

Title	Budgeting for cyclicity in a healthcare setting – accounting for economic shocks in the budgetary process
Authors	Gibbs, Ruth
Publication date	2024
Original Citation	Gibbs, R. 2024. Budgeting for cyclicity in a healthcare setting – accounting for economic shocks in the budgetary process. PhD Thesis, University College Cork.
Type of publication	Doctoral thesis
Rights	© 2024, Ruth Gibbs. - https://creativecommons.org/licenses/by-nc-nd/4.0/
Download date	2026-10-31 14:13:49
Item downloaded from	https://hdl.handle.net/10468/18358

Ollscoil na hÉireann, Corcaigh
National University of Ireland, Cork



**Budgeting for cyclicalities in a healthcare setting – Accounting for
economic shocks in the budgetary process**

Thesis presented by

Ruth Gibbs (96343630)

BSc, MSc, MEcon Sc

<https://orcid.org/0000-0002-3934-0593>

for the degree of

Doctor of Philosophy in Commerce

University College Cork

Cork University Business School

Accounting and Finance

Head of Department: Prof. Michelle Carr

Supervisors: Prof. Mark Mulcahy; Prof. Michelle Carr; Dr. Don Walshe

Advisor: Dr. Valerie Walshe

October 2024

Table of Contents

Table of Contents	2
Table of Tables	4
Table of Figures	5
List of Essays	6
Declaration	7
Acknowledgements	8
Abstract	9
<i>Chapter 1 Thesis Introduction</i>	<i>12</i>
Motivation & Rational.....	12
Paper Summaries	19
1.1 Summary of Essay 1	19
1.2 Summary of Essay 2	22
1.3 Summary of Essay 3	26
<i>Chapter 2 Healthcare Budgeting for Cyclicity: Structured Literature Review of Accounting, Public Administration and Health Management</i>	<i>30</i>
Essay Abstract	30
2.1 Summary	30
2.2 Practitioners Impact Statement.....	30
Essay Introduction	31
Research Methodology	34
Descriptive Findings and Insights.....	40
2.3 Descriptive Findings.....	40
2.4 Thematic Findings and Opportunities.....	43
Essay Conclusion	50
<i>Chapter 3 Planning for the Business Cycle in Healthcare Budgeting – A Multivariate Time Series Approach.....</i>	<i>54</i>
Essay Abstract	54
Essay Introduction	54
Theory	60
3.1 Budgetary Planning and Forecasting in Healthcare.....	60
3.2 Managing Cyclical Impacts on Resource Allocation Decisions	62
3.3 Managing Cyclical Impacts.....	64
3.4 The Irish Healthcare Context	65
Empirical Strategy	66
3.5 The VAR Methodology	66
3.6 Data	68
3.7 Model Selection	70
3.8 Model Outputs	72
Empirical Findings	73

3.9 Impulse Response Functions	74
3.10 Forecast Error Variance Decompositions	76
3.11 Counterfactual	77
Discussion.....	80
Essay Conclusion	82
<i>Chapter 4 Building Healthcare Capacity: Accounting for Utilisation Changes in the Aftermath of an Economic Shock.....</i>	<i>87</i>
Essay Abstract	87
Essay Introduction	87
Theory	91
Empirical Strategy	99
4.1 The Irish Healthcare System	100
4.2 Data Collection.....	101
4.3 Vector Autoregression Analysis	109
Empirical Findings	116
4.4 The Impact of Economic Shocks on Budgeting Processes	116
4.5 Deficiencies in the Budgeting Process to Cope with Shocks	119
4.6 Measuring the Impact of Shocks on Healthcare Utilisation	122
4.7 The Response of the Healthcare Utilisation Index to a GDP Shock.....	122
4.8 The Sensitivity of Healthcare Utilisation to GDP Shocks	126
Discussion.....	131
Essay Conclusion	134
<i>Chapter 5 Thesis Conclusion.....</i>	<i>138</i>
Chapter Introduction	138
Overview of Thesis	138
Thesis Contributions	141
5.1 Essay 1 Contribution	143
5.2 Essay 2 Contribution	143
5.3 Essay 3 Contribution	145
Limitations and Opportunities for Further Research.....	146
References	149
Appendix A: VAR Model Robustness Checks	177

Table of Tables

Table 2.3.1 List of Journal	38
Table 2.4.1 Summary of Categorisation.....	42
Table 3.4.1 Determinants of Health Expenditure Used in VAR Estimation	69
Table 3.4.2 Forecast Errors for Public Healthcare Expenditure, 2012-2021	70
Table 3.5.1 Forecast Error Variance Decomposition for Government Health Expenditure, 1970-2021 (%).	77
Table 3.5.2 Counterfactual Analysis of Cycles - Government Health Expenditure (GHE)	80
Table 3.5.3 Counterfactual Analysis of Cycles – Private Health Expenditure (PHE).....	80
Table 4.3.1: Healthcare Costing Systems.....	96
Table 4.4.1 Interview Sample Details	103
Table 4.4.2 Outline of the Utilisation Indicators.....	105
Table 4.4.3 The Forecast Errors of Healthcare Utilisation Indices.....	112
Table 4.4.4 HQ, AICC and SBC Test Results.....	114
Table 4.5.1 Forecast Error Variance Decomposition for Healthcare Utilisation, 1994-2021	127
Table 4.6.1 The Impact of Recent Shocks on Healthcare Utilisation	133
Table 15: Lag Length for Three Variable Model	177
Table 16: Model Selection	178
Table 17: Impulse Response Function with alternative variable ordering:.....	179

Table of Figures

Figure 2.3-1 PRISMA-Flow Diagram for Literature Review Process	38
Figure 3.5-1 Impulse Response Functions	75
Figure 3.5-2 Counterfactual Simulation of Government Healthcare Expenditure with GDP Shocks Turned Off (€million)	78
Figure 3.5-3 Counterfactual Simulation of Private Healthcare Expenditure with GDP Shocks Turned Off (€million)	79
Figure 4.4-1 Components of Hospital Utilisation Activity	107
Figure 4.4-2 The Number of People Eligible for GMS Scheme:	108
Figure 4.4-3 Activity that Care for the Elderly	109
Figure 4.5-1 Employment Affairs and Social Protection, Health, and Education Expenditure 2009-2023 (Indexed to 100)	119
Figure 4.5-2 The Response of the Hospital Utilisation Index to a GDP Shock	123
Figure 4.5-3 The Response of General Medicine Scheme Utilisation Index to a GDP Shock	125
Figure 4.5-4 The Response of Care of the Elderly Utilisation Index to a GDP Shock.....	126
Figure 4.5-5 Actual vs. Simulated Hospital Utilisation Index without Economic Shock Impact	129
Figure 4.5-6 Actual vs. Simulated GMS Utilisation Index without Economic Shock Impact .	130
Figure 4.5-7 Actual vs. Simulated Elderly Service Utilisation Index without Economic Shock Impact	131
Figure A 1-1: Impulse Response Comparing Using First Differences and Log Value	180

List of Essays

This doctoral dissertation consists of a summary and the following three essays, which are referred to in the text by their numerals:

Essay 1: Gibbs, R., Carr, M., Mulcahy, M., & Walshe, D. (2024). Healthcare budgeting for cyclicalities: Structured literature review of accounting, public administration and health management. *Public Money & Management*, 44(1), 35-43

Essay 2

Gibbs, R., Carr, M., Mulcahy, M., & Walshe, D. (2025). Planning for business cycle fluctuations in budgeting: The application of innovative data sources and techniques. *The British Accounting Review*, 101576.

Essay 3 Gibbs, R., Carr, M., Mulcahy, M., & Walshe, D. Building Financial Resilience in Healthcare Budgeting: Accounting for Utilisation Surges in the Aftermath of An Economic Shock. Unpublished Manuscript.

Declaration

This is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism.

Signature:

Ruth Gibbs

Acknowledgements

Completing this thesis would not have been possible without the help and support of a team of individuals who, in various ways, have contributed to it since I began my research in September 2016.

I would like to acknowledge and give my thanks to my supervision team, Professor Michelle Carr, Dr. Don Walshe and Professor Mark Mulcahy for their time and effort. I am grateful for their knowledge and expertise.

In addition, I would also like to thank the Health Services Executive in Ireland for providing generous financial support for my PhD. In particular, I like to extend my gratitude to Dr Valerie Walshe for her engagement throughout this project.

Finally, I would like to express my deepest gratitude to my husband, Adrian for his unwavering support, patience and encouragement throughout this journey. Your belief in me kept me going even during the most challenging times. Thank you for always being there for me. Abigail and Jude, you have inspired and motivated me to complete this research. I am so grateful for your patience and the sacrifices that you have made so that I could complete this thesis.

Abstract

The budgeting process is a critical component of any healthcare system's response to economic shocks. Recent events, such as the global financial crisis or the Covid-19 pandemic, have shown that the budgetary response is often insufficient to maintain a consistent level of service. This dissertation addresses these significant challenges by demonstrating how healthcare budgeting capabilities should be enhanced to better account for the impact of business cycle fluctuations.

Current healthcare accounting practices, such as annual incremental and global budgeting, are reactive and often fail to respond to economic shocks adequately. For instance, recent shocks have led to emergency reactionary budgets, subsequent austerity budgets and budgetary over-estimation for multiple years after the shock. Even the widely used DRG or PLIC costing systems, which aim to improve efficiencies and transparency, arguably come at the expense of financial resilience during and after recessions. These inadequacies underscore the need for more proactive, data-driven capabilities to inform budgeting decisions. By leveraging more data and analysis, systematic risks such as a recession can be assessed, and the impact of such shocks can be measured to inform budgetary responses and improve the financial resilience of healthcare systems.

The Irish Healthcare System is used as a case study to demonstrate how data and analysis can enhance budgeting decisions. Archival data on government and private healthcare expenditure were gathered, while data measuring the utilisation of services was also collected and used to calculate healthcare utilisation indices for three different areas of expenditure. The VAR methodology, a novel approach in healthcare budgeting, measures the impact of GDP shocks on healthcare expenditure and utilisation indices. The VAR methodology is a flexible way to understand the dynamic relationship between variables without imposing restrictive assumptions. Furthermore, qualitative interviews with C-level finance and research executives

working in the healthcare service in Ireland were also conducted to understand how political and institutional factors can be addressed with this analysis.

The interviews highlighted the need to understand the impact of shocks on the healthcare system. Currently, the budgetary response is reactionary and has adversely impacted the delivery of services and the financial management of healthcare services. The VAR analysis results further highlight the significant and growing need to understand the impact of the business cycle on budgetary processes. For example, GDP shocks impact public and private healthcare expenditure and public healthcare utilisation for multiple years after a shock occurs. However, the impact of a shock on healthcare budgets is multifaceted. For example, there is a positive relationship between government and private healthcare expenditure, and this impact can last up to 9 years after a shock occurs. In contrast, the impact of shocks on the utilisation of services is complex. Each sector responds differently to a shock, and the impact varies over time. By measuring the impact of shocks on healthcare services and accounting for these impacts in the budgeting decision-making process, adverse impacts on the provision of healthcare services at all stages of the business cycle could be minimised.

This dissertation, therefore, demonstrates how VAR methodology could expand healthcare budgeting capabilities to better account for the complex impacts of business cycle fluctuations. Specifically, using data and analysis to support resource allocation decisions by measuring the effect of a GDP shock on healthcare resources and healthcare utilisation can ensure that budgeting responds in an informed way rather than reacting to changes in the external environment. Secondly, the VAR methodology calculates a permanent level of resources that is likely to remain available even if economic conditions change and a temporary level of resources at risk after an economic shock. Ensuring that long-term budgetary decisions are based on a permanent level of expenditure, a consistent level of services is more likely even in an economic downturn.

Finally, this dissertation contributes to the evolution of the literature on financial resilience. For example, by measuring the impact of a shock on the utilisation of healthcare services and including these impacts in the estimation of the existing level of services, healthcare budgets are more likely to be based on a more reliable level of services, particularly after a shock occurs.

Chapter 1 Thesis Introduction

Motivation & Rational

This dissertation proposes that healthcare budgeting processes must be enhanced to anticipate, measure, and absorb the impacts of business cycle fluctuations. (Begkok & Antonopoulou, 2021; Busse *et al.*, 2013; OECD, 2015; Steccolini, 2018). Recent events such as the 2008 Global Financial Crisis and the Covid-19 Pandemic have demonstrated that there is an increasing need to provide a consistent level of services, while coping with the fallout of economic shocks (Bouckaert, 2021). Currently, healthcare budgeting processes react to economic shocks using emergency budgets and subsequent rebudgeting (Alensani, 2012; Annessi-Pessini *et al.*, 2012; Bracci *et al.*, 2015). Over several years, this has led to adverse healthcare outcomes and underinvestment in healthcare services, and persistent budget overruns (OECD, 2023a; 2023b). Ferry *et al.* (2023, p1) argues that “*countries are potentially going to face a perpetual state of emergency while struggling to deal with interlocking and successive shocks*”. The lack of financial resilience in the healthcare sector has limited many governments’ ability to withstand the impact of economic shocks (Barbera *et al.*, 2020; Coyle & Ferry, 2022; Ferry & Eckersky, 2022), while plans to meet longer term healthcare challenges such as the provision of care as the populations ages have also been derailed. This dissertation is motivated to help address these challenges by demonstrating how utilising more data and analytical tools, previously unexplored in a healthcare budgeting setting can measure the impacts of shocks on healthcare expenditure and on how services are utilised. This can provide insight into how healthcare providers operate under restrained resources, which is rarely understood (Ahrens & Ferry, 2020; Barbera *et al.*, 2020; Barbera *et al.*, 2021). Policy makers can make more informed decisions to mitigate risks and optimise resource allocation decisions by enhancing budgeting processes to measure and understand the impact of business cycle

fluctuations. This would help to ensure that committed healthcare services are maintained even after economic downturns.

These three essays examine how healthcare systems are affected by economic fluctuation, with a particular emphasis on the budgeting decision-making process. Healthcare systems face significant challenges when it comes to providing a consistent level of services, especially when hit by an economic shock. This dissertation aims to address this issue by exploring three research questions. 1) How have healthcare budgeting practices evolved in response to the recent crisis? 2) How could measuring the impact of economic shocks on healthcare resources make better resource allocation decisions? 3) How can the impact of economic shocks on the utilisation of services improve the financial resilience of healthcare systems? The main goal of this dissertation is to provide innovative insights into public administration and accounting research and theory that are theoretically and practically relevant to healthcare management and policymakers.

The implications of business cycle fluctuations on healthcare budgeting processes are explored in three distinct essays. Each essay is an independent entity, shedding light on how economic shocks impact budgeting processes and considering how these processes could be enhanced to better account for such shocks. The first essay describes current budgeting methods used in healthcare to allocate resources and how these methods are impacted by business cycle fluctuations. The essay utilises the structural literature review methodology to evaluate comprehensively, transparently, and systematically from existing literature in order to assess healthcare budgeting processes are used during economic adversity (Massaro *et al.*; 2015; Massaro *et al.*; 2016). Searching the literature across three disciplines, mainly public administration, management accounting and healthcare management helps to identify gaps and inconsistencies (Annessi-Pessini *et al.*, 2016). There is a particular focus on how budgeting is adapted when economic shocks occur whilst highlighting any deficiencies that persist in

minimising cyclical impacts on healthcare service provision. This essay is a foundation for exploring how current budgeting methods reinforce cyclical impacts on healthcare systems. For example, it highlights the dominance of annual incremental budgeting, where resources are allocated based on what was received last year plus an available increment, which means that budgetary cuts are inevitable when a shock occurs and increments are no longer available (Caiden, 2010; Caperchione *et al.*, 2014; George, 2017). Other budgeting processes, such as medium-term and long-term planning, have also failed to account for economic shocks, primarily due to the difficulties in accurately forecasting the timing and magnitude of recessions (Arnold & Artz, 2019; Jordan & Messner, 2019; McQuestin *et al.*, 2022). Consequently, these practices have been rendered inept when a shock occurs (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). This essay prompts the need to examine further how budgeting practices could be enhanced, specifically to use more data and analysis to account for cyclical impacts more effectively. Furthermore, this highlights the need to understand the institutional and political impediments that prevent reforms to healthcare budgeting.

The second essay responds to the need highlighted in the first essay for using more data and analysis to enhance budgeting practices. Specifically, it uses a time series econometric approach, Vector Autoregression (VAR), to measure the dynamic sensitivity of both public and private healthcare expenditure to GDP shocks in Ireland (Sims, 1972; 1980a; 1980b; 1983). The VAR methodology, which is novel in the healthcare budgeting context, uses historical data to capture complex dynamic interconnections between variables without making restrictive or unrealistic assumptions (Sims, 1980a; 1980b; Stock & Watson, 2001). By measuring and understanding dynamic interrelations between public and private health expenditure and business cycle fluctuations provides evidence to inform annual and multi-year budgetary decisions. Although VAR has been shown to have superior forecasting capabilities, we do not believe that this would be an optimal use of this technique for healthcare budgeting because

the difficulties in accurately predicting changes in economic cycle will continue (Arnold & Artz, 2019; Lu *et al.*, 2009; Mikesell, 2018). However, this essay uses impulse response functions and forecast variance decompositions and a counterfactual analysis, to measure cyclical impacts on healthcare. These estimates can be used to alter the reaction to shocks when they occur and ensure that multi-year impacts are considered (Stock and Watson, 2002). Such evidence would also help minimise short-termism and political and institutional factors that often impact healthcare resource allocation decisions. This essay, for example, specifically calls for financing multi-year healthcare programmes from a sustainable level of resources, which is measured by the counterfactual analysis. This would ensure that the committed level of services is sustainable even when an adverse economic shock occurs.

The third essay is premised on the basis that the utilisation of healthcare services reacts differently when an economic shock occurs (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). A mixed-method approach is undertaken to assess the factors that impact the provision of healthcare services when a shock occurs. Qualitative interviews were conducted with C-level executives in the HSE and Department of Health, Ireland's public provider of healthcare services. The intent of these interviews was discovery, particularly to understand how budgeting processes account for shocks and how such processes changed when recent economic shocks occurred. At the same time, data on healthcare utilisation in Ireland was collected and used to create three healthcare utilisation indices. The VAR methodology was then used to measure the impact of economic shocks on each utilisation index, by estimating impulse response functions and forecast error variance decompositions. A counterfactual analysis was also undertaken. The results showed that although the budgeting processes were adapted in the aftermath of an economic shock, they still failed to account for the impact of a shock on the delivery of services. The VAR analysis is then used to demonstrate how to measure the impact of GDP shock on each utilisation index and then account for these impacts

in the budgeting process. This analysis highlights the complex impact that each shock has on healthcare utilisation. There is a divergence in how each sector responds to a shock, and this impact also changes over time. The counterfactual analysis also demonstrates that the utilisation indices have responded differently to each shock. By measuring and incorporating these impacts in the budgeting process, healthcare budgeting can be used more effectively to anticipate and respond to economic shocks, and in doing so, the impact of the shock on healthcare provision can be minimised.

Empirical data for this dissertation was gathered from the Irish Healthcare sector. Ireland is an interesting context to analyse the impact of economic shocks on the healthcare system, as it has been widely acknowledged that the Irish government implemented the most significant cuts to healthcare expenditure in the aftermath of the 2008 Global Financial Crisis and was still recovering from these cuts when the Covid-19 shock occurred (Carr & Beck, 2022; Cohen *et al.*, 2015). As a result, health services today experience adverse healthcare outcomes, including long waiting times to access services, staffing shortages, and regular and significant budgetary overruns (Department of Public Expenditure & Reform, 2023a; NTPF, 2023). Furthermore, it has also been acknowledged that the budgetary processes have contributed to these adverse impacts (Cohen *et al.*, 2015; IMF, 2010). For example, in Ireland, data that could be used to provide evidence to support budgeting decisions would be routinely collected in other countries, which was not available (OECD, 2015). Accounting systems are also inadequate, as cash rather than accrual accounting methods tend to be the norm while costing systems such as DRG systems have not been adopted systematically (Cohen *et al.*, 2015). Cyclical impacts have also been reinforced by annual incremental and global budgeting, where resources are allocated centrally based on what is available through general taxation, and services are paid in total regardless of the services provided (White, 2013). For these reasons, a great need exists to demonstrate how analysing more data could enhance budgeting decisions in Ireland.

In summary, the unique research material presented in this dissertation offers a unique insight into how healthcare organisations can enhance their budgeting capabilities to ensure that healthcare services are provided consistently at all stages of the business cycle. Understanding that healthcare revenues and utilisation react differently after a shock (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018), the novel application of the VAR methodology used in essays 2 and 3, now supports this with evidence. By empirically demonstrating how healthcare budgeting can systematically measure the impact of GDP shocks on healthcare revenues and utilisation helps address the need highlighted in the literature and in the qualitative interviews to support the budgeting process with more data and analysis (Leoni *et al.*, 2021; McQuestin *et al.*, 2022; Tallaki & Bracci, 2020). Furthermore, the literature has also highlighted that political and institutional factors play a significant role in budgeting decisions (Kuhlmann *et al.*, 2021; Lee & Chen, 2022; Rogríguez-Tejedo, 2012; Wei, 2021). However, by splitting healthcare expenditure into a permanent and temporary level of expenditure, policymakers and politicians can ensure that new long-term committed expenditure programmes are based on a sustainable level of expenditure. Furthermore, by measuring the impact of a business cycle shock on healthcare utilisation, this research has demonstrated that the reaction of healthcare utilisation to a GDP shock is complex. For example, this research showed that different sectors react differently to shocks, while different shocks led to a different reaction. As a result, if healthcare budgeting is to respond to shocks when they occur, these impacts must be accounted for in budgeting decisions.

This dissertation highlights the need for healthcare budgeting processes must be enhanced to account for macro-systematic risks such as business cycle fluctuations (Anessi-Pessini *et al.*, 2020; Cepiku *et al.*, 2018; Di Massaro & Natalini, 2013; Leoni *et al.*, 2020; Tallaki & Bracci,

2020). Current budgeting processes, such as annual incremental and global budgeting, reinforce the impacts of business cycle fluctuations on the provision of healthcare (Braendle & Colombier, 2016; Chen *et al.*, 2013; Thompson *et al.*, 2022; White, 2013). Advancements in accounting systems in healthcare have focused on improving costing systems and micro-decision-making processes, such as how costs are allocated to a procedure or service provider (Busse *et al.*, 2013; Chapman *et al.*, 2014; Ellwood *et al.*, 2014). While these enhancements have improved decision-making at a micro level, systematic macro factors are inhibiting healthcare providers from delivering sustainable services (Stark, 2014; Steccolini, 2018). Consequently, enhancing healthcare budgeting techniques to measure and subsequently account for the impact of GDP shocks on both the expenditure and the utilisation of service will help to build more financial resilience. In doing so, the budgeting processes can assist in responding to and even absorbing the impact of GDP shocks on the system (Ahrens & Ferry, 2020; Barbera *et al.*, 2019; Barbera *et al.*, 2020). This dissertation is a compass to guide public administration and accounting scholars towards new research ideas while providing practical insights for healthcare finance practitioners.

This introductory chapter succinctly summarises the three dissertation essays. These summaries encompass the research motivation, the theoretical foundation, the empirical strategy, and the critical contributions of each study. The intention is to inspire the researcher and practitioners to delve deeper into the individual studies after reading the introduction, which will provide a more detailed perspective of the challenges that healthcare budgeting faces in ensuring that a consistent level of services is provided, even when dealing with the adverse consequences caused by an economic shock.

Paper Summaries

1.1 Summary of Essay 1

This essay aims to systematically analyse the public administration, management accounting, and healthcare management literature to assess the unexplored interrelations between these disciplines. Recent economic crises, including the 2008 financial crisis and the Covid-19 pandemic, have starkly illustrated that the provision of consistent healthcare services is often disrupted by economic shocks (Bouckaert, 2021). Current budgetary processes fail to plan and absorb the impact of inevitable shocks, leading to adverse effects on healthcare provision (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). For example, recent shocks have resulted in multi-year austerity budgets, rising government debt levels, persistent budgetary overestimation, staffing shortages and longer waiting times to access service (Bernal-Delgado et al, 2020; Guven-Uslu, 2012).

The SLR approach was undertaken to systematically search and synthesise the literature across the three disciplines of management accounting, public administration, and healthcare management to deepen the understanding of the problem caused by cyclical fluctuations and assess potential solutions (Annessi-Pessina *et al.*, 2016; Massaro *et al.*, 2015; Massaro *et al.*, 2016). The SLR methodology provides a methodological inclusive framework, given the use of qualitative and quantitative approaches in these disciplines (World Bank, 2022). This SLR is a three-step process. Firstly, high-quality journals in the three fields were considered if they had an ABS ranking of 3 stars or more. We also included a small number of 2-star journals that had a specific focus on healthcare or public administration (Chartered Association of Business Schools, 2021). Secondly, to adapt the research questions into searchable words, the PICO framework, Population, Intervention, Comparison and Outcome, was used (Davis, 2011; Tacconelli, 2010). Once the selected journals were searched, the relevant articles were coded into three categories to identify patterns in the literature and adopt a formal approach to

extracting information from each paper (Massaro *et al.*, 2016). Regional focus was relevant given the disparity of the response by different countries and public sector organisations to the 2008 financial crisis (Guthrie *et al.*, 2012; Massaro *et al.*, 2015). The research methodology used in each article was also considered to assess methods that may have been under-represented and, therefore, may warrant further investigation (Guthrie & Murthy, 2009). Finally, the articles were also categorised by the focus of each paper to understand how budgetary processes account for cyclicalities (Manhart & Thalmann, 2015).

The findings demonstrated that the European countries that the 2008 financial crisis had most impacted were studied most, and these studies tended to be in the management accounting field (Alesani, 2012; Anessi-Pessina *et al.*, 2012; Barbera *et al.*, 2016; Cepiku *et al.*, 2018; Cohen *et al.*, 2015; Di Mascio & Natalini, 2013; Dommett *et al.*, 2016; Gomes, 2021). In contrast, US studies tended to be in Public Administration journals. Qualitative studies were more popular than quantitative, although there has been an increase in such studies since 2020 (Amami *et al.*, 2021; Bernal-Delgado *et al.*, 2020; Brien *et al.*, 2021; Lee & Chen, 2021; McQuestin *et al.*, 2022; Wei, 2021). The focus of the studies showed that annual incremental budgeting, the norm in healthcare settings, while how the budgeting process manages cyclical impacts were underrepresented.

Upon closer examination, it becomes evident that budgetary processes are influenced by and contribute to the impact that business cycle impacts have on healthcare resource allocation decisions. The most commonly used budgeting technique, annual incremental budgeting, relies on consistent growth for an increment each year (Caiden, 2010; Caperchione *et al.*, 2014; George, 2017; Høgheim *et al.*, 1989). This reliance on growth makes the budgeting process vulnerable to economic shocks, often leading to budgetary overestimation and the need for rebudgeting (Braendle & Colombier, 2016; White, 2013). Other budgetary processes, such as

multi-year budgeting and long-term planning, also prove less effective in the face of economic shocks, as they are based on accurate forecasts.

As a result, recessions have become the primary source of budgetary overestimation and inaccuracy (Fitz Verploegh *et al.*, 2022; Meyers, 2009; Nakrošis *et al.*, 2020; Posner, 2009). To manage cyclical impacts, public sector organisations, particularly those bound by fiscal rules, need to reduce the volatility of revenues. For example, using counter-cyclical reserve funds to restrain expenditure during a period of economic growth to have sufficient resources available to absorb the impact of recessions when they occur can reduce cyclical impacts (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). Although these funds have improved the financial management of organisations that use them, they are often politically unfeasible, particularly in a healthcare setting where demand and need are so great (Hou & Smith, 2010; Lee & Chen, 2022; Rodríguez-Tejedo, 2012). To do so also requires good quality account information and capabilities to measure cyclical impacts.

This essay underscores the need for further research, particularly in Europe, to advance the use of quantitative techniques in improving budgetary processes. Further research demonstrating how to measure and incorporate cyclical impacts into the budgetary process would reduce adverse business cyclical impacts on healthcare provision. However, political and institutional barriers remain strong in healthcare settings, necessitating a deeper understanding of decision-making processes and impediments to budgeting reforms.

This paper contributes to the literature in the following ways. Firstly, Chen *et al.* (2013), Thomsen (2019) and Thompson *et al.* (2022) have all highlighted the inadequacies of healthcare budgeting processes, mainly annual incremental budgeting but also multi-year budgeting and long-term planning in allocating resources consistently through the economic cycle. This essay showed that research has focused on annual incremental budgeting rather

than managing cyclical impacts, while quantitative studies are also underrepresented. Therefore, there is a need for future research to expand budgeting capabilities, using more quantitative techniques to measure and account for cyclical impacts in the budgetary process. Secondly, this essay shows the political and institutional factors that continue to prohibit budgetary reform of healthcare budgeting processes. Kuhlmann *et al.* (2021), Lee & Chen (2022) and Rodriguez-Tejedo (2012) showed that political and institutional impediments to reforming budgeting processes, particularly in a healthcare setting, continue to exist. This essay has highlighted that institutional and political factors in budgeting decisions are significant, particularly in a healthcare setting where needs are great, and resources are rarely adequate to meet service demand. Further research is necessary to understand these impediments if business cycle impacts are accounted for through the budgetary process.

1.2 Summary of Essay 2

Sustainable healthcare provision requires the services to be delivered consistently, even in times of economic downturn (Bouckaert, 2021). However, current budgeting processes must be improved to manage cyclical impacts (Ahrens & Ferry, 2020; Barbera *et al.*, 2020; Braendle & Colombier, 2016; Lee & Chen, 2022; Thompson *et al.*, 2022). Economic shocks, such as the global financial crisis and the Covid-19 pandemic, led to overestimation in healthcare budgeting and required an emergency response through rebudgeting (Alesani, 2012; Anessi-Pessina *et al.*, 2012; Bracci *et al.*, 2015). The repercussions of these shocks also lasted for several years, with the implementation of subsequent austerity budgets (Hou & Moynihan, 2008; Lee & Chen, 2021). The budgeting response to crises has resulted in a shift in decision-making powers back to central government, sidelining strategic or longer-term plans, ignoring preferences, penalising efficient institutions, and leading to multi-year underinvestment in healthcare (Fitz Verploegh *et al.*, 2022; Meyers, 2009; Nakrošis *et al.*, 2020; Posner, 2009). Improving the budgeting response to shocks requires enhancing risk management capabilities

to anticipate, account and absorb the impact of shocks (Ahrens & Ferry, 2020; Barbera *et al.*, 2016; Barbera *et al.*, 2020). As a result, healthcare budgeting needs to adopt more sophisticated tools for data analysis, thereby supporting the budgeting process with evidence (Leoni *et al.*, 2021; Vollmer *et al.*, 2018). This approach can also address the significant influence of political and institutional factors on the healthcare sector (Kuhlmann *et al.*, 2021; Rodríguez-Tejedo, 2021; Snow *et al.*, 2012).

This essay aims to measure the dynamic impact of business cycle fluctuations on resourcing decisions, using the Irish healthcare sector as a case study. The Irish case provides a rich context for this study. Ireland was severely impacted by the 2008 financial crisis and suffered the most significant reduction in health expenditure of any OECD country (Carr & Beck, 2020; Turner, 2018). The Covid-19 pandemic occurred when the healthcare sector had not recovered sufficiently from the fallout of the 2008 recession (Crowley & Hughes, 2021; NTPF, 2022). Furthermore, government health expenditure is primarily financed directly from taxation, where cyclical impacts are often compounded (White, 2013). A robust private health sector is funded through health insurance and directly from patients (HIA, 2020; OECD, 2022). These factors provide a rich context to explore how the budgeting process can be adopted to expand its capabilities to anticipate, incorporate and better absorb business cycle impacts.

Public and private health expenditure and GDP data from 1970 until 2021 are collected from the Health Service Executive, OECD and Central Statistics Office (CSO, 2022; Department of Health, 2022). The VAR methodology is then used to calculate impulse response functions (IRF) and Forecast Variance decomposition (FEVD) to measure the impacts of GDP on public and private healthcare expenditure (Sims, 1980a; 1980b). VAR models are regularly used in other sectors to measure procyclical behaviour (Marcucci & Duagliariello, 2008; Pool *et al.*, 2015). It offers a highly flexible and evidence-based method of examining the dynamic relationships between variables through time without making restrictive

assumptions (Sims, 1980a). Then, a counterfactual analysis is undertaken, whereby public and private health expenditures are estimated, removing the impact of GDP shocks. The counterfactual analysis is then used to understand how business cycles have impacted healthcare provision in Ireland since 1970.

The findings demonstrate that Ireland's healthcare expenditure is highly sensitive and pro-cyclical. For example, the FEVD showed that GDP shocks account for 30-70% of the variation in government healthcare expenditure and up to 60% in private healthcare expenditure. Furthermore, it takes multiple years for the impact of a shock to occur, as the IRF estimated that the most significant effect on government healthcare expenditure was 3-7 years after a shock and nine years for private expenditure. Finally, the counterfactual analysis shows that cyclical impacts have increased throughout the study. Therefore, considering these impacts in the budgeting process is even more critical. For example, the counterfactual analysis measures a permanent level of healthcare expenditure that will persist after an economic shock occurs and a temporary level of expenditure that is at risk after an economic shock. Basing longer-term resource allocation decisions on the permanent level of healthcare expenditure would reduce the sensitivity of healthcare expenditure to economic shocks. Furthermore, the budgetary response to a shock could be more informed by using the VAR methodology to estimate the impact of a shock on resources for multiple years after the shock. Doing so would ensure that the budgeting response to shocks is more informed rather than reactionary, which reinforces the cyclical impacts.

