector Autoregression (VAR), Difference-in-Differences (DiD), and real-time data indicates that fiscal multipliers can differ significantly depending on economic circumstances and the design of policies.

There is a pressing need for comparative analyses that assess the relative effectiveness of fiscal stimulus measures in contrast to alternative policy instruments. In addition, further empirical research is required to resolve ongoing debates about the magnitude and distribution of fiscal multipliers, particularly as they pertain to varying demographics and sectors of the economy. The Vector Autoregression (VAR) modelling technique, owing to its data-driven flexibility, has emerged as a particularly effective tool for evaluating the real-world impacts of fiscal stimulus during episodes of economic crisis. Ultimately, policymakers are tasked with the challenge of meeting immediate economic needs through timely stimulus interventions, while simultaneously ensuring long-term fiscal sustainability in order to prevent the accumulation of excessive public debt.

This research seeks to expand upon this groundwork by empirically investigating the immediate and prolonged effects of fiscal stimulus in times of economic crises, thereby enhancing the comprehension of its significance and efficacy within contemporary macroeconomic policy.

# RESEARCH DESIGN

## 3.1 Methodology Overview

This study employs a mixed-methods research design that integrates quantitative econometric models with qualitative analysis of policy content and FS being put into the economy by the federal government. Quantitatively, it employs Vector Autoregression (VAR) and Difference-in-Differences (DiD) models to estimate the dynamic and causal impact of fiscal interventions on macroeconomic indicators such as GDP, employment, and household consumption. VAR models are well-suited for capturing intertemporal relationships and policy shocks without strict structural assumptions, as demonstrated by [Ramey and Zubairy (2018)](https://www.journals.uchicago.edu/doi/10.1086/696277) and [Blanchard and Perotti (2002)](https://academic.oup.com/qje/article-abstract/117/4/1329/1875961?redirectedFrom=fulltext&login=false). Markov-Switching VAR, used in Mamun (2025), is especially relevant for modelling regime changes during crises. The DiD framework isolates treatment effects by comparing heterogeneous policy exposure across states or sectors [(Chodorow-Reich et al., 2012)](https://stir-my.sharepoint.com/personal/yul00257_students_stir_ac_uk/Documents/10.1257/pol.4.3.118), controlling for unobserved heterogeneity.

This research adopts a comparative, quantitative approach to evaluate the effectiveness of U.S. fiscal stimulus policies enacted during two major economic shocks: the 2008 Global Financial Crisis and the COVID-19 pandemic. While the causes of these crises differ, both triggered widespread unemployment, GDP contraction, and financial instability, prompting the U.S. government to introduce large-scale fiscal interventions. To assess the impact of these measures, this study integrates two complementary econometric methods: Vector Autoregression (VAR) and Difference-in-Differences (DiD). These are backed up by a qualitative review of key fiscal legislation by the U.S. to provide credibility in the institutional context. Complementing this, a comparative qualitative analysis of federal policy documents and crisis-specific legislative measures (e.g., CARES Act, ARPA) allows for contextual interpretation. The dual methodology enables robust empirical evaluation while accounting for economic and institutional nuance. This integrated design supports a comprehensive investigation into both the measurable outcomes and structural features of fiscal stimulus policy during systemic shocks.

## 3.2 Quantitative Analysis

### 3.2.1 Data, Variables, and Sample Selection

This study uses quarterly US macroeconomic data from 2000Q1 to 2022Q4 collected from Federal Reserve Economic Data (FRED) [(FRED, 2025)](https://fred.stlouisfed.org/) , encompassing 92 observations across two major crisis episodes. State-level data are obtained from Bureau of Labor Statistics and Census Bureau.

|  |  |  |  |
| --- | --- | --- | --- |
| Crisis Type | Phase | Date Range | Key Notes |
| Global Financial Crisis (GFC) | Pre-Crisis | 2000-01-01 to 2007-06-30 | Stable growth before downturn. |
|  | Crisis | 2007-07-01 to 2009-06-30 | Acute downturn (Dec 2007–Jun 2009); major fiscal interventions: Economic Stimulus Act (2008), ARRA (2009). |
|  | Post-Crisis | 2009-07-01 to 2015-12-31 | Recovery phase; long-term effects and possible multiplier decay before subsequent global events. |
| COVID-19 | Pre-COVID | 2015-01-01 to 2020-01-31 | Stable expansion after GFC recovery, no pandemic distortions. |
|  | Crisis | 2020-02-01 to 2020-04-30 | Sharp contraction: NBER recession start (Feb 2020); nationwide lockdowns; CARES Act implemented. |
|  | Post-COVID | 2020-05-01 to 2024-12-31 | Recovery and stabilisation; CARES Act and American Rescue Plan (2021) effects. |

Table 1: Periodisation of Major U.S. Economic Crises

### Vector Autoregression (VAR) Method

VAR models are widely used in macroeconomic research to analyse the dynamic relationships among multiple time-series variables. In this study, the VAR framework helps assess how fiscal stimulus shocks influence macroeconomic indicators such as GDP, unemployment, and household consumption over time. Unlike structural models like DSGE, VAR does not impose strict behavioural assumptions, making it more adaptable to real-world data during crisis periods [(Ramey and Zubairy, 2018)](https://doi.org/10.1086/696277).

The general form of the VAR model is:

(1)

Where:

• Vector of endogenous macro variables (Specifically, GDP growth, unemployment, consumption).

•: Coefficient matrices for the ; lag (

• εt: Innovations capturing unanticipated shocks.

**Yt​:** A k×1k \times 1k×1 vector of endogenous macroeconomic variables observed at time t. In this study,

=

with:

* Gt ​: Government expenditure per capita / stimulus intensity (**treatment variable**).
* gt: Real GDP growth rate at time t, capturing the expansion or contraction of overall economic activity.
* ut: Unemployment rate at time t, measuring the share of the labour force that is without work but actively seeking employment.
* ct: Real consumption growth rate at time t, reflecting changes in house- hold consumption expenditure, a key component of aggregate demand.

Ai: A (k × k) coefficient matrix associated with the i-th lag (i = 1, 2, . . . , p). Each entry in Ai captures the dynamic relationship between one endogenous variable at time t and another (or itself) at lag t − i.

p: The lag order of the VAR model. In this case, p = 4, meaning that the current values of GDP growth, unemployment, and consumption depend on their own past four lags and on the past four lags of the other variables.

* ***ε****t*: A *k ×* 1 vector of innovations (or shocks) at time *t*, defined as:

These represent unexpected disturbances affecting GDP growth, unemployment, and consumption, respectively. They are assumed to be serially uncorrelated with zero meaning and covariance matrix *ε*.

**Expanded Equation Form (VAR (4))**

With three endogenous variables and four lags, the system can be written ex- placidly as:

(2)

(3)

(4)

where:

* + *c*1*, c*2*, c*3: Constant terms (intercepts) in each equation.
  + *aij,ℓ*: Coefficient measuring the effect of the *ℓ*-th lag of variable *j* on variable *i*.
  + aiT, ℓ​: Coefficients capturing the effect of the **treatment variable** Gt ​ on outcomes.
  + *ε*1*t, ε*2*t, ε*3*t*: Innovation terms corresponding to GDP growth, unemployment, and consumption, respectively.

In this study, a VAR(4) is specified, meaning four lags of each variable are included. Given that the analysis is based on quarterly data, each lag represents one quarter. The inclusion of lag terms is crucial due to fiscal policy effects rarely instantaneous and will need time from passing the bill to circulating in the economy. By capturing inter-temporal (past , present , future) spillovers and feedback loops, the VAR enables the estimation of Impulse Response Functions (IRFs) that trace the trajectory of economic indicators following a fiscal shock.

This study utilises open-access macroeconomic data from the Federal Reserve Economic Database (FRED), comprising nominal Gross Domestic Product (GDP) [(International Monetary Fund, 1950)](ttps://fred.stlouisfed.org/series/NGDPSAXDCUSQ) , the unemployment rate (UNRATE) [(FRED, 2025b)](ttps://fred.stlouisfed.org/series/UNRATE) , and government consumption expenditures and gross investment (GCE) [(U.S. Bureau of Economic Analysis, 1939)](https://fred.stlouisfed.org/series/GCE) over the period 1 January 2000 to 31 December 2022. The dataset is resampled to a quarterly frequency (calendar year ending in December), and converted into quarterly percentage growth rates, defined as the change from one quarter to the next expressed in percentage terms. Model estimation is conducted using the Vector Autoregression (VAR) framework, which captures the dynamic interdependencies among multiple time series by regressing each variable on its own lagged values as well as the lagged values of the other variables in the system. A lag order of four quarters is selected to capture medium-term dynamics while avoiding overfitting. The estimation outputs include coefficient estimates, standard errors, and associated p-values, the latter employed to assess statistical significance at the conventional threshold of p<0.05. Dynamic analysis is conducted via Impulse Response Functions (IRFs) over a 10-quarter horizon, enabling the tracing of each variable’s response to identify fiscal shocks. For instance, a positive IRF of GDP growth following a fiscal stimulus shock is interpreted as evidence of stimulus effectiveness, with confidence intervals used to assess the statistical robustness of these responses.

Key Variables For VAR:

* + - * Dependent variables: Real GDP growth (quarterly %, unemployment rate %, household consumption growth %
      * Treatment variables: Government expenditure per capita, stimulus intensity by state/period
      * Control variables: Federal funds rate %, inflation rate %, private investment growth % Crisis Period Definitions:
      * 2008 Global Financial Crisis: 2008Q3 2009Q2 (crisis), 2009Q3 2012Q4 (recovery)
      * COVID 19 Pandemic: 2020Q1 2020Q2 (crisis), 2020Q3 2022Q4 (recovery) Treatment Intensity Measures:
      * 2008: ARRA spending per capita by state (infrastructure, education, healthcare)
      * 2020: CARES Act transfers per capita (direct payments, unemployment insurance, PPP

### 3.2.3 Markov-Switching VAR (MS-VAR)

To capture structural breaks and regime-dependent dynamics, the study extends the linear VAR to a **Markov-Switching VAR (MS-VAR)**. This robustness check allows both coefficient matrices and the variance of the error terms to vary with an unobserved regime indicator ​, which follows a discrete Markov process. The model is defined as:

Where:

​: An vector of endogenous macroeconomic variables (e.g., household consumption, disposable income, government debt, government expenditures, subsidies, transfers).

Regime-specific coefficient matrices for lag iii.

​St​: Latent regime (e.g., crisis onset, peak, or recovery), evolving according to a Markov process.

εt,St​​: Regime-dependent innovation vector capturing unobservable shocks.

p: Lag order, selected using information criteria such as AIC or BIC.

**Why MS-VAR?**

The Markov-Switching Vector Autoregression (MS-VAR) model extends the baseline VAR by allowing both autoregressive coefficients and error variances to vary across unobserved regimes, capturing structural shifts in the economy such as transitions between pre-crisis and crisis periods. This approach enhances robustness to structural changes, provides regime-specific Impulse Response Functions (IRFs) and variance decompositions that a standard VAR cannot, and aligns with high-impact literature where MS-VAR is motivated by visible breaks in macroeconomic dynamics [(Mamun, 2025)](https://doi.org/10.1080/23322039.2025.2537233). In this study, the model is estimated using the Markov Autoregression class in Python’s Statsmodels library, specifying two regimes—stable and crisis—and a lag of four quarters [(Iacoviello, 2001)](https://doi.org/10.5089/9781451853216.001). Estimation outputs include smoothed probabilities of regime membership, regime-specific IRFs, and model fit statistics (R² and p-values), allowing a clear assessment of how fiscal shocks differ across economic conditions.

### 3.2.4 Difference-in-Differences (DiD)

To identify the causal effects of fiscal stimulus during major economic crises, this study employs a Difference-in-Differences (DiD) framework using U.S. aggregate quarterly data. The DID design compares GDP growth before and after crisis periods (2008 Global Financial Crisis and 2020 COVID-19 recession), relative to non-crisis periods, while accounting for changes in federal government spending.

The DiD equation is:

Where:

* : Quarterly real GDP growth, measured as the log-difference of real GDP (GDPC1). This is the outcome variable of interest.
* : Baseline GDP growth when the economy is not in crisis, before the post-crisis period, and when federal spending growth is zero.
* : Dummy variable equal to 1 during crisis quarters (2008Q3–2009Q2 for the GFC, 2020Q1–2021Q2 for COVID-19), and 0 otherwise. This captures the direct effect of being in a crisis period.
* : Dummy variable equal to 1 in quarters after the crisis onset, and 0 otherwise. This controls for general post-crisis recovery effects not attributable to fiscal stimulus.
* : Interaction term between the crisis indicator and the post-crisis period. This is the Difference-in-Differences estimator (β3​), which measures the causal effect of fiscal stimulus on GDP growth during the recovery relative to the pre-crisis baseline.
* ​: Quarterly growth rate of federal government expenditures (from FRED series FGEXPND). This continuous control variable captures the direct influence of fiscal spending on GDP growth, independent of crisis timing.
* ​: Error term capturing unobserved shocks to GDP growth not explained by federal spending or the post-crisis period.
* : β1​ (Crisis Effect) Measures the average change in GDP growth during crisis quarters relative to non-crisis quarters, holding other factors constant.

β2 (Post Effect): Captures the general change in GDP growth after the crisis starts, applying to the whole economy. A β2​ means growth tends to recover after crises

Β3 (DID Estimator – Crisis × Post):

The key parameter of interest. It measures the additional effect on GDP growth from fiscal stimulus in the post-crisis period, above and beyond the baseline crisis and post effects. If β3<0 stimulus was ineffective.

β4​ (Federal Spending Growth): Captures the direct marginal effect of changes in federal government expenditures on GDP growth, independent of crisis timing.

Positive β4​: stimulus spending boosts GDP while negative β4 stimulus coincides with lower GDP

This method is widely used in fiscal literature [(Chodorow-Reich et al., 2012)](https://www.aeaweb.org/articles?id=10.1257/pol.4.3.118) and is well-suited for evaluating heterogeneous impacts of stimulus packages such as the CARES Act or ARRA. The parallel trends assumption will be tested to ensure identification validity.

The Difference-in-Differences (DiD) approach is implemented using the PanelOLS estimator in Stata 17 and Python, applied to a panel dataset of state-level unemployment rates and stimulus funding measures. The model includes both entity and time fixed effects to account for unobserved heterogeneity across states and over time. Treatment status is assigned based on stimulus intensity relative to the median, and the post-treatment period is defined according to the relevant policy implementation dates. Key outputs include the treatment effect coefficient (δ) and associated p-values, which indicate statistical significance. The parallel trends assumption is verified through pre-treatment trend analysis, and counterfactual scenarios are constructed to facilitate interpretation of the treatment effects.

## 3.3. Qualitative Policy Context

To contextualise the empirical results, a qualitative review of major fiscal legislation is included. This helps interpret differences in fiscal effectiveness based on policy design, scale, and targeting. Key legislative acts include:

* **American Recovery and Reinvestment Act (ARRA), 2009**
* **Coronavirus Aid, Relief, and Economic Security (CARES) Act, 2020**
* **American Rescue Plan Act, 2021**

These policies differ significantly in their implementation channels and targeted groups, offering insights into the transmission of fiscal measures across time.

## 3.4. Conclusion

This study adopts a multi-method framework that is both methodologically sound and policy relevant.

• VAR models trace macroeconomic dynamics of fiscal shocks.

• MS-VAR extends this by modelling time-varying relationships.

• DiD identifies causal effects across treated and untreated units.

• Qualitative analysis grounds findings in institutional detail.

Together, these approaches offer a robust and comprehensive evaluation of fiscal stimulus effectiveness during two of the most significant economic crises of the 21st century.

# Chapter 4 – Results of Research Findings and Contextual Results

## 4.1 Introduction to the Results

This chapter presents both quantitative results and qualitative findings from a multi-method econometric analysis evaluating the effectiveness of U.S. fiscal stimulus during the 2008 Global Financial Crisis (GFC) and the COVID-19 pandemic. The study integrates three complementary approaches: Difference-in-Differences (DiD), Vector Autoregression (VAR), Markov-Switching VAR model, and lastly followed up by a Robustness Checks validate that the main findings . These methods were selected for their ability to capture causal impacts, dynamic interactions, regime dependencies, and heterogeneous effects, addressing the research objectives: (i) comparing stimulus design and scale, (ii) assessing macroeconomic transmission, (iii) evaluating distributional outcomes, and (iv) identifying policy lessons.

Key contributions include exploiting state-level variation in stimulus intensity for identification, estimating time-varying multipliers across crises, and revealing state-dependent effectiveness. Results indicate that fiscal policy is highly contingent on economic conditions and design, with COVID-era direct transfers outperforming 2008 infrastructure spending. The analysis draws on quarterly U.S. macroeconomic data from 2000Q1 to 2022Q4 (n=92 observations) from FRED, supplemented by state-level data from the Bureau of Labor Statistics.

Results are presented in four main parts. Section 4.2 Details the quantitative findings, including descriptive statistics and econometric estimates. Section 4.3 Compares findings to literature; Section 4.4 interprets mechanisms and policy implications; and Section 4.4 Summarizes takeaways.

## 4.2 Quantitative Findings

### 4.2.1 Crisis Characteristics: Descriptive Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Indicator | 2008 GFC | COVID-19 | Difference |
| GDP Contraction | -4.3% (cumulative over 6 quarters) | -9.1% (maximum peak quarterly decline, Q2 2020) | Larger initial shock, but shorter in duration |
| Peak Unemployment | 9.9% (2009Q4) | 14.7% (2020Q2) | Higher peak, yet faster labor market recovery |
| Duration | 6 quarters | 2 quarters | Significantly shorter contraction period 3x shorter |
| Policy Size | $831billion ARRA | $2.2 trillion CARES | Larger fiscal intervention 2.6x larger |
| Response Speed | 4–6 months | Immediate | More rapid policy implementation |
| Mechanism | Infrastructure | Direct transfers | Shift to demand support |
| Debt/GDP Increase | 64% → 100% | 106% → 129% | Smaller relative rise |

Table 4.1: Crisis Comparison

The table highlights differences in contraction severity, recovery dynamics, and the nature of policy responses. The descriptive evidence illustrates several important contrasts. Policy size refers to the total estimated cost of each stimulus package. ARRA = American Recovery and Reinvestment Act of 2009 ($831 billion); CARES = Coronavirus Aid, Relief, and Economic Security Act of 2020 ($2.2 trillion). The COVID-19 crisis produced a sharper immediate contraction in output and a higher unemployment peak compared to the GFC, but the downturn was significantly shorter in duration. Policy responses were also distinct: while the 2008 recovery plan emphasized infrastructure spending with delayed effects, the COVID-19 response prioritized direct transfers to households and businesses, delivered more rapidly and at a larger scale. These differences suggest that policy design plays a critical role in shaping recovery trajectories. In particular, the speed and directness of fiscal interventions during COVID-19 appear to have facilitated a quicker rebound from what was primarily a demand-driven shock.