This essay uniquely contributes to the public administration, accounting, and healthcare management literature. It introduces a novel approach to healthcare budgeting that would increase the use of data and analytics to enhance decisions while also helping minimise political and institutional factors that can dominate healthcare settings. Firstly, Hou and Moynihan

(2008) and Lee & Chen (2021) have highlighted the limitations of annual incremental budgeting in accounting for business cycle fluctuations, which lead to adverse multi-year impacts on the provision of services. This essay empirically demonstrates how the VAR methodology could be used to measure the effects of a GDP shock on healthcare resourcing decisions and incorporate these impacts into the annual and multi-year resource allocation process. Secondly, Henttu-Aho & Järvinen (2013) and Mikesell (2018) have shown that a primary limitation to multi-year budgeting is the inadequacies in accurately forecasting the timing and magnitude of economic fluctuations. This essay highlights that rather than relying on inaccurate forecasts to allocate resources, measuring and incorporating the cyclical impacts into their decision-making processes would be more effective in minimising the multi-year impact of business cycle fluctuations. Therefore, the budget process can be used to alter the response to the shock in an informed rather than a reactionary manner.

Finally, building on the need for evidence-backed budgetary decisions as highlighted by Thompson & Gates (2007), Vollmer *et al.* (2009) and White (2013), this essay employs counterfactual analysis to divide healthcare expenditure into a permanent or persistent level and a temporary level that fluctuates with cyclical impacts. Multi-year and longer-term expenditure decisions can be based on permanent expenditure, and one-off short-term expenses can be based on temporary expenditure. The practical implication is that decision-makers can strive to minimise the impact of political cycles on healthcare decisions, especially during economic growth. This analysis also illustrates the consequences of overspending on longer-term healthcare provision by calculating the sustainable healthcare expenditure level at all economic cycle stages.

This analysis underscores the necessity for future research to delve deeper into the political and institutional factors influencing resource allocation decisions. Additionally, understanding

the impact of economic cycles on healthcare utilisation is a crucial area that requires further exploration.

1.3 Summary of Essay 3

The utilisation of healthcare services changes in the aftermath of an economic shock and failing to understand these impacts impairs the delivery of a consistent level of services (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). Recent healthcare accounting reforms have focused on improving accounting information to increase transparency and accountability by developing costing systems such as Diagnostic Related Systems (DRG) or Patient Led Costing Systems (PLIC) (Busse *et al.*, 2013; Chapman *et al.*, 2014; Ellwood *et al.*, 2015). While these systems have been successful in improving clinician decision-making, increasing transparency, and making efficiency gains (Begkok & Antonopoulou, 2021; Chapman *et al.*, 2022; Llewellyn *et al.*, 2016), there is growing evidence that the financial resilience of healthcare systems has suffered, particularly in the aftermath of a recession (Stark, 2014; Steccolini, 2018). Financial resilience has been defined as the capacity to anticipate, measure and absorb the impact of a shock when it occurs (Ahrens & Ferry 2020; Barbera *et al.*, 2019; 2020; Lee & Chen, 2021; Marrs, 2020; Padovani *et al.*, 2021). To improve financial resilience, Leoni *et al.* (2020) and Tallaki & Bracci (2020) have called for an increasing emphasis on longer-term planning and risk management by using more data and analysis. This essay addresses this need by demonstrating how to measure the impact that economic shocks have on the utilisation of healthcare services. To do so requires an assessment of current budgeting practices, explicitly emphasising how such practices have evolved after recent economic shocks. Subsequently, we demonstrate how the budgeting process could be further enhanced to account for the impacts of business cycle fluctuations on healthcare utilisation.

The essay employs a mixed-method approach by undertaking qualitative field interviews, collecting archival data and performing quantitative analysis to measure the impact of GDP

shocks on healthcare utilisation using the VAR methodology (Sims, 1972; 1980a; 1980b). Interviews of C-level executives working in finance and research functions in the provision of public healthcare in Ireland were conducted to delve into current budgeting practices and assess how these practices have evolved in response to recent economic shocks. Data is also collected to create healthcare utilisation indices across different areas of healthcare expenditure, mainly the hospital sector, services that care for elderly patients and GP services provided by the government (Department of Health, 2022). The VAR methodology was then employed to calculate Impulse Response Functions (IRF) and Forecast Error Variance decomposition (FEVD) to measure the impact of GDP shock on the three healthcare utilisation indices (Stock & Watson, 2001). A counterfactual analysis was also undertaken to measure how healthcare utilisation would have evolved over the past twenty-seven years had GDP shocks not occurred (Sims, 1980a). Finally, the findings from the qualitative study and the VAR analysis were tied together to show how the budgeting process could be further enhanced to account for the impact of business cycle fluctuations. This analysis provided substantial insight into the impact of GDP shocks on healthcare utilisation at different stages of the economic cycle.

The finding demonstrates the complexity of accounting for the impact of business cycle fluctuation on the utilisation of healthcare services. Firstly, the interviews confirmed that economic shocks require an emergency response and budgetary practices are adapted to respond to changes in the environment. However, despite increasing efforts to support budget decisions with data and analysis, budgeting processes rely on annual incremental and global budgets to allocate expenditures. The quantitative analysis highlights the need to measure and incorporate cyclical impacts into the budgetary decision-making process. This analysis has highlighted that economic shocks have a multi-year impact on the healthcare utilisation sectors, and there is a need to assess and account for each sector separately. For example, the VAR findings show that each sector responds differently to an economic shock; this response varies

over time. Finally, the counterfactual analysis showed that different shocks have impacted the healthcare utilisation sectors differently. Therefore, for the annual budgeting process to begin to account for such impacts, we recommend that the estimation for the existing level of services is adjusted by cyclical impacts as measured by the VAR model. In doing so, the annual budgets will estimate the level of committed services more accurately. In doing so, the transparency of health budget estimates will be improved by accounting for the impact of shocks in the budgeting process, and the estimate of the existing level of services will be more reliable.

The finding demonstrates the complexity of accounting for the impact of business cycle fluctuation on the utilisation of healthcare services. Firstly, the interviews confirmed that economic shocks require an emergency response and budgetary practices are adapted to respond to environmental changes. However, despite increasing efforts to support budget decisions with data and analysis, budgeting processes rely on annual incremental and global budgets to allocate expenditures. The quantitative analysis highlights the need to measure and incorporate cyclical impacts into the budgetary decision-making process. This analysis has highlighted that economic shocks have a multi-year impact on the healthcare utilisation sectors, and there is a need to assess and account for each sector separately. For example, the VAR findings show that each sector responds differently. This essay contributes to the financial resilience literature by using data and analysis to empirically demonstrate how the impact of shocks can be incorporated into budget decisions. Barbera *et al.* (2021) and Marr (2020) have recognised the need for government budgets to emphasise long-term planning and risk management and understand the impact of adverse pro-cyclical policies on fiscal vulnerabilities. This essay responds to this need by estimating the impact of business cycle fluctuations on the utilisation of healthcare services and demonstrating how these impacts can be incorporated into budgeting decisions. Doing so will help improve healthcare organisations'

financial resilience by measuring and potentially absorbing the impact of economic shocks when they occur.

This essay also contributes to the healthcare accounting literature by responding to the need highlighted by Tallaki and Bracci (2020) for further improvement in accounting systems to utilise accounting data to respond to macro systematic risks. Historical advancements in accounting systems have focused on efficiency gains, improving clinician decision making and increasing transparency (Busse *et al.*, 2013; Chapman *et al.*, 2014). While there is a great for such accounting systems, there is also a need for this costing information to be better utilised to measure and account for macro systematic risks such as economic shocks more effectively. Finally, the counterfactual analysis showed that different shocks have impacted the healthcare utilisation sectors differently. Therefore, for the annual budgeting process to begin to account for such impacts, we recommend that the estimation for the existing level of services is adjusted by cyclical impacts as measured by the VAR model. In doing so, the annual budgets will estimate the level of committed services more accurately. In doing so, the transparency of health budget estimates will be improved as the impact of budget cuts on the delivery of services will be estimated.

Chapter 2 Healthcare Budgeting for Cyclical: Structured Literature Review of Accounting, Public Administration and Health Management

Essay Abstract

2.1 Summary

Healthcare organisations are challenged to consistently deliver routine services, after a recession. This paper examines how healthcare budgets are affected by business cycles, using the structured literature review methodology to examine the public administration, accounting, and healthcare literature. The results demonstrate that budgetary techniques fail during a recession, requiring an emergency response. Complexities in forecasting accurate and credible targets due to the difficulty of forecasting the timing and magnitude of recessions are leading to budgetary overestimation. This paper calls for an expansion of budgetary planning capabilities to measure the impact of the economic cycles on budgetary processes, minimising the need for forecasting.

2.2 Practitioners Impact Statement

This study highlights cyclical stocks are prohibiting the consistent delivery of routine healthcare services. Planning fails when a shock occurs, and policymakers must adapt to budgetary overestimation. To ensure a sustainable level of services at all stages of the economic cycle, cyclical impact should be systematically determined. So doing, would improve decision-making, and help minimise institutional and political impediments. However, developing these capabilities is difficult, requiring a multi-year perspective to be incorporated into the annual budgeting process. Stakeholders' understanding of the impact that cyclical is having on healthcare services will be an essential prerequisite for achievement.

Essay Introduction

Annual incremental allocation methods, customary in healthcare settings, significantly increase cyclical impacts on resourcing decisions (Caiden, 2010; Hou & Moynihan, 2008). Typically, healthcare budgetary strategies have relied on rebudgeting and rising debt levels in response to recessions¹, defined as a significant, widespread, and prolonged economic downturn, resulting in lower government revenues, and growing government expenditure (Annessi-Pessini *et al.*, 2016; Cohen *et al.*, 2015; Mikesell, 2018). Recent world events, however, highlight the growing need to provide consistent healthcare while coping with unexpected shocks (Bouckaert, 2021). Many countries were just recovering from the 2008 financial crisis when they were required to increase indebtedness further to deal with the economic and health consequences of the Covid-19 pandemic (Annessi-Pessini *et al.*, 2016; Cepitu *et al.*, 2018). Both crises required an emergency policy response, i.e., increasing debt levels and/or rebudgeting. These strategies are suggested to potentially jeopardise the provision of sustainable healthcare in the longer term and are inhibiting the consistent delivery of health services through the economic cycle (Annessi-Pessina *et al.*, 2016; George, 2017; Groot & Budding, 2008; Johnsen, 2018). As a result, concerns about long-term fiscal sustainability and financial resilience of healthcare expenditure continue to escalate.

This paper reviews the budgeting literature to understand the problems caused by cyclicity and the potential solutions to manage cyclical impacts on healthcare resources with the objective of developing insights, critical reflections, and future research paths. To do so, the paper uses a structured literature review (SLR) methodology (Massaro *et al.*, 2016). The SLR approach provides a methodological inclusive framework that, given the use of qualitative and quantitative studies in public management, management accounting and healthcare

¹ The National Bureau of Economic Research (NBER) defines a recession as “a significant decline in economic activity that is spread across the economy and that lasts more than a few months.”

literature, is particularly useful (Transfield *et al.*, 2013). To reduce subjectivity, we use the PICO framework (which adapts the research question into searchable terms) to search the extant literature (Tacconelli, 2010; Richardson *et al.*, 1995). Finally, given the broad interdisciplinary relevance of budgeting, this study undertakes a scientific search of the literature in public management, management accounting, and health journals (Anessi-Pessina *et al.*, 2016; Bracci *et al.*, 2015).

The descriptive findings highlight that budgeting for cyclicalities has been studied across North America and in Europe, especially where governments have faced austerity in the aftermath of a recession, i.e., Portugal, Italy, and Ireland (Alesani, 2012; Anessi-Pessina *et al.*, 2012; Barbera *et al.*, 2016; Cepiku *et al.* 2018; Cohen *et al.*, 2015; Di Mascio & Natalini, 2013; Dommett *et al.*, 2016; Gomes, 2021). An interesting observation from this analysis is that European studies in this area tend to be published in the accounting literature. In contrast, US studies are more likely to be published in the public administration literature. Quantitative and qualitative methods are used in this area, although qualitative studies are more popular. More recent studies are using time-series econometric approaches (Ammi *et al.*, 2021; Bernal-Delgado *et al.*, 2020; Brien *et al.*, 2021; Lee & Chen, 2021; McQuestin *et al.*, 2022; Wei, 2021). There is a notable lack of quantitative studies published in the accounting literature in this area. The thematic analysis reveals that annual incremental budgeting is the norm for healthcare planning, with the most significant number of papers addressing this area in our review. This budgeting process is prohibiting the consistent and sustainable delivery of service, particularly once a recession occurs. Other less-studied budgeting processes, such as multi-year and long-term healthcare planning, have not successfully managed cyclical impacts. Fewer but more recent studies, particularly in Europe, are starting to examine how healthcare planning can address cyclical impacts. Still, this review highlights the need for further innovations in this regard.

Specifically, analysis of the extant research highlights the inadequacies of current planning methods, such as annual incremental budgeting, multi-year budgeting and even long-term planning processes, in allocating resources consistently through the economic cycle. Expansion of budgetary analytical capabilities could improve fiscal discipline. This analysis suggests that budgetary planning capabilities can be expanded to account for cyclical impacts to provide services more consistently and sustainably through the cycle.

This SLR emphasises the well-studied limitations of traditional budgetary techniques, which are insufficient when a recession occurs. More interesting, however, it also shows that multi-year planning and long-term planning, which are often cited as a solution to this limitation, are also ineffective when recessions occur and cyclical impacts are evident (Lorenzoni *et al.*, 2017). Therefore, we are calling for innovative solutions to enhance the budgetary planning process so that cyclical impacts are understood at all stages of the economic cycle.

There is also a need to examine the significance of political and institutional impediments which may obstruct the adoption of these techniques. Short-term incremental allocation models are long embedded into the expenditure allocation process, primarily because they require small amounts of data and low analytical capabilities. Equally, political cycles and institutional performance are often measured in short-term cycles rather than longer-term needs. Stakeholders, perhaps understandably, prefer to prioritise the provision of services today rather than worry about the potential repercussions of overspending (Kuhlmann *et al.*, 2021; Lee & Chen, 2022; Rodríguez-Tejedo, 2012; Rose & Smith, 2012; Snow *et al.*, 2015).

The paper is organised into five sections. Section 2.3 describes the SLR methodology. Section 2.4 provides an analysis of the descriptive findings and critiques the healthcare budgetary literature, highlighting the implications of cyclicity on budgeting processes.

Section 2.5 presents conclusions, illustrating the contributions of this study while offering future opportunities for research.

Research Methodology

This paper uses the Structure Literature Review (SLR) methodology to review the literature to develop insights, provide critical reflections, and suggest future research paths (Massaro *et al.*, 2016). SLRs collect, critically appraise, and synthesise evidence to answer a specially41 formulated research question. The SLR protocol requires stating the research question, the methods used, the study types and designs the reviewer intends to locate and how these studies will be appraised and synthesised (Massaro *et al.*, 2015; Massaro *et al.*, 2016). To pursue this objective, a three-stage approach is adopted. In the first stage, high-quality journals in the public management, accounting and healthcare disciplines are selected. Given the broad interdisciplinarity of budgeting, we will limit our analysis to academic journals with an ABS ranking of three or more. We have also included journals specifically focusing on either public sector accounting or are dedicated to public administration and management. We hope to capture the interdisciplinary nature of budgeting, highlighting unexplored intersections across the disciplines. To select the journals, we use the ABS list to choose high-quality journals, mainly rated 3 or 4, and a small number of journals rated 2, which are particularly focused on healthcare management or public sector budgeting. The ABS ratings provide a rigorous and transparent way of selecting journals based on strong methodology and are updated regularly (Chartered Association of Business Schools, 2021). This list, however, has been criticised by some for not including all socially relevant journals and reviewers having discretion over the choice. This analysis been limited the search to a selection of journals that have been rated by through the Academic Journal Guide by the Chartered ABS.

Seven public administration journals were chosen based on their ABS rating of 3 or more. These include Public Administration (PA), Public Administration Review (PAR), Journal of

Public Administration: Research and Theory (JPART), Governance (GOV), International Review of Administration Service, Public Management Review (PMR), and International Public Management Journal (IPMJ). Public Money and Management (PMM) was included due to its focus on international practice providing evidence from public service management to inform policy.

Seven accounting journals that focus on public sector accounting either predominately (Financial Accountability and Management (FAM)) or significantly (Accounting, Auditing and Accountability Journal (AAAJ); Accounting Forum (AF); Accounting Organisation and Society (AOS); Critical Perspectives on Accounting (CPA); European Accounting Review (EAR); and Management Accounting Research (MAR)) are also included.

We also included eight healthcare management journals with an ABS ranking of 2 or higher. These include Health Service Research, Health Economics, The Journal of Health Economics, Health Policy, Healthcare Financial Management, International Journal of Health Care Finance and Economics, Health Care Management Review, and European Journal of Health Economics.

The second stage, a word search is developed using inclusion criteria derived from the PICO framework (Tacconelli, 2010). The PICO framework identifies search criteria based on Population, Intervention, Comparison, and Outcome (Davies, 2011). Although its initial use was to answer health related questions, other fields have since adopted the framework to adapt research questions into searchable terms. The acronym has been expanded to include more letters including C for context or T for type of study or timeline (Petticrew & Roberts, 2005; Richardson et al., 1995). Given that the context of this analysis is already included in the PICO search and the timeline is deliberately left open to capture the evolution of the theory of budgetary planning, we believe that PICO is the most appropriate acronym for our search.

When evaluating the problems caused by business cycle fluctuations and the potential solutions to managing these impacts on healthcare budgeting, it is essential to understand how different factors may affect resource allocation decisions. The PICO framework is used to translate this research objective into searchable terms. The population of interest is healthcare organisations. However, all organisations are included in this search as valuable lessons can be observed from other public or private sector organisations to understand how they manage cyclical impacts. The intervention of interest is Budgeting, which allows healthcare organisations to allocate resources efficiently to meet the needs of the population. Budgeting is central to the short term financial decision-making process in healthcare organisations and is central in responding to business cycle changes. Planning and forecasting can also play a role of the healthcare financial decision-making process, often focusing on medium or longer terms needs. Cyclicalities refers to the recurrent cycles that can change the availability of funding or how patients use services due to changes in the economy. In order to understand these factors, the following literature search criteria as set out in Table 2.3.1 are assessed.

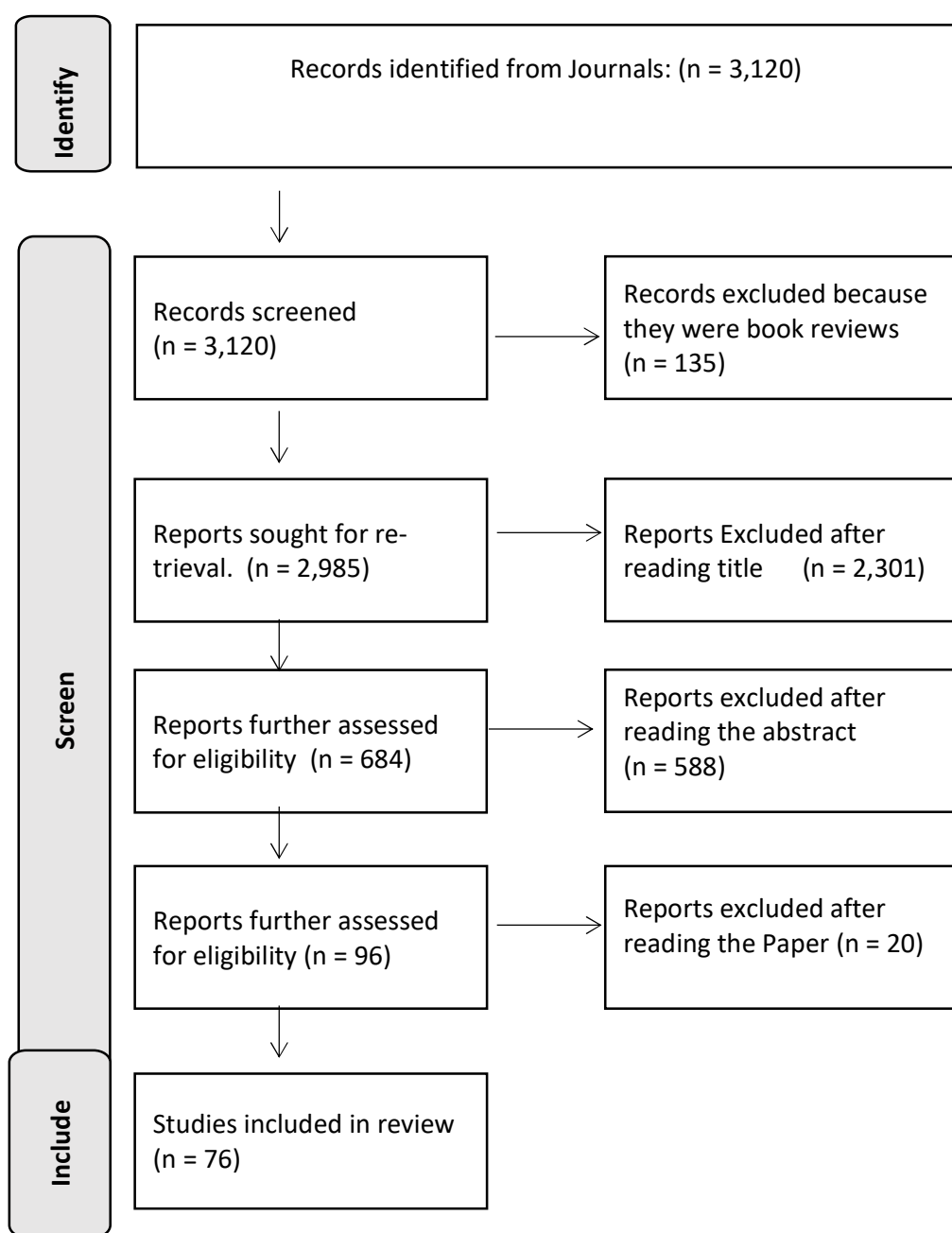
Table 2.3.1 Journal Search Criteria

	Research Objective	Inclusion Search Criteria
<i>Population</i>	Organisations, Corporations, Public Sector Organisations, Health Sector Organisations	
<i>Intervention</i>	Budgeting	Budget OR Budgeting OR Budgetary
<i>Comparator</i>	Forecasting, Planning	Forecast OR Forecasting OR Plan OR Planning

<i>Outcomes</i>	The Business Cycle	Cycle OR Cyclical OR Cyclicity OR “Business Cycle” OR “Economic Cycle” OR Shock
------------------------	--------------------	---

The process of the literature review is described in Figure 2.3.1.

Figure 0-1 PRISMA-Flow Diagram for Literature Review Process



The list of these journals is outlined in Table 2.3.2.

Table 0.1 List of Journal

Journal	No of Articles
<i>Public Administration Review</i>	17

<i>Public Money & Management</i>	9
<i>Public Administration</i>	7
<i>Financial Accountability & Management</i>	7
<i>Public Management Review</i>	7
<i>Health policy</i>	5
<i>Health economics</i>	4
<i>Journal of Public Administration Research and Theory: J-PART</i>	4
<i>Accounting Organization & Society</i>	3
<i>European Accounting Review</i>	3
<i>International Review of Administrative Sciences</i>	3
<i>Accounting, Auditing & Accountability Journal</i>	2
<i>Health Services Research</i>	2
<i>Governance</i>	1
<i>Journal of Health Economics</i>	1
<i>Management Accounting Research</i>	1

In the third stage, a coding system with three categories was developed to identify patterns in the literature and adopt a formal approach to extracting information from the articles (Massaro *et al.*, 2016). The first category is based on regional focus (Guthrie *et al.*, 2012; Massaro *et al.*, 2015). Regional focus is significant because different countries have a history of adopting different budgetary responses to crises, including the 2008 recession. Therefore, examining the literature in this context deepens our understanding of regional responses to shocks. The second category is the research method used (Guthrie & Murthy, 2009), which helps to understand which methodologies are underrepresented and could be used to develop the theory further. The final category breaks the paper into research themes, which has helped to understand how current budgeting processes manage cyclicalities. In doing so, we have interpreted the papers to address our research question and examine avenues for further research (Manhart & Thalmann, 2015).

Organisation type was also considered but given that 67 of the papers examined public sector organisations, we thought it unnecessary to include this category. Definition and quantitative methods used were also considered, but the results were too granular, and it was difficult to derive any conclusive findings.

Descriptive Findings and Insights

This section explores the regions studied, the research methods used and the focus of each to analyse the research question. Table 2.4.1 summarises the categorisation of articles under these headings.

2.3 Descriptive Findings

It is evident from Table 2.4.1 that European studies (excluding the UK) (29) are prevalent, notably in countries that adopted austerity following the 2008 recession, i.e., Italy (5), Portugal (4) and Ireland (3). Studies based in North America (25) are all published in public

administration (22) and healthcare journals (3). Case studies (17) are the most popular research methodology used, followed by viewpoints (12), panel studies (12) and time series studies (12). Time series studies measure a given relationship over time, while panel data studies have the dimensions of both time series and cross-sectional data (Brooks, 2019). Time series techniques have become more popular recently, with five such studies published since 2020. Only two such studies have been in the accounting field.

We identified that there are three primary planning mechanisms used in healthcare (annual incremental budgeting, multi-year budgeting, and long-term planning), all impacted by cyclicalities. To understand these processes, the articles are categorised by the planning mechanism used and how cyclicalities are being addressed in each area. Thirty-one articles address the annual incremental budgeting. Twenty-one articles address multi-year planning, and ten articles focus on long-term planning. Fourteen articles concentrated on how cyclicalities impact planning processes. There is a notable need for more analysis to be provided in this area, particularly in the accounting field, where only one study fits this category. Accounting studies are more focused on annual incremental and multi-year budgeting.

Table 0.1 Summary of Categorisation

Categories	Variables	Results
<i>Regional Focus</i>	European	29
	North America	25
	UK	11
	Other	9
	Asia	2
	Total	76
<i>Research Method</i>	Case Study	17
	Panel Data	13
	Time Series	12
	Viewpoint	12
	Survey	10
	Comparative Country Study	6
	Literature Review	6
	Total	76
<i>Focus of the Paper</i>	Annual Incremental Budgeting Process	31
	Multi-Year Budgeting Process	21
	Cyclical Impacts on the Planning Process	14
	Long-term Healthcare Planning Process	10
	Total	76

2.4 Thematic Findings and Opportunities

This section critiques and reviews the public administration, accounting, and healthcare literature, considering how annual incremental budgeting, multi-year budgeting and longer-term planning are impacted by cyclical shocks.

2.4.1 Annual Incremental Budgeting Process

Planning is an attempt to influence the future by assessing the organisation and its environment, setting objectives, and developing strategies (Chambers, 1984; George *et al.*, 2017; Jimenez, 2019). Viewed as a rational decision-making tool, budgetary planning matches the needs of an organisation with its resources (Bovaird, 2007; Jimenez, 2019; Nakrošis *et al.*, 2020; Skelcher, 1980). In so doing, stakeholder engagement improves, and short-term knee-jerk decisions are reduced (George, 2017; George *et al.*, 2017).

Governments, including healthcare organisations, rely on short-term incremental budgeting, where next year's budget is based on the previous year's expenditure adjusted for an increment (Caiden, 2010; Caperchione *et al.*, 2014; George, 2017; Høgheim *et al.*, 1989). Healthcare services that are financed through general taxation are more dependent on incremental budgeting (Braendle & Colombier, 2016; White, 2013). The merits of incremental budgeting include requiring limited resources and data to allocate expenditure, and it is politically feasible (Skelcher, 1980). Incremental allocation models limit the effectiveness of planning (Groot & Budding, 2008) as programmes become institutionalised, rolling over from one year to the next (Seal, 2003; Skelcher, 1980).

Incremental allocation models are particularly problematic during economic crises (Braendle & Colombier, 2016; Caiden, 2010; Chen *et al.*, 2013; Hou, 2006; Seal, 2003; Thompson *et al.*, 2022; White, 2013). Once a recession occurs, resources are no longer available to increase expenditure and “re-budgeting” becomes inevitable (Alesani, 2012;

Anessi-Pessina *et al.*, 2012; Bracci *et al.*, 2015; Caiden, 2010; Hou, 2006; Skelcher, 1980). The need for immediate action during a crisis minimises the planning function (Bostock *et al.*, 2020). Decision-making powers tend to move back towards the central government, and managers lose autonomy. “Across the board” cuts are common during re-budgeting, particularly in the early stages of the crisis (Barbera *et al.*, 2016; Bedford *et al.*, 2022; Bostock *et al.*, 2020; Cohen *et al.*, 2015; Doukakis *et al.*, 2019; van der Voet, 2022; Van Heche *et al.*, 2021). Across-the-board cuts are seen as equitable but don’t reflect need or preference (Barbera *et al.*, 2019; Brien & Eger, 2021; Raudla *et al.*, 2015) and often penalise efficient institutions (Bozeman & Pandey, 2004; Cepiku *et al.*, 2018; Di Mascio & Natalini, 2013).

Rebudgeting is usually followed by “cutback” budgets in subsequent years, as recessionary impacts usually have multi-year effects (Hou & Moynihan, 2008). Cutback budgets sometimes result in multi-year underinvestment, reducing financial resilience and the ability to prepare for the next crisis (Lee & Chen, 2021). There is also evidence that the latter stages of crisis can induce institutional learning where strategy and efficiency gains are prioritised (McQuestin *et al.*, 2022). This can place a government organisation in a stronger place to face the next crisis once there are sufficient resources (Gomes, 2021; Lee & Chen, 2021). Multi-year budgeting has been highlighted as a tool to help address the limitations of incremental budgeting.

2..4.2 Multi-Year Budgeting Process

To account for political strategic goals, macroeconomic processes, and longer-term government commitments would involve moving to multi-year budgets (Fitz Verploegh *et al.*, 2022; Meyers, 2009; Nakrošis *et al.*, 2020; Posner, 2009). Multi-year planning has the potential to advance the budgeting process into a dynamic tool that is updated regularly to reflect the internal and external environment (Hettlage, 1970). Strategic priorities are typically outlined on a three to five-year horizon, often matching the political cycle (Boyle, 1997; Fitz Verploegh

et al., 2022; Ho, 2018). They provide an opportunity for unconstrained thinking and policy direction, while also considering fiscal risks (Skelcher, 1980). Multi-year budgets feed into the annual budgetary cycle, ensuring that the annual budget reflects strategic priorities (Boyle, 1997; Skelcher, 1980). To ensure that multi-year budgets remain relevant, rolling budgets are required (Hansen & Stede, 2004; Johnsen, 2018), where data and targets are updated periodically to reflect changes in the environment. Rolling budgets provide an opportunity for learning, as actual performance is reflected (Jordan & Messner, 2019).

Multi-year budgets are reliant on accurate forecasts and good quality data and expertise (Arnold & Artz, 2019; Jordan & Messner, 2019; McQuestin *et al.*, 2022). The inaccuracy of targets associated with biases arising from forecasting methodologies has damaged the credibility of multi-year budgets (Cornia *et al.*, 2004; Jung, 2014; Thomsen, 2019). Notably, human judgement forecasting involves experts using background knowledge and best estimates to create forecasts, but underutilises data and evidence, lacks transparency and are subject to systematic biases (Hood, 2007; Mikesell, 2018; Mikesell & Ross, 2014; Thomsen, 2019). For example, many public sector budgeters tend to consistently overestimate recurring expenditures to avoid the cost of unexpected and costly deficits (Rose & Smith, 2012). In contrast, budget overruns are more common in the healthcare sector, where it is politically feasible to adjust budgets upwards (Braendle & Colombier, 2016; Serritzlew, 2005). Consensus forecasts are sometimes used to minimise systematic biases by pooling forecasts from a group of internal and external experts to build a consensus on the economic outlook, revenues, and expenditure (Cornia *et al.*, 2004; Hood, 2007; Mikesell, 2018; Mikesell & Ross, 2014).

Forecasting cyclicalities often utilise quantitative methods such as probability distributions and sensitivity analysis (Anand, 1988). By understanding the impact of each scenario, policymakers are better prepared to respond to unexpected changes in the environment (Cornia *et al.*, 2004; Thomsen, 2019; Thompson & Gates, 2007). Such methods require

interdisciplinary understanding of calculative practices, but budgeters often lack this expertise (Vollmer *et al.*, 2009). The unpredictability of changes in the economic cycle also undermines the credibility of multi-year plans, leading to adjustments in tax policies, expenditure cuts, re-budgeting and increasing debt levels (Arnold & Artz, 2019; Cornia *et al.*, 2004). Healthcare planning also uses long-term planning techniques aimed at addressing sustainability risks.

2..4.3 Long Term Budgeting Process

The healthcare management literature uses forecasting and analytical tools to understand long-term healthcare needs, often focusing on the sustainability of health services (Astolfi *et al.*, 2012). Component-based models are commonly used as they break current expenditure into groups or cohorts, such as the age of the user and the services being consumed (Astolfi *et al.*, 2012). Expenditure is then extrapolated into the future based on estimates about the progression of these defined groups. Computable General Equilibrium (CGE) make predictions about the optimal level of healthcare expenditure using theoretical assumptions about supply and demand. Econometric tools are also used for long-term healthcare planning, often focusing on the determinants of healthcare expenditure (Braendle & Colombier, 2016; Foster & Xuan, 2005; Gerdtham *et al.*, 1992; Roberts, 1999).

Time-series dynamic econometric techniques have greater predictive power than static models, which measure the relationship at one point in time (such as component-based, CGE and cross-sectional econometric models) (Roberts, 1999). Longer-term forecasting models are found to have even lower predictive power due to arbitrary probabilities and unrealistic underlying assumptions (Lee & Miller, 2002). Cyclical impacts undermine long-term healthcare plans, particularly those based on static and arbitrary base years. By ignoring cyclical impacts on the expenditure in the base years, these plans are often rendered redundant once a change in cyclical conditions occurs.