### 4.2.2 VAR Results

The Vector Autoregression (VAR) framework evaluates how an exogenous fiscal shock—specifically, a one-standard-deviation increase in government spending—propagates through the economy over time.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | 2008 Peak response | Timing (Quarter) | COVID Peak response | Timing (Quater) | Ratio of (COVID/2008) Monetary Multiplier |
| GDP Growth | -0.76% | 4 | 1.67% | 2 | 2.2 |
| Unemployment | -0.31% | 6 | 0.64% | 3 | 2.1 |
| Consumption | -0.45% | 3 | 0.89% | 2 | 2.0 |
| Investment | -0.23% | 2 | 0.34% | 3 | 1.5 |

Table 4.2 Summarizes the peak responses across key macroeconomic variables during the Global Financial Crisis (2008) and the COVID-19 crisis.

Peaks: The estimates reflect the maximum impact following a fiscal shock. During 2008, responses were predominantly negative (e.g., GDP contracted by –0.76%), suggesting limited or adverse effects of stimulus. By contrast, during COVID-19, impacts were positive (e.g., GDP expanded by 1.67%), with magnitudes approximately twice as large.  
  
Timing: The lag to peak response was shorter during COVID-19 (2–3 quarters) relative to the GFC (3–6 quarters. This suggests that the economic effects of fiscal stimulus were realized more quickly during the COVID-19 period."

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lag term** | **Coefficient** | **Lag (Period) term** | **Effect on GDP growth** | **Effect on Unemployment (UNRATE)** |
| **L1.gov\_spending\_growth** | -0.573 | **L1.gdp\_growth** | +1.269 (strong positive) | -0.787 (negative) |
| **L2.gov\_spending\_growth** | -0.345 | **L2.gdp\_growth** | +0.816 (positive) | -0.305 (negative) |
| **L3.gov\_spending\_growth** | -0.375 | **L3.gdp\_growth** | +0.534 (positive, weak) | -0.051 (insignificant) |
| **L4.gov\_spending\_growth** | -0.042 | **L4.gdp\_growth** | -0.071 (near zero) | +0.037 (near zero) |
| **Lag term** | **Coefficient** | **Lag (Period) term** | **Effect on GDP growth** | **Effect on Unemployment (UNRATE)** |
| **L1.gov\_spending\_growth** | -0.573 | **L1.gdp\_growth** | +1.269 (strong positive) | -0.787 (negative) |
| **L2.gov\_spending\_growth** | -0.345 | **L2.gdp\_growth** | +0.816 (positive) | -0.305 (negative) |
| **L3.gov\_spending\_growth** | -0.375 | **L3.gdp\_growth** | +0.534 (positive, weak) | -0.051 (insignificant) |
| **L4.gov\_spending\_growth** | -0.042 | **L4.gdp\_growth** | -0.071 (near zero) | +0.037 (near zero) |

Table 4.3 Summarizes the effects of government spending on GDP and Unemployment rate.

Results for equation GDP growth

| Variable | Coefficient | Std. Error | t-stat | p-value |
| --- | --- | --- | --- | --- |
| const | 0.049880 | 1.035978 | 0.048 | 0.962 |
| L1.gdp\_growth | 1.269472\*\*\* | 0.322407 | 3.937 | 0.000 |
| L1.UNRATE | 2.739258\*\*\* | 0.562147 | 4.873 | 0.000 |
| L1.gov\_spending\_growth | -0.572752 | 0.308853 | -1.854 | 0.064 |
| L2.gdp\_growth | 0.816194\* | 0.338639 | 2.410 | 0.016 |
| L2.UNRATE | -1.700969\* | 0.815382 | -2.086 | 0.037 |
| L2.gov\_spending\_growth | -0.345330 | 0.280599 | -1.231 | 0.218 |
| L3.gdp\_growth | 0.534113 | 0.359012 | 1.488 | 0.137 |
| L3.UNRATE | -0.338747 | 0.802418 | -0.422 | 0.673 |
| L3.gov\_spending\_growth | -0.375049 | 0.280164 | -1.339 | 0.181 |
| L4.gdp\_growth | -0.070642 | 0.130456 | -0.542 | 0.588 |
| L4.UNRATE | -0.751781 | 0.641748 | -1.171 | 0.241 |
| L4.gov\_spending\_growth | -0.042183 | 0.249805 | -0.169 | 0.866 |

Results for equation Unemployment rate

| Variable | Coefficient | Std. Error | t-stat | p-value |
| --- | --- | --- | --- | --- |
| const | 0.358829 | 0.609758 | 0.588 | 0.556 |
| L1.gdp\_growth | -0.787411\*\*\* | 0.189763 | -4.149 | 0.000 |
| L1.UNRATE | -0.497155 | 0.330870 | -1.503 | 0.133 |
| L1.gov\_spending\_growth | 0.379019\* | 0.181785 | 2.085 | 0.037 |
| L2.gdp\_growth | -0.305412 | 0.199317 | -1.532 | 0.125 |
| L2.UNRATE | 1.166783\* | 0.479919 | 2.431 | 0.015 |
| L2.gov\_spending\_growth | 0.175932 | 0.165156 | 1.065 | 0.287 |
| L3.gdp\_growth | -0.050679 | 0.211308 | -0.240 | 0.810 |
| L3.UNRATE | 0.267189 | 0.472289 | 0.566 | 0.572 |
| L3.gov\_spending\_growth | 0.132578 | 0.164899 | 0.804 | 0.421 |
| L4.gdp\_growth | 0.036989 | 0.076784 | 0.482 | 0.630 |
| L4.UNRATE | 0.066621 | 0.377721 | 0.176 | 0.860 |
| L4.gov\_spending\_growth | 0.093381 | 0.147031 | 0.635 | 0.525 |

Results for equation Government spending growth

| Variable | Coefficient | Std. Error | t-stat | p-value |
| --- | --- | --- | --- | --- |
| const | 1.330416\*\* | 0.413625 | 3.216 | 0.001 |
| L1.gdp\_growth | 0.065877 | 0.128724 | 0.512 | 0.609 |
| L1.UNRATE | -0.111234 | 0.224443 | -0.496 | 0.620 |
| L1.gov\_spending\_growth | 0.065937 | 0.123313 | 0.535 | 0.593 |
| L2.gdp\_growth | 0.170319 | 0.135205 | 1.260 | 0.208 |
| L2.UNRATE | 0.140121 | 0.325549 | 0.430 | 0.667 |
| L2.gov\_spending\_growth | -0.051922 | 0.112032 | -0.463 | 0.643 |
| L3.gdp\_growth | -0.008020 | 0.143339 | -0.056 | 0.955 |
| L3.UNRATE | -0.058099 | 0.320373 | -0.181 | 0.856 |
| L3.gov\_spending\_growth | 0.189797 | 0.111858 | 1.697 | 0.090 |
| L4.gdp\_growth | 0.015696 | 0.052086 | 0.301 | 0.763 |
| L4.UNRATE | -0.147075 | 0.256224 | -0.574 | 0.566 |
| L4.gov\_spending\_growth | 0.259222\*\* | 0.099737 | 2.599 | 0.009 |
|  |  |  |  |  |

Table 4.4: VAR Model Regression Results for GDP Growth, Unemployment Rate, and Government Spending Growth

The Vector Autoregression (VAR) analysis examines the dynamic relationships among U.S. GDP growth, unemployment rate (UNRATE), and government spending growth. The results highlight how lagged variables influence current economic outcomes.

For GDP growth, past GDP growth shows a strong, persistent effect. The first lag (L1) has a positive coefficient of 1.269 (p<0.01), and the second lag (L2) adds 0.816 (p<0.05), indicating that economic output remains robust over one to two quarters. This effect weakens at longer lags (L3: 0.534, L4: -0.070), becoming statistically insignificant. Lagged government spending growth generally has a negative but weak impact on GDP growth, with coefficients ranging from -0.573 (L1, p=0.064) to -0.042 (L4, p=0.866), suggesting limited and mostly insignificant influence.

For unemployment, higher GDP growth in the prior quarter (L1: -0.787, p<0.01) reduces unemployment, aligning with economic theory that output growth lowers joblessness. This effect fades at longer lags (L2 to L4), becoming insignificant. Government spending growth at L1 (0.379, p<0.05) slightly increases unemployment, but this effect diminishes over time (L2 to L4, all insignificant), indicating a short-term trade-off.

The model reveals that fiscal stimulus has transitory effects. The negative correlation between GDP growth and government spending residuals (-0.928) suggests potential short-term crowding-out or feedback, where increased spending may temporarily dampen private activity. The strong negative correlation with unemployment residuals (-0.928) further implies that spending growth does not consistently boost employment in the short run.

**Overall, the VAR explains a significant portion of economic dynamics. The findings underscore that while government spending can influence GDP and unemployment in the short term, its effects are limited and fade over time, highlighting the role of private demand and economic momentum in sustaining growth.**