The overreliance on annual incremental allocation models and their detachment from multi-year budgeting and longer-term healthcare planning, means that cyclical dynamic impacts are often ignored in healthcare decisions. Health expenditure interacts differently with economic and fiscal conditions (Ammi *et al.*, 2021). The failure of these planning techniques to address or understand the cyclical impacts on health budgeting means that the consistent delivery of services and sustainable long-term healthcare planning is inhibited. Specific policy responses, which aim to manage cyclicity, are discussed in the next section.

2..4.4 Cyclicity in the Budgeting Process

Recessions are the primary source of budgetary overestimation and planning inaccuracies in multi-year and long-term healthcare planning because revenues and expenditures react differently to periods of economic growth (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). Failing to understand cyclical impacts on revenues and expenditure makes planning redundant once a recession occurs. Even stringent fiscal rules that have been written into law are interpreted differently depending on the economic context (Hou & Smith, 2010). In a healthcare setting, where political influences take precedence, fiscal rules and budgets tend not to be binding, such that there is an overreliance on re-budgeting (Bernal-Delgado *et al.*, 2020; Foster & Xuan, 2005; Gravelle *et al.*, 2003; Guven-Uslu, 2012; López-Nicolás, 1998). The economic cycle is not only undermining the annual budgeting process but also the multi-year planning process (Cornia *et al.*, 2004).

The budgetary process can be employed to manage cyclical impacts by reducing the volatility of income and expenditure through the economic cycle. Averaging the growth rate of income and expenditure through the cycle would ensure that expenditure is increased by a consistent rate. This would mean that expenditure would be lower during periods of economic growth to minimised cuts during and after a recession (Thompson & Gates, 2007).

Another approach to managing cyclical impacts that have gained some traction in public sector organisations (notably those that adhere to fiscal rules) is the use of counter-cyclical reserve funds (Hou, 2006; Hou & Smith, 2010; Lee & Chen, 2022). Counter-cyclical funds help governments to smooth consumption over the economic cycle by saving funds during periods of economic growth to offset recessionary cuts (Hou & Smith, 2010; Lee & Chen, 2022; Rodríguez-Tejedo, 2012). These funds enhance contingency planning and provide a more transparent way of protecting revenues and expenditures from economic shocks. States in the US that use such funds have greater financial control and tend to have higher credit ratings and lower overall borrowing costs (Rodríguez-Tejedo, 2012; Rose & Smith, 2012; Snow *et al.*, 2015). Counter-cyclical reserve funds recognise that budget cuts can impact balances for some years after a recession, not just in the year of the downturn, and therefore require an understanding of dynamic impacts (Hou & Moynihan, 2008). It is unclear whether counter-cyclical reserve funds could be used by health systems in European countries in the same way that US states have adopted them. Firstly, healthcare in European countries is a public service, and the needs are always greater than capacity, even during periods of economic growth. Therefore, financial resources are unlikely to be available for counter-cyclical reserve funds at any stage of the economic cycle. Secondly, although Eurozone countries face fiscal rules similar to those of US states, historically, these have not been binding. Consequentially, political and institutional impediments to saving for counter-cyclical reserve funds are greater in Europe (Lee & Chen, 2021; Lee & Chen, 2022; Rose & Smith, 2012).

The adoption of counter-cyclical reserve funds or averaging revenue through the cycle requires good quality accounting data, training and experience of personnel, and commitment to professionalism to generate and accumulate budget surpluses during periods of economic growth. The aggregate cash flows saved in counter-cyclical reserve funds are often not sufficient to cover the effects of severe fiscal shocks, and in some cases, cuts have been

inevitable despite the sacrifices made during periods of growth (Doukakis *et al.*, 2019; Hou & Moynihan, 2008; Mikesell, 2018; Mikesell & Ross, 2014).

Political and institutional impediments remain a major inhibitor limiting the adoption of measures that would manage cyclicalities (Kuhlmann *et al.*, 2021; Lee & Chen, 2022; Rodríguez-Tejedo, 2012; Rose & Smith, 2012). For example, voters prefer lower taxes and higher spending during periods of economic growth and governments may fail to attract funding from intra-governmental organisations due to the perceived high levels of cash flows built up during period of economic growth (Snow *et al.*, 2015).

The autonomy and professionalism of budgeting managers are key to restraining expenditure and long-term commitments during periods of economic growth to ensure the continued delivery of services once a recession occurs and that long-term strategic priorities are realised (Foged, 2021; Hood, 1995; Lee & Chen, 2022; Lee & Chen, 2021; Wei, 2021). Governments involved in prior crises tend to have greater organisational capacity to save for future crises, but only once they have sufficiently recovered from the previous crisis and have sufficient resources to save or plan for future crises (Dommett *et al.*, 2016; Dzigbede *et al.*, 2020; Foged, 2022; Lee & Chen, 2021; Thompson *et al.*, 2022). Further research is necessary to measure the impact of the economic cycle over time. In doing so, budget planning can more accurately and transparently estimate the savings needed during economic growth to safeguard against the next recession. Approaches could be borrowed from other disciplines, but to date, there is limited evidence that the healthcare sector is considering cyclical impacts on resource allocation decisions. The business cycle continues to inhibit the consistent delivery of healthcare services (Vollmer *et al.*, 2009).

Essay Conclusion

This multidisciplinary SLR has systematically reviewed the public administration, accounting, and healthcare literature to provide a comprehensive overview of the healthcare budgetary planning literature. From a research point of view, this area is multifaceted and a potential rich area to investigate and develop. The SLR analysis describes how budgetary planning mechanisms fail when a recession occurs, forcing policymakers to adapt to budgetary overestimation with an emergency response, undermining the effectiveness of budgets. Furthermore, the analysis highlights how budgetary processes continue to be undermined by the complexities involved in forecasting accurate and credible targets, as the timing and magnitude of recessions are difficult to forecast. In so doing, the paper calls for future research to investigate the expansion of budgetary planning capabilities, to measure the impact of the economic cycles on budgetary processes so the need for forecasting cyclical changes is minimised.

The descriptive analysis shows that budgeting for cyclicality has been studied across North America and Europe, especially in countries that have faced austerity in the aftermath of a recession. There has been a notable difference in the response to recessions between these regions. For example, in the US, adopting counter-cyclical reserve funds has improved financial resilience and financial management capabilities (Hou, 2006; Hou & Smith, 2010; Lee & Chen, 2022). In countries such as Ireland, Portugal, and Italy, which experienced austerity following the 2008 recession, budgetary decisions moved to central government, and strategic planning was sidelined in favour of adherence to restrictive budgetary rules. (Bernal-Delgado *et al.*, 2020; Carr & Beck, 2022). More recent recessionary shocks in European countries tend to be followed by a period of retrenchment, prohibiting reform, and often weakening financial resilience once the next shock occurs (Barbera *et al.*, 2016; Barbera *et al.*, 2019).

Another interesting observation from this analysis is that European studies in this area tend to be published in the accounting literature, but US studies are more likely to be published in the public administration literature. There is a notable lack of quantitative studies published in the accounting literature in this area. Finally, the descriptive analysis reveals that annual incremental budgeting is the predominant tool that is researched, although multi-year planning is also of interest. Public administration journals, which are likely to address the impact of cyclicalities on the budgeting process, while accounting journals focus on incremental and multi-year budgeting. We also found that there was a predominance of qualitative analysis with a prevalence of case studies, viewpoints, and surveys. It is important to note that annual incremental budgeting and multi-year budgeting tended to be examined through more qualitative methods such as case studies (15), cross-country comparisons (5), surveys (9) and viewpoints (10). In contrast, long-term healthcare planning and understanding cyclical impacts on the budgeting process are more likely to apply more quantitative techniques such as time series analysis (6) or panel data sets (11). From a theoretical standpoint, there is no dominant theoretical framework analysed, although studies have drawn from Institutional Theory (2), Actor Network Theory (2), New Public Management (4) and Structuration Theory (1), to name a few. It is also worth noting time series studies have become more common in recent years, perhaps emphasising the need for more evidence-based policy recommendations.

The thematic analysis highlighted that the mechanisms used for healthcare budgeting planning, short-term incremental allocation, multi-year planning, and long-term forecasting models are largely ineffective once a recession occurs. Annual incremental budgeting models allocate resources to pay for expenditure programmes each year. Multi-year planning is a dynamic tool that can be used to match medium-term strategic goals with resource allocation decisions, while long-term forecasting seeks to predict the level of expenditure that will be required in the future. Although there are connections between these applications, they are

often undertaken in isolation and have very different purposes. This SLR research has highlighted the need to investigate how cyclical impacts can be better understood and, therefore, accounted for in all stages of healthcare planning. We show that continuing to ignore these impacts will inhibit the consistent delivery of healthcare services, particularly once an economic shock occurs. But measuring cyclical impacts on healthcare expenditure would provide evidence to support policy makers in ensuring that expenditure is restrained during periods of economic growth. In doing so, rebudgeting would be less likely (or less significant) after a cyclical shock.

Future research areas identified involve developing and applying econometric models to understand the dynamic impacts of cyclical shocks. Research aiming to measure cyclical impacts on both healthcare expenditure and service utilisation to account for cycles of growth and recessions would be advantageous. In doing so, annual incremental allocation models, multi-year budgets, and longer-term forecasting models could be more effective by systematically accounting for the business cycle. For example, understanding cyclical impacts on resource allocation decisions is necessary to ensure the consistent and sustainable delivery of services. This SLR has highlighted that techniques such as counter-cyclical reserve funds have improved the financial resilience of the government organisations that have implemented them. For example, States in the US are particularly impacted by recessions due to laws prohibiting them from having a deficit in any year. Although the Stability and Growth Pact in Europe has similar restrictions, in reality, it has been less effective. As a result, the use of countercyclical reserve funds is more common in the US.

This analysis was limited to a selection of peer reviewed journals based on their focus and quality as we believe these journals have undergone a rigorous review process. However, we

do acknowledge this is a limitation of the study, particularly given the extensive research in this area by International Organisations such as the OECD and World Bank.

Finally, this SLR also acknowledges that it is hard to change these budgeting processes, which are embedded into institutional and political frameworks. Existing applications are well established in workflows, and expertise is instituted to undertake these processes. Furthermore, short-termism is justified in a healthcare setting, given that resourcing is suboptimal to meet healthcare demands. Therefore, while long-term planning is undertaken, it is often perceived as aspirational, while the focus, perhaps justifiably, remains on meeting demand today. The SLR highlights the need to examine the significance of political and institutional impediments that may obstruct the understanding of the potential repercussions of overspending.

Chapter 3 Planning for the Business Cycle in Healthcare Budgeting – A Multivariate Time Series Approach

Essay Abstract

Severe economic crises, such as the 2020 COVID-19 pandemic, have illustrated that failure to plan for such inevitable but unpredictable events adversely impacts the delivery of healthcare services. An expansion of budgeting capabilities is required to improve the effectiveness of healthcare planning processes. This expansion is also necessary to ensure consistent healthcare delivery throughout the economic cycle. We aim to contribute by empirically investigating how the impact of the business cycle can be measured and used to enhance budgetary planning. Specifically, we employ the time series Vector Auto Regression (VAR) technique to calibrate the dynamic relationship between healthcare expenditure and GDP. Our results demonstrate that healthcare expenditure is highly sensitive to GDP shocks, and that these shocks have a multi-year impact. Our findings suggest that accounting for the impact of shocks via the budgetary process could improve the effectiveness and reliability of the annual budgets, multi-year, and longer-term planning models. Furthermore, our analysis facilitates evidence-based budgeting by providing a comprehensive understanding of the multi-year impacts of shocks on resources for practitioners. This approach can aid in the transition toward a more sustainable model of service delivery in healthcare, as well as in other public service settings.

Essay Introduction

Recent crises highlight the need for healthcare sector organizations to provide routine services consistently, even when faced with an economic adversity (Bouckaert, 2021; Carr & Beck, 2022; Heberle *et al.*, 2024). Furthermore, significant economic downturns, exemplified

by events like the 2008 financial crisis and the 2020 COVID-19 pandemic, have highlighted the importance of anticipating unforeseeable yet inevitable circumstances. Neglecting to plan for such occurrences can significantly hinder healthcare service provision and diminish financial stability when the next economic downturn arises (Ahren & Ferry, 2020; Barbera *et al.*, 2016; Barbera *et al.*, 2020). In this article, we argue that there is a societal need for cyclical impacts on expenditure to be understood in order to improve the effectiveness of healthcare budgeting processes.

Cyclical impacts on healthcare resourcing are undermining the effectiveness of the budgeting processes i.e., annual incremental budgeting, multi-year budgeting, and long-term planning. Annual incremental budgeting becomes problematic once a recession occurs because increments are no longer available (Ahrens & Ferry, 2020; Barbera *et al.*, 2020; Braendle & Colombier, 2016; Chen *et al.*, 2013; Hou, 2006; Thomson *et al.*, 2022). This is particularly acute when healthcare systems that are financed directly through general taxation as is the case in many countries including Ireland, UK, Canada, and Australia (White, 2013). As a result, recessions often lead to periods of rebudgeting (Alesani, 2012; Anessi-Pessina, Barbera *et al.*, 2012; Bracci *et al.*, 2015; Caiden, 2010; Hou, 2006; Skelcher, 1980). Across the board cuts are common in the immediate aftermath of a recession, where strategic planning is minimised, preferences are ignored, and efficient institutions and processes are penalised (Barbera *et al.*, 2016; Cohen *et al.*, 2015; Van der Voet, 2022).

Multi-year planning is often seen as a mechanism to help policy makers focus on strategic plans, by forecasting for the cyclical changes (Fitz Verploeghet *et al.*, 2022; Meyers, 2009; Nakrošis *et al.*, 2020; Posner, 2009). To date, such techniques have been ineffective, largely due to the difficulties in forecasting the magnitude and timing of recessions (Arnold & Artz, 2019; Cornia *et al.*, 2004; Henntu-Aho & Järvinen, 2014; Mikesell, 2018). Furthermore,

multi-year plans and subsequently longer-term planning goals are often side-lined once a recession occurs. The reality is that cyclical impacts need to be understood if the effectiveness of healthcare planning processes can be improved. By specifically measuring the dynamic multi-year impact of an economic shock on healthcare resources. Incorporating these impacts into the multi-year and annual budgeting processes by adjust the existing level of services for cyclical impacts, could improve the effectiveness of the budgeting process, particularly around changes in the economic cycle, when budget inaccuracies are most prevalent. Doing so, would ensure that routine services could be consistently delivered even through recessionary shocks and long-term planning processes would be more effective (Gibbs *et al.*, 2024).

This article contributes to this debate by empirically investigating how the impact of the business cycle on healthcare expenditure can be measured and used to enhance budgetary planning. Specifically, it employs the time series Vector Auto Regression (VAR) technique to calibrate the dynamic relationship between Irish current healthcare expenditure and GDP from 1970–2021. The Impulse Response Functions (IRF), estimated by the VAR model, show the percentage change healthcare expenditure each year after a shock, because of the economic shock. The IRF will estimate the cumulative magnitude of the impact of the shock on the healthcare system, while also indicating when impacts will peak and how long the effects will last. This analysis is further supported by the counterfactual analysis which will estimate how healthcare expenditure would have evolved had the economic shock not occurred. VAR, which is used in other settings such as banking to examine procyclical behaviour (Marcucci & Quagliariello, 2008; Pool *et al.*, 2015), is a suitable technique to understand how expenditure reacts to different types of shocks and can help governments to ensure that policy decisions to expand the level of services are sustainable in the future. It

uses historical data to capture complex dynamic interactions between variables without making restrictive or unrealistic assumptions (Sims, 1980a). The Irish case study is relevant because income tax is primarily used to generate healthcare resources, which heightens the sensitivity of healthcare expenditure to variations in the business cycle and, as such, the issue of procyclicality of expenditure is particularly acute (Cohen *et al.*, 2015; Dommett *et al.*, 2016; White, 2013). The analysis specifies current and not capital expenditure because we are trying to understand the impact of cyclicity on the delivery of routine healthcare services, rather than investment in hospital equipment. Our results demonstrate that GDP shocks account for approximately 30% to 70% of the variation in government healthcare expenditure in Ireland and that these shocks have a multi-year impact, on average 8.8 years after the shock. Moreover, counterfactual thought analysis (the focus of this article) shows the cyclical impacts on healthcare resourcing in Ireland have been increasing over the period of this study. For example, the VAR model estimates that the 2008–2012 recessionary period has resulted in actual healthcare expenditure being a total of €18bln (or 13% of health expenditure) lower than it would have been in the absence of that crisis.

This article contributes to the public sector accounting literature in the following ways. Firstly, it adds to the crisis budgeting literature by proposing a novel application of the VAR methodology to measure the pro-cyclical and highly sensitive response of health resources to changes in the business cycle. In so doing, it highlights the confines of using an incremental budgeting process to allocate resources by demonstrating that current budgetary practices are inhibiting the consistent delivery of routine services after a crisis (Bouckaert, 2021; Caiden, 2010; Hou, 2006; Meyers, 2009). Secondly, it proposes that the VAR methodology can be used to address a major limitation of the forecasting process insofar as the credibility and accuracy of forecasts have been curtailed by the difficulty in predicting the timing or

magnitude of recessions. By demonstrating that GDP shocks impact government healthcare expenditure over a period of three-to-seven-years after a shock, the need for forecasting is reduced because policy makers have adequate time to respond to unpredictable changes in the environment. Furthermore, by assessing the impact of shocks over a multi-year horizon, this article shows how the budgeting process can be used to manage unexpected events by altering the response in an informed rather than reactionary manner (Thompson & Gates, 2007; Vollmer *et al.*, 2009; White, 2013).

Finally, this article attempts to provide evidence to support budgetary decisions for practitioners. Short-termism and political cycles regularly dominate budgetary decisions, particularly in healthcare where the institutional environments are complex such that applying changes to budgeting practices is more challenging than in other settings (Cardinaels & Soderstrom, 2013; Gibbs, *et al.*, 2024). Furthermore, politicians will always prioritise the provision of service today rather than worry about future needs or the repercussion of overspending in the future (Kuhlmann *et al.*, 2021; Rodríguez-Tejedo, 2021; Snow, *et al.*, 2015). Improving financial resilience and being more prepared for future crises requires expertise, evidence, and professionalism of the people involved in the budgetary process (Gomes, 2021). The VAR methodology can help with this by estimating a more sustainable level of expenditure which should ideally only be used to deliver long-term expenditure programmes or commitments that are required, regardless of the stage of the economic cycle and the current political needs (Arnold & Artz, 2019; Lee & Miller, 2002; Thomsen, 2019). Multi-year and longer-term planning should also be based on these levels of expenditure instead of using arbitrary years to estimate future expenditure needs, where impact of business cycle fluctuations could be misunderstood or even ignored. It should, however, be noted, that because the VAR methodology is a time series econometric technique, the

sustainable level of expenditure estimated is based on previous trends, not on the healthcare needs at a given point in time. For example, if expenditure has been previously below healthcare needs, then the counterfactual will also be below healthcare needs. This VAR analysis is specifically measuring the impact that economic shocks are having on healthcare resourcing.

The article concludes by arguing that measuring GDP impacts in this way could ensure that practitioners and policymakers should be motivated to understand and account for these impacts and adjust expenditure estimates in an informed way based on the current economic environment. What this means is that committed healthcare expenditure programmes should be based on the permanent level of expenditure, as measured in the counter-factual analysis. Therefore, after a recession, expenditure levels may need to be higher in order to deliver a sustainable level of expenditure. More broadly, our analysis suggests that the need to adopt a 5-year budget planning process in order to generate a long-run secular trend so that the annual budget can provide a consistent level of services, and that longer-term plans are based on a sustainable level of expenditure. Failure to do so, leads to unnecessary volatility in the provision of budgetary resources.

The remainder of this article will be organised into six further sections. Section 3.3 positions the article in the healthcare budgetary planning literature, outlining an overview of the role of forecasting models in healthcare planning and explains the Irish healthcare context of this article. Section 3.4 outlines the empirical strategy. Section 3.5 sets out the empirical findings. Section 3.6 discusses these findings. Section 3.7 concludes by outlining the contribution, the policy implications and limitations.

Theory

3.1 Budgetary Planning and Forecasting in Healthcare

Planning attempts to influence the future by forecasting changes in an organization and its environment. It facilitates decisions, motivates employees, and improves the co-ordination of activities (Chambers, 1984; George *et al.*, 2017; Jimenez, 2019). In public sector organizations, a robust planning process enhances the formation of strategic goals and resource allocation decisions, while avoiding short-term knee jerk decisions and political interference (Ekholm & Wallin, 2000; Nakrošis *et al.*, 2020; George, 2017; George *et al.*, 2017). Despite this, annual incremental budgeting, where this year's budget is based on last year's expenditure adjusted for any increments that are available centrally from government is the norm for healthcare organizations (Braendle & Colombier, 2016; Caperchione *et al.*, 2014; George, 2017; Høgheim, *et al.*, 1989; White, 2013). While annual incremental budgeting is politically feasible it relies on limited data and analysis such that planning is often minimised as programmes become institutionalised as they are rolled over from one period to the next, without considering their effectiveness (Groot & Budding, 2008; Seal, 2003; Skelcher, 1980). As such, incremental budgeting underutilises the planning function and side-lines strategic thinking (Hou, 2006; Seal, 2003; Skelcher, 1980) and is said to be particularly problematic once a recession occurs because increments are no longer available. Expenditure cuts become necessary to avoid increasing deficits and borrowing (Ahrens and Ferry, 2020; Barbera *et al.*, 2016; Braendle & Colombier, 2016; Caiden, 2010; Chen *et al.*, 2013; Hou, 2006; Seal, 2003; Thompson *et al.*, 2022; White, 2013). In such circumstances, the incremental budgeting process itself can exacerbate the cyclical impact of resource allocation decisions.

Multi-year budgets typically set out expenditure decisions and strategic priorities on a three-to-five-year horizon which facilitates unconstrained thinking, policy planning and the

ability to address longer-term fiscal and healthcare needs and, as such, is seen as a method to reduce cyclical impacts of the annual budget (Fitz Verploegh *et al.*, 2022; Meyers, 2009; Nakrošis *et al.*, 2020; Posner, 2009). Annual budgets should then be derived from multi-year budgets to determine how quickly the multi-year plan is implemented (Boyle, 1997; Ho, 2018). Unlike annual budgeting, multi-year budgets require robust and rigorous methods to establish targets and goals which, rely on accurate and credible forecasts (Cornia *et al.*, 2004; Jung, 2014; Thomsen, 2019). Forecast inaccuracies, however, which arise from the difficulties in forecasting the timing of economic turning points or the magnitude of recessions continue to undermine multi-year plans (Arnold & Artz, 2019; Cornia *et al.*, 2004; Jordan & Messner, 2019; Thomsen, 2019; Thompson & Gates, 2007). Hence, economic shocks and their multi-year implications have remained a primary cause of budgeting overestimation (Mikesell, 2018; Henttu-Aho & Järvinen, 2013). Such recessionary periods lead to indiscriminate fluctuations in healthcare expenditure through the business cycle and increase the need for rebudgeting and cutbacks (Alesani, 2012; Caiden, 2010; Hou, 2006; Skelcher, 1980).

Rebudgeting occurs when budgeters are required to issue supplementary budgets in middle of budgetary periods in order to avoid large deficits and to address cyclical shortfalls in revenues (Alesani, 2012; Bracci *et al.*, 2015). As these cyclical shortfalls tend to last more than one year, rebudgeting is often followed by further cutbacks or austerity budgets (Hou & Moynihan, 2008). These fluctuations in resource allocation decisions undermine medium term strategic thinking, impede evidence-based learning, and inhibit the planning for long-term expenditure needs and adequate investment (Bozeman and Pandey, 2004; Cepiku *et al.*, 2018; Di Mascio & Natalini, 2013). Addressing and managing the fiscal risk associated with cyclical changes in healthcare expenditure requires an expansion of budgetary planning capabilities to understand multi-year cyclical impacts.

Long-term planning also occurs in healthcare, usually aimed at ensuring healthcare systems remain sustainable. For example, long-term forecasts tend to be static predictions of what healthcare expenditure might be as population ages (Astolfi *et al.*, 2012). Component based models, where the population is divided into cohorts such as age or illness and the current level of expenditure is then projected into the future. Theoretical models such as Computable General Equilibrium are also used where expenditure is predicted based on prediction of future supply and demand (Astolfi *et al.*, 2012). Econometric time-series are also used to predict healthcare expenditure based on historical trends (Braendle & Colombier, 2016; Foster & Xuan, 2005; Gerdtham *et al.*, 1992; Roberts, 1999). However, as with multi-year budgets, longer-term forecasts are often rendered unrealistic once a recession occurs because the static inputs are often no longer true (Lee & Miller, 2002; Roberts, 1999). Therefore, to accurately assess longer term healthcare needs, cyclical factors need to be considered.

3.2 Managing Cyclical Impacts on Resource Allocation Decisions

Multi-year budgeting faces limitations due to the challenge of accurately forecasting targets and goals. Budgetary overestimation tends to be particularly high when pinpointing turning points (Arnold & Artz, 2019; Chambers, 1984; Jordan & Messner, 2019). The public administration literature has sought to address these difficulties by moving away from point estimates of GDP and expenditure to probability ranges or sensitivity/scenario analysis (Cornia *et al.*, 2004; Hansen and Van der Stede, 2004; Thomsen, 2019). Other public administration studies seek to dampen cyclical impacts by averaging expenditure growth or using countercyclical reserve funds (Hou, 2006; Lee & Chen, 2021; Rodríguez-Tejedo, 2012; Thompson & Gates, 2007).

Averaging expenditure growth through the cycle and using counter cyclical reserve funds to dampen extremes implies that while expenditure will be lower than it could be in periods of economic growth, but cuts will also be less severe than they could be after a recession. Such mechanisms would help protect the provision of services from an economic shock in a very transparent way (Hou & Moynihan, 2008; Rodríguez-Tejedo, 2012) such that, it is no surprise that they are also associated with greater financial control as evidenced by the higher credit rating and lower borrowing costs of public sector organizations that use them (Rodríguez-Tejedo, 2012; Rose & Smith, 2012; Snow *et al.*, 2015). However, given the difficulty in predicting the magnitude of a recession, the amount of money saved in counter-cyclical funds is often inadequate when a recession occurs and some cuts are still inevitable (Marrs, 2020; Mikesell, 2018; Mikesell & Ross, 2014). Furthermore, the implementation of such techniques also requires training, experience, and a commitment to professionalism in order to generate a surplus large enough to offset the impact of the next shock (Kuhlmann *et al.*, 2021; Lee & Chen, 2021; Rodríguez-Tejedo, 2012; Rose & Smith, 2012). In actuality, political and institutional impediments often limit surpluses because, when resources are available, voters prefer lower taxes and higher spending now to the promise of financial stability when the next recession occurs (Gibbs *et al.*, 2024; Snow *et al.*, 2015).

However, effectively applying such discipline to the budgetary process in order to manage cyclical impacts consistently through the cycle requires preparation of good quality accounting data to quantify the relationship between healthcare expenditure and the business cycle (Hou & Moynihan, 2008; Snow *et al.*, 2015). Furthermore, we argue that datafication via the application of novel econometric techniques is important if we are to continue to improve budgetary processes (Begkos, *et al.*, 2023). One such route would be to utilise more advanced econometric tools (as investigated in this article) that would quantify

cyclical impacts in order to enhance multi-year budgetary planning (Lopreite & Mauro, 2017; Vollmer *et al.*, 2009). Ensuring that longer-term commitments are based on a sustainable level of expenditure during periods of economic growth would help to safeguard the provision of these programmes during the next recession. In doing so, budget planning would improve financial resilience and ensure that routine services can be delivered regardless of the stage of the economic cycle.

3.3 Managing Cyclical Impacts

The Vector Autoregression (VAR) methodology is a time series econometric tool that can be used to capture complex dynamic interactions between variables across time without the need for unrealistic and restrictive assumptions (Sims, 1972; 1980a; 1980b; 1983). VAR is also a dynamic tool that reflects the dynamic multi-year impact of a shock, that varies through time (Stock & Watson, 2001). While the VAR method could be used in a healthcare setting in the same way as other macro forecasting tools such as computerised general equilibrium and component-based models to forecast long term GDP and expenditure, the sub-optimal decision-making process would remain unchanged, and the impact of cyclicity would remain hidden. A better use of the features of the VAR methodology, and the focus of this article, is to utilise the impulse response functions, forecast error variance decomposition and counterfactual analysis to uncover the dynamic relationship between GDP and health expenditure through time in order to understand and quantify the response of healthcare expenditure to an economic shock. Specifically, VAR facilitates the decomposition of healthcare expenditure into a sustainable component and a temporary component that will depend on GDP fluctuation component. Doing so can ensure that long-term commitments are aligned with the sustainable level of expenditure.

Restraining expenditure growth to this sustainable level of expenditure in the aftermath of positive economic shocks, will reduce the likelihood that cuts will be inevitable once the next recession occurs such that, and more importantly, a prolonged period of lower expenditure may be avoided. If possible, such expenditure could be used to meet emergency expenditure or temporary needs but should not be committed to long-term expenditure programmes. Used in this way, VAR would provide the information necessary for policy makers to respond to their environment, rather than using static information to forecast (and ultimately react to) a change in the environment. This article applies the use of the VAR methodology to the healthcare budget planning literature by employing impulse response functions (IRF), forecast error decompositions (FEVD), and counterfactual thought experiments to measure the dynamic impact of business cycle shocks on health expenditure.

3.4 The Irish Healthcare Context

Ireland is an appropriate setting to demonstrate the usefulness of VAR to manage the impact of business cycle fluctuations because the Irish healthcare system is acutely impacted by shocks. For example, the 2008 financial crisis resulted in one of the largest cuts to health expenditure across the OECD (Carr & Beck, 2020). More recently, the COVID-19 pandemic has also adversely impacted the provision of healthcare services, as large increases in resources have been required to counteract the pandemic, causing routine healthcare services to be delayed and cancelled. This has resulted in large increases in waiting lists and anecdotal evidence of adverse health outcomes due to the difficulties in accessing services (Crowley & Hughes, 2021; NTPF, 2022). The reason why the impact of business cycle fluctuations on healthcare resources in Ireland is particularly acute is partly due to the healthcare financing model, where Irish government finances health expenditure directly from general taxation, 48% of which came from income tax in 2020 (Department of Finance, 2021). Furthermore,

there is evidence that the Irish government is also heavily reliant on incremental budgeting, which (as previously discussed) increases such impacts on resourcing decisions (Boyle, 1997). The use of sub-optimal accounting practices by the Irish government contributed to the severity of the impact of the 2008 global financial crisis on government's finances (Carr & Beck, 2022; Cohen *et al.*, 2015; Dommett *et al.*, 2015).

Another interesting facet of the Irish healthcare system that will add to this study is the relationship between public and private health expenditure. The Irish health system is a two-tiered system where government health expenditure accounted for 75% of total health expenditure in 2019 (OECD, 2023a). Approximately 14% of total health expenditure was paid for from the health insurance companies, as 50% of the population hold private health insurance (OECD, 2023a; HIA, 2020). Out-of-pocket expenditure accounts for a further 12% of total expenditure (OECD, 2023a). During the 2008 financial crisis the government increased the burden of health expenditure on the private sector (particularly out-of-pocket expenditure) to offset some of the impact of the crisis (OECD, 2017). For example, charges were introduced or increased for users of public services, the provision of private services increased. In contrast, the government's burden of health expenditure increased during the COVID-19 pandemic as government expenditure accounted for 79% of total expenditure in 2020, as the health insurers' share declined to 14%. This dynamic relationship is explored further in this article.

Empirical Strategy

3.5 The VAR Methodology

This article employs the time series VAR methodology to measure the dynamic impact of business cycle fluctuations on healthcare expenditure in Ireland. VAR models were popularised in econometrics by Sims (1972; 1980a; 1980b; 1982) as a generalisation of a

univariate model. A VAR model is a system of regression equations with more than one dependent variables. In comparison to a univariate model, which uses a single equation to describe a relationship between a variable and the past values of the same variable. A VAR model is a n -equation, n -variable linear model that relates each variable to the past value of itself and the past values of the other $n-1$ variable (Stock & Watson, 2001). VAR is a highly flexible way to capture co-movements between variables, reducing specification problems by allowing the data to describe the relationships such that there is no need for the researcher to specify the endogenous or exogenous variables or to outline theoretical parameters. This flexibility offers a rich structure to capture the features of the data that wouldn't be evident from specified models (Sims, 1980a). Similarly, evidence-based health policy decisions have been shown to be superior to more restrictive forecasting frameworks (particularly after the 2008 financial crisis) (Sunstein, 2013). As a result, the VAR model is the ideal framework for this study to measure cyclical impacts on healthcare financing. Specifically, the VAR methodology is used to estimate Impulse Response Functions (IRF), Forecast Error Variance Decomposition (FEVD) and undertake a counterfactual analysis. The IRF illustrates how a variable (in this case both public and private health expenditure) reacts over time to a shock in another variable (in this case a GDP shock). For example, the IRFs are used to measure the dynamic percentage change in both public and private health expenditure each year after a GDP shock (Sims 1972; 1980a; 1980b; 1983). The FEVD complements the IRF analysis by determining how much of the forecast error variance of each variable in the system is attributed to different shocks over time. It quantifies the relative importance of each shock in explaining the fluctuation in each variable and how this can change over time. Finally, a counter-factual analysis is undertaken, whereby both public and private health expenditures are estimated at each point in time assuming that GDP shocks had not occurred.