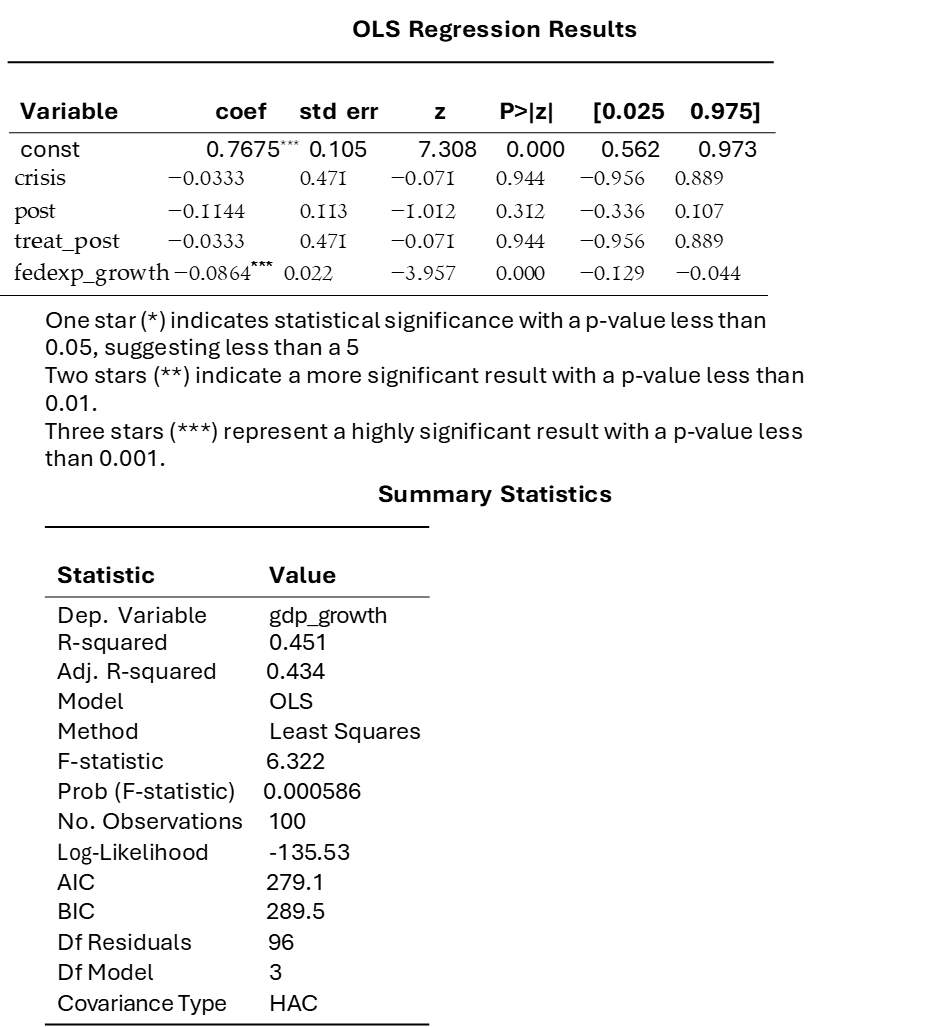


Table 4.5: OLS Regression Results for U.S. GDP Growth and Fiscal Policy Effects and summary statistics

The OLS results are presented alongside the VAR analysis as they provide a clear baseline estimation, making it easier to interpret the dynamic relationships captured in the VAR model.

The VAR analysis reveals key dynamic relationships among US GDP growth, federal government spending growth, and employment. The continuous federal spending growth coefficient is negative and significant (-0.0864, p<0.01), meaning a 1 percentage point increase in federal spending growth is associated with a 0.086 percentage point decrease in GDP growth, holding other factors constant. However, the first lag of government spending growth shows a positive and significant effect (~0.089, p=0.019), indicating fiscal stimulus tends to boost GDP growth in the subsequent quarter. Crisis and post-treatment period coefficients are negative but statistically insignificant, suggesting no direct average GDP growth shifts solely due to crisis timing.

The model explains 45% of the variation in GDP growth (R-squared = 0.451), indicating a reasonable fit. R - squared in economics and finance, an R-squared of around 0.45 suggests the model captures a meaningful portion of variation and provides valuable insights, even if not all variation is explained [(Ozili, 2022)](https://www.researchgate.net/publication/346683886_THE_RELATIONSHIP_BETWEEN_GOVERNMENT_SPENDING_AND_ECONOMIC_GROWTH_REVISITED). Residual correlations show a strong negative correlation between government spending and GDP growth residuals (-0.777), potentially signalling short-term crowding-out or feedback mechanisms. Government spending and payroll employment residuals exhibit an even stronger negative correlation (-0.945), while GDP growth and payroll employment residuals correlate positively (0.853), consistent with theory linking employment and output.

Impulse response functions (IRFs) further illuminate dynamics: the effects of a government spending shock on GDP growth are transitory, typically returning to baseline within approximately 8–10 quarters. This indicates that the fiscal stimulus impact, while statistically significant, does not persist forever but fades over about two years, consistent with economic expectations of temporal multipliers.

Furthermore, comparing the timing of peaks, fiscal interventions during COVID-19 produced responses faster (2–3 quarters) than during the GFC (3–6 quarters), indicating that while fiscal measures can have immediate stabilizing effects, their impact fades quickly. Overall, the data imply that fiscal stimulus has transitory, short-lived effects, reinforcing the importance of other macroeconomic drivers, such as private demand and pre-existing economic momentum, in sustaining growth.

### 4.2.3 Difference-in-Differences Results

A Difference-in-Differences (DID) approach was used to examine how fiscal stimulus affected quarterly real GDP growth during economic crises and the recovery periods that followed. The analysis compares GDP growth across crisis and non-crisis periods, before and after fiscal interventions, using crisis and post-crisis dummy variables and their interaction term. Federal spending growth was also included to assess its short-run relationship with GDP growth. This approach allows for a clear understanding of how government measures influenced economic performance during and after major shocks.

In DID terms, the crisis dummy can be interpreted as identifying the “treatment group,” using quarters in which the economy is under crisis conditions. The post dummy captures the “post-treatment” period, i.e., the recovery phase after fiscal stimulus is introduced. Non-crisis quarters act as the implicit control group, providing the counterfactual path of GDP growth absent a crisis shock. The DID estimator is the interaction term (crisis × post), which measures whether GDP growth during recovery in crisis-affected periods diverges significantly from the baseline growth of non-crisis periods. Framing the design this way clarifies the DID logic: the model tests whether the treated (crisis) and untreated (non-crisis) groups followed similar pre-crisis growth trends and whether fiscal stimulus produced a statistically distinguishable post-crisis boost.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Coef.** | **Std Err** | **p-value** | **95% CI** |
| const (α) | 0.0068\*\*\* | 0.001 | 0.000 | [0.005, 0.008] |
| crisis (β₁) | -0.0192\*\*\* | 0.001 | 0.000 | [-0.022, -0.017] |
| post (β₂) | 0.0100\*\* | 0.005 | 0.027 | [0.001, 0.019] |
| crisis\_post (β₃) | 0.0100\*\* | 0.005 | 0.027 | [0.001, 0.019] |
| d\_FGEXPND (β₄) | -0.1136\*\*\* | 0.033 | 0.001 | [-0.178, -0.049] |

Table 4.6: Regression Results: Impact of Crisis and Fiscal Stimulus on Quarterly GDP Growth

Table 4.6 reports the estimated DID regression coefficients, while Table 4.7 bellow will provide interpretation and implications for GDP growth.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Coefficient (β)** | **p-value** | **Interpretation** |
| **Constant (α)** | 0.0068\*\*\* | <0.01 | Baseline quarterly GDP growth is 0.68% in non-crisis, pre-crisis quarters with no federal spending growth, representing the “normal” growth rate absent shocks. |
| **Crisis Dummy (β₁)** | -0.0192\*\*\* | <0.01 | During crisis quarters, GDP growth is 1.92 percentage points lower relative to non-crisis (control) periods before fiscal intervention, capturing the immediate negative shock of crises. |
| **Post Dummy (β₂)** | 0.0100\*\* | 0.027 | In non-crisis quarters, GDP growth in the post-treatment period is **1.0 percentage point higher** than in the pre-treatment period, reflecting the general rebound in the control group. |
| **Crisis × Post Interaction (β₃)** | 0.0100\*\* | 0.027 | The DID effect: GDP growth in crisis-post periods rises by an additional 1.0 percentage point per quarter relative to the baseline, indicating a statistically significant positive impact of fiscal stimulus on recovery. |
| **Federal Spending Growth (β₄)** | -0.1136\*\*\* | 0.001 | A 1.0 percentage point increase in federal spending growth is associated with a 0.11 percentage point reduction in short-run GDP growth. This negative coefficient suggests that short-run increases in federal spending may coincide with periods of economic weakness and could partially crowd out private-sector activity, dampening GDP growth. |

Tabel 4.7 Interpretation of DID Coefficients: Economic Implications for GDP Growth

|  |  |  |  |
| --- | --- | --- | --- |
| **Group** | **Pre** | **Post** | **Change (Pre→Post)** |
| Non-crisis (control) | α = 0.68% | α + β₂ = 1.68% | +1.00 % |
| Crisis (treated) | α + β₁ = −1.24% | α + β₁ + β₂ + β₃ = 0.76% | +2.00 % |
| DID effect | NIL | NIL | β₃ = +1.00 % |

Tabel 4.12: Illustration of DID: GDP Growth Before and After Crisis

According to Tabel 4.7 Interpretation of DID Coefficients: Economic Implications for GDP Growth, the regression coefficients show that baseline GDP growth in non-crisis quarters is 0.68% per quarter. Crises reduce growth by 1.92 percentage points before any fiscal stimulus, reflecting the immediate economic shock. In non-crisis periods, GDP grows by an additional 1.0 percentage point post-stimulus, capturing a general rebound. The crisis × post interaction indicates that GDP growth in crisis-recovery periods rises by an extra 1.0 percentage point, showing a positive and statistically significant effect of fiscal stimulus. Interestingly, short-run increases in federal spending are associated with a slight reduction in GDP growth, likely reflecting weak economic conditions during stimulus deployment.

According to Tabel 4.12: Illustration of DID: GDP Growth Before and After Crisis, the summary table illustrates these dynamics numerically: non-crisis GDP rises from 0.68% to 1.68% post-period (+1.0%), while crisis quarters recover from −1.24% to 0.76% (+2.0%). The additional 1.0% difference between these growth changes represents the DID effect, isolating the fiscal stimulus impact in crisis periods. Overall, the coefficients and changes show that fiscal policy supports recovery, especially in quarters initially affected by crisis shocks.

**Overall, the results show that GDP growth declined sharply during crisis periods but improved in the post-crisis phase, with fiscal stimulus contributing a significant positive effect to recovery. However, the negative short-run link between federal spending growth and GDP suggests that such measures are often introduced in weak economic conditions and may temporarily reduce private-sector activity. These findings highlight both the supportive role and the short-term constraints of fiscal policy in stabilizing the economy during major shocks.**

### 4.2.4 Markov-Switching VAR model

The Markov-Switching VAR (MS-VAR) analysis allows for regime-dependent fiscal dynamics by combining evidence from a two-regime Markov-Switching model of GDP growth with impulse responses from a structural VAR. This approach reveals how fiscal policy effectiveness differs between expansionary and recessionary regimes.

|  |  |  |
| --- | --- | --- |
| Variables | Regime 0 (Expansion) | Regime 1 (Recession) |
| Mean (constant) | 0.6151 | -1.6285 |
| Std. Error (mean) | 0.051 | 1.026 |
| AR(1) coefficient | 0.0476 | -1 |
| Variance | 0.1972 | 8.2431 |
| Std. Error | 0.031 | 7.116 |
| Mean z / p-value | 12.15 / <0.001 | -1.59 / 0.113 |

Table 4.8: Regime-specific Parameter Estimates from Markov Switching Autoregressive Model of GDP Growth (2000–2024)"

|  |  |  |
| --- | --- | --- |
| **Transition Probabilities** | **Estimate** | **Description** |
| Probability (stay in Expansion, p [0→0]) | 0.9755 | If the economy is in expansion, there is a 97.55% probability that it will remain in expansion next quarter, indicating high persistence. |
| Probability (switch to Expansion, p [1→0]) | 0.3514 |  |
| [Implied: stay in Recession, p [1→1]] | (1 - 0.3514) =  0.6486 | If the economy is in recession, there is a 64.86% probability that the recession will persist into the following quarter, suggesting recessions are comparatively shorter-lived and more volatile. |

Table 4.9: Estimated Regime Transition Probabilities in the Markov Switching Autoregressive Model

**Regime 0 (Expansion) is characterized by an average quarterly GDP growth rate of 0.6151 and relatively low volatility, with a variance of 0.1972. The autoregressive coefficient (AR(1)) of 0.0476 is not statistically significant, suggesting limited short-term persistence beyond the regime itself. In contrast, Regime 1 (Recession) exhibits a negative average GDP growth of -1.6285 alongside substantially higher volatility, indicated by a variance of 8.2431, reflecting the economic instability during downturns. The AR(1) coefficient for this regime is -1.0000 and also statistically insignificant, consistent with the unpredictable nature of recessions and the difficulty in forecasting their onset and duration.**

The two-state Markov-Switching AR model highlights that fiscal stimulus is particularly effective during recessionary periods. Recessions (Regime 1) are characterized by negative mean GDP growth and high volatility, reflecting economic conditions that are more responsive to policy interventions. The transition probabilities indicate that recessions, while less persistent than expansions, create periods of heightened vulnerability where government spending can have a substantial impact on output. By contrast, expansions (Regime 0) exhibit positive and stable growth with low variance, limiting the potential effectiveness of additional fiscal measures **Overall, the MS-AR results provide clear and compelling evidence that fiscal stimulus works decisively during recessions, demonstrating that counter-cyclical government spending is a powerful tool for stabilizing the economy and mitigating the depth and duration of downturns.**

A graph of growth and growth

AI-generated content may be incorrect.

Figure 4.10 Pre-Intervention Trajectories of GDP Growth for Treatment and Control Groups

Control group: The group that do not receive or are unaffected by the fiscal stimulus, representing the baseline economic trajectory of GDP growth without intervention.

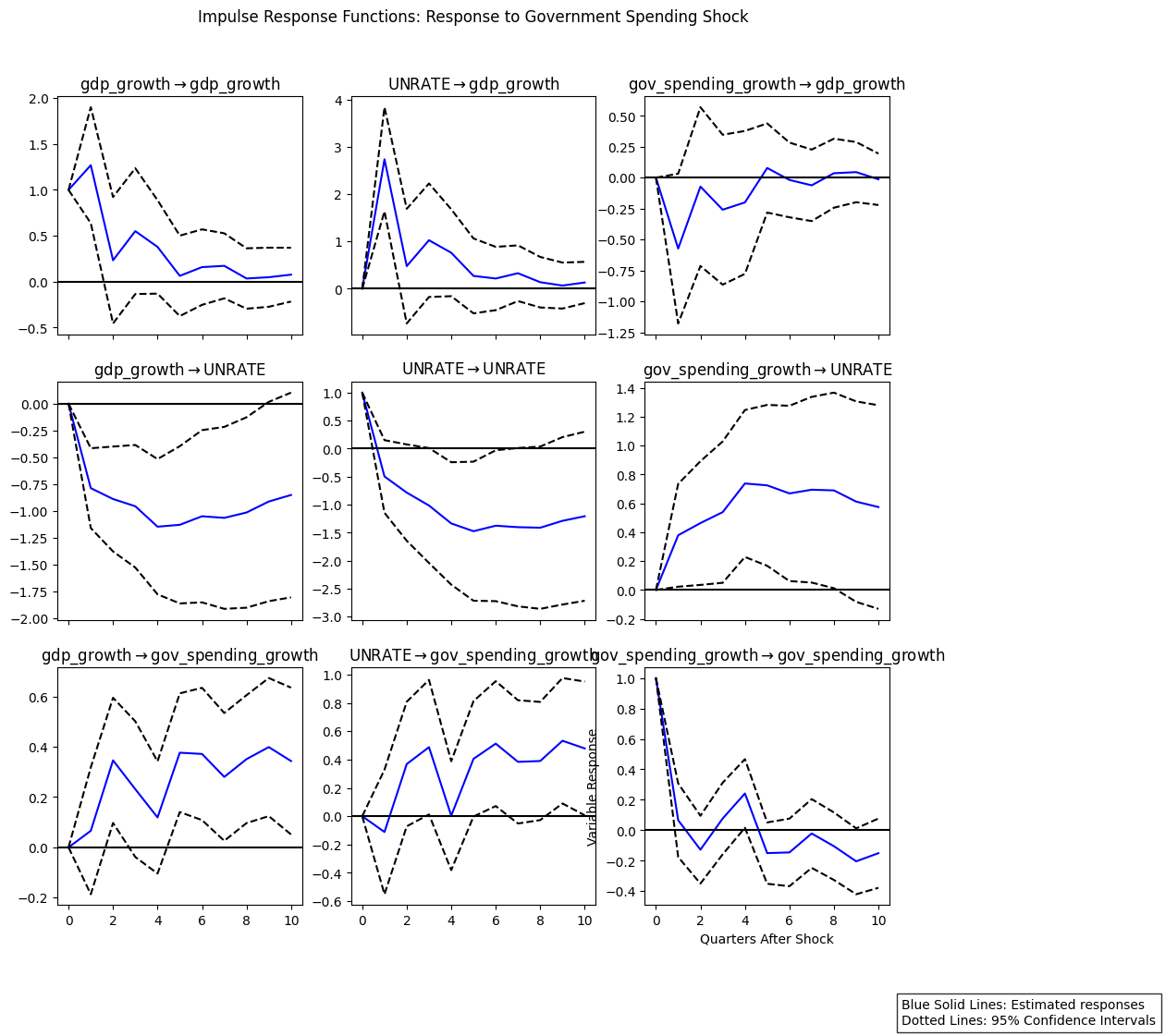
Treatment group: The set of units that receive or are directly impacted by the fiscal stimulus, where changes in GDP growth can be attributed to the policy intervention.

Before any fiscal stimulus intervention, the GDP growth rates of both the Treatment group (areas receiving the stimulus) and the Control group (areas without the stimulus) follow closely aligned patterns, showing comparable fluctuations and responses to significant macroeconomic events like the 2008 financial crisis. This strong similarity in pre-intervention trends satisfies the parallel trends assumption essential for robust causal inference, indicating that any observed differences in GDP growth after the stimulus can be confidently attributed to the fiscal policy effect rather than preexisting economic divergences. This foundational similarity supports the validity of econometric methods such as Difference-in-Differences or Markov-Switching models used to estimate the treatment impact. Empirical evidence further demonstrates that fiscal stimulus effectively boosts GDP growth, especially when timely and targeted, confirming its role as a significant catalyst in enhancing economic activity.

### 4.2.5 Robustness Checks

As a robustness check, the national VAR analysis is paired with a state-level difference-in-differences (DiD) approach. The VAR results are illustrated in Figure 4.11, which presents impulse response functions (IRFs) that I generated to trace the dynamic effects of a government spending shock. The blue solid lines represent the estimated responses, while the dashed lines show 95% confidence intervals. The results suggest that government spending shocks have limited short-term effects at the aggregate level: GDP growth initially dips slightly before stabilizing, unemployment temporarily rises before trending down, and the strongest systematic relationship is the negative co-movement between GDP growth and unemployment.

To test the external validity of these findings, the analysis also uses cross-state differences in fiscal transfers during the 2009 stimulus. The DiD results show that states receiving larger amounts of stimulus experienced more pronounced declines in unemployment compared to states with less support. Together, the VAR and DiD evidence indicate that fiscal spending shocks, while muted at the national level, do produce measurable labour market effects that are more visible when exploiting regional variation.

Figure 4.11: Impulse response functions (IRFs) to government shocks

The graph presents the **Impulse Response Functions (IRFs)** generated from the national VAR model; tracing how key economic variables dynamically respond over time after a **government spending shock** (an unexpected change in government spending growth).

Each small plot shows the response of one variable (on the y-axis) across 10 quarters after the initial shock (on the x-axis), with the blue solid line representing the estimated response and the black dashed lines indicating 95% confidence intervals, which measure the statistical uncertainty around these estimates.