3.6 Data

Annual data, in logarithmic form, is used from 1970 to 2021. The variables included in the VAR time series model are commonly used in studies of healthcare predictability (Astolfi *et al.*, 2012). Both private and government healthcare expenditure are considered to account for the market structure of the Irish healthcare market. The following variables were considered for inclusion in the VAR model and are outlined in Table 3.4.1:

- The level of current government healthcare expenditure in Ireland from 1997 until 2021 is sourced directly from the Department of Health. In order to extend this sample back to 1970, the growth rate of current government health expenditure, sourced from the OECD, was applied to the 1997 level from the Department of Health (Department of Health, 2005, 2022; OECD, 2023a). The data from OECD and Department of Health are similar from 1997 until 2021. The average deviation between the growth rates of these variables between 1997 and 2021 was 1%, where the OECD health expenditure is on average 1% higher per annum than the Department of Health. The deviation between the data is highest prior to 2000.
- Annual private healthcare expenditure in Ireland was sourced from the OECD from 1970 until 2021 (OECD, 2023a).
- GDP, sourced from the Central Statistics Office (CSO), is used to measure the business cycle in Ireland. There was a significant break in the methodology used to calculate GDP in 1995 and for that reason, the growth rate in the 1970 - 1995 data series is applied to the 1995 level of GDP to extend the time series back to 1970 (CSO, 1995, 2022).

- Demographics is a meaningful determinant of healthcare expenditure and so an age index was calculated by dividing the number of people in the Irish population over 65 years by the number of people of working age i.e., aged 15 to 64, using data from the CSO (2021).

Table 0.1 Determinants of Health Expenditure Used in VAR Estimation

<i>Variable</i>	<i>Description</i>	<i>Period</i>	<i>Source</i>	<i>Indicator</i>
<i>GHE</i>	Government Health Expenditure	1997-2021	Department of Health, Ireland	HSE Gross Non-Capital
		1970-1990	OECD	Health Financing
<i>GDP*</i>	GDP at Constant Prices (€mln)	1970-2021	Central Statistics Office, Ireland	National Accounts Ireland
<i>PHE</i>	Private Health Expenditure (€mln)	1970-2021	OECD	Health Financing
<i>AI**</i>	Age Index	1970-2021	Central Statistics Office, Ireland	Annual Population Estimates
* GDP levels data is calculated by applying the growth rate of the historical series from 1970 until 1994 to the 1995 GDP level from the current series.				
** AI = Number of People aged 65 and over/ Number of people aged between 15 and 65				

3.7 Model Selection

To determine which variables should be included in this VAR model several models are estimated with the aim of minimising the forecasting error over a medium-term horizon, while retaining as much information as possible. In doing so, we examine the forecast error of the various models over both one and five-year horizons. The mean error, the absolute mean error, the root mean squared error (RMSE) and the Theil-U (which compares the RMSE to a random walk model) are all calculated. The results of this process are outlined in Table 3.4.2. Understanding the limitations of purely forecasting health expenditure, this article seeks to understand the impact of GDP shocks to healthcare expenditure and examine how these impacts react dynamically over multiple years. As such, the five year ahead forecast errors are a better indicator for this analysis. A variety of multi-variate models that included government health expenditure, private health expenditure, GDP and the age index were analysed. This analysis shows that including private health expenditure improves the forecasting power of the model, while also providing insights into healthcare resourcing in Ireland. However, when the age index was included, the efficiency of the forecasting model was reduced, although this variable is likely to be important for longer-term models but given the objective of the article is to understand business cycle impacts, this variable is excluded from the analysis such that a three-variable model (included government health expenditure, private health expenditure and GDP) which had the lowest 5 year ahead forecasting error was chosen.

Table 0.2 Forecast Errors for Public Healthcare Expenditure, 2012-2021

Model	Variables	Mean	MAE	RMSE	Theil's U
1 Year Ahead					

<i>Univariate AR (1)</i>	GHE	0.05	0.05	0.07	0.75
<i>Univariate AR (2)</i>	GHE	0.03	0.05	0.07	0.73
<i>Bivariate (2)</i>	GHE GDP	-0.16	0.06	0.07	0.69
<i>3 Variable (1)</i>	GHE GDP PHE	-0.03	0.05	0.06	0.60
<i>3 Variable (2)</i>	GHE GDP PHE	-0.01	0.06	0.07	0.67
<i>4 Variable (2)</i>	GHE GDP PHE AI	0.00	0.05	0.06	0.65
5 Year Ahead					
<i>Univariate AR (1)</i>	GHE	0.26	0.26	0.26	0.62
<i>Univariate AR (2)</i>	GHE	0.28	0.28	0.28	0.67
<i>Bivariate (2)</i>	GHE GDP	-0.02	0.02	0.02	0.06
<i>3 Variable (1)</i>	GHE GDP PHE	-0.09	0.09	0.09	0.21
<i>3 Variable (2)</i>	GHE GDP PHE	-0.01	0.01	0.01	0.02
<i>4 Variable (2)</i>	GHE GDP PHE AI	0.02	0.02	0.02	0.04

The standard techniques of Akaike Information Criteria (1974), Schwarz (1978) Bayesian Criteria and Hannan Quinn (1979) Criteria were employed to determine the optimal lag length in the VAR specification. For the VAR to be unrestricted, the same number of lags is used in

each equation. For the three-variable model over a five-year horizon, these tests indicate that a two-lag model is optimal².

3.8 Model Outputs

The chosen three-variable VAR model with two lags is estimated using OLS. Impulse response functions (IRF) and forecast error variance decomposition (FEVD) are estimated, and a counterfactual analysis is undertaken. The IRF traces the responsiveness of each variable in the model to a unit shock in each of the other variables over time (Brooks, 2019). For ease of interpretation, one standard deviation shock is calculated in this model such that the IRF used in this article is measuring the responsiveness of both government and private health expenditure to a one standard deviation shock in GDP; two standard error bands around the IRF are also calculated using Monte Carlo Simulation.

The FEVD measures the proportion of the movement in the dependent variable in each equation that is due to its own shock and the proportion that is due to another shock in the dynamic system over time. The FEVD offers a slightly different method for analysing the VAR dynamics to the IRF which allow this article to determine the proportion of the movement in both public and private health expenditure that is due to business cycle shock. This impact is calculated each year for 10 years. For calculating both the IRF and the FEVD, the ordering of variables in the VAR system can be important. The IRF refer to a shock in one of the equations in the VAR system and assumes that all the shocks in the other equations in the VAR system are held constant. However, this assumption is unlikely to be valid because it implies that the error terms across equations are uncorrelated when, in practice, the error terms will have common components that cannot be associated with a single variable alone.

² As test for stationarity was not necessary as the coefficients used for a forecasting model. This analysis seeks to understand the relationships between the variables, and differencing to neutralise stationarity will reduce the information on any long-run relationship.

To overcome this, IRF are generated where shocks are independent for those orthogonalized IRF and variable ordering is applied to the equations to allow the movement of certain variables in the VAR system to follow rather than precede others. For example, government health expenditure and private health expenditure are assumed to be fast moving variables that respond to a shock in GDP instantly, but GDP is constrained to react to health expenditure shocks with a lag. The model was estimated with different ordering and little difference in the results is observed implying that the residuals in each of the VAR equations are uncorrelated.

An interesting feature of the VAR methodology that we use in this study is the counterfactual analysis, where we ask the question: what healthcare expenditure would look like had no business cycle shocks occurred. This is particularly useful because it facilitates the simulation of variables of interest with certain shocks 'turned off'. In this article, a counterfactual simulated series of healthcare expenditures is estimated where business cycle shocks are set to zero and these simulations are compared to actual healthcare expenditures. Insofar as this simulated series deviates from actual observed historical data, we can conclude that unexpected variations in the business cycle have a significant impact on healthcare expenditure. Moreover, we can also consider the dynamic properties of any differences in the actual and simulated series such as the amplitude and persistence of the deviations, as well as their behaviour around peaks and troughs in the series i.e., turning points.

Empirical Findings

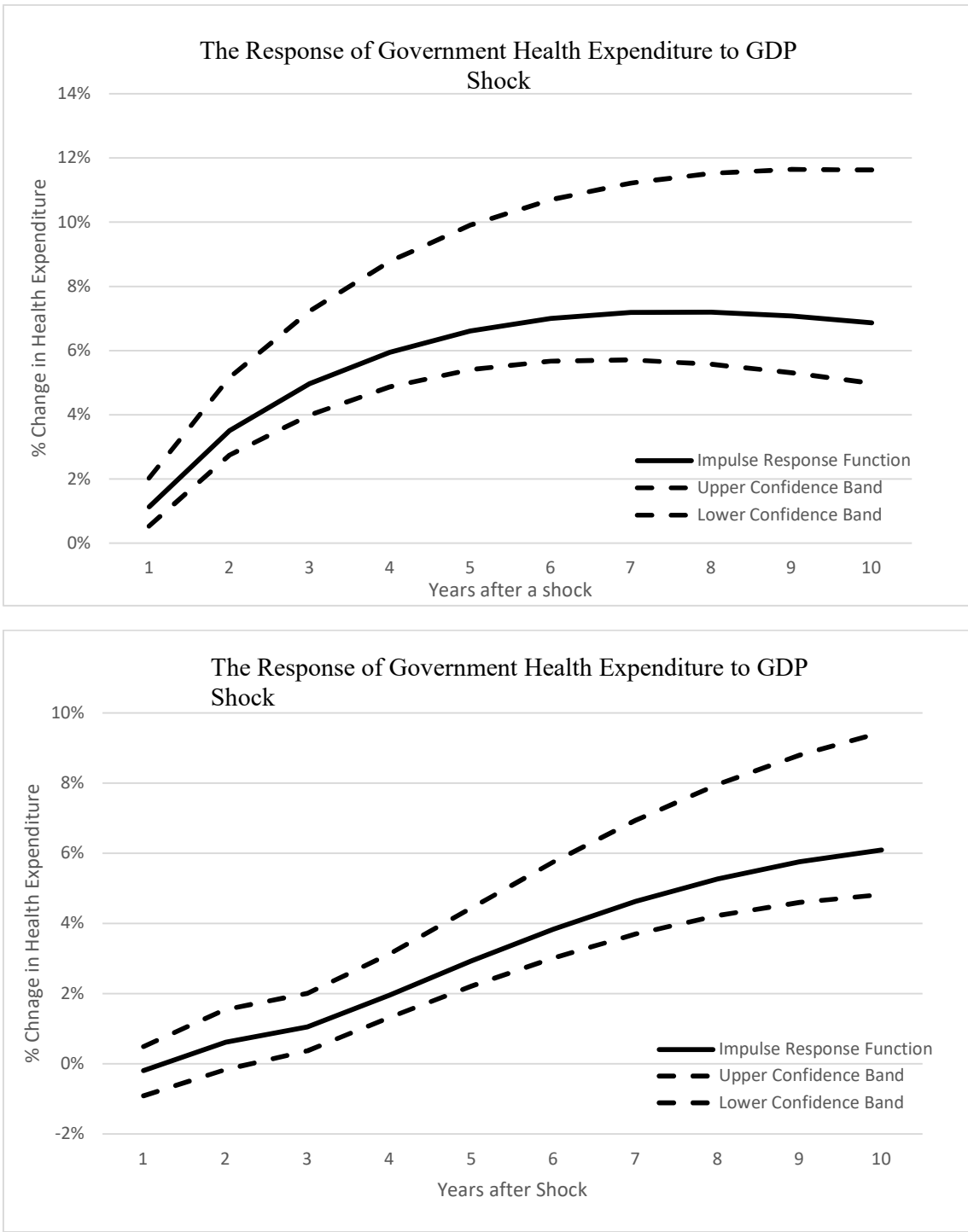
The results of the VAR analysis (IRF, FEVDs and the counterfactual analysis) all confirm that health expenditure in Ireland is highly sensitive to GDP shocks, regardless of whether it is financed by the public or private sector. Furthermore, our analysis highlights how health expenditure responds to a business cycle shock dynamically over a multi-year horizon. This

section will outline the implications of the findings from the IRF, FEVD and the counterfactual analysis.

3.9 Impulse Response Functions

The estimated response of Irish healthcare expenditure to a one standard deviation GDP shock over a ten-year horizon are presented in Figure 3.5.1. The IRF shows that i) government expenditure takes three years to respond to a GDP shock, ii) the impact of this response continues to grow for seven years, and iii) private expenditure takes even longer to respond. Specifically, the VAR model indicates that government health expenditure will be 7% higher per annum (over a ten-year horizon) because of a positive business cycle shock, and private expenditure is estimated to increase by 6% per annum over the same period. Over shorter horizons, however, the sensitivity of public expenditure to business cycle shocks is much more pronounced than private health expenditure -- four years after an unexpected GDP increase, the VAR model indicates that public healthcare expenditure will have increased by 5% per annum, while private expenditure will have increased by only 1%. Although the response of private healthcare expenditure is relatively muted in the short run, it is expected to display similar dynamics to that of public expenditure over the long run.

Figure 0-1 Impulse Response Functions



The confidence bands are based of Monte Carlo Simulation, the upper 84th percentile and the lower 16th percentile.

3.10 Forecast Error Variance Decompositions

The FEVD complements the IRF analysis in Figure 3.5.1 by measuring the relative importance of selected shocks to government and private health expenditure fluctuations over various time horizons. For the period 1970 – 2021, Table 3.5.1 outlines that 36% of the variation in government health expenditure on average, is explained by a GDP shock. In contrast, the corresponding effect on private health expenditure is much lower, at 5%. Over a longer-term horizon, however, the contribution of GDP shocks to healthcare resourcing becomes even more significant, and the differences in government and private health expenditure dynamics are reduced considerably. For example, over a nine-year time horizon, the FEVD analysis indicates that close to 70% of the variation in government health expenditure is due to business cycle shocks, while the corresponding effect on private health expenditure is 53%. The joint dynamics between public and private sector healthcare resourcing has implications for government policy. The FEVD, outlined in Table 3.5.1, shows that six years after a shock, government health expenditure shocks are nearly as important as GDP in explaining the variation in private health care expenditure, accounting for 32% and 25%, respectively. However, private health expenditure accounts for less than 2% of government healthcare expenditure. This confirms the impulse response analysis that, despite government attempts to allow the private sector to pick up some of the slack from government cutbacks in the aftermath of a recession, ultimately (in the longer run), the private sector will also run out of capacity.

Table 0.1 Forecast Error Variance Decomposition for Government Health Expenditure, 1970-2021 (%)

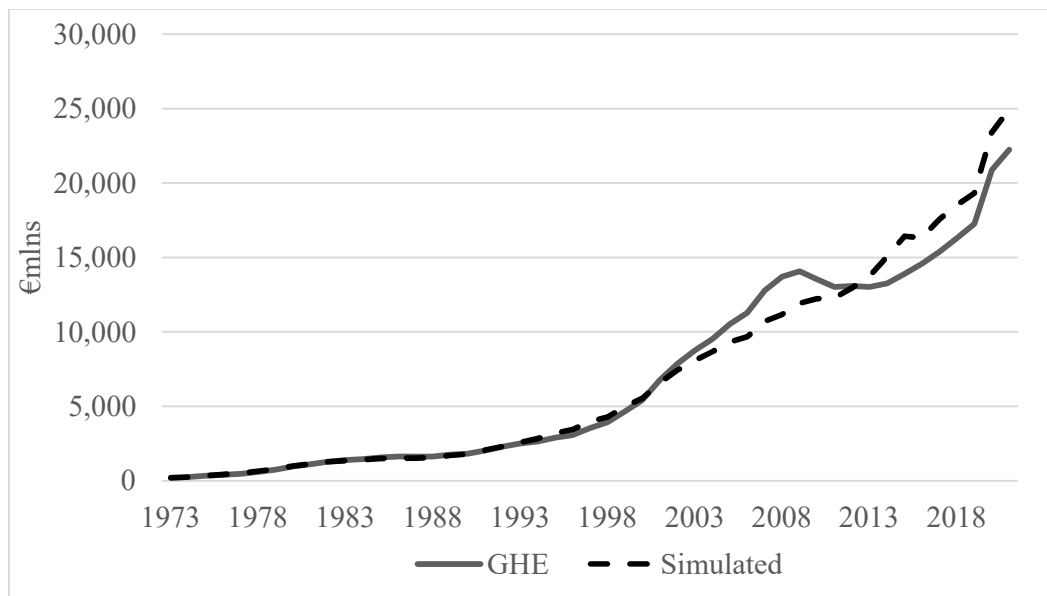
	GDP			PHE			GHE		
Govt.	Lower	Mean	Upper	Lower	Mean	Upper	Lower	Mean	Upper
HE									
<i>1</i>	1.4	6.9	16	0.3	3	9.4	77.8	88	95.4
<i>3</i>	21.5	36.6	51.6	0.4	2	6.8	45.4	59.8	74.4
<i>6</i>	39.6	57.3	72.4	0.4	1.7	6	25.6	39.6	56.2
<i>9</i>	50.6	68.3	81.5	0.5	2	6.8	16.4	28.3	44.2
<i>10</i>	52.8	70.4	83	0.5	2.3	7.2	14.9	25.9	41.5
	GDP			PHE			GHE		
Private	Lower	Mean	Upper	Lower	Mean	Upper	Lower	Mean	Upper
HE									
<i>1</i>	0.1	1.2	5.1	94.9	98.8	99.9	0	0	0
<i>3</i>	2.2	6.5	15.4	77.3	86.9	93	2.7	5.1	9.4
<i>6</i>	18.4	32.4	47.7	28.1	39.7	53.2	15.9	25.3	36.7
<i>9</i>	35.7	53.4	69.1	11.9	19.6	30.8	13.7	24.8	38.7
<i>10</i>	40.1	58.2	73.5	9.7	16.7	27.3	12	22.9	37.2
The confidence bands are based of Monte Carlo Simulation, the upper 84th percentile and the lower 16th percentile.									

3.11 Counterfactual

The counterfactual analysis demonstrates how the VAR methodology can be applied to facilitate the budgeting process. Specifically, we consider how healthcare expenditure would have evolved over time if GDP shocks were set to zero. The simulated series for government

health expenditure (GHE) and private health expenditure (PHE) are provided in Figures 3.5.2 and 3.5.3, respectively.

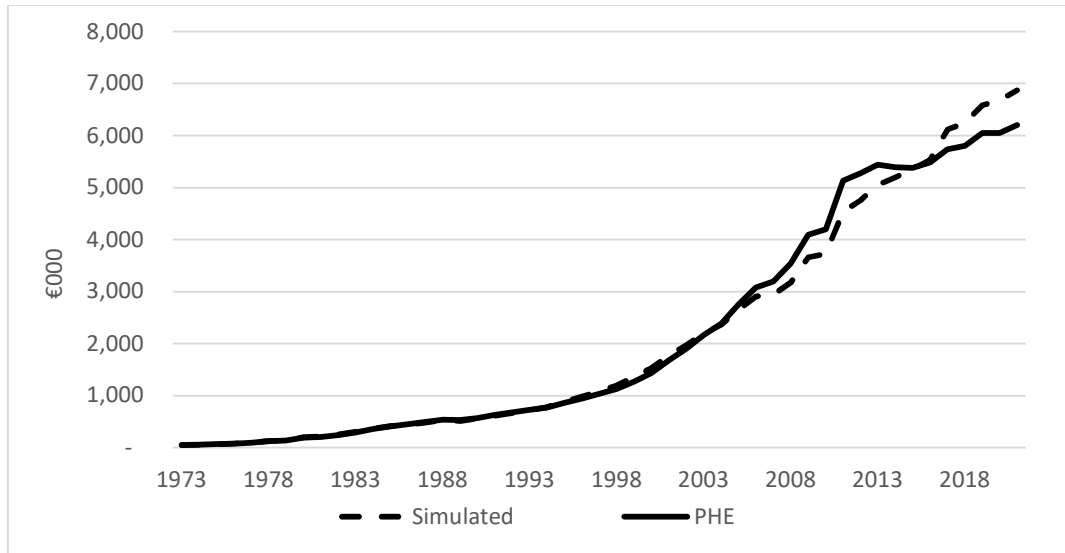
Figure 0-2 Counterfactual Simulation of Government Healthcare Expenditure with GDP Shocks Turned Off (€million)



**GHE is Government Health Expenditure*

**Simulated – Represents the simulated Government Health Expenditure calculated by the VAR model assuming no GDP shocks.*

Figure 0-3 Counterfactual Simulation of Private Healthcare Expenditure with GDP Shocks Turned Off (€million)



**PHE is Private Health Expenditure*

**Simulated – Represents the simulated Private Health Expenditure calculated by the VAR model assuming no GDP shocks.*

Each cycle is characterised by a period when the government spent either more or less on health expenditure than it would have had if a GDP shock had not occurred. An analysis of each of the five cycles is outlined in Tables 3.5.4 and 3.5.5. This analysis confirms the findings from the IRF and forecast error variance decompositions that a GDP shock has a multi-year impact on health expenditure, regardless of how it is financed, and that the impact is delayed for private health expenditure. It is also evident from this analysis that the impact of GDP shocks on health expenditure, particularly government health expenditure, has increased since the start of the study period.

Table 0.2 Counterfactual Analysis of Cycles - Government Health Expenditure (GHE)

Period		Number of years	Average Annualised GDP Growth	Government Expenditure Growth	Actual GHE vs Simulated €mln	Actual GHE vs Simulated %
1973	1982	9	4%	21%	-236	-4%
1983	1990	7	2%	4%	421	3%
1991	2000	9	7%	11%	-2179	-7%
2001	2012	11	2%	6%	13828	10%
2013	2021	8	10%	7%	-18430	-13%

Table 0.3 Counterfactual Analysis of Cycles – Private Health Expenditure (PHE)

Period		Number of years	Average Annualised GDP Growth	Growth	Actual vs Simulated €mln	Actual vs Simulated % of PHE
1973	1985	12	3%	19%	-58	-3%
1986	1993	7	5%	7%	80	2%
1994	2003	9	5%	12%	-556	-4%
2004	2015	11	5%	8%	3537	7%
2016	2021	5	6%	4%	-2,706	-8%

Discussion

There are several noteworthy observations from this analysis that could significantly assist both policymakers and accounting professionals within healthcare systems in addressing the fluctuating impact of economic cycles on the provision of healthcare services. For example,

the novel application of the VAR methodology used in this study demonstrates that traditional budgeting practices (whether incremental or multi-year) are limited, primarily due to their failure to address the growing impact of GDP shocks on health expenditure.

For example, the model estimates that government health expenditure would have been €13.8 billion (or 10%) lower from 2000 - 2012 had economic shocks not occurred (see Table 3.5.2). This deviation was greatest between 2007 - 2009 when an additional €6.7 billion was spent by the government on healthcare because of previous positive GDP shocks. The VAR model also indicates that the impact of positive GDP shocks continued until 2013, despite the economic decline during that period. This confirms the findings in the IRF and FEVD, that the impact of the recessions is greatest between three to seven years after the shock. Similarly, during the 2013–2021 period of economic and fiscal recovery, there is a large divergence between the economic performance and expenditure in healthcare. The VAR model estimates that previous GDP shocks have resulted in €18.4 billion less government health expenditure over this period. This represents 13% of government health expenditure, or €2.0 billion per year. The VAR model estimates that these recessions have resulted in lower private health expenditure of €2.7 billion or 8% since 2016.

Table 3.5.3 shows that the main difference between public and private healthcare expenditure is that the private sector takes longer to respond to an economic shock than government health expenditure. Positive GDP shocks also resulted in increased private health expenditure from 2004 to 2015. Over this period, the VAR model estimates that an additional €3.5 billion or 7% was spent on private healthcare that would not have been spent had economic shocks impacted.

Overarchingly, our results have shown that GDP shocks take at least three years to impact government health expenditure and up to seven years for the full effect of that shock

to be experienced such that policy makers have time to alter their response to changes in the cycle. Prolonged periods of underinvestment, such as that seen in Ireland since 2013, reduce financial resilience and result in the bottlenecks in the system that are currently evident e.g., extended waiting lists and overcrowding (NTRF, 2023). The COVID-19 pandemic also occurred in this period, which resulted in a 21% increase in government health expenditure in 2020, as the healthcare sector was at the centre of this crisis. While the pandemic undoubtedly exacerbated these bottlenecks, the prolonged impacts of the previous recession meant that the healthcare service had very little capacity to deal with this crisis, as suggested by this analysis. Although further analysis is required to understand what impact that business cycle fluctuations have on healthcare utilisation, the backdrop of years of underinvestment in healthcare services, compounded by the fallout from the COVID-19 pandemic would suggest that financial resilience has decreased over this period.

As a result, there is a necessity for healthcare policy makers to begin to understand GDP impacts in their multi-year budgeting processes. In doing so, healthcare expenditure growth should be restrained to the sustainable level of expenditure as measured by the VAR model. This could improve the financial resilience of the health service going forward and minimise the risk of another prolonged period of underinvestment like that most recently experienced. This will not be easy as political and institutional pressures are great (particularly given the ever-present need for investment in healthcare services). However, failure to do so will most likely result in excessive volatility in the provision of resources.

Essay Conclusion

This article empirically investigates how the impact that the business cycle can be measured and used to enhance budgetary planning in Ireland. Specifically, our article uses the VAR methodology to examine how the annual incremental budgeting process could be enhanced

by measuring the impact of the business cycle on health expenditure over a multi-year horizon. These estimates can be used in their own right to increase the reliability of budgeting targets. Meanwhile, the counterfactual analysis (the main focus of this article) can be used to demonstrate how budgeters can distinguish between funds that are sustainable and those that are temporary and so may no longer be available once expenditure is impacted by the next recession, which could be as much as seven years after a crisis (Arnold & Artz, 2019; Chambers, 1984; Jordan & Messner, 2019).

Our study contributes to the literature in three ways. Firstly, we add to the public sector budgeting literature by using a novel approach (the VAR methodology) to measure the pro-cyclical and highly sensitive response of health resources to the business cycle, particularly over medium to longer term. This finding demonstrates the limitations of traditional annual budgeting processes to allocate resources (Barbera *et al.*, 2016; Braendle & Colombier, 2016; Chen *et al.*, 2013; Hou, 2006; Thompson *et al.*, 2022; White, 2013). Secondly, this article utilises a feature of VAR, counterfactual analysis, to propose an alternative to directly forecasting expenditure which, as Arnold & Artz (2019) and Hou (2006) highlight, is particularly challenging due to the difficulties in predicting the magnitude and timing of recessions. That is, instead of using forecasts which reinforce the cyclicity caused by incremental budgets, this article proposes measuring the impact of business cycle fluctuation firstly and then utilising this finding to alter budgeters' response to the changes in their business environment.

Understanding the impact of shocks in this manner can better inform the planning process such that decision makers and planners can respond using evidence to the economic environment that the impact can be understood and absorbed in the system, which would support financial resilience (Barbera *et al.*, 2017; Begkos *et al.*, 2020; 2023; Bouckaert, 2021;

Marrs, 2020). In so doing, a more informed budgeting process can facilitate improved financial management and allocation of healthcare resourcing, which in turn leads to an overall improvement in budgetary planning and control. Moreover, it will help overcome the challenges faced by healthcare management in the process of implementing budgetary reforms (Carr & Beck, 2022; Mauro *et al.*, 2021). It also follows that failing to utilise the information provided by the counterfactual analysis could result in a period of large increases in government health expenditure over the following 8-10 years, which would not be sustainable once the effects of the next recession impacts. Therefore, by assessing the impact of shocks over a multi-year horizon, our findings demonstrate how the budgeting process can be used to manage unexpected events by altering the response in an informed rather than reactionary manner (Carr & Beck, 2022; Thompson & Gates, 2007; Vollmer *et al.*, 2009; White, 2013).

Finally, this empirical analysis can be used to support evidence-based policy decisions. Political and parliamentary cycles tend to be short sighted and inhibit the implementation and effectiveness of multi-year plans (Kuhlmann *et al.*, 2021; Rodríguez-Tejedo, 2021; Snow *et al.*, 2015). To overcome these impacts and to ensure that government organizations have more financial resilience, particularly once the next crisis occurs, requires a greater level of expertise, professionalism, and knowledge of decision makers. The VAR methodology supports this process by using the counterfactual analysis to reduce the impact of economic shocks on expenditure decisions, helping to ensure that expenditure levels will be more consistent and sustainable. In addition, estimating future expenditure based on the permanent level of expenditure estimated by the VAR model will further reduce cyclical impacts on these longer-term forecasts.

Our analysis also provides insights for practitioners into how to account for the impacts of business cycle fluctuations on the multi-year budgetary planning process. In particular, our counterfactual analysis supports previous research that has observed procyclicality in healthcare expenditure (Cronin & McQuinn, 2018). In doing so, we provide further data suggesting that the relationship between GDP and healthcare expenditure is important and warrants consideration by healthcare budgeters. Furthermore, our impulse response analysis (see Figure 3.5.1) demonstrates that 90 percent of the business cycle effects on total healthcare expenditure growth have worked through by Year 5 after the economic shock. In budgetary planning terms this means that the cyclical impact is exhausted after 5 years suggesting that long-run budgetary planning should have a horizon of at least 5 years. We argue that, informed by this accounting information, practitioners and policymakers should be motivated to produce cyclically adjusted expenditure estimates based on expected GDP growth. Our analysis demonstrates the merits of adopting 5-year budget planning process in order to generate a long-run secular trend which is required in many developed countries, including Ireland, given rising healthcare demands and demographic changes. However, the VAR model can also be used effectively in the current annual incremental budgeting process, by estimating the sustainable level of healthcare expenditure from which long-term committed expenditure should be financed. By paying for such programmes from the temporary resources, as calculated by the counterfactual analysis will lead to unnecessary volatility in the provision of budgetary resources, particularly once the next recession occurs.

This article has some limitations. Although VARs are powerful tools for describing data, they are purely empirical models and do not impose any theoretical restrictions either on causality or on the scale of effects between variables. The notion of business cycle impacts in healthcare expenditure, for example, is based on the empirical observation of a shock being

relatively short-lived compared to longer-term or permanent effects. Defining cyclical in such dynamic terms can be construed as somewhat arbitrary without a theoretical framework suggesting that business cycle impacts on healthcare expenditure are likely to vary between the short-run and longer run, however defined. Also, from a policymaking perspective, the VAR methodology used in this article is not explicit about how expectations are formed, and it is possible that the sensitivity of the budgetary process to future business cycle developments is different from the simple lag structure defined in the VAR model. Moreover, the lag structure is held constant over the entire sample period, which precludes the possibility of changing expectations over time. However, while alternative models with explicit causal links and expectations provide an intellectually coherent framework for policy analysis, such models do not fit the data well and so we are forced to make a trade-off between the empirical and theoretical best fit. Finally, the VAR methodology is not a parsimonious model and requires large amounts of data to estimate the large number of coefficients. For each variable that is added to a VAR, the number of coefficients to be estimated is squared. As such, the availability of quality health data over long periods is challenging. More recently data has improved, especially at a macro level, which is the type of data used in this article. However, data quality issues are more problematic for granular data. Finally, this article also focuses on macro budgeting decisions, and it is beyond the scope of this article to assess the impact that the economic cycle is having on hospitals, GP and pharmaceutical services and primary care services. However, there is evidence that demand side factors display countercyclical properties also. Additional research is required to understand the countercyclical properties of utilisation factors.

Chapter 4 Building Healthcare Capacity: Accounting for Utilisation Changes in the Aftermath of an Economic Shock

Essay Abstract

The impact of the Covid-19 pandemic highlights the challenges faced by healthcare systems worldwide, particularly in anticipating and absorbing the repercussions of such shocks. This study explores the vulnerability of healthcare systems to economic shocks, emphasising the importance of financial resilience. Despite the significance of contemporary accounting practices in predicting revenues and expenditures, their efficacy in preventing substantial multi-year deficits following shocks remains limited. To address this gap, our research focuses on empirically demonstrating how a greater understanding of utilisation activity could complement healthcare costing practices in accounting for cyclical changes. To do so, we conduct a case study of the Irish healthcare sector. Employing a mixed-methods approach, we combine exploratory interviews with C-suite healthcare finance executives, archival data analysis on healthcare utilisation, and a novel application of vector autoregression methodology. Our objective is to develop a measure of healthcare utilisation to better account for cyclical impacts in the budgeting process. The findings contribute to the management accounting healthcare literature by demonstrating how incorporating the impact of economic shocks on healthcare utilisation into the budgeting process enhances decision-makers' ability to anticipate and absorb shocks. The study also emphasises the importance of using micro-data from accounting or costing systems in conjunction with macro analysis to improve transparency and balance efficiency with financial resilience.

Essay Introduction

The impact of events such as the Covid-19 Pandemic and the Global Financial Crisis have highlighted the vulnerability of healthcare systems, revealing that many lack the financial

resilience necessary to adequately anticipate and absorb the repercussions of such shocks (Barbera *et al.*, 2020; Coyle & Ferry, 2022; Ferry & Eckersky, 2022). Consequently, healthcare systems are now grappling with adverse healthcare outcomes, such as reduced accessibility to services, as well as, incurring larger annual budget deficits (OECD, 2023b; 2023c). Contemporary accounting practices should serve as a pivotal anticipatory tool in building financial resilience, capable of predicting revenues and expenditures (Ferry & Eckersky, 2022). However, in reality, these practices have been unable to avert the occurrence of substantial multi-year deficits, following a shock, leading to insufficiencies in meeting healthcare commitments (Barbera *et al.*, 2016; Ferry & Eckersky, 2022). Ferry *et al.* (2023, p.1) argues that “countries are potentially going to face a perpetual state of emergency in which they struggle to deal with interlocking and successive crises”. Consequently, budget overruns have become a recurring challenge for healthcare systems, significantly undermining efforts in financial management and strategic planning (Braendle & Colombier, 2016; Serritslew, 2005).

Further advances in healthcare accounting practices are necessary to build financial resilience (Ahrens & Ferry, 2020; Anessi-Pessini *et al.*, 2020; Lee & Chen, 2022). Financial resilience referring to the ability to anticipate and absorb the consequences of unforeseen shocks and is argued to be contingent upon the availability of financial resources, as well as proficiency in anticipating, comprehending, and adeptly responding to emergencies (Anessi-Pessini *et al.*, 2020; Barbera *et al.*, 2017; Barbera *et al.*, 2019; Thomson *et al.*, 2022). Our study seeks to contribute to this goal by developing a measure of healthcare utilisation that can assist in accounting for cyclical impacts specifically in the budgeting process. Our intent being to empirically demonstrate how a greater understanding of utilisation activity could be used to complement healthcare costing practices in accounting for cyclical changes.