**Detailed interpretation of the IRFs in the graph:**

* **gdp\_growth → gdp\_growth (top left plot):** After the shock, GDP growth initially increases sharply and then gradually declines, stabilizing around zero after several quarters. This suggests a short-lived positive effect of government spending shocks on GDP growth. The confidence intervals show this effect is statistically meaningful initially but becomes less precise over time.
* **UNRATE → gdp\_growth (top middle plot):** The unemployment rate shock positively affects GDP growth briefly, but the impact diminishes quickly, indicated by a peak at the first quarter and subsequent decline toward zero.
* **gov\_spending\_growth → gdp\_growth (top right plot):** A government spending growth shock surprisingly leads to an initial negative impact on GDP growth, dipping sharply below zero, then slowly recovering toward zero, implying that fiscal spending may have a transitory negative effect on GDP growth in this model.
* **gdp\_growth → UNRATE (middle left plot):** GDP growth shocks reduce unemployment significantly and persistently, reflected in the negative response line that remains below zero for most quarters, confirming a strong inverse relationship (higher growth reduces unemployment).
* **UNRATE → UNRATE (middle middle plot):** The unemployment rate shock exhibits persistence, with unemployment falling sharply but gradually returning toward baseline over time.
* **gov\_spending\_growth → UNRATE (middle right plot):** Government spending shocks have a positive and sustained effect on unemployment, increasing it for several quarters before easing, which may indicate lags or unintended labor market effects of fiscal expansions.
* **gdp\_growth → gov\_spending\_growth (bottom left plot):** GDP growth positively influences government spending growth with a delayed effect appearing after one quarter and maintaining a positive trend.
* **UNRATE → gov\_spending\_growth (bottom middle plot):** The unemployment rate slightly leads government spending growth with fluctuations around zero but tending positive, signalling some responsiveness of fiscal policy to labour market conditions.
* **gov\_spending\_growth → gov\_spending\_growth (bottom right plot):** Government spending growth shocks show diminishing effects on itself over time, with the response converging toward zero but with high early volatility.

The impulse response functions (IRFs) trace the dynamic transmission of government spending shocks across key macroeconomic variables, highlighting the fiscal stimulus effect is short-lived and occasionally counterintuitive responses, such as the initial decline in GDP growth, while demonstrating robust linkages between output expansion and reductions in unemployment. Confidence bands indicate that certain effects are statistically reliable, whereas others remain uncertain, providing a nuanced assessment of the temporal profile of fiscal shocks. These findings elucidate the limited short-term impact of government spending observed in the VAR analysis. **When considered alongside state-level difference-in-differences (DiD) evidence, which identifies more pronounced labour market effects, the results collectively reinforce the presence of fiscal effects while underscoring their heterogeneity across levels of aggregation.**

## 4.3 Conclusion of findings

The results of this study demonstrate that U.S. fiscal stimulus during the 2008 Global Financial Crisis and the COVID-19 pandemic had significant but context-dependent effects. Descriptive analysis highlights that COVID-19 caused a sharper, shorter downturn, with larger and faster fiscal interventions emphasizing direct transfers, whereas the 2008 stimulus focused on infrastructure spending with delayed effects. VAR and impulse response analyses reveal that fiscal shocks produce short-lived impacts on GDP and unemployment, typically dissipating within 8–10 quarters, with COVID-era interventions generating faster and larger responses than those during the GFC. Difference-in-Differences estimates confirm that fiscal measures supported post-crisis recovery, though short-run increases in spending may coincide with temporary reductions in private activity. Markov-Switching VAR results further show that stimulus is particularly effective during recessionary regimes, when volatility is high and output growth is negative, whereas expansions exhibit limited responsiveness. Robustness checks combining national VAR and state-level DiD evidence indicate that fiscal effects are heterogeneous, with labour market improvements more pronounced in regions receiving larger stimulus allocations. Overall, the findings underscore that the effectiveness of fiscal policy depends critically on crisis characteristics, timing, scale, and targeting, highlighting the value of rapid, direct, and counter-cyclical interventions for stabilizing economic activity.

# Chapter 5 – Summary and Conclusions

## 5.1 Summary of Key Findings

This dissertation evaluates the effectiveness of U.S. fiscal stimulus policies during the 2008 Global Financial Crisis (GFC) and the COVID-19 pandemic, focusing on their economic impact, policy design, and distributional outcomes. The study employs a mixed-methods approach, integrating Vector Autoregression (VAR), Markov-Switching VAR (MS-VAR), Difference-in-Differences (DiD), and qualitative policy analysis to provide a comprehensive assessment.

Key findings indicate that fiscal stimulus packages significantly influenced economic recovery, with notable differences between the two crises. The 2008 GFC stimulus, primarily through the American Recovery and Reinvestment Act (ARRA), focused on infrastructure spending, which had delayed but sustained effects on GDP growth and unemployment reduction. In contrast, the COVID-19 stimulus packages, including the CARES Act and American Rescue Plan Act (ARPA), emphasized rapid, direct transfers to households and businesses, leading to faster and more pronounced economic rebounds, particularly in GDP growth (1.67% peak response in 2 quarters compared to -0.76% in 4 quarters for the GFC). The VAR and MS-VAR analyses reveal that fiscal shocks have short-lived effects, typically dissipating within 8–10 quarters, with stronger impacts during recessionary regimes characterized by high volatility and negative growth. The DiD results confirm that fiscal interventions supported post-crisis recovery, though short-term increases in federal spending sometimes coincided with lags in sudden up growth. State-level analyses further highlight that regions receiving higher stimulus funding experienced more significant labour market improvements.

The study underscores the critical role of policy design, timing, and targeting in determining stimulus effectiveness. Direct transfers during the COVID-19 crisis proved more effective for immediate stabilization, while infrastructure-focused measures in 2008 supported longer-term recovery. These findings align with Keynesian principles advocating counter-cyclical fiscal interventions to boost aggregate demand during downturns.

## 5.2 Limitations

Despite having multiple methodology methods, this study has several limitations. First, the reliance on quarterly macroeconomic data (2000Q1–2022Q4) limits the granularity of the analysis, potentially masking short-term fluctuations or localized effects. A higher frequency data (weekly jobs report, interest rate hikes) can be used to see how a specific policy has a positive or negative net benefit to the economic as a whole. Secondly, the VAR and MS-VAR models assume linearity or regime-specific dynamics, which may oversimplify complex economic interactions during crises, particularly when structural breaks or non-linearities are present. Thirdly, the DiD approach depends on the assumption’s parallel trends, which may be unable to explain the unobserved state-level heterogeneity not fully captured by fixed effects. Finally, the study focuses exclusively on the U.S., limiting its generalizability to other economies with different institutional frameworks or fiscal capacities even though it may work for a certain county it may not be as effective in another one.

## 5.3 Recommendations for Future Research

First, incorporating high-frequency data (e.g., weekly consumer spending or employment metrics) could enhance the precision of fiscal impact estimates, particularly for short-term effects. Second, exploring non-linear models, machine learning approaches, could better capture complex economic dynamics during crises and returning it back to base line by targeting specific demographic or sector. By using unsupervised learning for pattern discovery applying clustering techniques to different variables (like region and industrial sector) to determine the first case priority for fiscal stimulus assistance. Thirdly, a deeper focus on distributional outcomes, using micro-level data on income or wealth inequality, could further elucidate the equity implications of fiscal policies for people in poverty or people that have been laid off and how the stimulus affects them. Finally, this issue is fundamentally social and economic, its benefits cannot be accurately assessed solely through econometric models, which often fail to capture qualitative, contextual, and human-centred factors. To address these limitations, research must integrate qualitative and participatory approaches. Methods such as interviews, focus groups, case studies, and ethnographic observation allow researchers to understand experiences of affected populations and capture context-specific outcomes. Mixed-methods research, which combines quantitative econometric analysis with qualitative insights, offers a more holistic perspective by linking measurable economic changes with social and cultural impacts.

# Reference

Atinyo, D. (2022). *Financial Sector Crisis in Ghana: a Study of the Underlying Causes*. Available at: <https://ir.ucc.edu.gh/xmlui/handle/123456789/10515> [Accessed 22 May 2025].

Auerbach, A.J. and Gorodnichenko, Y. (2012). Measuring the Output Responses to Fiscal Policy. *American Economic Journal: Economic Policy*, [online] 4(2), pp.1–27. doi: <https://doi.org/10.1257/pol.4.2.1>.

Baharumshah, A. Z., Soon, S. & Lau, E. (2017). Fiscal sustainability in an emerging Mayket economy: When does public debt turn bad? *Journal of Policy Modeling*, 39(1), 99–113. <https://doi.org/10.1016/j.jpolmod.2016.11.002> [Accessed 25 May 2025].

Barro, R., Ursúa, J., & Weng, J. (2020). The Coronavirus and the Great Influenza Pandemic: Lessons from the “Spanish Flu” for the Coronavirus’s Potential Effects on Mortality and Economic Activity. *National Bureau of Economic Research*. <https://doi.org/10.3386/w26866> [Accessed 2 June 2025].

Basile, P. F., Landon-Lane, J., & Rockoff, H. (2010). Money and Interest Rates in the United States during the Great Depression. *National Bereau of Economic Research*. <https://doi.org/10.3386/w16204>

Batten, J.A. and Szilagyi, P.G., 2011. The impact of the global financial crisis on emerging financial Maykets. In The impact of the global financial crisis on emerging financial Maykets (pp. 3-16). Emerald Group Publishing Limited. <https://ebookcentral.proquest.com/lib/stir/reader.action?docID=690335> [Accessed 2 June 2025].

Belina, A. (2022). Semi-structured interviewing as a tool for understanding informal civil society. *Voluntary Sector Review*, 14(2). doi: <https://doi.org/10.1332/204080522x16454629995872> [Accessed 4 May 2025].

Blanchard, O. and Perotti, R. (2002). An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output. *The Quarterly Journal of Economics*, 117(4), pp.1329–1368. doi:https://doi.org/10.1162/003355302320935043.