To do this, a case study of the Irish healthcare system is undertaken. The Irish system qualifies as an interesting case because it was forced to implement one of the largest austerity

programmes after the Global Financial Crisis. This was a condition of a Programme of Financial Support from the Troika (a single decision-making group created by the IMF, EU, and ECB) worth a total of €85 billion during the period 2010-2013 (European Commission, 2011). The IMF identified cuts to healthcare expenditure, the largest area of public expenditure in Ireland, as critical to the attainment of these targets (IMF, 2010, p.27). International comparative work suggests that of all 53 WHO countries, Ireland experienced the greatest decline in healthcare expenditure from 2009 until 2013 (Carr & Beck, 2022, Cohen *et al.*, 2015). Moreover, the Covid-19 pandemic occurred at a time when this sector had not yet recovered from the impacts of the 2008 financial crisis. In Ireland, annual budget overruns and staffing crises have persisted in many areas of the healthcare system since the financial crisis (Department of Public Expenditure & Reform, 2023a). Additionally, accessing services has become more challenging, with waiting lists reaching unprecedented levels (NTPF, 2022).

A mixed methods approach is employed, encompassing both qualitative and quantitative research methodologies. To begin, exploratory interviews are conducted with C-suite healthcare finance executives, aimed at understanding the budgeting decision-making process during and after both the 2008 Global Financial Crisis and the Covid-19 Pandemic. Secondly, to assess the effect of a shock on healthcare utilisation, archival data on the utilisation of (i) hospital services, (ii) general practitioner and pharmaceutical services, and (iii) services for the elderly was analysed. Thirdly, a novel application of the vector autoregression (VAR) methodology is used to measure the impact of a shock on the utilisation of these three sectors. Finally, the quantitative and qualitative analyses is amalgamated to empirically demonstrate how these calculations could be incorporated into the decision-making process, enabling healthcare budgets to account for the impact that business cycle fluctuations have on the utilisation of services. We argue that by considering such impacts in the budgeting process,

healthcare systems can be better equipped to anticipate and respond rather than merely reacting when shocks occur.

This paper contributes to the literature in the following ways. Firstly, this paper responds to the need highlighted by Thompson *et al.* (2022) and Ferry *et al.* (2023) for greater use of data and analysis to underpin financial resilience once a shock occurs. Central to this, is the need for the budgeting process to “understand the impacts” of a shock if an unforeseen event is to be anticipated (Anessi-Pessini *et al.*, 2020). This paper uses the VAR methodology to measure the annual impact of a shock on healthcare utilisation for multiple years. Doing so, has demonstrated the complexities that healthcare planners face in responding to healthcare needs after a shock, particularly if the impacts are not understood. For example, the impacts of a shock have varied between sectors and across time. By incorporating these impacts into the budgeting process, the healthcare system would be better set to anticipate and absorb the impact of a shock in order to return to its pre-shock state (Ahrens & Ferry., 2020; Barbera *et al.*, 2017; Bedford *et al.*, 2022). This paper advances the financial resilience literature by explicitly demonstrating how extensive systematic data and greater analysis can improve budgeting anticipatory capabilities by understanding the impact of shocks on healthcare systems.

Secondly, this paper will also potentially balance the need to make efficiencies with the necessity to improve financial resilience when a shock occurs (Chapman *et al.*, 2014; Chapman., 2022; Grossi *et al.*, 2020; Kober & Thambar, 2021; Leoni *et al.*, 2021; Llewellyn *et al.*, 2022). Hood’s (1991) healthcare accounting reforms have focused on developing costing systems such as DRG and PLIC which focus on increasing efficiency, improving transparency and facilitating a comparison between healthcare organisations (Chapman *et al.*, 2014; Ellwood *et al.*, 2014; Llewellyn *et al.*, 2016). However, Steccolini (2018) and Stark (2014) have raised concerns that the drive for efficiency have had profound consequences for the resilience

agenda. Elsewhere, Leoni *et al.* (2021) highlights that accounting systems and data were central to the immediate response to the Covid-19 pandemic, but further research is needed to see how the use of data and analysis in accounting systems could extend beyond the crisis. This paper demonstrates the importance of using this data to inform macro analysis to support systematic decision making, which is often overlooked during periods of economic prosperity. For example, consistently focusing on efficiencies without considering the macro environment can contribute to the reactionary response when a recessionary shock occurs. Using the VAR methodology to measure the impacts of a shock on services utilised can ensure that policy makers are more prepared to anticipate, respond and ultimately absorb shocks when they occur. However, this analysis is a complement to these accounting systems, as the accounting data can improve the analysis.

The remainder of this paper will be organised into four further sections. Section 4.3 positions the paper in the healthcare budgeting literature, outlining how the introduction of costing systems in healthcare planning aimed at improving efficiencies, may have come at the cost of financial resilience once a shock occurs. Section 4.4 outlines the empirical strategy used in this paper. Section 4.5 sets out the empirical findings. Section 4.6 discusses these findings by outlining how our findings could be incorporated into the decision-making process, enabling healthcare budgets to account for the impact that business cycle fluctuations have on the utilisation of services. Section 4.7 concludes by outlining the policy implications and the contributions of this paper.

Theory

The sustainability of public services, including healthcare services, has been on the agenda of many governments for the past thirty years (OECD, 2015). This has led to a significant body of public service reform literature over the past 30 years. Notably, New Public Management

theory (NPM) was initiated in the early 1990s by Hood (1991) in response to the high level of public debt that accumulated during the 1970s and early 1980s (Begkok & Antonopoulou, 2021; Busse *et al.*, 2013; Groot & Budding, 2008; Steccolini, 2018). At this time, there was a desire to improve the quality of government, through market-based reforms which seek to improve accountability and transparency (Ellwood *et al.*, 2014; Llewellyn *et al.*, 2016). But more importantly, NPM has a strong focus on financial control, where governments emphasised value for money to improve the efficiency of public services, including healthcare services (Chapman *et al.*, 2014; Goldfield, 2010; Llewellyn *et al.*, 2016).

Despite these reforms, global budgeting continues to play a prominent role in healthcare systems. Global budgeting allocates revenues of healthcare services providers based on a predetermined amount for all services, regardless of the quantity or quality of services provided. However, the implementation of costing systems such as Diagnostic Related Groups (DRG) and Patient Level Information Costing Systems (PLIC) have yielded enhancements in healthcare accounting practices (Busse *et al.*, 2013; Chapman *et al.*, 2014; Ellwood *et al.*, 2014). These include (i) engaging clinicians in comprehending the intricacies of service costs (Llewellyn *et al.*, 2022; Kerpershoek *et al.*, 2016); (ii) fostering enhanced cost transparency (Begkok & Antonopoulou, 2021; Chapman *et al.*, 2022; McCarthy *et al.*, 2022); (iii) identifying and increasing efficiency gains by facilitating benchmarking across procedures, hospitals, regions, and healthcare systems (Begkos & Antonopoulou, 2021; Busse *et al.*, 2013; Llewellyn *et al.*, 2016) and focusing on ensuring patients have access to high quality services (Porter, 2010). Table 4.3.1 provides a detailed description of each of these three costing systems.

While the implementation of these bottom-up costing systems has significantly enhanced accountability and transparency, it is suggested that this may have occurred at the expense of financial resilience particularly when faced with unexpected shocks (Steccolini, 2018). For

example, Stark (2014 p. 692) argues that “two well-entrenched value sets, relating to efficiency and procedural rationality, have profound consequences for the resilience agenda”. This focused-on efficiency gains has left healthcare services lacking the financial resilience needed to absorb the impact of economic shocks when they occur.

Financial resilience is defined as the capacity to plan, anticipate, and absorb shocks, enabling a healthcare system to revert to its pre-shock state (Ahrens & Ferry, 2020; Barbera *et al.*, 2019; Barbera *et al.*, 2020; Lee & Chen, 2021; Marrs, 2020; Padovani *et al.*, 2021). Once a shock occurs, many healthcare systems have been unable to avert the occurrence of substantial multi-year deficits, leading to insufficiencies in meeting healthcare commitments (Barbera *et al.*, 2016; Ferry & Eckersky, 2022; Ferry *et al.*, 2023). Consequently, budget overruns have become a recurring challenge for healthcare systems, significantly undermining efforts in financial management and strategic planning (Braendle & Colombier, 2016; Serritslew, 2005).

There is a growing body of literature, particularly since the 2008 Global Financial Crisis which examines the financial resilience of public sector, including healthcare organisations, in the aftermath of a shock. This literature has shown that organisations that have less financial resilience when a shock occurs tend to be more reliant on external the sources of funding and therefore, they have less control over revenue (Cabaleiro *et al.*, 2013; Padovani *et al.*, 2021). For example, shocks have a greater impact on organisations when resources are scarce, debt burdens are high or the organisation is adhering to stringent fiscal rules during a crisis (Lee & Chen, 2022; Kober & Thambar, 2021; Roa *et al.*, 2023). The strategies that used to respond to shocks can also impact the consequence of shocks. For example, organisations that “bouncing back,” rather than “bounce forward”, when a shock occurs also have less financial resilience (Barbera *et al.*, 2017; Coyle & Ferry, 2022). Institutional factors such as the systems and controls in place to manage risks also contribute to having poorer financial resilience (OECD,

2023b). For instance, a lack of an adequate accounting systems that provides the data and information needed to anticipate the level of financial vulnerability when a shock occurs, inhibits an organisation capacity to respond to a shock (Anessi-Pessini *et al.*, 2020; Bracci & Tallaki, 2021; Leoni *et al.*, 2021; Tallaki & Bracci, 2020).

Improving financial resilience often occurs when an organisation is successful recovering from the previous crisis (Kober & Thamber, 2021; Lee & Chen, 2022). Organisational learning typically occurs in the latter stages of the cutback management process. There is often an increasing emphasis on fostering fiscal prudence, a desire on to ensure that policy decisions are based on evidence, and the establishment of a sufficient buffer to support the organisation in the face of subsequent shocks (Gomes, 2021; Lee & Chen, 2021; McQuestin *et al.*, 2022). However, when severe shocks occur close together there is rarely enough time or capacity built up in the system to adequately improve financial resilience and the impact of the second shock can compound the adverse outcome that occurred after the first shock.

Reforms in healthcare accounting practices, therefore, are necessary to build financial resilience in this sector regardless of the economic conditions (Ahrens & Ferry, 2020; Anessi-Pessini *et al.*, 2020; Lee & Chen, 2022). Governments can actively shape financial resilience by placing a greater emphasis on long-term planning, risk management, and recognising the adverse effects of pro-cyclical policies on fiscal vulnerability (Anessi-Pessina *et al.*, 2020; Barbera *et al.*, 2021; Lee & Chen, 2021; Marrs, 2020; Wei, 2021). To do so, requires robust accounting systems, such as DRG and PLIC, to furnish data to help to respond to macro systematic risks (Tallaki & Bracci, 2020). While historically accounting systems have focused on efficiency gains (Busse *et al.*, 2013; Chapman *et al.*, 2014), there is now a need to use the granular data from these accounting systems to understand systematic risks such as identifying shocks, managing financial vulnerabilities, and adapting internal processes to respond effectively to shocks (Bracci and Tallaki, 2021; Leoni *et al.*, 2021; McQuestin *et al.*, 2022). By

leveraging accounting systems and the budgeting process, governments can proactively identify potential shocks, manage financial vulnerabilities, and adjust internal processes to effectively respond to shocks (Bracci & Tallaki, 2021; Leoni *et al.*, 2021; McQuestin *et al.*, 2022). This approach allows for the quantification of risks associated with an inevitable shock, and in the event of a shock, facilitates the assessment of its impact, enabling health systems alter its response to the shock so that the impacts are absorbed more effectively, and adverse outcomes are minimised (Marrs, 2020).

Specifically, we suggest that once a shock occurs, such as financial crisis or the Covid-19 pandemic, the utilisation of healthcare services fluctuates beyond normal parameters, while simultaneously the availability of resources declines sharply. Failing to measure, understand and account for these fluctuations in the budgeting planning process, along with the continued search for increased efficiencies within healthcare, is exacerbating the fragility of the healthcare sector, particularly if shocks occur close together (Ahern & Ferry, 2020; Barbera *et al.*, 2020; Barbera *et al.*, 2021). This study seeks to quantify these impacts, specifically by measuring how Irish healthcare activity has been impacted and responded to the two previous economic and healthcare shocks. To enhance the budgeting process to improve financial resilience, the impact of a GDP shock on healthcare utilisation will be measured over a multi-year period. We will subsequently demonstrate how these impacts can be included in the budgeting process. In doing so, the impact of business cycle shocks on the utilisation of services can be more accurately accounted for and even, financed, when a shock occurs. In doing so, the healthcare sector can improve its financial resilience and its ability to absorb the impact of the shock. The empirical strategy that is used is outlined in the next section.

Table 0.1: Healthcare Costing Systems

	Global Budgeting	Diagnostic Related Groups (DRG)	Patient Level Information Costing Systems (PLIC)	Population Based Resource Allocation Models
Definition	Healthcare services, typically hospitals, are paid a set fixed amount for the total number of services provided.	Patients are categorised into homogenous groups with similar clinical diagnoses to control hospital costs and to determine payor reimbursement rates.	Costs are collected for each patient episode. Information on activity levels, financial resources used, and operational data are used to estimate costs.	A funding model that distributes healthcare resources based on the characteristics of the population.
Advantages	Simple and cheap administration.	Creates a measurable definition of the services provided by	Creates a measurable definition of services provided in	Allocate funds based on population need.

		healthcare institutions.	healthcare institutions.	
	The aggregate total spend on a particular programme is controlled.	Increases transparency	Increases transparency.	Improve transparency and predictability of funding.
	There is a level of certainty for the payer and providers of services.	Facilitates benchmarking between local and national services.	Facilities benchmarking between local and national services.	Promotes innovation, integrated care, and accountability.
		Engages clinicians in costing and financial decision-making processes.	Engages clinicians in costing and financial decision-making processes.	Promotes efficiency and equity of access.
		Highlights the efficient providers of	Highlights the efficient providers of	Promotes innovation, integrated care,

		services and helps to identify and reduce waste.	services and helps to identify and reduce waste.	and accountability.
		Provides data to support evidence-based decision	Provides data to support evidence-based decision	
		Disincentives the over treatment of patients.	Promotion an integrated service.	
Limitations	No performance based or output-based incentives.	Difficulty in assigning some costs such as joint or non-proportional costs.	Difficulty in assigning all costs accurately.	Does not consider the quality of the service provided.
	Little differentiation between efficient service providers.	Difficult to identify products and outputs.	Service quality is not measured.	Can be substantially impacted by rising

				transactional costs.
	Very little transparency around what is driving costs.	Lead to unintentional cherry picking of procedures, where fewer complex cases are preferred.	Non-hospital costs are often ignored.	

Empirical Strategy

This paper employs field-based interviews and archival data to assess and measure the impact that business cycles fluctuations have on the Irish healthcare system. The interviews and data collection were completed concurrently. The interviews are used to understand the impact that recent business cycle shocks have had on the healthcare system and the decision-making process. The archival data is used to formulate a measure of healthcare utilisation in Ireland. Subsequently, this utilisation measure is used to measure the impact of GDP shocks on healthcare utilisation through a novel application of the Vector Autoregression (VAR) methodology. The overall objective being to examine how the healthcare budgeting process can be enhanced to account for the impacts of for business cycle fluctuations. Although the research is grounded and linked to extant bodies of research (Barbera *et al.*, 2020; Ferry & Eckersky, 2022; Gorina *et al.*, 2018; McQuestin *et al.*, 2022; Thomson *et al.*, 2022), the research questions are exploratory. Our intent is discovery, but we also wish to empirically demonstrate how a greater understanding of utilisation could be used to complement healthcare costing methods in accounting for business cycle changes. We argue that by considering such

impacts in the budgeting process, healthcare systems will be better equipped to anticipate and respond, rather than merely reacting when shocks occur.

4.1 The Irish Healthcare System

A case study of the Irish healthcare system was undertaken. The Irish setting is particularly interesting in the context of economic shocks since Ireland was acutely impacted by the 2008 recession and the healthcare sector has continued to grapple with substantial healthcare cuts to services, personnel, and funding (Carr & Beck, 2020; Turner, 2018). Also, the Covid-19 shock occurred at a time when healthcare services in Ireland had not substantially recovered from the previous shock associated with the financial crisis (Carr & Beck, 2022).

In Ireland, the Department of Health's function is to support the Minister for Health in the development and implementation of health policy in Ireland, as well as to monitor the performance of the Health Service Executive (HSE) (Department of Health, 2021). The HSE is the operational body through which health services are delivered (HSE, 2022). The healthcare budgeting function in Ireland is completed as a collaboration between the Department of Health, the HSE and the Department of Public Expenditure and Reform (DPER). DPER is a centralised government department responsible for the "sound governance of public expenditure" (Department of Public Expenditure & Reform, 2022, Department of Public Expenditure & Reform, 2011). A key function of DPER is to allocate funds to public services, that are financed from general taxation, based upon the resources that are available to the Government in any given year. The health service is the largest area of expenditure that is financed directly from taxation in Ireland.

An annual budgeting process is predominantly used to allocate resources to pay for public healthcare services. Multi-year and long-term planning also exist in various forms, but these are often completed in isolation to the annual process and are less important. The annual

budgeting process is largely an incremental budgeting process. The HSE starts the process by determining the existing level of service (ELS), which is the estimated cost of health and social services provided by the HSE at the end of the current year. The ELS is prioritised regardless of the stage of the economic cycle. The ELS is adjusted for other factors such as changes to staffing costs, demographics, and inflation. Once the ELS has been agreed, budgeters then decide what resources are available for new developments. Decisions on new developments are based on political decisions, programme for governments, the implementation of multi-year plans, or the implementation of “Slainte Care”, which is a long-term healthcare plan that has been developed by all political parties. Once programmes are agreed and implemented, however, they are then included in the ELS going forward, meaning that new expenditure programme in any given year has multi-year impacts.

4.2 Data Collection

Exploratory interviews were conducted with C-Suite healthcare finance executives, with the objective of comprehending the budgeting decision-making process during and after both the 2008 Global Financial Crisis and the Covid-19 Pandemic. These interviews took place between August and November 2022, seeking insights into how budgeting and resource allocation processes had adapted in response to the 2008 recessions and the Covid-19 pandemic, the most recent exogenous shocks they faced. More specifically, the interviews sought to (i) explore rich descriptions of how the budgeting process has been adapted in response to changes in the economic cycle (ii) identify deficiencies in healthcare budgeting processes that hinder the sustainable and consistent delivery of services once a shock occurs.

Three finance executives from the HSE, along with two senior researchers from the Department of Health, responded and agreed to be interviewed. Table 4.4.1 provides details about the interviewees who have chosen to remain anonymous. All interviews were conducted on MS Teams and varied in duration between 45 minutes and 1.5 hours. The interview protocol

focused on eliciting open-ended descriptions from participants about the budgeting process and how it was utilised to respond to shocks. The aim was to capture a respondent-driven perspective within the interviews, leveraging the opportunity provided by relatively in-depth discussions with C-suite level management. Three of the interviewees preferred not to have the interviews recorded, so notes were taken and transcribed immediately after the interview. Despite the convention of recording qualitative interviews over the past 30 years (Lee, 2004), a comparative analysis demonstrated that the data from recorded interviews and notes taken directly after the interview were comparable (Rutakumwa *et al.*, 2020; Shavers, 2015). Considering the seniority of the participants and their deep involvement in the budgeting process in Ireland, it was deemed essential to capture their views in the analysis, even if the interviews could not be recorded. The other two participants agreed to be recorded, and the recordings were transcribed, with the original recordings subsequently deleted from all devices. The interviewees prohibited direct quotations. Although direct quotes in qualitative research have become the norm, Eldh *et al.* (2020) suggest that quotations should preferably be used for illustrating the analysis process and/or findings. The interviews in this paper, however, are exploratory and the quantitative analysis is used to illustrate the analysis and findings. Furthermore, from a research ethics point of view, it is important to protect the confidentiality of the interviewees and using quotations in this small study of senior people within two organisations could jeopardise this need for confidentiality (Denzin, 2008).

Table 0.1 Interview Sample Details

Designation	Division	Interview Length	Recorded
<i>Researcher</i>	Department of Health	1hr 30 mins	Yes
<i>Researcher</i>	Department of Health	1 hour 20 mins	Yes
<i>Senior Finance Executive</i>	Health Service Executive	45 minutes	No
<i>Senior Finance Executive</i>	Health Service Executive	1 hour 20 minutes	No
<i>Senior Finance Executive</i>	Health Service Executive	50 minutes	No

In order to assess the effect of a shock on healthcare utilisation, we analyse archival data on the utilisation of (i) hospital services, (ii) general practitioner and pharmaceutical services, and (iii) services that care for the elderly. Hospital and community care utilisation indicators were collected from a number of publicly available health sector reports. These indicators were chosen because they best represented the utilisation of health care resources and also had historical data available. For example, expenditure on hospital services, the GMS Scheme and on services that care of elderly people accounted for 51% of total government health expenditure in 2022 (Department of Health 2023; HSE, 2023a). Therefore, the four variables that are used in the model are GDP, Hospital Utilisation Index, Care of the Older People Utilisation Index and GMS Index (CSO, 2022; Department of Health, 2023; Healthcare Pricing Office 2022; HSE, 2023a).³ Three areas of healthcare expenditure were selected for

³ Health data that is routinely collected by other European countries, is not collected in Ireland and therefore historical healthcare activity data is not as easily found. The ESRI Hippocrates Report, which provides evidence about how population ageing will affect the demand for health and social care services in Ireland, sets out the data sources that are available to measure utilisation activity in Ireland for both public and private healthcare

analysis: acute hospital activity (33% of current expenditure in 2021); services that care for older people (9.7% of current expenditure in 2021), and finally the payment for services under the GMS Scheme, which provides GP and Pharmaceutical services for eligible people (8.6% of current expenditure in 2021). These variables are described below while their data sources are detailed in Table 4.4.2.

provision (Wren *et al.*, 2017). This also highlights the lack of data that is available on how much care is provided privately in many sectors including home care hours, GP visits, occupational visits etc (Wren *et al.*, 2017).

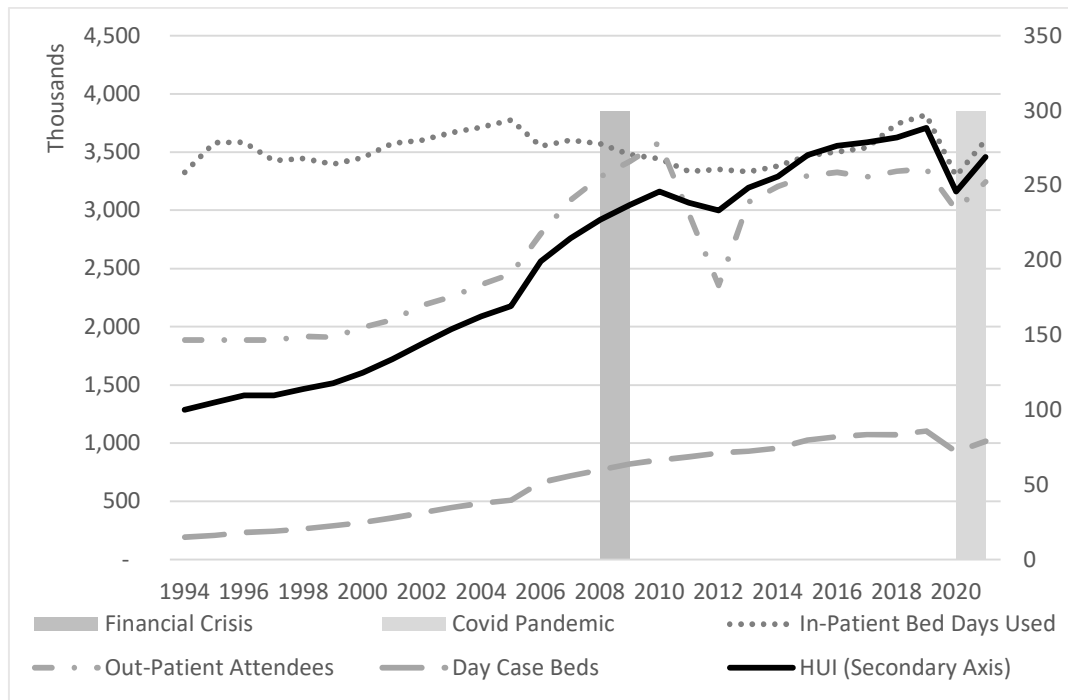
Table 0.2 Outline of the Utilisation Indicators

Healthcare Section	Expenditure in 2021 (in €million)	Percentage of Expenditure 2021(%)	Utilisation Activity Indicator	Database
Acute Hospitals	€7,297	33%	Inpatient Day Beds Used	Hospital Inpatient Enquiry Database
			Outpatient Attendance	Hospital Inpatient Enquiry Database
			Day Case Bed	Hospital Inpatient Enquiry Database
General Medical Services (GMS)	€1,746	8.6%	The number of people Eligible for GMS	Primary Care Reimbursement Service – Statistical Analysis of Claims and Payments

Care of the elderly	€2,119	9.7%	Long Stay Care Number of Patients at year end	National Nursing Home Support Scheme
			Home support hours	National Nursing Home Support Scheme

Hospital Utilisation Index (HUI): is calculated using data from the Hospital In-Patient Enquire Scheme (HIPE), which measures the discharge activity in acute hospitals in Ireland. To understand hospital utilisation, an equally weighted index of in-patient day beds used, outpatient attendees and day-case beds from 1994-2021 is created. The history of the components of the Hospital Utilisation Index from 1994 to 2021 are outlined in Figure 4.4.1. This demonstrates that most recently the Covid-19 pandemic resulted in a decline in all hospital activity measures, although in 2021, some of this decline was reversed. In contrast, the 2008 financial crisis resulted in a decline in in-patient and outpatient activity which continued for a number of years after the shock, while day cases continued to increase after this shock.

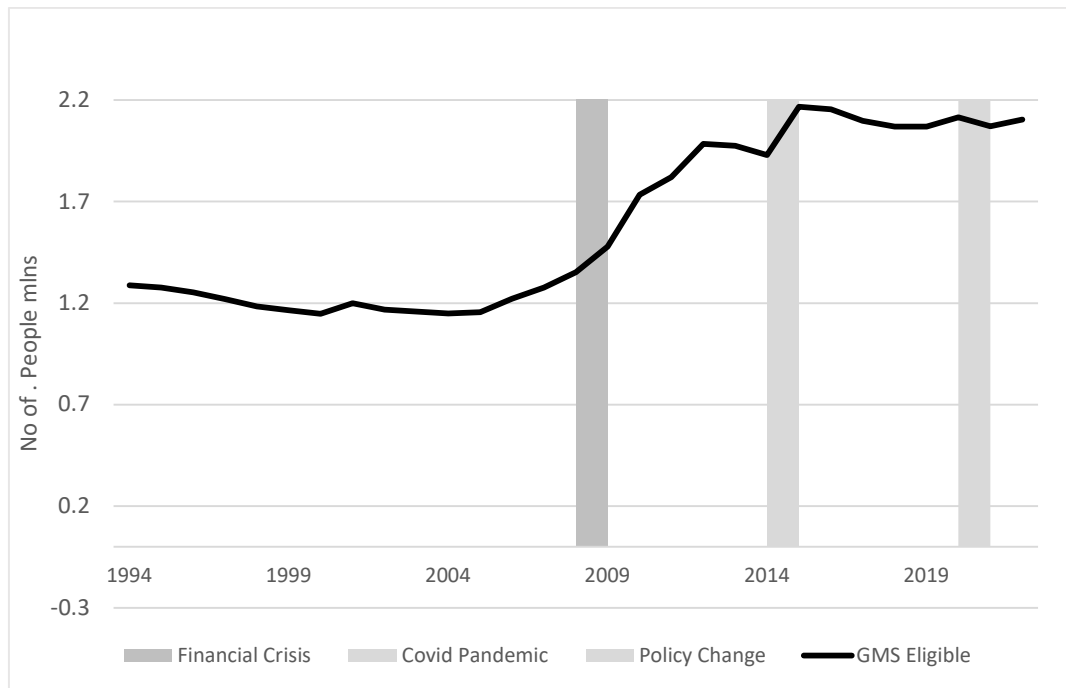
Figure 0-1 Components of Hospital Utilisation Activity



Gross Domestic Product: sourced from the Central Statistics Office (CSO), is used to measure the business cycle in Ireland from 1994 until 2022 (CSO, 2023).

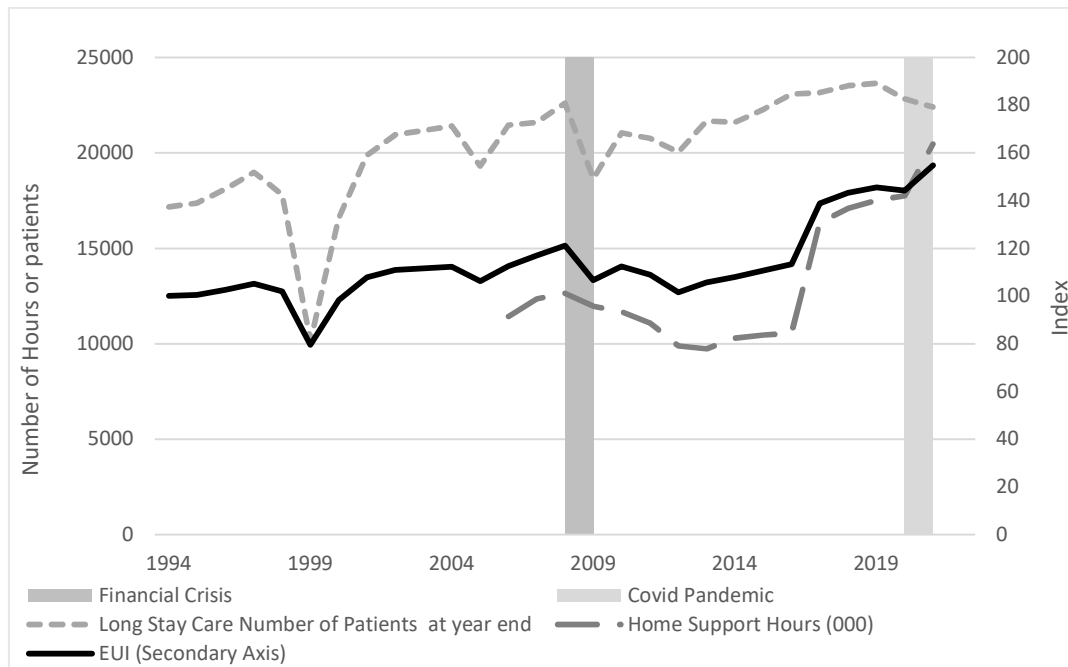
GMS Scheme Index (GMI): is an index of the number of people that are eligible for the GMS Scheme. The GMS Scheme provides GP and Pharmaceutical services to eligible people, which depends on age and/or income. GPs receive a capitation fee for each GMS patient and therefore, the cost to the HSE is incurred for each holder of a GMS card, rather than the number of uses. Therefore, it is appropriate to measure utilisation of this expenditure using the number of people eligible for the scheme. The number of people who are eligible for the GMS scheme has increased since the 2008 financial crisis. This has been a permanent increase in GMS eligibility. The initial shift reflects the impact of the economic shock, but more recently this reflects a policy shift to increase eligibility for the scheme which occurred in 2014. The Covid-19 pandemic resulted in an immediate increase to the number of people eligible, and as with hospital activity this impact has been partially reversed in 2021.

Figure 0-2 The Number of People Eligible for GMS Scheme:



Elderly Utilisation Index (EUI): is calculated by creating an equal weighted index of the number of long stay care patients and home support hours used using data from the Nursing Homes Support Scheme. The number of home support hours is only available since 2005 and therefore has only been included in the index from then. Figure 4.4.3 outlines the drivers of activity for services caring for the elderly. After the 2008 financial crisis, the number of patients in long stay care and the number of home support hours initially declined but then recovered, as the economic recovery strengthened. Covid-19 Pandemic resulted in the number of home support hours continuing to increase, but the number of people in long stay care to decline in both 2020 and 2021.

Figure 0-3 Activity that Care for the Elderly



Our analysis, therefore, will focus on the utilisation of 51.3% of government healthcare expenditure. Services currently excluded include care for people with disabilities, mental health services, and primary care and community health. These exclusions are due to the unavailability of historical data. The utilisation indicators were then utilized.

4.3 Vector Autoregression Analysis

Empirically, we measure the multi-year impact of a GDP shock on healthcare utilisation activity, we employ the time series Vector Autoregression (VAR) methodology. VAR models were popularised in econometrics by Sims (1972; 1980a; 1980b; 1983) as a generalisation of a univariate model and have become a key empirical tool in modern macroeconomics. A VAR model is a system of regression equations with more than one dependent variable. In comparison to a single equation model, which clearly defines the relationship between a dependent variable and the independent variables, VAR models assess all relationships between the variables, using historical data. For example, a VAR model is a n -equation, n -

variable linear model that relates each variable to the past values of itself and the current and past values of all of the other variables in the system (Stock & Watson, 2001).

The VAR methodology is suitable in this context as it is a highly flexible way to capture dynamic relationships between variables. That is, the researcher does not define the relationship or specify the exogenous or endogenous variables, as they would in a single equation model. Hence, the data is used to measure relationships that would not be seen in a more specified model (Sims, 1980). For example, VAR models have had superior forecasting accuracy to other more specified models. But are also a suitable tool for structural analysis such as model identification and measuring the response of variables to a shock (Del Negro & Schorfheide, 2004).