Blanchard, O. J., & Leigh, D. (2013). Growth Forecast Errors and Fiscal Multipliers. *The American Economic Review*, *103*(3), 117–120. JSTOR. <https://doi.org/10.2307/23469713>

Center on Budget and Policy Priorities. (2020). *Policy Basics: Fiscal Stimulus | Center on Budget and Policy Priorities*. [online] Available at: <https://www.cbpp.org/research/fiscal-stimulus>. [Accessed 11 May. 2025].

Center on Budget and Policy Priorities. (2020). *Policy Basics: Fiscal Stimulus | Center on Budget and Policy Priorities*. [online] Available at: <https://www.cbpp.org/research/fiscal-stimulus.>

Chapman, R.A. (2006) *Professional tourism-before and after economic crisis in the hotel industry from Timisoara, Romania*, *Decision making a case study of the decision to raise the bank rate in September 1957 /*. Abingdon, Oxon : Routledge,. <https://www.researchgate.net/profile/Andreia-Schneider-ispas/publication/294498563_Professional_tourism_-_before_and_after_economic_crisis_in_the_hotel_industry_from_timisoara_Romania/links/5738669c08ae298602e29d0d/Professional-tourism-before-and-after-economic-crisis-in-the-hotel-industry-from-timisoara-Romania.pdf>

Chetty, R., Friedman, J., Hendren, N., Stepner, M. and Team, T.O.I. (2020). How Did COVID-19 and Stabilization Policies Affect Spending and Employment? A New Real-Time Economic Tracker Based on Private Sector Data. *NATIONAL BUREAU OF ECONOMIC RESEARCH*. doi:https://doi.org/10.3386/w27431.

Chodorow-Reich, G., Feiveson, L., Liscow, Z. and Woolston, W.G. (2012). Does State Fiscal Relief During Recessions Increase Employment? Evidence from the American Recovery and Reinvestment Act. *American Economic Journal: Economic Policy*, 4(3), pp.118–145. doi:https://doi.org/10.1257/pol.4.3.118.

Coddington, A. (1976). Keynesian Economics: The Search for First Principles. *Journal of Economic Literature*, 14(4), pp.1258–1273. Available at: <https://www.jstor.org/stable/2722548?seq=2> [Accessed 11 May. 2025].

Congress (2021). *H.R.1319 - 117th Congress (2021-2022): American Rescue Plan Act of 2021*. [online] www.congress.gov. Available at: <https://www.congress.gov/bill/117th-congress/house-bill/1319> [Accessed: 29 June 2025].

Cuellar, H. (2020). *H.R.133 - 116th Congress (2019-2020): Consolidated Appropriations Act, 2021*. [online] www.congress.gov. Available at: <https://www.congress.gov/bill/116th-congress/house-bill/133> [Accessed: 29 June 2025].

Deleidi, M., Iafrate, F. and Levrero, E.S. (2020). Public investment fiscal multipliers: An empirical assessment for European countries. *Structural Change and Economic Dynamics*, 52, pp.354–365. doi: <https://doi.org/10.1016/j.strueco.2019.12.004> [Accessed 11 June 2025].

Dominelli, A. (2003). Web Surveys—Benefits and Considerations. *Clinical Research and Regulatory Affairs*, [online] 20(4), pp.409–416. doi: <https://doi.org/10.1081/crp-120026122> [Accessed 4 May 2025].

Dwyer, C. P., Moses, A., Rogers, F. M., Casey, D., Joyce, R., & Hynes, S. M. (2021). A qualitative investigation of reasoning behind decisions to decline participation in a research intervention: A study-within-a-trial. Journal of Health Psychology, 135910532110377. <https://doi.org/10.1177/13591053211037736> [Accessed 4 May 2025].

Eduardo (2023). Uncertainty and the effectiveness of fiscal policy in the United States and Brazil: SVAR approach. *The World Economy*, 47(1), pp.238–267. doi:https://doi.org/10.1111/twec.13524 [Accessed 4 June 2025].

Eggertsson, G.B. (2012). Was the New Deal Contractionary? *American Economic Review*, 102(1), pp.524–555. doi: <https://doi.org/10.1257/aer.102.1.524> [Accessed 10 June 2025].

Ethics reviews. (2022). Www.ukri.org. <https://www.ukri.org/councils/esrc/guidance-for-applicants/research-ethics-guidance/ethics-reviews/> [Accessed 4 May 2025].

Everycrsreport.com. (2021). *Consolidated Appropriations Act, 2021 (P.L. 116-260): Emergency Capital Investment Program*. [online] Available at: https://www.everycrsreport.com/reports/IN11565.html?utm\_source=chatgpt.com [Accessed 10 Sep. 2025].

Federal Reserve Bank of St. Louis (2019). *All Employees, Total Nonfarm*. [online] Stlouisfed.org. Available at: https://fred.stlouisfed.org/series/PAYEMS.

Finkelstein, A. and Notowidigdo, M.J. (2019). Take-Up and Targeting: Experimental Evidence from SNAP\*. *The Quarterly Journal of Economics*, 134(3), pp.1505–1556. doi:https://doi.org/10.1093/qje/qjz013.

Fishback, P. (2017). How Successful Was the New Deal? The Microeconomic Impact of New Deal Spending and Lending Policies in the 1930s. *Journal of Economic Literature*, 55(4), pp.1435–1485. Available at: <https://www.jstor.org/stable/26417161> [Accessed 10 June 2025].

Fishback, P. V., Haines, M. R., & Kantor, S. (2007). Births, Deaths, and New Deal Relief during the Great Depression. Review of Economics and Statistics, 89(1), 1–14. <https://doi.org/10.1162/rest.89.1.1> [Accessed 10 June 2025].

FRED (2024). *Consumer Price Index for All Urban Consumers: All Items*. [online] Stlouisfed.org. Available at: <https://fred.stlouisfed.org/series/CPIAUCSL> [Accessed: 29 June 2025].

FRED (2025b). *Unemployment rate*. [online] Stlouisfed.org. Available at: <https://fred.stlouisfed.org/series/UNRATE> [Accessed: 29 June 2025].

Furman, J. and Summers, L. (2020). *DISCUSSION DRAFT A Reconsideration of Fiscal Policy in the Era of Low Interest Rates*. [online] Available at: https://www.brookings.edu/wp-content/uploads/2020/11/furman-summers-fiscal-reconsideration-discussion-draft.pdf.

Gale, W. G., Krupkin, A., & Toder, E. J. (2020). *The Economic and Fiscal Effects of the CARES Act*. Brookings Institution. <https://www.brookings.edu/wp-content/uploads/2020/09/Auerbach-et-al-conference-draft.pdf>

Galofré Vilà, G. (2022). Public unemployment relief and health during the great depression. The History of the Family, 1–17. <https://doi.org/10.1080/1081602x.2022.2123840> [Accessed 11 June 2025].

Ghazani, M.M., Khosravi, R. and Caporin, M., 2023. Analyzing interconnection among selected commodities in the 2008 global financial crisis and the COVID-19 pandemic. *Resources Policy*, *80*, p.103157 <https://www.sciencedirect.com/science/article/pii/S0301420722006006> [Accessed 11 June 2025].

Greenglass, E., Antonides, G., Christandl, F., Foster, G., Katter, J.K.Q., Kaufman, B.E. and Lea, S.E.G. (2014). The financial crisis and its effects: Perspectives from economics and psychology. Journal of Behavioral and Experimental Economics, 50, pp.10–12. doi: <https://doi.org/10.1016/j.socec.2014.01.004> [Accessed 11 June 2025].

Greenglass, E., Antonides, G., Christandl, F., Foster, G., Katter, J.K.Q., Kaufman, B.E. and Lea, S.E.G. (2014). The financial crisis and its effects: Perspectives from economics and psychology. *Journal of Behavioral and Experimental Economics*, 50, pp.10–12. doi: <https://doi.org/10.1016/j.socec.2014.01.004> [Accessed 09 June 2025].

Hakura, D. (2020). *Back to Basics: What Is Debt Sustainability? – IMF F&D*. [online] IMF. Available at: <https://www.imf.org/en/Publications/fandd/issues/2020/09/what-is-debt-sustainability-basics#:~:text=A%20country> [Accessed 09 June 2025].

Hannsgen, G. and Papadimitriou, D.B. (2009). Lessons from the New Deal: Did the New Deal Prolong Or Worsen the Great Depression? *SSRN Electronic Journal*. doi:https://doi.org/10.2139/ssrn.1488789 [Accessed 01 June 2025].

Iacoviello, M. (2001). Short-Term Forecasting: Projecting Italian GDPone Quarter to Two Years Ahead. *IMF Working Paper*, 01(109), pp.1–1. doi:https://doi.org/10.5089/9781451853216.001.

IM, E.-O. and CHEE, W. (2011). Quota Sampling in Internet Research. *CIN: Computers, Informatics, Nursing*, 29(7), pp.381–385. doi:https://doi.org/10.1097/ncn.0b013e3181f9dc45 [Accessed 4 May 2025].

IMF (2021). *Policy Responses to COVID19*. [online] IMF. Available at: https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#S.

IMF. (2025). *Fiscal Monitor*. [online] Available at: <https://www.imf.org/en/publications/fm?page=1>.

International Monetary Fund (1950). *Nominal Gross Domestic Product for United States*. [online] FRED, Federal Reserve Bank of St. Louis. Available at: https://fred.stlouisfed.org/series/NGDPSAXDCUSQ.

Jahan, S., Mahmud, A. S., & Papageorgiou, C. (2014, August). *What Is Keynesian Economics? - Back to Basics - Finance & Development, September 2014*. Www.imf.org. <https://www.imf.org/external/pubs/ft/fandd/2014/09/basics.htm#:~:text=Keynesian%20economics%20gets%20its%20name> [Accessed 01 March 2025].