The VAR model is employed to measure the impact that economic shocks have on healthcare utilisation. Initially the Annual Key Trends in Health was used to understand the predominant areas of healthcare expenditure in Ireland and how this has evolved over the years (Department of Health, 2023). The three sectors in this study represented 50% of expenditure in 2021 and had represented up to 70% previously. This was followed by consultation with finance executives in the HSE, which indicated what variables would need to be included in order to fully represent utilisation of services in each sector. For example, in the acute hospital sector it is necessary to include a combination of in-patient day beds used, outpatient attendance, and day case beds. Combining these three variables together, provides a complete overview of the services that are consumed by the hospital system. The HIPE database is a rich source of information with data showing how these variables have evolved since 1994. Data is also available on the care of older people, specifically since 1994, the NHSS has reported the number of beds used in the long-term care at the end of each year and the number of home care hours paid for since 2005. The Primary Care Reimbursement Service also provides data on how GP services in Ireland are paid for by the government. Eligibility for

state-funded GP services is based on income, age and illness. Furthermore, the historical data environment in the healthcare sector in Ireland is challenging and good quality historical data is limited for some areas of expenditure. For example, mental health, social inclusion and disability services were also considered, however data to understand how these sectors are utilised is not available currently.

The primary purpose of this model is to measure the impact that GDP shocks have on these utilisation indices, rather than a forecasting model. However, to understand forecasting power of the model, the mean error, the absolute mean error, the root squared error and the Theil's-U (compares the RMSE to the random walk) were all calculated and outlined in Table 4.4.3. A Theil's-U ratio greater than 1 implies that the random walk has greater predictive power than the model being tested. This is the case for all of the variable, with the exception of EUI over a five-year horizon have a lower predictive power than the random walk. However, because the VAR model in this study is being used to measure the impact of a shock on the utilisation indicators, the forecasting power of the models is not central to this analysis.

The results, however, highlight that the four variable model has better predictive power than the three and two variable models as evident by the lower U-Theil's ratio. The model also has greater predictive power for a one-year forecasting horizon than a five-year horizon implying that the outputs of the VAR model, are more appropriate for to be used in the annual budgeting process than in longer-term analysis.

Table 0.3 The Forecast Errors of Healthcare Utilisation Indices

1 Year Ahead						
Model (Lags)	Model Variables	Predicted Variable	Mean	MAE	RMSE	Theil's U
<i>Bivariate (1)</i>	GDP HUI	HUI	-11.71	18.63	25.69	1.20
<i>Bivariate (1)</i>	GDP GMI	GMI	-7.55	7.55	8.46	2.71
<i>Bivariate (1)</i>	GDP EUI	EUI	12.24	12.24	14.34	1.14
<i>3 Variable (1)</i>	GDP HUI	HUI	-8.27	19.24	26.49	1.23
	GMI	GMI	0.86	4.70	5.57	1.79
<i>3 Variable (1)</i>	GDP HUI	HUI	-8.55	17.96	24.95	1.16
	EUI	EUI	11.38	11.38	13.83	1.10
<i>3 Variable (1)</i>	GDP GMI	GMI	-6.72	7.04	8.32	2.66
	EUI	EUI	12.55	12.55	15.00	1.19
<i>4 Variable (1)</i>	GDP HUI	HUI	-3.82	17.78	26.08	1.22
		GMI	4.13	6.34	6.65	2.13
	GMI EUI	EUI	8.75	9.25	13.34	1.06

5 Year Ahead						
Model (Lags)	Model Variables	Predicted Variable	Mean	MAE	RMSE	Theil's U
<i>Bivariate (1)</i>	GDP HUI	HUI	- 56.55	56.55	56.55	7.07
<i>Bivariate (1)</i>	GDP GMI	GMI	- 54.07	54.07	54.07	8.37
<i>Bivariate (1)</i>	GDP EUI	EUI	37.97	37.97	37.97	0.92
<i>3 Variable (1)</i>	GDP HUI GMI	HUI	- 60.94	60.94	60.94	7.62
		GMI	- 24.14	24.14	24.14	3.74
<i>3 Variable (1)</i>	GDP HUI EUI	HUI	- 56.80	56.80	56.80	7.10
		EUI	39.27	39.27	39.27	0.95
<i>3 Variable (1)</i>	GDP GMI EUI	GMI	- 54.17	54.17	54.17	8.38
		EUI	41.91	41.91	41.91	1.01
<i>4 Variable (1)</i>	GDP HUI GMI EUI	HUI	- 56.41	56.41	56.41	7.05

		GMI	- 21.11	21.11	21.11	3.27
		EUI	39.84	39.84	39.84	0.96

The model specification also involved calculating the Akaike Information Criteria (1974), Schwarz (1978) Bayesian Criteria and Hannan Quinn (1979) to determine the optimal lag length. The results of these tests are outlined in Table 4.4.4. For the VAR to be unrestricted, the same number of lags is used in each equation.

Table 0.4 HQ, AICC and SBC Test Results

Lags	HQ	AICC	SBC
0	25.35	25.31	25.49
1	18.52	18.73*	19.24*
2	18.49*	19.90	19.79
3	18.67	23.34	20.55
4	19.00	32.59	21.45

For the four-variable model over a five-year horizon, these tests indicate that a one-lag model is optimal⁴.

The four variable one lag model that has been chosen was calculated using OLS. Impulse Response functions (IRF) and Forecast Error Variance Decompositions (FEVD) were calculated, and counter-factual analysis was undertaken. The IRF trace the responsiveness of

⁴ As test for stationarity was not necessary as the coefficients used for a forecasting model. This analysis seeks to understand the relationships between the variables, and differencing to neutralise stationarity will reduce the information on any long-run relationship.

each variable in the model to a shock in the other variables over time (Brooks, 2019). For ease of interpretation, a one standard deviation shock is estimated in the model so that this study is measuring the response of each of three utilisation healthcare indicators to a one standard deviation shock in GDP. Two error bands around the IRF are calculated using the Monte Carlo Simulation to measure the distribution of the IRFs.

The FEVD measures the proportion of the movement in each equation that is due to its own shock and how much is due to the shocks in the other variables over time. The FEVD offers an alternative method of analysing the proportion of the movement in each of the utilisation variables that is due to the business cycle. This impact is calculated for ten years after a shock. For the calculation of the IRF and the FEVD, the ordering of variables in the model can be important. For example, the IRF refers to a shock in one equation in the VAR model, while all of the other equations are held constant. However, this assumption is unlikely to be valid because it implies that the error terms across the VAR model are uncorrelated, when in practice the error terms will be impacted by common factors that cannot be associated with a single variable alone. To address this, the IRF are generated such that shocks are independent for those orthogonalized IRF, where the ordering of variables is applied to the equations to allow the movement of certain variables in the system follow rather than precede others.

In our VAR model, GDP is considered a fast-moving variable as it is seen to impact the utilisation variables instantaneously, while the utilisation indices are considered slower moving variables, and their impact is with a lag. The impact of this ordering was tested and there was little impact on the results.

The counterfactual analysis is also undertaken where the historical decomposition of the healthcare utilisation indices is undertaken where each index is divided into a base forecast and the sum of all of the contributions of the components. This technique examines what would

happen to the data if the sequence of shocks is somehow different from the corresponding estimated model (Burbidge & Harrison, 1985). Specifically, a simulated utilisation index for each sector is calculated with the GDP residuals set to zero, rather than what has been observed. In doing so, we compare the actual utilisation index with what it would have been had the GDP shocks not occurred. This allows us to understand the impact that each GDP shock has had on the utilisation of healthcare services. We suggest that this information could be incorporated into longer-term budgeting processes to understand how much the utilisation of services will change from the previous year purely as a result of the economic environment.

Empirical Findings

The impact of business-cycle shocks on the budgeting process is assessed using both qualitative and quantitative methods. Firstly, interviews with the HSE and Department of Health are used to outline how the budgeting process has adapted in response to both the Global Financial Crisis and the Covid-19 pandemic. The interviews also explore any deficiencies that remain in the budgeting process which are prohibiting the healthcare system absorbing the impact of an economic shock when it occurs. Secondly, quantitative analysis is employed to measure the impact of business cycle shocks on three healthcare utilisation indices. Finally, we examine how this analysis could be used to address some of the deficiencies of the budgeting process in order to ensure that the healthcare system is more equipped to anticipate and respond to business cycle shocks when they occur.

4.4 The Impact of Economic Shocks on Budgeting Processes

The interviews demonstrate the complexities in accounting for business cycle shocks through the budgeting and planning processes. The two most recent growth shocks, the Global Financial Crisis and the Covid-19 pandemic, have both impacted the delivery of healthcare services, but

there are stark differences between the budgeting response to each of these shocks. Primarily, the Global Financial Crisis resulted in the level of resources available for healthcare from central government being reduced by on average 1% per annum between 2009 and 2012, while the Covid-19 pandemic resulted in an unprecedented increase in healthcare resources by 18% in 2020 alone. Hospital utilisation activity continued to increase between 2008 and 2010 but declined by a modest 3% per annum in 2012 and 2013. In contrast, hospitals utilisation activity declined by 15% in 2020 (Department of Health, 2023).

After 2008 Global Financial Crisis, significant reforms were introduced across the public service, including the healthcare sector. Several agencies were set up including the Irish Government Economic Evaluation Services unit, the Irish Fiscal Advisory Council and the Parliamentary Budget Office. All of these agencies are involved in providing analysis to support policy decisions. A multi-year plan was also established, called the ‘Summer Economic Statement’ and is used to inform the Annual Budgeting Process. Data infrastructure has also improved greatly since 2012, although it was widely acknowledged in the interviews that further work needs to be done with this regard. The capabilities to provide analysis to support policy decisions has also improved greatly. For example, the Department of Health alone now employs 17 economists, a capability that was not there prior to 2008. However, much of this data and analysis is used to support new policy developments.

The interviewees disclosed that there remains a lack of data and analysis to explain what is driving changes in the ELS. For example, when submitting the budgeting estimates to central government, the HSE adjusts the previous year’s ELS by staffing costs (the rate is agreed by central government), demographic impacts (although this is sometimes not included), and changes in the inflation rate. However, there is no adjustment made, or data used to describe the drivers that are impacting utilisation activity. The interviewees also acknowledged that

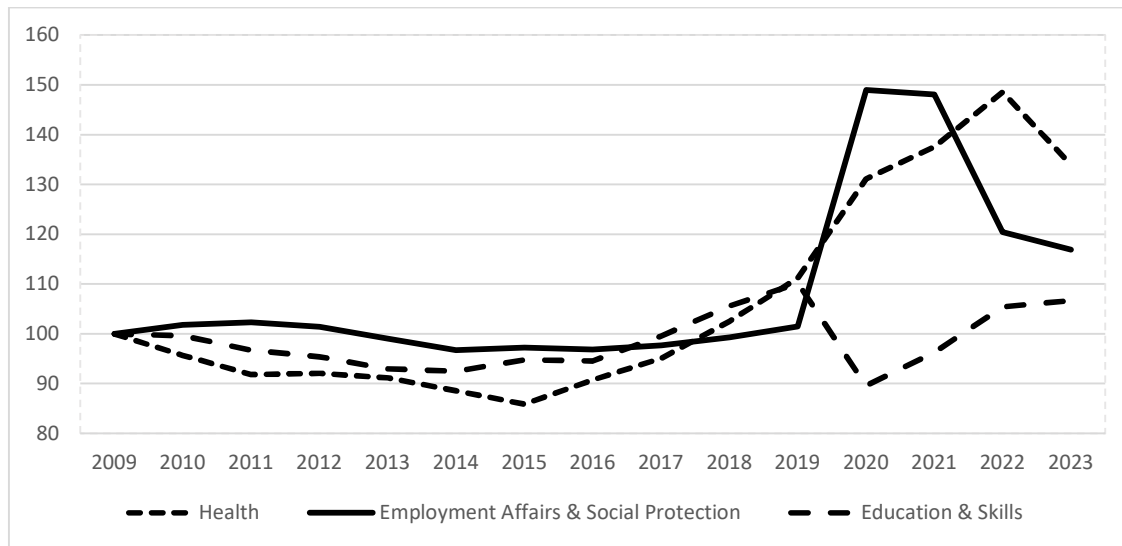
more analysis is needed to increase the transparency, to understand fluctuations in the ELS, and also improve the accuracy of budget targets.

For greater transparency, other countries have moved to activity-based funding or accounting models in healthcare budgeting for hospital services. In Ireland, hospital services are mainly paid for or funded through a global budgeting process. Although there has been a gradual adoption of activity-based funding, namely a DRG funding model, since 2016, the progress remains slow (European Commission, 2016). This transition started with inpatient and day cases and has gradually been widened out to outpatient cases. At present, only a small proportion of hospital expenditure is allocated through the DRG system. One interviewee also highlighted that progress towards a DRG system in some hospitals was halted during Covid-19. The interviewees highlighted that the HSE are also in the process of developing a system-wide Management Information System which is expected to be rolled out in 2024 at the earliest. It is hoped this system will deliver more transparency around costs and activity levels for all healthcare services.

Despite the organisational learning and reforms around the budgeting process that have occurred since the 2008 Global Financial Crisis, the budgeting process remained ill-equipped to respond effectively to the Covid-19 pandemic. Despite the unanticipated 18% increase in healthcare expenditure in 2020 due to the Covid-19 pandemic, publicly funded activity in the hospitals sector declined sharply by 15%. Non-covid diagnosis was put on hold during this period, which is now having a long-term impact on the healthcare system. It is expected that late diagnosis will eventually result in increased severity and complexity of cases. Currently, this impact is reflected in large waiting lists to access services (NTPF, 2022). However, the higher costs associated with treating patients with more complex cases and more severe

illnesses is not fully understood. These deficiencies in the budgeting processes are discussed in the next section.

Figure 0-1 Employment Affairs and Social Protection, Health, and Education Expenditure 2009-2023 (Indexed to 100)



Source: (Department of Public Expenditure and Reform, 2023)

4.5 Deficiencies in the Budgeting Process to Cope with Shocks

Since 2008 recession, the healthcare budgeting process has continued to underestimate of the cost of providing the ELS. Between 2015 and 2019, it is estimated that the HSE had budget overruns of on average of €590 million per year or 3% of current expenditure (Casey & Carrol, 2021). In 2023, the budgetary overrun is estimated to be between €1.7 billion and €2 billion (HSE, 2023b). Continuing to underestimate the cost of providing the ELS is undermining the budgetary process. Budget targets have been described by the HSE interviewees as “fictitious” as they are not achievable and require rebudgeting during the year. Finance managers know the targets provided are not realistic and that more funds will be available later in the year. This incentivises poor financial management with little motivation to manage resources within the

constraints they are given. Furthermore, these budget overruns are rolled over from one year to the next, reinforcing the deficiencies in the budgeting process.

A primary reason for this budgeting underestimation is failure to understand what is driving ELS changes. The interviewees emphasised structural factors in the Irish health sector, which drive changes in services utilisation in the aftermath of business-cycle shocks. For example, approximately 50% of the population currently purchases private health insurance. In the aftermath of the Global Financial Crisis, however, the number of people with private health insurance decreased by a total of 11% between 2009 and 2014 (HIA,2020). This creates higher demand for public healthcare resources. Furthermore, eligibility for the GMS scheme is based on income and/or age, and as income decreases during a recession, the number of people eligible for GMS services increases. Between 2009 and 2014, for example, the number of people eligible for a GMS card increased by 60% (HSE, 2023a). Currently the healthcare budgeting process does not analyse these factors in the budgeting process, and without this evidence, the health sector is likely to be treated the same as all other departments when a recession occurs. In fact, there is evidence that healthcare received greater cuts than other departments, that could better demonstrate the impact of the recession on their services (Figure 4.5.1).

Another issue that is impacting healthcare budgets is the drive for efficiencies. Since 2008, achieving efficiency gains and value for money across the public sector, including healthcare, has been a main objective for Central Government. This remains a significant challenge for the healthcare budgeting process because one of the main priorities of the finance managers in the HSE is to maintain the ELS from one year to the next. Programmes of expenditure in the ELS are rolled over without any assessment of the services that are being delivered. So, when expenditure cuts occurred after the 2008 Global Financial Crisis, they were applied to all services. Once these cuts were completed, however, the HSE was unable to demonstrate to

central government any efficiency gains that were made. Efficiency gains in healthcare systems are inherently difficult to measure because demand for healthcare services is always greater than the level of services being provided. Therefore, efficiency gains often lead to increased utilisation, rather than overall expenditure savings. Currently no analysis is conducted in the budgeting process that would break down the ELS into costs and activity levels in order to gauge if any efficiencies are being made.

When the Covid-19 pandemic occurred, these deficiencies in the healthcare budgeting process were augmented. There is no question that additional funds had to be allocated to healthcare to respond to the pandemic. However, the Covid-19 pandemic has once again illustrated one of the key difficulties that the HSE struggles with - how to provide evidence to demonstrate the effectiveness of their use of their resources. Despite the additional resources, the impact of this shock on the healthcare system has been magnified in the form of greater waiting lists to access services and even greater annual deficits. Now more than ever, there is a pressing need to better understand and quantify the factors that are driving changes in the ELS. Doing so, would provide greater transparency around taxpayer returns from healthcare expenditure. Furthermore, the HSE can attempt to demonstrate if and where efficiencies are being made, and to improve budget accuracy given that the appetite from central government to finance such budgeting deficits is significantly waning. Further financial mismanagement may result in further cuts to resources and will ultimately lead to even higher waiting times and poorer health outcomes.

The next section seeks to address these issues by measuring the impact of business cycle shocks on the utilisation of hospital services, the number of people eligible for the GMS scheme, and the utilisation of services that care for the elderly. By measuring these impacts,

the budgeting process can be enhanced to account for changes in healthcare utilisation that are caused by business cycle shocks.

4.6 Measuring the Impact of Shocks on Healthcare Utilisation

The results of the VAR analysis confirm the findings of the interviews that the response of healthcare utilisation to an economic shock is complex. In general, The VAR findings show that:

- each sector responds differently to economic shocks.
- the response of each sector varies over time; and,
- different shocks have had a different impact on each of the healthcare utilisation sectors.

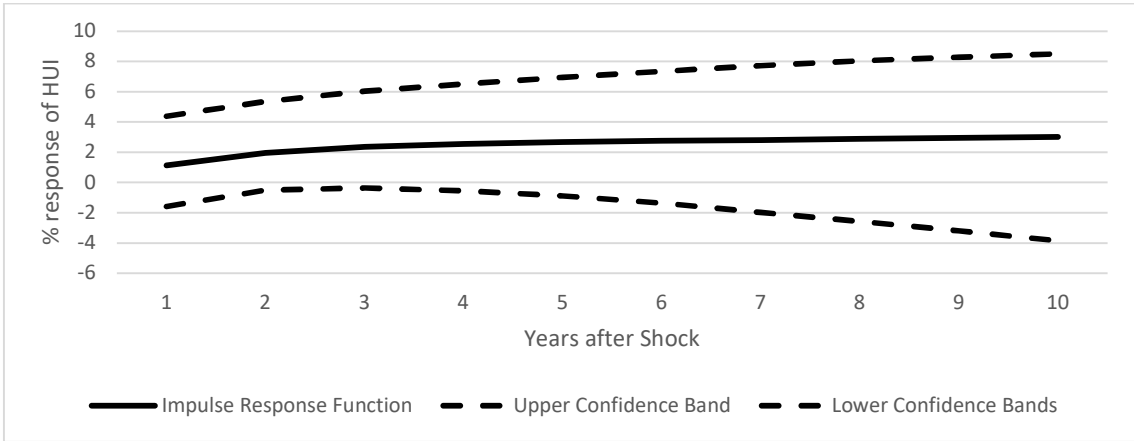
The effects of business cycle shocks on healthcare are measured through Impulse Response Functions (IRF), Forecast Error Variance Decomposition (FEVD), and Counterfactual Analysis. The IRF traces out the percentage response of each of the utilisation indices to a GDP shock (a one standard deviation move in GDP) each year for 10 years after a shock. The FEVD offers a complementary method to understand the sensitivity of each of the healthcare utilisation indices to GDP. Specifically, the FEVD measures the relative importance of selected shocks to fluctuations in the healthcare utilisation indices over various time horizons. The counterfactual analysis simulates what each of the healthcare utilisation indices would have been each year since 1998 had GDP shocks not occurred.

4.7 The Response of the Healthcare Utilisation Index to a GDP Shock

The IRF measures the response of each of the utilisation indices to a one standard deviation move in GDP over a ten-year horizon. The IRFs are presented in Figures 5-7. The IRFs for each of the three sectors show that each sector responds differently to a GDP shock and these responses change over time.

Firstly, the IRF of the Hospital Utilisation Index (Figure 4.5.2) shows that there is a positive relationship between hospital utilisation and a GDP shock. Specifically, a positive GDP shock will result in hospital utilisation increasing between 1% and 2% per annum in the first two years after a shock. Between four and ten years after a shock hospital utilisation will increase by up to 3% per annum. Therefore, the IRFs estimate that the long-term impact of a shock on hospital utilisation is 3% per annum. If the healthcare budgeting process is to account for this impact, hospital resources would have to increase by approximately 3% per annum after a positive economic shock, in order to maintain the existing level of services over the long run. Most of this impact will occur in the first 4 years after a shock.

Figure 0-2 The Response of the Hospital Utilisation Index to a GDP Shock

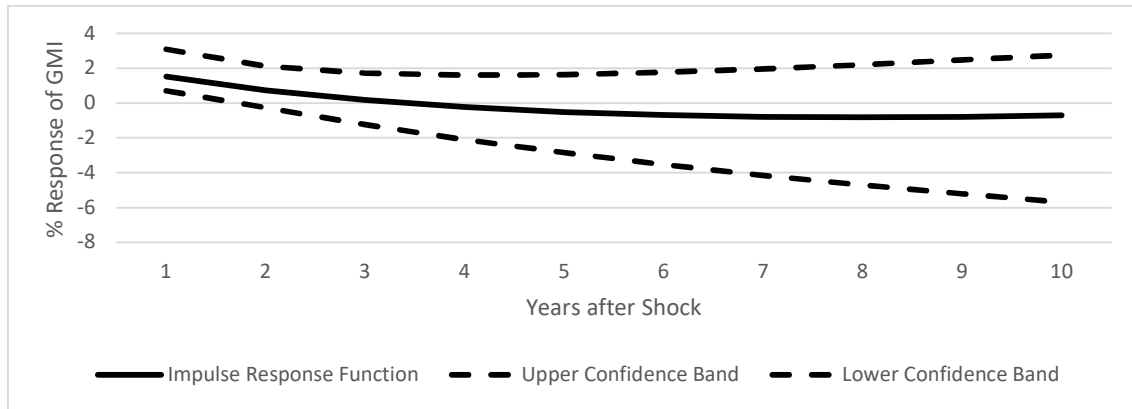


The confidence bands are based of Monte Carlo Simulation, the upper 84th percentile and the lower 16th percentile.

In contrast, the impact of a GDP shock on the number of people eligible for the GMS scheme diverges between the short and long run as evident by Figure 4.5.3. In the first three years after a positive GDP shock, the number of people eligible for the GMS scheme increases by on average 0.8% per annum. However, this impact is temporary and over the longer run, the VAR model estimates that the number of people eligible for the GMS scheme would decrease by up to 1% per annum for 8 years after that shock. This finding confirms, but also quantifies, the

expectations of the interviewees that eligibility for this scheme should increase in the long run after a recession due to the decline in income.

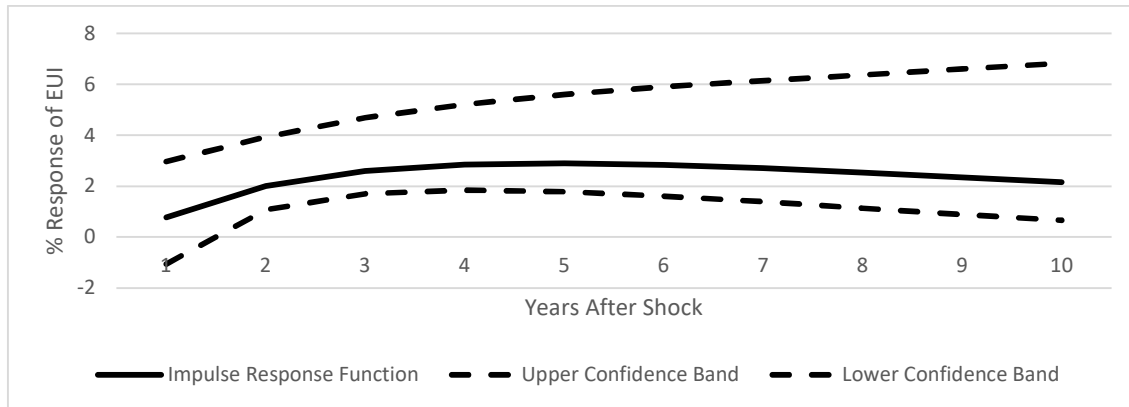
Figure 0-3 The Response of General Medicine Scheme Utilisation Index to a GDP Shock



The confidence bands are based on Monte Carlo Simulation, the upper 84th percentile and the lower 16th percentile.

The IRF for elderly care utilisation (Figure 4.5.3) also shows that there is a positive relationship between a GDP shock and utilisation of services that care for the elderly. In Figure 4.5.3, two years after a positive GDP shock, the VAR model estimates that elderly care utilisation will increase by 2%. The greatest impact of the positive shock on elderly care utilisation occurs between three to seven years after a shock, with an increase of almost 3% per annum. The impact of the shock on elderly care utilisation peaks seven years after a shock. The estimated long-run impact of a positive shock on elderly care utilisation is roughly 2% per annum. The impact of a shock on elderly care utilisation will overshoot the long-term impact in years three to seven. However, this impact is temporary, and the budgeting process should only consider the longer-term impact of 2% growth in utilisation following a positive economic shock.

Figure 0-4 The Response of Care of the Elderly Utilisation Index to a GDP Shock



The confidence bands are based on Monte Carlo Simulation, the upper 84th percentile and the lower 16th percentile.

4.8 The Sensitivity of Healthcare Utilisation to GDP Shocks

The FEVD offers a complementary method to measure the sensitivity of healthcare utilisation indices to GDP shocks over various time horizons. The FEVD, outlined in Table 4.5.1, shows that the sensitivity of each utilisation index to GDP shocks varies between each sector and also varies over time.

For the Hospital Utilisation Index, a relatively small proportion (between 1% and 8%) of its variation is explained by GDP shocks. This indicates that factors other than GDP are driving fluctuations in hospital activity. Therefore, when an economic shock occurs and resources are impacted by this shock, hospital utilisation activity will not necessarily adjust accordingly. A key finding here is hospital utilisation will be maintained even if healthcare resources are negatively impacted by business cycle shocks.

In contrast, the FEVD shows that the eligibility for GMS scheme is more sensitive to GDP shocks than hospital activity, and this sensitivity is greatest in the shorter term. For example, one year after a shock, 12% of the variation in GMS eligibility is explained by GDP shocks, while only 2% of this variation is explained by GDP six years after the shock. Another

interesting observation from this analysis is that hospital utilisation explains over 60% of the variation in GMS eligibility six years after a shock.

The FEVD confirms that the utilisation of services that care for the elderly are more sensitive to GDP shocks than the other services and is affected over long time horizons. Six years after a shock, 22% of the deviation in utilisation of services that care for the elderly are explained by GDP shocks. This analysis has interesting consequences for the long term planning of services that care for the elderly. Specifically, it highlights the need for a more active policy response in this sector when an economic shock occurs. The utilisation of services that care for the elderly will be more susceptible to recessionary impacts, which could potentially derail long-term plans that seek to accommodate an aging population.

Table 0.1 Forecast Error Variance Decomposition for Healthcare Utilisation, 1994-2021

<i>Hospital Utilisation Index</i>	GDP	HUI	GMI	EUI
<i>1</i>	1.1	98.8	0.0	0.0
<i>6</i>	5.7	73.5	0.0	20.8
<i>10</i>	8.9	64.8	0.0	26.2
<i>GMS Index</i>	GDP	HUI	GMI	EUI
<i>1</i>	11.9	0.0	88.1	0
<i>6</i>	2.0	65.8	19.9	12.3
<i>10</i>	2.4	60.8	27.7	9.1
<i>Elderly Utilisation Index</i>	GDP	HUI	GMI	EUI
<i>1</i>	1.1	0.5	2.8	96.1
<i>6</i>	22.8	17.1	6.7	53.4
<i>10</i>	29.0	15.9	13.0	42.1

4.2.3 Simulating Healthcare Utilisation Indices without Economic Shocks.

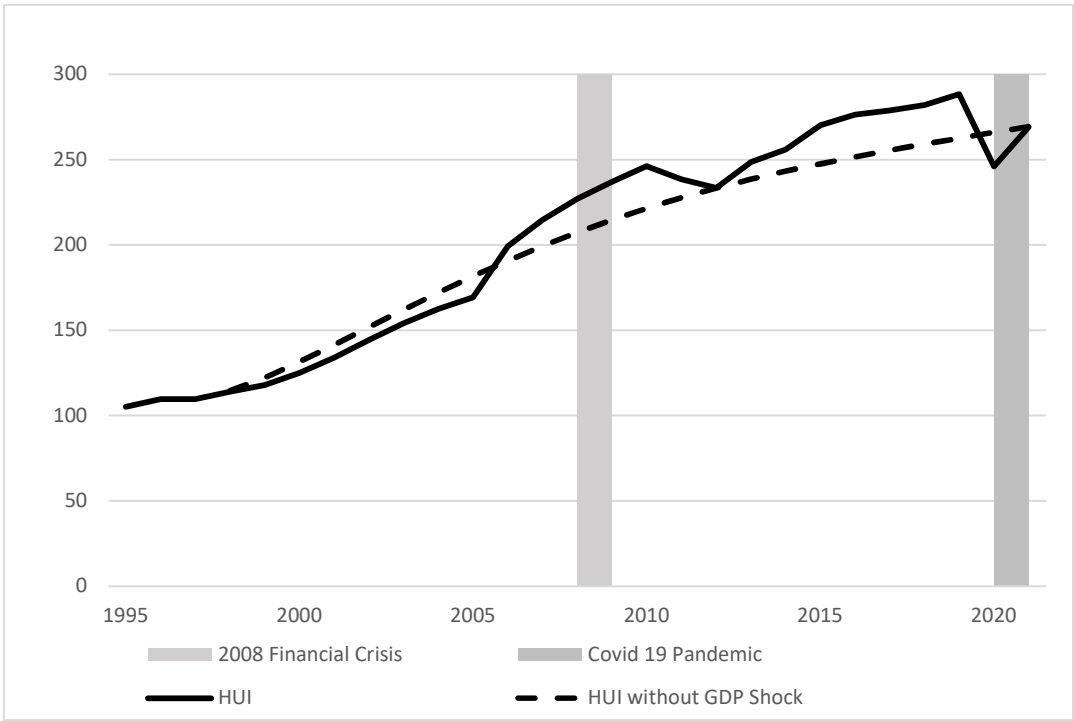
The counterfactual analysis offers another useful perspective on the impact of business cycle shocks on the health sector. Specifically, the counterfactual analysis measures how each of the utilisation indices would have evolved since 1998 had GDP shocks not occurred. The simulated series for hospital utilisation, GMS eligibility and the utilisation of services that care for the elderly, are shown in Figure 4.5.5-4.5.7 and the two most recent recessions are highlighted.

Interestingly, the counterfactual analysis for hospital utilisation confirms the findings of the FEVD that hospital utilisation is not always sensitive to GDP shocks. But when all business cycle shocks over the past 23 years are examined, different shocks have impacted hospital utilisation differently. For example, the positive economic growth environment in the early 2000s, had a greater impact on hospital utilisation than the 2008 Global Financial Crisis. However, the Covid-19 pandemic impacted hospital utilisation immediately. Figure 4.5.5 shows that hospital utilisation was on average 7% higher between 2006 and 2019 than it would have been in the absence of these positive economic shocks. This impact continued until 2019, but when the Covid-19 pandemic occurred in 2020, hospital utilisation was immediately impacted. Hospital utilisation dropped 15% in 2020 and the counterfactual analysis estimates that this was 8% lower than it would have been had this economic shock not occurred. Some of this impact was reversed in 2021 as hospital utilisation increased by 9% in 2021 but remained below the pre-covid level.

This analysis has significant implications for the annual and multi-year planning processes. Hospital utilisation levels are generally maintained, even when resources such as expenditure and staffing are cut. Furthermore, hospital utilisation can react differently to different shocks. The counterfactual analysis shows that the long-term impact of positive economic shocks led to higher utilisation even after a recessionary shock occurred and expenditure was cut in the

short-term. If the HSE desired to resource the existing level of services that was being provided in the hospital system at that time, then we would argue that the estimation for ELS should have been increased each year to account for the higher level of services that was being provided in hospitals due to economic expansion.

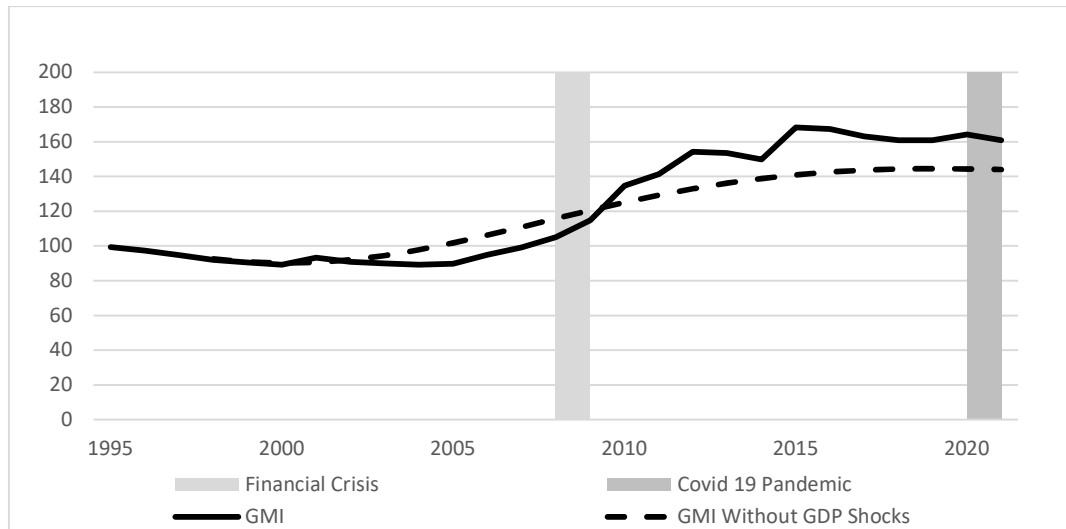
Figure 0-5 Actual vs. Simulated Hospital Utilisation Index without Economic Shock Impact



In contrast to the hospital sector, eligibility for the GMS scheme is more sensitive to GDP shocks. The counterfactual analysis demonstrates that the Global Financial Crisis had a permanent impact on the number of people eligible for the GMS scheme. From 2010, GMS eligibility was higher than it would have been had this shock not occurred. Specifically, between 2010 and 2021, the number of people eligible for the GMS scheme was 11% higher per annum than it would have been had economic shocks not occurred. To date, it is too early for the impact of Covid-19 pandemic to be seen in the data, but the planning process should anticipate a higher level of GMS membership from 2025 onwards. In contrast, GMS eligibility

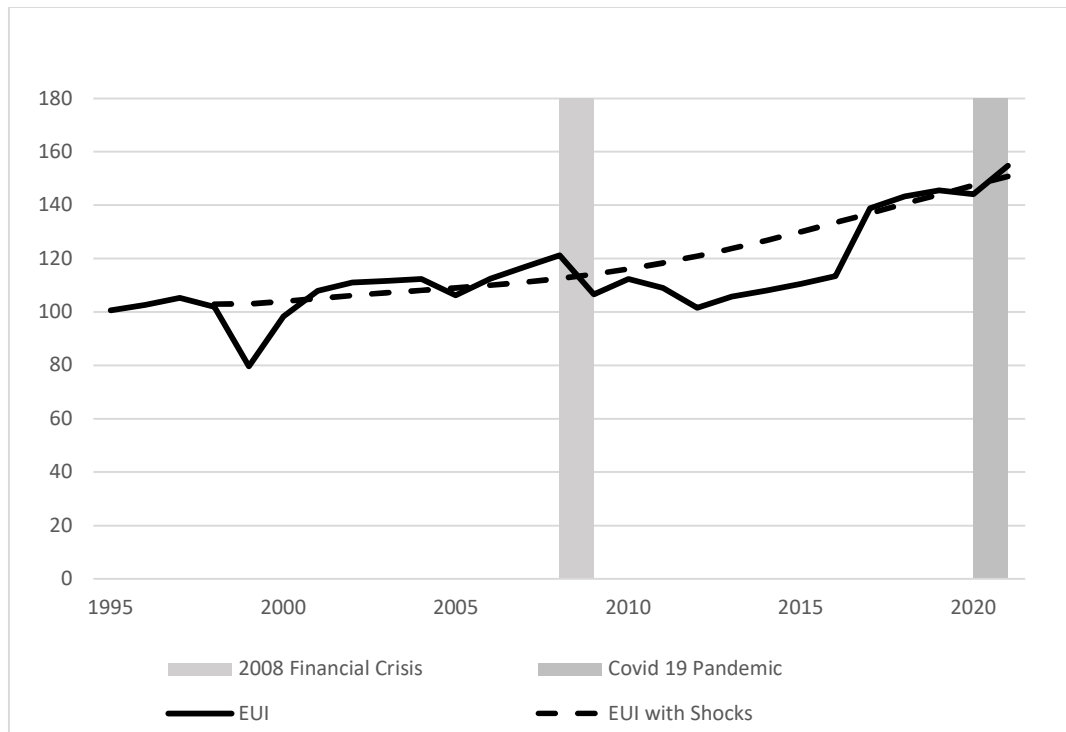
was on average 6% lower, prior to 2010, than it would have been had the economic shocks of the late 1990s and early 2000s not occurred.

Figure 0-6 Actual vs. Simulated GMS Utilisation Index without Economic Shock Impact



The counterfactual analysis confirms the findings in the IRF and FEVD that utilisation of services that care for the elderly are sensitive to GDP shocks. However, the counterfactual analysis also shows that the impact of shocks on the utilisation of elderly services has increased, particularly since the global financial crisis. Between 2009 and 2016, 13% less services that care for the elderly were utilized, on average, than would have happened had this recession not occurred. The divergence between the actual and simulated is greatest between 2012 and 2016 when 18% less services were utilized each year, on average. The negative growth shock that occurred between 2007-2009 only impacted until 2016. Since then, recessionary impacts on the utilisation of services that care for the elderly have been negligible. It is still too early to measure the full impact of the Covid-19 pandemic on the utilisation of services that care for the elderly. Utilisation of these services declined by just 1% in 2020 and recovered to pre-pandemic levels in 2021. The planning process, however, should anticipate that these services will decrease from 2024.

Figure 0-7 Actual vs. Simulated Elderly Service Utilisation Index without Economic Shock Impact



This counterfactual analysis has interesting implications for the budgeting process, particularly if it is to be used to improve decision-making around ensuring that healthcare services are more sustainable regardless of the stage of the economic cycle. The next section will discuss how these findings could be incorporated into budgeting decision-making processes, in order to smooth out the impact of economic shocks on healthcare utilisation over time.

Discussion

This paper's intent was to empirically explore and demonstrate how a greater understanding of utilisation activity could be used to complement healthcare costing practices in accounting for cyclical changes. By doing so, we argue that it would help ensure that budgetary processes going forward can better facilitate the sustainable delivery of services. To do this, a case study of the Irish healthcare system is undertaken. The interview findings suggest that recent

economic shocks have added additional complexity in enabling them to provide a consistent level of service from one year to the next. Despite the reforms introduced since 2008 that provide additional data and improved capabilities to analyse this data, accurately estimating the cost of providing the existing level of services remains a key challenge. This has resulted in significant budget deficits each year since 2008, which have increased substantially since the Covid-19 pandemic. Furthermore, our findings suggest that this has caused a lack of trust between central government departments and the HSE around the estimation of the ELS. The interviewees indicated that recent economic shocks have influenced this move but to date there is little analysis to prove this. Furthermore, central government and politicians have an increasing desire since 2008 for public services to increase efficiencies and provide value for money for taxpayers. Without the data and analysis to determine what is driving changes in the ELS it is difficult for the HSE to demonstrate if or where efficiencies are being achieved.

To improve the transparency around the factors that are driving changes in ELS, we have used the VAR methodology to measure the impact that shocks are having on three sectors of healthcare utilisation, mainly hospital services, eligibility for the GMS Scheme and utilisation of services that care for the elderly. 14

Each sector responds differently to economic shocks, and the response varies over time (Table 4.6.1). Furthermore, the counterfactual analysis demonstrates that utilisation responds differently to different economic shocks. Therefore, if healthcare budgeters are to estimate the existing level of services more accurately, and to demonstrate efficiency gains, the impacts of shocks on utilisation on each sector needs to be considered in the budgeting process.

Table 0.1 The Impact of Recent Shocks on Healthcare Utilisation

		Hospital Utilisation	GMS eligibility	Elderly Services Utilisation
<i>IRF</i>	Short Run	Positive	Positive	Positive
	Long Run	Positive	Negative	Positive
	Terminal Impact	+3%	-1%	+2%
<i>FEVD</i>		No impact	Temporary	Persistent
<i>Counterfactual</i>	2008 GFC	No Impact	Persistent	Persistent
<i>Analysis</i>	Covid-19	Temporary*	No impact*	No impact*

**This analysis is only one year after the Covid-19 Pandemic it may be too early for the full impact to emerge in the data.*

To account for these impacts in the annual budgeting process, we would suggest that the ELS be adjusted for business cycle impacts. The ELS is already adjusted for staffing cost, price changes, and demographic impacts. To incorporate the 2020 recessionary shock in the 2024 budgeting estimate, for example, we can use the IRF to estimate that GMS eligibility will be largely unchanged from the 2021 level. After 2025, however, the IRF predicts that the number of people eligible for GMS will increase by 0.5%. In contrast, the IRF predicts that utilisation of services that care for the elderly will decline by 2.8% in 2024 due to business cycle impacts and will have declined by a total of 7% between 2021 and 2024. It should be noted, however, that this impact is currently at a peak level and will decline back to the terminal reduction of -2% per annum by 2028. The impact of the 2020 Covid-19 pandemic has been sudden and severe for the hospital sector. This sector is less sensitive to GDP shocks than the GMS and elderly sector. There are tentative signs that utilisation is recovering from this adjustment as

2021 utilisation increased and now the counterfactual analysis estimates that the impacts of shocks on hospital utilisation are currently negligible.

We argue that the application of this methodology takes a step closer to addressing the need that has been highlighted in the interviews to use data and dynamic analysis to support the budgeting process. Firstly, by creating utilisation indices for these three sectors we have shown which sectors have provided more services and which sectors had to reduce their services after the two most recent GDP shocks. Taking the analysis further by measuring the dynamic impact of GDP shocks, helps budgeters to better explain variations in the ELS. This increases the accuracy and transparency of the budgeting process but can also help to reduce the adverse healthcare outcomes by using policy interventions to ensure that the level of services does not decline unnecessarily in the aftermath of a shock.

Essay Conclusion

Recent economic and healthcare crises have highlighted the healthcare system's vulnerability for several years following an economic shock. Healthcare accounting reforms implemented over the past thirty years, including the introduction of DRG or PLIC accounting systems (Begkok & Antonopoulou, 2021; Busse *et al.*, 2013; Chapman *et al.*, 2022), have enhanced transparency in healthcare costs, facilitated benchmarking across healthcare services, and improved the alignment between clinical decisions and costs (Begkok & Antonopoulou, 2021; Busse *et al.*, 2013; Eldenburg *et al.*, 2011).

The overarching aim of introducing DRG or PLIC systems, however, is to achieve efficiency gains (Chapman *et al.*, 2014; Grossi *et al.*, 2020; Llewellyn *et al.*, 2022), which can become problematic once an economic shock occurs. For instance, the onset of the financial crisis in 2008 resulted in significant cuts to healthcare systems in many countries and demonstrated that a failure to understand systematic risks has an adverse impact on healthcare

outcomes. This shock also led to budgeting inaccuracies, persisting for multiple years afterward (OECD, 2022). Furthermore, the onset of the 2020 Covid-19 pandemic illustrated that healthcare systems failing to recover sufficiently from the previous shock had less capacity to respond to the next shock (Barbera *et al.*, 2020; Ferry & Eckersley, 2022).

There is a pressing need for accounting systems not only to continue achieving efficiencies and enhance cost transparency in the budgeting process but also to ensure that the system is resilient enough to withstand the impacts of economic shocks. Reforms in healthcare accounting practices are necessary to build financial resilience (Ahrens & Ferry, 2020; Anessi-Pessini *et al.*, 2016; Lee & Chen, 2022). Our study aims to contribute to this goal by developing a measure of healthcare utilisation that can assist in accounting for cyclical impacts specifically in the budgeting process. Our intent is to empirically explore and demonstrate how a greater understanding of utilisation activity could be used to complement healthcare costing practices in accounting for cyclical changes. By doing so, we argue that it would help ensure that budgetary processes going forward can better facilitate the sustainable delivery of services.

This study highlights the dynamic and complex nature of budgetary responses to economic shocks, evident in the adverse healthcare outcomes and annual budget inaccuracies observed during the 2008 Global Financial Crisis and the Covid-19 Pandemic. Our findings, emphasis the critical need for enhanced data and analysis integration in budgeting decisions, fostering transparency and a more profound understanding of the factors affecting the annual cost of delivering committed services. Proposing an evidence-based budgeting process, we argue that this approach would enhance responses to shocks, ultimately minimizing adverse healthcare outcomes. Specifically, we suggest that utilizing the VAR methodology could help address the identified deficiencies in the budgeting process. This study measured the impact of recent economic shocks on the utilisation of three healthcare sectors in Ireland. In doing so, it reveals

the complex and sector-specific responses to shocks with varying timing and impacts. These results allow us to emphasize the necessity of incorporating business cycle impacts into the budgeting process. We suggest that the estimation of the existing level of services needs to be adjusted for business cycle impacts, calculated for each sector by the VAR model. In doing so, the budgeting process is likely to provide a more accurate reflection of the committed level of services that need to be resourced. Furthermore, we argue that the budgeting process, which is at the center of healthcare decision-making, can also be used to alter the response to economic shocks and hence minimize their impact. This would reform the role that the budgeting process plays when a recession occurs, which to date has largely been a reactionary tool. This would be central to improving financial resilience by facilitating the healthcare system to absorb the impact of the shock.

This study contributes to the financial resilience literature by demonstrating how healthcare budgets can use more data and analysis to anticipate and respond to economic shocks (Gibbs *et al*, 2024). Improving financial resilience requires healthcare budgeting systems to anticipate and account for shocks to absorb their impact when they occur (Ahrens & Ferry., 2020; Barbera *et al.*, 2017; Bedford *et al.*, 2022). This paper demonstrates how the budgeting system could be enhanced to incorporate a systematic and dynamic analysis that would measure the impact of shocks on the utilisation of healthcare services so that these impacts can be accounted for in the budgeting process. Although, increased financial resilience requires sufficient resources to help withstand the impact of the shock (Lee & Chen, 2021; Steccolini, 2018); actively managing and accounting for cyclical impacts means that healthcare budgeters can plan their response to shocks rather than relying on emergency reactions.

Secondly, this paper demonstrates how using data microdata from costing systems can advance our understanding of macro or systematic risks (Coyle & Ferry, 2022; Leoni *et al.*

2021; Kober & Thambar; 2021). Healthcare costing systems such as DRG and PLIC systems have increased transparency and attempted to improve efficiency (Chapman *et al.*, 2014; Chapman., 2022; Grossi *et al.*, 2020; Kober & Thambar, 2021; Leoni *et al.*, 2021; Llewellyn *et al.*, 2022). However, these systems are often ineffective once a shock occurs, and services are required to operate under more constrained resources. However, by utilising the data from these micro-costing systems to understand macro systematic impacts, these accounting systems can advance from largely seeking to drive efficiency gains and become a key tool in risk management, recognising vulnerabilities, better understanding the dynamic impact of a shock, while also increasing transparency in the healthcare system.

Future research would seek to expand this analysis to include more areas of healthcare expenditure. This paper has demonstrated how the VAR model could be used to measure the dynamic impacts of economic shocks on the utilisation of three sectors, which account for 50% of healthcare expenditure. Extending this out to other sectors requires more data but would help to more accurately account for shocks. This paper has also highlighted that healthcare outcomes, such as higher waiting times and missed diagnostics have increased after the recent recessions. Future research could also analyze these adverse healthcare outcomes and how they might be resolved.

Chapter 5 Thesis Conclusion

Chapter Introduction

This chapter aims to collate the overall findings of this dissertation, presented in the preceding chapters, explicitly outlining its contribution to theory and practice. Section 5.2 summarises the findings of this dissertation. Section 5.3 describes the contributions of each of the essays. Section 5.4 considers the limitations of the dissertation and section 5.5 discusses potential opportunities for future research.

Overview of Thesis

This thesis was motivated by the impact that recent crises, such as the 2008 Global Financial Crisis and the Covid-19 pandemic, had on the healthcare sector. Notably, these crises have derailed efforts to provide a sustainable level of healthcare expenditure in many countries (Bouckert, 2021). However, the response to these crises has highlighted deficiencies in healthcare budgeting processes (Alensani, 2012; Bracci et al., 2015). These crises, for example, have ultimately resulted in budgetary inaccuracies for many years after the shock, which has inhibited healthcare providers from delivering a consistent level of healthcare (Bouckert, 2021; OECD, 2023a; 2023b). In order to provide further insight into these challenges, this research has undertaken a structured literature review across the public administration, healthcare management and management accounting literature (Gibbs et al., 2024). This structured literature review sought to develop insights, critical reflections, and future research paths by understanding the deficiencies in budgetary processes, mainly when a business cycle shock occurs. This essay highlights an increasing need for budgeting capabilities to be enhanced using more data and analysis to account for multi-year business cycle impacts (Dommett et al., 2016; Dzigbede et al., 2020; Foged, 2022; Lee & Chen, 2021; Thompson et al., 2022). Furthermore, this essay also alluded to the political and institutional impediments to reforming budgeting

practices that can be particularly strong in a healthcare setting (Kuhlmann et al., 2021; Lee & Chen, 2022; Rodríguez-Tejedo, 2012; Rose & Smith, 2012). As a result, there is also a need to provide insight into the budgeting decision-making process and how such factors can be addressed.

Chapter 3 uses a VAR methodology to address the challenges outlined in Chapter 2 by measuring the multi-year impact on public and private healthcare expenditures from a GDP shock. A counterfactual analysis is also undertaken to estimate what health expenditure would have been had economic shocks not occurred. The findings show that economic shocks have a multi-year impact on public and private healthcare resourcing, mainly there is a positive relationship between GDP and government health expenditure. For example, government health expenditure will increase up to 7% after a positive GDP shock. The impact of a shock on government health expenditure is most significant 3-8 years after a shock occurs. There is also a positive relationship between GDP and private healthcare expenditure, mainly private health expenditure will increase by up to 6% after a positive GDP shock, while the impact on private sector expenditure can be felt up to 10 years after that shock. The counterfactual analysis demonstrated that the impact of shocks on healthcare expenditure has been increasing over the past 20 years. For example, in the aftermath of the Global Financial Crisis, between 2013-2020 government health expenditure would have been an estimated €18.4bln higher had this GDP shocks not occurred. Hence, now more than ever, it is essential to start accounting for these impacts. By failing to understand these impacts and account for them in the budget process, healthcare expenditure is fluctuating and prohibiting the delivery of consistent services.

Finally, chapter 4 uses a three-stage approach to understand the impact of recent shocks on healthcare utilisation:

1. Qualitative interviews of key finance and research managers working in the healthcare budgeting process in Ireland were undertaken. These exploratory interviews aimed to provide a deep insight into budgetary processes, particularly emphasising how these processes have adapted in response to the previous two economic crises.
2. Data was collected to create utilisation indices for three critical areas of healthcare expenditure: the hospital sector, access to GP services and services that care for older people. In order to have a consistent output, as in Chapter 3, the VAR methodology was then used to measure the impact that GDP shocks have on each of these indices. A counterfactual analysis was also undertaken to calculate what each utilisation index would have been had GDP shocks not occurred.
3. The results of the qualitative and quantitative analyses were combined to demonstrate how the budgeting process could be enhanced to account for the impacts of business cycle fluctuations.

The interviews underscore the role of economic shocks in contributing to a prolonged period of budgeting underestimation and, consequentially, poorer financial management. While budgeting processes have adapted to respond to each shock, deficiencies in good-quality accounting data and analysis hinder substantial reforms. The VAR analysis responds to this need by demonstrating how the impact of shocks on healthcare utilisation can be measured. The results of the VAR analysis reveal the complexities in accounting for the impact of business cycle fluctuations on the utilisation of the three healthcare sectors. The different sectors respond differently to economic shocks, and these impacts diverge between the long and short term. Furthermore, the counterfactual analysis shows that the impact of the two most recent shocks on hospital utilisation differs.

This chapter, finally, demonstrates how the current budgeting process could be enhanced to incorporate cyclical fluctuations, for example, by adding a separate adjustment in their estimation of the existing level of services for business cycle adjustments, which would use the impacts calculated by the VAR analysis. In doing so, a more accurate measure of the level of healthcare services could be used in the estimation process. Also, supporting this estimation with this evidence would provide healthcare management professionals and policymakers with evidence of what is driving changes in healthcare budgets at all stages of the business cycle. Accounting for such impacts in the budgeting process would help respond to changes in the business cycle so that its impacts are anticipated and absorbed, which would help improve financial resilience.

Thesis Contributions

This section highlights the both the theoretical and practical contributions that this dissertation makes. Specifically, the research provides an insight into the contrast between cumulative causation theory and equilibrium theory, by identifying both temporary and permanent impacts on the healthcare sector as a result of economic shocks. Cumulative causation theory explains how small economic changes can trigger self-reinforcing effects that often lead to disparities between different regions or sectors (Myrdal, 1972; Pierson, 2002). In Chapter 3 this dissertation estimates that after the 2008 Global Financial Crisis, austerity measures impacted government health expenditure for nine years after this shock, even though the economy had recovered significantly before this. In fact, the health system had not recovered sufficiently when the Covid-19 Pandemic occurred, which resulted in a spike in waiting times to access healthcare services and continued budgetary underestimation.

In contrast, equilibrium theory suggests that economies tend to revert to a state of balance after an external shock (Arrow and Hurwicz, 1958, Galí, 2015, Lucas, 1995). Equilibrium theory would predict that the healthcare system would react to an economic shock,

but market or policy interventions would eventually restore stability. The evidence provided in Chapter 3 and 4 of this dissertation, demonstrates that economic shocks have had long-term impacts on the delivery of healthcare services in Ireland. Market and policy interventions have not been adequate to restore stability, as equilibrium theory would suggest. As a result, the negative feedback loop described in cumulative causation theory, has created structural healthcare problems and a lack of resilience within the healthcare system to withstand future economic shocks.

In contrast, equilibrium theory suggests that economies tend to revert to a state of balance after an external shock (Arrow and Hurwicz, 1958, Galí, 2015, Lucas, 1995). Equilibrium theory would predict that the healthcare system would react to an economic shock, but market or policy interventions would eventually restore stability. The evidence provided in Chapter 3 and 4 of this dissertation, demonstrate that economic shocks have had long-term impacts on the delivery of healthcare services in Ireland. Market and policy interventions have not been adequate to restore stability, as equilibrium theory would suggest. As a result, the negative feedback loop described in cumulative causation theory, has created structural healthcare problems and a lack of resilience within the healthcare system to withstand future economic shocks.

These contributions offer practical solutions to improve budgeting decisions in order to manage the impact of economic shocks that will assist both researchers and healthcare budgeting practitioners. Specifically, this research advances healthcare budgeting capabilities by showcasing how data and analysis can amplify the understanding of the impact of business cycle fluctuations on the healthcare systems (Dommett et al., 2016; Dzigbede et al., 2020; Foged, 2022; Lee & Chen, 2021; Thompson et al., 2022). This shift in approach empowers healthcare budgeters to move from a reactive stance to a proactive one, ensuring that the impacts of GDP shock are measured and considered explicitly in the budgeting processes.

5.1 Essay 1 Contribution

Chapter 2 identifies those budgetary processes, including annual incremental budgeting, multi-year budgeting and long-term healthcare planning, are not sufficiently ensuring that healthcare services are provided consistently when an economic shock occurs (Boukaert, 2021). As a result, healthcare budgeters must make an emergency response once a shock occurs (Barbera et al., 2019; Brien & Eger, 2021; Raudla et al., 2015). However, it is unclear whether shocks have a temporary impact and revert to “market equilibrium” as suggested by equilibrium theory. Alternatively, cumulative causation theory would indicate that the impact of these shocks would have self-reinforcing effects that would lead to persistent and permanent impact on the healthcare sector (Myrdal, 1972; Pierson, 2002).

The SLR highlights the need for budgeting capabilities to be enhanced using data and analysis to understand and respond to business cycle fluctuations in a more informed way (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). Doing so would move away from forecasts fraught with inaccuracies due to the difficulties in responding to economic changes and towards a system that facilitates healthcare policymakers responding to the economic environment (Cornia et al., 2004; Jung, 2014; Thomsen, 2019). Furthermore, expanding budgeting capabilities with more evidence using data and analysis would help minimise political and institutional factors that have been highlighted as particularly influential in the healthcare sector (Dommett et al., 2016; Dzigbede et al., 2020; Foged, 2022; Lee & Chen, 2021; Thomspson et al., 2022).

5.2 Essay 2 Contribution

In Chapter 3, we first demonstrate how to address the limitations of the annual incremental budgeting process, as highlighted by Barbera *et al.* (2020), Hou (2006) and Thomspson *et al.* (2022). Specifically, we demonstrated how the VAR methodology, a novel approach in healthcare budgeting, can be used to measure the impact of economic shocks on healthcare expenditure; the budgeting process can be altered to account for shocks for multiple

years after a shock occurs. This paper specifically demonstrates that shocks have had a greater and more enduring impact on healthcare expenditure over the past two decades, consistent with the principals of cumulative causation theory. For example, the impact of the global financial crisis in 2008, led to a divergence between the economic performance and the recovery in healthcare expenditure. Chapter 3 estimates that health expenditure was on average €2 billion per year lower between 2013 and 2021 than it would have been had economic shocks not occurred. This period has coincided with reduced healthcare outcomes such as longer waiting times to access services, shortages in healthcare staff and consistent budgetary underestimation. These outcomes deteriorated further when Covid-19 occurred as the system had not recovered sufficiently from previous shocks.

Secondly, we demonstrate how the VAR methodology can provide an alternative to directly forecasting GDP and revenues in the budgeting process. Arnold and Artz (2019) highlighted that accurately forecasting GDP and healthcare revenues is particularly challenging due to the difficulties in forecasting the magnitude or the timing of changes in the economic cycle. These inaccurate forecasts minimise budgeting processes' effectiveness and often reinforce business cycle impacts (Arnold & Artz, 2019; Cornia et al, 2004; Jordan & Messner, 2019; Themsen, 2019; Thompson & Gates, 2007). The VAR analysis, in contrast, can be used to alter policymakers' response to changes in business cycle fluctuations, ensuring that the impacts are minimised. Understanding and quantifying the impact of shocks on healthcare resources can better inform the planning process so that budgeting inaccuracies are minimised, particularly the budgeting underestimation that has occurred after the recent shocks (Henttu-Aho & Jarvinen, 2013; Mikesell, 2018). Finally, Chapter 3 responds to increasing political and institutional factors that instil short-termism in budgeting processes and inhibit the effectiveness and implementation of multi-year and longer-term budgeting, as highlighted by Kulmann *et al.* (2021) and Rodríguez-Tejedo (2020). To overcome these factors, the

counterfactual analysis used in Chapter 3 demonstrates how these factors can be minimised by providing evidence to measure a sustainable or permanent level of expenditure. Chapter 3 suggests that by ensuring that all committed annual expenditure programmes are financed from this level of expenditure, the need to reduce these programmes could be minimised when the next recession occurs.

5.3 Essay 3 Contribution

Chapter 4 extends the analysis done in Chapter 3 by assessing the impact of GDP shocks on the utilisation of healthcare services using the same VAR methodology. This chapter also conducts qualitative interviews to delve into the political and institutional impediments inhibiting reforms to budgeting processes, as highlighted in Chapters 2 and 3. This chapter addresses the concerns raised by Barbera *et al.* (2017), Ahrens and Ferry. (2020) and Bedford *et al.* (2022) that budgeting processes need to increase their data, analytics, and risk management capabilities to anticipate and absorb the impact of economic shocks when they occur. By creating healthcare utilisation indicators and using the VAR methodology to measure GDP shocks' impact on these indices. Healthcare budgeting practitioners can include these impacts in estimating the existing level of services that need to be provided. Policymakers can ensure that this estimate is more accurate and accounts for fluctuations in services caused by the economic environment. Doing so makes it more likely that the healthcare system can absorb these impacts and that adverse systematic healthcare outcomes are minimised after a shock. This would ensure that healthcare organisations are more financially resilient after a shock.

This paper also highlights the need for a more holistic approach to healthcare budgeting reform. Much of the accounting reforms of the past 30 years have centred around building healthcare costing systems such as DRG and PLIC to increase transparency and accountability and ultimately make efficiency gains (Busse et al., 2013; Chapman et al., 2014; Ellwood et al., 2014). However, these systems have centred around micro-decisions and have yet to respond

to systematic risks such as economic shock (Stark, 2014; Steccolini, 2018). This paper shows how systematic risks could be incorporated into the current budgeting process to improve financial resilience when a shock occurs. For example, using high-quality data from DRG or PLIC systems, the impact of shocks on the utilisation of data can be measured and used in the budgeting process to ensure response to changes in utilisation due to the shocks.

In contrast to Chapter 3, which shows that the impact of economic shocks on healthcare expenditure is consistent with the principals of cumulative causation theory, Chapter 4 shows that shocks have a complex impact on the utilisation of healthcare services. Specifically, each sector responds differently to an economic shock and these responses vary over time. The counterfactual analysis which estimates what the utilisation of each sector would have been had shocks not occurred, shows that persistent changes are evident for GMS eligibility and services that care for older people but that no such relationship is evident for acute hospital services.

Limitations and Opportunities for Further Research

While the research outlined in this thesis has been executed to a high standard and has made significant contributions to both theory and practice, it must be acknowledged that there are limitations to be considered when assessing this work. Some of these limitations also provide opportunities for further research, which has been beyond the scope of this thesis.

Firstly, attention is drawn to the size and scope of the research conducted. An accepted limitation of this research is the limited scope of primarily using Ireland as a sole case study in Chapter 3 and Chapter 4. The Irish healthcare sector, with its unique challenges and circumstances, provides a fascinating backdrop to demonstrate the impacts that business cycle fluctuations can have on healthcare provision. While this represents geographical concentration, the results can apply to many healthcare settings in the OECD, in particular, healthcare organisations that are grappling with providing a consistent level of service through

the economic cycle. However, White (2013) noted that healthcare systems that are financed directly from taxation, as Ireland is, are more susceptible to cycle fluctuations. As a result, Ireland is an interesting backdrop for this analysis, given its reliance on annual incremental budgeting. But a country comparison with a healthcare system that has a different financing mechanism would provide further insight. Doing so would demonstrate which healthcare systems should account for the impact of business cycle fluctuation in their budgeting processes.

Secondly, data availability has been a significant limitation of this study. The need for greater access to data is a key result of this thesis. This would at a minimum increase transparency and improve engagement between financial and clinical decisions but would also have a much greater impact in demonstrating if and where efficiencies are taking place. The OECD has commented that Ireland does not produce regular data that is collected in healthcare settings, which is greatly inhibiting evidence-based policy decision-making. Although the collection of data has improved since the 2008 financial crisis in the sector, large data gaps continue to persist, and historical data is also very limited. For example, there is a notable absence of data on private healthcare services, which has excluded from Chapter 4. There is anecdotal evidence that private healthcare consumption has declined after the 2008 Global Financial Crisis and the Covid-19 pandemic. For example, the number of people with healthcare insurance declined after 2008, which would have reduced access to these private services. In 2020, some private hospitals were closed and used by the government for extra capacity. These relationships would provide an interesting backdrop for further study but would require more data on the private healthcare sector. Furthermore, in Chapter 4, we analysed three sectors, mainly services provided by hospitals and GPs, and services that care of the elderly. These sectors combined accounted for over 50% of healthcare expenditure. The other areas of expenditure, such as mental health and disability services also warrant analysis,

particularly as mental health expenditure was negatively impacted by the austerity cuts from 2009-2013. However, there is limited historical data available for the utilisation of these services in Ireland.

Thirdly Chapter 3 and Chapter 4 rely on the VAR methodology, which is an effective tool for describing relationships between variables. However, it is an empirical model without theoretical restrictions. Recent shocks such as the Global Financial Crisis and Covid-19 pandemic demonstrated that the impacts of shocks on the healthcare sector are dynamic and are likely to vary between the short-run and longer run. The VAR methodology used in Chapter 3 and Chapter 4 does not explicitly define these relationships, and as such it is possible that the impact of the healthcare system to future business cycle fluctuations is different from the simple lag structure defined in the VAR model. However, the literature has highlighted the limitations of alternative models with explicit causal links which often do not fit the data well, particularly when a shock occurs. Consequentially we are forced to make a trade-off between the empirical and theoretical best fit. Finally, the VAR methodology is not a parsimonious model and requires large amounts of data to estimate the large number of coefficients. For each variable that is added to a VAR, the number of coefficients to be estimated is squared. As such, the availability of quality health data over long periods is challenging.

Finally, a limitation of all research is unintended omission due to concurrency or duplication of effort. While great care was taken in conducting a thorough literature review, some relevant articles may have needed to be included while this thesis is awaiting review.