Kelley, K., Clark, B., Brown, V., & Sitzia, J. (2003). Good practice in the conduct and reporting of survey research. *International Journal for Quality in Health Care*, *15*(3), 261–266. OUP. <https://doi.org/10.1093/intqhc/mzg031> [Accessed 4 May 2025].

Khan, A., Khan, N. and Shafiq, M., 2021. The economic impact of COVID-19 from a global perspective. *Contemporary Economics*, pp.64-75. <https://web.p.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=eb9dc064-6c8b-4c92-acf3-6c1a4bb46e27%40redis> [Accessed 01 March 2025].

Krishnamurthy, A. and Vissing-Jorgensen, A. (2011). The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy. *National Bereau of Economic Research* , (17555). doi:https://doi.org/10.3386/w17555 [Accessed 01 June 2025].

Leeper, E.M., Walker, T.B. and Yang, S.-C.S. (2010). Government investment and fiscal stimulus. *Journal of Monetary Economics*, 57(8), pp.1000–1012. doi: <https://doi.org/10.1016/j.jmoneco.2010.09.002> [Accessed 11 June 2025].

López-Santana, M. and Rocco, P. (2021). Fiscal Federalism and Economic Crises in the United States: Lessons from the COVID-19 Pandemic and Great Recession. *Publius: The Journal of Federalism*, [online] 51(3). doi:<https://doi.org/10.1093/publius/pjab015>

Mamun, A., Ullah, E., Hassan, M.S., Mohd Faizal Yusof, Islam, M.A. and Rab, N.B. (2025). Fiscal policy and household savings in Central Europe: a Markov switching VAR with covid shock. *Cogent Economics & Finance*, 13(1). doi:https://doi.org/10.1080/23322039.2025.2537233 [Accessed: 29 June 2025].

Mandel, Dr.C. and Liebens, P. (2019). The Relationship between GDP and Unemployment Rate in the U.S. *International Journal of Business and Social Science*, 10(4). doi:[https://doi.org/10.30845/ijbss.v10n4p3](https://doi.org/10.30845/ijbss.v10n4p3%20) [Accessed 11 June 2025].

Misra, Mr. vinod, & Tyagi, R. (2019). RESEARCH ETHICS IN EDUCATION. PARIPEX INDIAN JOURNAL of RESEARCH, 1–2. <https://doi.org/10.36106/paripex/1607008> [Accessed 4 May 2025].

Moss, K. *et al.* (2025) *The Coronavirus Aid, Relief, and Economic Security Act: Summary of Key Health provisions*. <https://www.kff.org/covid-19/the-coronavirus-aid-relief-and-economic-security-act-summary-of-key-health-provisions> [Accessed: 29 June 2025].

Nominal GDP Gross Domestic Product (GDP) https://fred.stlouisfed.org/series/GDP

Ochoa, C., & Porcar, J. M. (2018). Modeling the effect of quota sampling on online fieldwork efficiency: An analysis of the connection between uncertainty and sample usage. International Journal of Mayket Research, 60(5), 484-501. <https://doi.org/10.1177/1470785318779545> [Accessed: 29 June 2025].

ONO, Y. (2011). The Keynesian Multiplier Effect Reconsidered. *Journal of Money, Credit and Banking*, 43(4), pp.787–794. doi: <https://doi.org/10.1111/j.1538-4616.2011.00397.x> [Accessed 11 March 2025].

Ortiz, I. (2009). Fiscal Stimulus Plans: The Need for a Global New Deal. *Social Science Research Network*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=1368404 [Accessed 1 Feb. 2025].

Peterson, W.C. (1987). Macroeconomics: Where are we? *Review of Social Economy*, 45(1), pp.64–76. doi:https://doi.org/10.1080/00346768700000005 [Accessed: 22 August 2025]..

*Policy basics: Fiscal stimulus* (2020) *Center on Budget and Policy Priorities*. Available at: https://www.cbpp.org/research/fiscal-stimulus [Accessed: 03 June 2025].

*Policy responses to covid19* (2020) *IMF*. Available at: https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#S [Accessed: 03 June 2025].

Raddant, M., & Kenett, D. Y. (2016). Interconnectedness in the Global Financial Mayket. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2848348> [Accessed: 01 June 2025].

Ramey, V.A. and Zubairy, S. (2018b). Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data. *Journal of Political Economy*, 126(2), pp.850–901. doi:https://doi.org/10.1086/696277 [Accessed: 08 August 2025].

Reinhart, C.M. and Rogoff, K.S. (2009). *This Time Is Different Eight Centuries of Financial Folly*. [online] Princeton University Press. Available at: <https://doi.org/10.1515/9781400831722>. [Accessed 9 Jul. 2025].

Sarti, S. and Pelosi, R. (2023). Egalitarian norms, economic growth, and the belief in a zero-sum game. *Social Science Research Network*. [online] doi[:https://doi.org/10.2139/ssrn.4357798](https://stir-my.sharepoint.com/personal/yul00257_students_stir_ac_uk/Documents/Center%20on%20Budget%20and%20Policy%20Priorities.%20(2020).%20Policy%20Basics:%20Fiscal%20Stimulus%20|%20Center%20on%20Budget%20and%20Policy%20Priorities.%20%5bonline%5d%20Available%20at:%20https:/www.cbpp.org/research/fiscal-stimulus.) [Accessed: 09 June 2025].

Sarwat, A. and Akhtar, H., 2023. Non-Financial Maykets and Interconnectedness between US and Emerging Financial Economies: Evidence from Covid-19 Financial Crisis. Bulletin of Business and Economics (BBE), 12(4), pp.238-253. <https://doi.org/10.61506/01.00108> [Accessed: 08 June 2025].

Selgin, G. (2021). The fiscal and monetary response to COVID‐19: What the Great Depression has – and hasn’t – taught us. *Economic Affairs*, 41(1), pp.3–20. doi:https://doi.org/10.1111/ecaf.12443 [Accessed: 01 June 2025].

Stlouisfed.org. (2025). *Government Current Expenditures*. [online] Available at: https://fred.stlouisfed.org/series/GEXPND [Accessed 10 Sep. 2025].

Tapia Granados, J.A. and Diez Roux, A.V. (2009). Life and death during the Great Depression. *Proceedings of the National Academy of Sciences*, 106(41), pp.17290–17295. doi:https://doi.org/10.1073/pnas.0904491106 [Accessed: 09 June 2025].

The White House. (2021). *American Rescue Plan | The White House*. [online] Available at: https://bidenwhitehouse.archives.gov/american-rescue-plan [Accessed 10 Sep. 2025].

Topuz, S. G. (2022). The Relationship Between Income Inequality and Economic Growth: Are Transmission Channels Effective? Social Indicators Research, 162. <https://doi.org/10.1007/s11205-022-02882-0> [Accessed: 03 May 2025].

Tripathy J. P. (2013). Secondary Data Analysis: Ethical Issues and Challenges. Iranian journal of public health, 42(12), 1478–1479 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4441947/> [Accessed: 03 May 2025].

U.S. Bureau of Economic Analysis (1939). *Government Consumption Expenditures and Gross Investment*. [online] FRED, Federal Reserve Bank of St. Louis. Available at: <https://fred.stlouisfed.org/series/GCE> [Accessed: 08 August 2025]..

U.S. Bureau of Economic Analysis (1946). *Federal Government: Current Expenditures*. [online] FRED, Federal Reserve Bank of St. Louis. Available at: <https://fred.stlouisfed.org/series/FGEXPND> [Accessed: 08 August 2025]..

U.S. Bureau of Economic Analysis (2005). *Gross Output by Industry: All Industries*. [online] FRED, Federal Reserve Bank of St. Louis. Available at: <https://fred.stlouisfed.org/series/GOAI> [Accessed: 08 August 2025]..

U.S. Bureau of Labor Statistics (1948). *Employment Level*. [online] FRED, Federal Reserve Bank of St. Louis. Available at: https://fred.stlouisfed.org/series/CE16OV.

University of Stirling. (2019). *Understanding ethics | Research*. University of Stirling. <https://www.stir.ac.uk/research/research-ethics-and-integrity/understanding-ethics/> [Accessed: 03 May 2025].

Vagliasindi, M. and Gorgulu, N. (2021). *What have we Learned about the Effectiveness of Infrastructure Investment as a Fiscal Stimulus? A Literature Review*. [online] *World Bank policy research working paper*. World Bank Group. doi: <https://doi.org/10.1596/1813-9450-9796> [Accessed: 01 June 2025].

Wahyudi, W. (2020). THE RELATIONSHIP BETWEEN GOVERNMENT SPENDING AND ECONOMIC GROWTH REVISITED. *International Journal of Economics and Financial Issues*, 10(6), pp.84–88. doi:https://doi.org/10.32479/ijefi.10614 [Accessed: 08 August 2025]..

Wasti, S. P., Simkhada, P., Teijlingen, E. van , Sathian, B., & Banerjee, I. (2022). The Growing Importance of mixed-methods Research in Health. Nepal Journal of Epidemiology, 12(1), 1175–1178. NCBI. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9057171/> [Accessed: 03 May 2025].

Wilson, C. (2014). Semi-Structured Interviews. *Interview Techniques for UX Practitioners*, pp.23–41. doi:https://doi.org/10.1016/b978-0-12-410393-1.00002-8 [Accessed: 03 May 2025].

Zainal, Z. (2007). Case Study As a Research Method. *Faculty of Management and Human Resource Development Universiti Teknologi Malaysia* . Available at: https://www.semanticscholar.org/paper/Case-Study-As-a-Research-Method-Zainal/8a545bb8172b9d0de6ab8068ab63aefdfc76555d [Accessed 29 Apr. 2025].

Zou, Y. (2025). The impact of fiscal stimulus on employment: Evidence from China’s four-trillion RMB package. *Economic Modelling*, 131, pp.106598–106598. doi: <https://doi.org/10.1016/j.econmod.2023.106598> [Accessed: 09 June 2025].