References

- Ahrens, T. & Ferry, L. (2020). Financial Resilience of English Local Government in the Aftermath of Covid-19. *Journal of Public Budgeting, Accounting & Financial Management*, 32(5), 813-823. [DOI:10.1108/JPBAFM-07-2020-0098](https://doi.org/10.1108/JPBAFM-07-2020-0098)
- Akaike, Hirotugu. (1974). A New Look at the Statistical Model Identification. *IEEE Transactions on Automatic Control* 19(6): 716-723. [DOI: 10.1109/TAC.1974.1100705](https://doi.org/10.1109/TAC.1974.1100705)
- Ammi, M., E. Arpin & S. Allin (2021). Interpreting Forty-Three-Year Trends of Expenditures on Public Health in Canada: Long-Run Trends, Temporal Periods, and Data Differences. *Health Policy* 125(12): 1557-1564. [DOI:10.1016/j.healthpol.2021.10.004](https://doi.org/10.1016/j.healthpol.2021.10.004)
- Alesani, D. (2012). Rethinking Budgeting as a Continuous Process. *Public Administration Review*, 72(6), 885-886. [DOI:10.1111/j.1540-6210.2012.02644.x](https://doi.org/10.1111/j.1540-6210.2012.02644.x)
- Anessi-Pessina, E., Sicilia, M., & Steccolini, I. (2012). Budgeting and Rebudgeting in Local Governments: Siamese Twins? *Public Administration Review*, 72(6), 875–884. [DOI:10.1111/j.1540-6210.2012.02590.x](https://doi.org/10.1111/j.1540-6210.2012.02590.x)
- Anessi-Pessina, E., Barbera, C., Sicilia, M. & Steccolini, I. (2016). Public Sector Budgeting: A European Review of Accounting and Public Management Journals. *Accounting, Auditing and Accountability Journal*, 29(3), 491-519. [DOI:10.1108/AAAJ-11-2013-1532](https://doi.org/10.1108/AAAJ-11-2013-1532)
- Anessi-Pessina, E., Barbera, C., Langella, C., Manes-Rossi, F., Sancino, A., Sicilia, M. and Steccolini, I., (2020). Reconsidering Public Budgeting after the COVID-19 Outbreak: Key Lessons and Future Challenges. *Journal of Public Budgeting, Accounting & Financial Management*, 32(5), 957-965. [DOI:10.1108/JPBAFM-07-2020-0115](https://doi.org/10.1108/JPBAFM-07-2020-0115)

- Anand, P. (1988). Monitoring and Auditing Value for Money in the UK: The Scope for Quantitative Analysis. *Financial Accountability and Management*, 4(4), 253-270. [DOI:10.1111/j.1468-0408.1988.tb00301.x](https://doi.org/10.1111/j.1468-0408.1988.tb00301.x)
- Arnold, M. & Artz, M. (2019). The Use of a Single Budget or Separate Budgets for Planning and Performance Evaluation. *Accounting, Organizations and Society*, 73, 50-67. [DOI:10.1016/j.aos.2018.06.001](https://doi.org/10.1016/j.aos.2018.06.001)
- Arrow, K. J., & Hurwicz, L. (1958). On the stability of the competitive equilibrium, I. *Econometrica: Journal of the Econometric Society*, 522-552. [DOI:/10.2307/1907515](https://doi.org/10.2307/1907515)
- Astolfi, R., Lorenzoni, L. & Oderkirk, J. (2012). Informing Policy Makers About Future Health Spending: A Comparative Analysis of Forecasting Methods in OECD Countries. *Health Policy*, 107(1), 1-10. [DOI:10.1016/j.healthpol.2012.05.001](https://doi.org/10.1016/j.healthpol.2012.05.001)
- Barbera, C., Guarini, E. & Steccolini, I. (2016). Italian Municipalities and the Fiscal Crisis: Four Strategies for Muddling Through. *Financial Accountability and Management*, 32(3), 335-361. [DOI:10.1111/faam.12088](https://doi.org/10.1111/faam.12088)
- Barbera, C., Jones, M., Korac, S., Saliterer, I. and Steccolini, I. (2017), Governmental Financial Resilience under Austerity in Austria, England and Italy: How do Local Governments Cope with Financial Shocks?“, *Public Administration*, 95(3), 670-697. [DOI:10.1111/padm.12350](https://doi.org/10.1111/padm.12350)
- Barbera, C., Jones, M., Korac, S., Saliterer, I. & Steccolini, I. (2019). Local Government Strategies in the Face of Shocks and Crises: The Role of Anticipatory Capacities and Financial Vulnerability. *International Review of Administrative Sciences*, 87(1), 154-170. [DOI:10.1177/00208523198426](https://doi.org/10.1177/00208523198426)
- Barbera, C., Guarini, E., & Steccolini, I. (2020). How do Governments Cope with Austerity? The Roles of Accounting in Shaping Governmental Financial Resilience. *Accounting*,

- Auditing & Accountability Journal*, 33(3), 529-558. [DOI:10.1108/AAAJ-11-2018-3739](https://doi.org/10.1108/AAAJ-11-2018-3739)
- Barbera, C., Jones, M., Korac, S., Saliterer, I. and Steccolini, I., (2021). Local Government Strategies in the Face of Shocks and Crises: the Role of Anticipatory Capacities and Financial Vulnerability. *International Review of Administrative Sciences*, 87(1), 154-170. [DOI:10.1177/00208523198426](https://doi.org/10.1177/00208523198426)
- Bedford, D. S., Speklé, R. F. & Widener, S. K. (2022) Budgeting and Employee Stress in Times of Crisis: Evidence from the Covid-19 Pandemic, *Accounting, Organizations and Society*, 101346. [DOI:10.1016/j.aos.2022.101346](https://doi.org/10.1016/j.aos.2022.101346)
- Begkos, C. & Antonopoulou, K., (2021). Hybridization as Practice: Clinical Engagement with Performance Metrics and Accounting Technologies in the English NHS. *Accounting, Auditing & Accountability Journal*, 35(3), 627-657. [DOI:10.1108/AAAJ-12-2019-4333](https://doi.org/10.1108/AAAJ-12-2019-4333)
- Begkos, C., Antonopoulou, K., Ronzani, M. (2023). To Datafication and Beyond: Digital Transformation and Accounting Technologies in the Healthcare Sector. *The British Accounting Review*, 101259. [doi:10.1016/j.bar.2023.101259](https://doi.org/10.1016/j.bar.2023.101259)
- Bernal-Delgado, E., Comendeiro-Maaløe, M., Ridao-López, M. & Sansó Rosselló, A. (2020). Factors Underlying the Growth of Hospital Expenditure in Spain in a Period of Unexpected Economic Shocks: A Dynamic Analysis on Administrative Data. *Health Policy*, 124(4), 389-396. [DOI:10.1016/j.healthpol.2020.02.001](https://doi.org/10.1016/j.healthpol.2020.02.001)
- Bostock, J., Breese, R., Ridley-Duff, R. & Crowther, P., (2020). Challenges for Third Sector Organisations in Cutback Management: A Sporting Case Study of the Implications of Publicness. *Public Management Review*, 22(2), 184-205. [DOI:10.1080/14719037.2019.1577911](https://doi.org/10.1080/14719037.2019.1577911)

- Bouckaert, G. (2021). Plenary Session, 11th International EIASM Public Sector Conferences, Online – Belfast, 27-28th September 2021.
- Bovaird, T. (2007). Beyond Engagement and Participation: User and Community Coproduction of Public Services. *Public Administration Review*, 67(5), 846-860. [DOI:10.1111/j.1540-6210.2007.00773.x](https://doi.org/10.1111/j.1540-6210.2007.00773.x)
- Boyle, R. (1997). Civil Service Reform in the Republic of Ireland. *Public Money and Management*, 17(1), 49-53. [DOI:10.1111/1467-9302.00056](https://doi.org/10.1111/1467-9302.00056)
- Bozeman, B. & Pandey, S. K. (2004). Public Management Decision Making: Effects of Decision Content. *Public Administration Review*, 64(5), p.553-565. [DOI:10.1111/1467-9302.00056](https://doi.org/10.1111/1467-9302.00056)
- Bracci, E., Humphrey, C., Moll, J. & Steccolini, I. (2015). Public Sector Accounting, Accountability and Austerity: More Than Balancing the Books? *Accounting, Auditing and Accountability Journal*, 28(6), p.878-908. [DOI:10.1108/AAAJ-06-2015-2090](https://doi.org/10.1108/AAAJ-06-2015-2090)
- Bracci, E., Tallaki, M., Gobbo, G., & Papi, L. (2021). Risk Management in the Public Sector: A Structured Literature Review. *International Journal of Public Sector Management*, 34(2), 205-223. [doi:10.1108/IJPSM-02-2020-0049](https://doi.org/10.1108/IJPSM-02-2020-0049)
- Braendle, T. & Colombier, C. (2016). What Drives Public Health Care Expenditure Growth? Evidence from Swiss Cantons, 1970–2012. *Health Policy*, 120(9), p.1051-1060. [DOI:10.1016/j.healthpol.2016.07.009](https://doi.org/10.1016/j.healthpol.2016.07.009)
- Brien, S. T., Eger Iii, R. J. & Matkin, D. S. T. (2021) ‘The Timing of Managerial Responses to Fiscal Stress’, *Public Administration Review*, 81(3), p 414-427. [DOI:10.1111/puar.13359](https://doi.org/10.1111/puar.13359)

- Brennan N (2003). Commission on Financial Management and Control Systems in the Health Service. Dublin, Stationery Office. Available at: <http://www.lenus.ie/hse/bitstream/10147/46721/1/1776.pdf>. Accessed: August 2023.
- Brooks, C. (2019). Introductory Econometrics for Finance. Fourth Edition. *Cambridge University Press*. Cambridge, United Kingdom.
- Burbidge, J., & Harrison, A. (1985). A Historical Decomposition of the Great Depression to Determine the Role of Money. *Journal of Monetary Economics*, 16(1), 45-54. doi:10.1016/0304-3932(85)90005-4
- Busse, R., Geissler, A., Aaviksoo, A., Cots, F., Häkkinen, U., Kobel, C., Mateus, C., Or, Z., O'Reilly, J., Serdén, L. and Street, A., 2013. Diagnosis Related Groups in Europe: Moving Towards Transparency, Efficiency, and Quality in Hospitals?. *Bmj*, 346. DOI:10.1136/bmj.f3197
- Cabaleiro, R., Buch, E., & Vaamonde, A. (2013). Developing a Method to Assessing the Municipal Financial Health. *The American Review of Public Administration*, 43(6), 729-751. DOI/10.1177/0275074012451523
- Caiden, N. (2010). Challenges Confronting Contemporary Public Budgeting: Retrospectives/Prospectives from Allen Schick. *Public Administration Review*, 70(2), p.203-210. DOI: 10.1111/j.1540-6210.2010.02148.x
- Caperchione, E., Salvatori, F. & Benghi, E. (2014). New Development: Where There's a Will, There's a Way—Acting Beyond Cutbacks. *Public Money and Management*, 34(2), p.135-138. DOI:10.1080/09540962.2014.887546
- Cardinaels, E., & Soderstrom, N. (2013). Managing in a Complex World: Accounting and Governance Choices in Hospitals. *European Accounting Review*, 22(4), 647-684. DOI/10.1080/09638180.2013.842493

- Carr, M., & Beck, M. P. (2020). Clinician Responses to Management Control: Case Evidence from a University Hospital During the Fiscal Crisis. *Financial Accountability & Management*, 36(3), 319-337. [DOI:10.1111/faam.12224](https://doi.org/10.1111/faam.12224)
- Carr, M., & Beck, M. (2022). Accounting Practices and Professional Power Dynamics During a Crisis. *The British Accounting Review*, 101085. [DOI:10.1016/j.bar.2022.101085](https://doi.org/10.1016/j.bar.2022.101085)
- Casey, E. and Carroll, K. (2021). “The Path for Ireland’s Health Budget”. Irish Fiscal Advisory Council Analytical Note Series No. 14. Dublin. Available at: www.FiscalCouncil.ie
- Cepiku, D., Giordano, F. & Savignon, A. B. (2018). Does Strategy Rhyme with Austerity? *Public Management Review*, 20(3), 421-443. [DOI:10.1080/14719037.2017.1285116](https://doi.org/10.1080/14719037.2017.1285116)
- Chambers, D. (1984). Plans as Promise: What Does ‘Corporate Planning’ Mean in a Publicly-Owned Corporation? *Public Administration*, 62(1), 35-49. [DOI:10.1111/j.1467-9299.1984.tb00543.x](https://doi.org/10.1111/j.1467-9299.1984.tb00543.x)
- Chapman C., Kern, A. and Laguecir, A., (2014). Costing Practices in Healthcare. *Accounting Horizons*, 28(2), pp.353-364. [DOI:10.2308/acch-50713](https://doi.org/10.2308/acch-50713)
- Chapman, C. S., Kern, A., Laguecir, A., Doyle, G., Angelé-Halgand, N., Hansen, A., ... & Quentin, W. (2022). Managing Quality of Cost Information in Clinical Costing: Evidence Across Seven Countries. *Journal of Public Budgeting, Accounting and Financial Management*, 34(2), 310-329. [DOI:10.1108/JPBAFM-09-2020-0155](https://doi.org/10.1108/JPBAFM-09-2020-0155)
- Chartered Association of Business Schools, (2021). Academic Journal Guide 2021. https://charteredabs.org/wp-content/uploads/2021/06/Academic_Journal_Guide_2021-Methodology.pdf . Accessed: November 2022.
- Chen, G., Inder, B., Lorgelly, P. & Hollingsworth, B. (2013). The Cyclical Behavior of Public and Private Health Expenditure in China. *Health Economics*, 22(9), 1071-1092. [DOI:10.1002/hec.2957](https://doi.org/10.1002/hec.2957)

- Christensen, T. and Lægreid, P., 2009. Transcending New Public Management—The Increasing Complexity of Balancing Control and Autonomy. *Journal of Public Administration*, 2(1), 1-29.
- Cohen, S., Guillamón, M.-D., Lapsley, I. & Robbins, G. (2015). Accounting for Austerity: The Troika in the Eurozone. *Accounting, Auditing and Accountability Journal*, 28(6), 966-992. [DOI:10.1108/AAAJ-04-2014-1668](https://doi.org/10.1108/AAAJ-04-2014-1668)
- Cornia, G. C., Nelson, R. D. & Wilko, A. (2004). Fiscal Planning, Budgeting, and Rebudgeting Using Revenue Semaphores. *Public Administration Review*, 64(2), 164-179. [DOI:10.1111/j.1540-6210.2004.00358.x](https://doi.org/10.1111/j.1540-6210.2004.00358.x)
- Coulam, R.F. and Gaumer, G.L., (1992). Medicare's Prospective Payment System: a Critical Appraisal. *Health Care Financing Review*, 1991(Suppl), 45. [PMCID: PMC4195137](https://pubmed.ncbi.nlm.nih.gov/1495137/).
- Coyle, H., & Ferry, L. (2022). Financial resilience! A Comparative Study of Three Lower-Tier Authorities in England. *Financial Accountability and Management*, 38(4), 686-702. [DOI/10.1111/faam.12344](https://doi.org/10.1111/faam.12344)
- Cronin, D., McQuinn, K. (2018). The Cyclicalities of Irish Fiscal Policy Ex-Ante and Ex-Post. *The Economic and Social Review*, 49(1), 1–16. Available at: <https://www.esr.ie/article/view/857>. Accessed: May 2024
- Crowley, P. and Hughes, A. (2021), The Impact of COVID-19 Pandemic and the Societal Restrictions on the Health and Wellbeing of the Population, and on the Health Service Capacity and Delivery: A Plan for Healthcare and Population Health Recovery, Version 2 (May 2021). Dublin: National QI Team, Health Service Executive. Available: <https://www.lenus.ie/handle/10147/638256> . Accessed: June 2024.
- CSO, (1995). National Accounts Historical Input and Output Tables. Electronic Database. <https://data.cso.ie/#> Accessed: April 2017.

- CSO, (2021). *Annual Population Estimates*. Electronic Database. <https://data.cso.ie/#> . Accessed: November 2021.
- CSO, (2022). *National Accounts*. Electronic Database. <https://data.cso.ie/#> Accessed: March 2022.
- Davies, K. S. (2011). Formulating the Evidence Based Practice Question: A Review of the Frameworks. *Evidence Based Library and Information Practice*, 6(2), 75-80. [DOI:10.18438/B8WS5N](https://doi.org/10.18438/B8WS5N)
- Del Negro, M., & Schorfheide, F. (2004). Priors from General Equilibrium Models for VARs. *International Economic Review*, 45(2), 643-673. [DOI/10.1111/j.1468-2354.2004.00139.x](https://doi.org/10.1111/j.1468-2354.2004.00139.x)
- Denzin, N. K. (2008). *The Landscape of Qualitative Research* (Vol. 1). Sage.
- Department of Finance, (2021), Monthly Exchequer Tax Receipts 1984-Present, Electronic Database. Department of Finance. <https://data.gov.ie/organization/departments-of-finance?tags=tax+receipts> . Accessed: September 2021.
- Department of Health, (2005). *Health Statistics*, Electronic Report. Accessed: April 2017.
- Department of Health (2021). About the Department of Health. The Government of Ireland. Available at: <https://www.gov.ie/en/organisation-information/7d70f7-about-the-department-of-health/>, Accessed: November 2022.
- Department of Health, (2022). HSE Non-Capital Vote Allocation in Million of Euro. 7.2, Key Trends in Health report from 2005-2021. Accessed: March 2022.
- Department of Health, (2023). Health in Ireland. Key Trends in 2022. Available at <https://www.gov.ie/en/publication/fdc2a-health-in-ireland-key-trends-2022/>. Accessed: August 2023.

Department of Public Sector Reform. (2011). Public Sector Reform. Available at: <https://assets.gov.ie/35067/7f1d75ab9ccf47ab9ed13ae80e73b502.pdf> Assessed: November 2022.

Department of Public Expenditure and Reform (2022) About the Department of Public Expenditure and Reform. The Government of Ireland. Available at <https://www.gov.ie/en/organisation-information/919c7d-about-dper/>. Accessed November 2022.

Department of Public Expenditure & Reform. (2023a). Budget 2023: Expenditure Reports Part II Expenditure Reports. Available: <https://www.gov.ie/en/publication/eb6ec-budget-2023-expenditure-reports/> Accessed: September 2023.

Department of Public Expenditure & Reform. (2023b). Department of Public Expenditure & Reform Databank. Gross Expenditure by Vote Group History. Available: <https://databank.per.gov.ie/Expenditure.aspx?rep=GrossVGH>. Accessed: September 2023

Di Mascio, F. & Natalini, A. (2013). Analysing the Role of Ministerial Cabinets in Italy: Legacy and Temporality in the Study of Administrative Reforms. *International Review of Administrative Sciences*, 79(2), 328-346. [DOI:10.1177/0020852313477972](https://doi.org/10.1177/0020852313477972)

Dommett, K., Maccarthaigh, M. & Hardiman, N. (2016). Reforming the Westminster Model of Agency Governance: Britain and Ireland after the Crisis. *Governance*, 29(4), 535-552. [DOI:10.1111/gove.12227](https://doi.org/10.1111/gove.12227)

Donnelly, S. (2023). Dail Debate – Thursday 23 March 2023. Save Staffing Levels in Hospitals: Statement. Available: <https://www.oireachtas.ie/en/debates/debate/dail/2023-03-23/33/>. 1035 (6). Accessed: August 2023.

- Doukakis, L., Ghicas, D. C., Siougle, G. & Sougiannis, T. (2019). The Informativeness of Micro and Macro Information During Economic Crisis and Non-Crisis Periods: Evidence from Europe. *European Accounting Review*, 23(3). 1-26. [DOI:10.1080/09638180.2019.1642221](https://doi.org/10.1080/09638180.2019.1642221)
- Dzigbede, K. D., Gehl, S. B. & Willoughby, K. (2020) ‘Disaster Resiliency of U.S. Local Governments: Insights to Strengthen Local Response and Recovery from the COVID-19 Pandemic’, *Public Administration Review*, 80(4), 634-643. [DOI:10.1111/puar.13249](https://doi.org/10.1111/puar.13249)
- Ekholm, B.-G. & Wallin, J. (2000). Is the Annual Budget Really Dead? *European Accounting Review*, 9, 519-539. [DOI:10.1080/09638180020024007](https://doi.org/10.1080/09638180020024007)
- Eldenburg, L. G., Gunny, K. A., Hee, K. W., & Soderstrom, N. (2011). Earnings Management Using Real Activities: Evidence from Nonprofit Hospitals. *The Accounting Review*, 86(5), 1605-1630. [DOI:10.2308/accr-10095](https://doi.org/10.2308/accr-10095)
- Eldh, A. C., Årestedt, L., & Berterö, C. (2020). Quotations in Qualitative Studies: Reflections on Constituents, Custom, and Purpose. *International Journal of Qualitative Methods*, 19. [DOI:10.1177/1609406920969268](https://doi.org/10.1177/1609406920969268)
- Ellwood, S., Chambers, N., Llewellyn, S., Begkos, C. and Wood, C., (2015). Debate: Achieving the Benefits of Patient-Level Costing—Open Book or Can’t Look?. *Public Money & Management*, 35(1), 69-70. [DOI:10.1080/09540962.2015.986893](https://doi.org/10.1080/09540962.2015.986893)
- Ellwood, S., Llewellyn, S., Chambers, N., Begkos, C. and Wood, C., (2016). Patient-Level Information and Costing Systems (PLICS): A Mixed Methods Study of Current Practice and Future Potential for the NHS Health Economy. Available at: <https://research-information.bris.ac.uk/en/publications/patient-level-information-and-costing-systems-plics-a-mixed-metho> Accessed: June 2024

- ESRI (2018). Universal GP Care in Ireland, Potential Costs Implications. Available <https://www.esri.ie/publications/universal-gp-care-in-ireland-potential-cost-implications>. Accessed: August 2023.
- European Commission. (2011). Financial Assistance to Ireland. Available at: https://economy-finance.ec.europa.eu/eu-financial-assistance/euro-area-countries/financial-assistance-ireland_en Assessed: June 2023.
- European Commission. (2016). Report of the Expert Panel on Effective Ways of Investing in Health (EXPH) on Access to Health Services in the European Union – Final Opinion. Available at: https://ec.europa.eu/health/sites/default/files/expert_panel/docs/015_access_healthservices_en.pdf Accessed: June 2023.
- Farrar, S., Yi, D., Sutton, M., Chalkley, M., Sussex, J. and Scott, A., (2009). Has Payment by Results Affected the Way that English Hospitals Provide Care? Difference-In-Differences Analysis. *Bmj*, 339. [DOI:10.1136/bmj.b3047](https://doi.org/10.1136/bmj.b3047)
- Ferry, L. and Eckersley, P., (2022). Budgeting and Governing for Deficit Reduction in the UK Public Sector: Act Four—Risk Management Arrangements. *Public Money & Management*, 42(6), 365-367. [DOI:10.1080/09540962.2019.1598199](https://doi.org/10.1080/09540962.2019.1598199)
- Ferry, L., Midgley, H., & Green, S. (2023). Accountability, Emergency, and Liberty During COVID-19 in the UK 2020–22. *Accounting, Auditing and Accountability Journal*. 37(1), 176-198 [DOI/10.1108/AAAJ-07-2022-5931](https://doi.org/10.1108/AAAJ-07-2022-5931)
- Fitz Verploegh, R., Budding, T. & Wassenaar, M. (2022) Policy Control as an Alternative Approach to Performance-Based Budgeting (PBB) to Strengthen the Link Between Policy and Financial Means. *Public Money and Management*, 1-9. [DOI:10.1080/09540962.2022.2062162](https://doi.org/10.1080/09540962.2022.2062162)

- Foged, S. K. (2022) Spending Allocations During Low and High Fiscal Stress: Priority Setters and Spending Advocates in Danish Municipalities, 2008–2015, *Public Administration*, 100(4), 1107-1124. [DOI:10.1111/padm.12759](https://doi.org/10.1111/padm.12759)
- Foster, E. M. & Xuan, F. (2005). An Episode-Based Framework for Analyzing Health Care Expenditures: An Application of Reward Renewal Models. *Health Services Research*, 40(6), 1953-1971. [DOI:10.1111/j.1475-6773.2005.00452.x](https://doi.org/10.1111/j.1475-6773.2005.00452.x)
- Faezipour, M., & Ferreira, S. (2011). Applying Systems Thinking to Assess Sustainability in Healthcare System of Systems. *International Journal of System of Systems Engineering*, 2(4), 290-308. [DOI:10.1504/IJSSE.2011.043861](https://doi.org/10.1504/IJSSE.2011.043861)
- Gali, J. (2015). *Monetary policy, inflation, and the business cycle: an introduction to the new Keynesian framework and its applications*. Princeton University Press.
- George, B. (2017). Does Strategic Planning ‘Work’ in Public Organizations? Insights from Flemish Municipalities. *Public Money and Management*, 37(7), 527-530. [DOI:10.1080/09540962.2017.1372116](https://doi.org/10.1080/09540962.2017.1372116)
- George, B., Desmidt, S., Nielsen, P. A. & Baekgaard, M. (2017). Rational Planning and Politicians’ Preferences for Spending and Reform: Replication and Extension of a Survey Experiment. *Public Management Review*, 19(9), 1251-1271. [DOI:10.1080/14719037.2016.1210905](https://doi.org/10.1080/14719037.2016.1210905)
- Gerdtham, U.-G., Sogaard, J., Andersson, F. & Jönsson, B. (1992). An Econometric Analysis of Health Care Expenditure: A Cross-Section Study of the OECD Countries. *Journal of Health Economics*, 11(1), 63-84. [DOI:10.1016/0167-6296\(92\)90025-V](https://doi.org/10.1016/0167-6296(92)90025-V)
- Gibbs, R., Carr, M., Mulcahy, M., & Walshe, D. (2024). Healthcare Budgeting for Cyclicalality: Structured Literature Review of Accounting, Public Administration and Health Management. *Public Money & Management*, 44(1), 35-43. [Doi:10.1080/09540962.2023.2172686](https://doi.org/10.1080/09540962.2023.2172686)

- Goldfield, N. (2010). The Evolution of Diagnosis-Related Groups (DRGs): From its Beginnings in Case-Mix and Resource Use Theory, to its Implementation for Payment and Now for its Current Utilisation for Quality Within and Outside the Hospital. *Quality Management in Healthcare*, 19(1), 3-16. DOI: [10.1097/QMH.0b013e3181ccbcc3](https://doi.org/10.1097/QMH.0b013e3181ccbcc3)
- Gomes, P. (2021) 'Financial and Non-Financial Responses to the Covid-19 Pandemic: Insights from Portugal and Lessons for Future', *Public Money and Management*, 41(8), 660-662. DOI: [10.1080/09540962.2021.1880059](https://doi.org/10.1080/09540962.2021.1880059)
- Gorina, E., Maher, C., & Joffe, M. (2018). Local Financial Distress: Measurement and Prediction. *Public Budgeting & Finance*, 38(1), 72–94. DOI: [10.1111/pbaf.12165](https://doi.org/10.1111/pbaf.12165)
- Gravelle, H., Sutton, M., Morris, S., Windmeijer, F., Leyland, A., Dibben, C. & Muirhead, M. (2003). Modelling Supply and Demand Influences on the Use of Health Care: Implications for Deriving a Needs-Based Capitation Formula. *Health Economics*, 12 (12), 985-1004. DOI: [10.1002/hec.830](https://doi.org/10.1002/hec.830)
- Groot, T. & Budding, T. (2008). New Public Management's Current Issues and Future Prospects. *Financial Accountability and Management*, 24(1), 1-13. DOI: [10.1111/j.1468-0408.2008.00440.x](https://doi.org/10.1111/j.1468-0408.2008.00440.x)
- Grossi, G., Kallio, K. M., Sargiacomo, M., & Skoog, M. (2020). Accounting, Performance Management Systems and Accountability Changes in Knowledge-Intensive Public Organizations: a Literature Review and Research Agenda. *Accounting, Auditing & Accountability Journal*, 33(1), 256-280. doi: [10.1108/AAAJ-02-2019-3869](https://doi.org/10.1108/AAAJ-02-2019-3869)
- Guthrie, J. & Murthy, V. (2009). Past, Present and Possible Future Developments in Human Capital Accounting. *Journal of Human Resource Costing and Accounting*, 13(2), 125-142. DOI: [10.1108/14013380910968647](https://doi.org/10.1108/14013380910968647)

- Guthrie, J., Ricceri, F. & Dumay, J. (2012). Reflections and Projections: A Decade of Intellectual Capital Accounting Research. *The British Accounting Review*, 44(2), 68-82. [DOI:10.1016/j.bar.2012.03.004](https://doi.org/10.1016/j.bar.2012.03.004)
- Güven-Uslu, P. (2012). Uncertainty and Commitment in Commissioning of Health Services. *Public Money and Management*, 32(5), 349-356. [DOI:10.1080/09540962.2012.703419](https://doi.org/10.1080/09540962.2012.703419)
- Hannan, Edward J., and Barry G. Quinn (1979). The Determination of the Order of an Autoregression. *Journal of the Royal Statistical Society: Series B (Methodological)* 41, (2): 190-199 [DOI:10.1111/j.2517-6161.1979.tb01072.x](https://doi.org/10.1111/j.2517-6161.1979.tb01072.x)
- Hansen, S. C. & Stede, W. a. V. D. (2004). Multiple Facets of Budgeting: An Exploratory Analysis. *Management Accounting Research*, 15(4), 415-439. [DOI:10.1016/j.mar.2004.08.001](https://doi.org/10.1016/j.mar.2004.08.001)
- Heberle, J. M., Bedford, D. S., Chapman, C. S., Sivabalan, P. (2024). Developing Enabling Cost Information During the COVID-19 Crisis. *Accounting Forum*, 1-27. [doi:10.1080/01559982.2024.2326954](https://doi.org/10.1080/01559982.2024.2326954)
- Healthcare Pricing Office. (2022). Activity in Acute Hospitals in Ireland, 2021 Annual Report. Available at [http://www.hpo.ie/HIPE and NPRS Reports.htm](http://www.hpo.ie/HIPE_and_NPRS_Reports.htm). Accessed 24/08/2023.
- Henttu-Aho, T. & Jarvinen, J. (2013). A Field Study of the Emerging Practice of Beyond Budgeting in Industrial Companies: An Institutional Perspective. *European Accounting Review*, 22(4), 765-785. [DOI:10.1080/09638180.2012.758596](https://doi.org/10.1080/09638180.2012.758596)
- Hettlage, K. M. (1970). New Techniques in Government Budgeting 2. The Problems of Medium-Term Financial Planning. *Public Administration*, 48(3), 263-272.
- HIA. (2023). Historical Data on the Market. Available at: [Market reports and bulletins | The Health Insurance Authority \(hia.ie\)](https://www.hia.ie/publications/market-reports-and-bulletins). Accessed on 19th January 2024.

- Ho, A. T.-K. (2018). From Performance Budgeting to Performance Budget Management: Theory and Practice. *Public Administration Review*, 78(5), 748-758. [DOI:10.1111/puar.12915](https://doi.org/10.1111/puar.12915)
- Høgheim, S., Monsen, N., Olsen, R. H. & Olson, O. (1989). The Two Worlds of Management Control. *Financial Accountability and Management*, 5(3), 163-178. [DOI:10.1111/j.1468-0408.1989.tb00315.x](https://doi.org/10.1111/j.1468-0408.1989.tb00315.x)
- Hood, C. (1991). A Public Management for all Seasons?. *Public administration*, 69(1), 3-19. [DOI:10.1111/j.1467-9299.1991.tb00779.x](https://doi.org/10.1111/j.1467-9299.1991.tb00779.x)
- Hood, C. (1995). Emerging Issues in Public Administration. *Public Administration*, 73(1), 165-183. [DOI:10.1111/j.1467-9299.1995.tb00822.x](https://doi.org/10.1111/j.1467-9299.1995.tb00822.x)
- Hood, C. (2007). Public Service Management by Numbers: Why Does It Vary? Where Has It Come From? What Are the Gaps and the Puzzles? *Public Money and Management*, 27(2), 95-102. [DOI:10.1111/j.1467-9302.2007.00564.x](https://doi.org/10.1111/j.1467-9302.2007.00564.x)
- Hou, Y. (2006). Budgeting for Fiscal Stability over the Business Cycle: A Countercyclical Fiscal Policy and the Multiyear Perspective on Budgeting. *Public Administration Review*, 66(5), 730-741. [DOI:10.1111/j.1540-6210.2006.00638.x](https://doi.org/10.1111/j.1540-6210.2006.00638.x)
- Hou, Y. & Moynihan, D. P. (2008). The Case for Countercyclical Fiscal Capacity. *Journal of Public Administration Research and Theory: J-PART*, 18(1), 139-159. [DOI:10.1093/jopart/mum006](https://doi.org/10.1093/jopart/mum006)
- Hou, Y. & Smith, D. L. (2010). Informal Norms as a Bridge between Formal Rules and Outcomes of Government Financial Operations: Evidence from State Balanced Budget Requirements. *Journal of Public Administration Research and Theory: J-PART*, 20(3), 655-678. [DOI:10.1093/jopart/mup026](https://doi.org/10.1093/jopart/mup026)

- HSE (2022). About the HSE Code of Government. The Health Service Executive. Available at: <https://www.hse.ie/eng/about/foi-publication-scheme/about-us/> Accessed: November 2022.
- HSE (2023a). Primary Care Reimbursement Service Statistical Analysis of Claims and Payments 2022. Available at: <https://www.hse.ie/eng/staff/pcrs/pcrs-publications/annual-report-2022.pdf>. Accessed: August 2023.
- HSE. (2023b). Minutes of Special HSE Board Meeting Wednesday 13th September 2023. Available at: <https://www.hse.ie/eng/about/who/board-members/minutes-of-hse-board-meeting/minutes-hse-board-special-meeting-13th-september-2023.pdf>. Accessed: November 2023.
- IMF. (2010). Letter of Intent, Memorandum of Economic and Financial Policies and Technical Memorandum of Understanding. Available at: *Ireland: Letter of Intent, Memorandum of Economic and Financial Policies, and Technical Memorandum of Understanding; December 3, 2010 (imf.org)*. Accessed: January 2024.
- Jimenez, B. S. (2019). Assessing the Efficacy of Rational Budgeting Approaches: Fiscal Recovery Planning and Municipal Budgetary Solvency. *Public Management Review*, 21(3), 400-422. [DOI:10.1080/14719037.2018.1497696](https://doi.org/10.1080/14719037.2018.1497696)
- Johnsen, Å. (2018). Impacts of Strategic Planning and Management in Municipal Government: An Analysis of Subjective Survey and Objective [DOI:10.1093/jopart/mus058](https://doi.org/10.1093/jopart/mus058) Production and Efficiency Measures in Norway. *Public Management Review*, 20(3), 397-420. [DOI:10.1080/14719037.2017.1285115](https://doi.org/10.1080/14719037.2017.1285115)
- Jordan, S. & Messner, M. (2019). The Use of Forecast Accuracy Indicators to Improve Planning Quality: Insights from a Case Study. *European Accounting Review*, 29(2). 1-23. [DOI:10.1080/09638180.2019.1577150](https://doi.org/10.1080/09638180.2019.1577150)

- Jung, C. S. (2014). Why Are Goals Important in the Public Sector? Exploring the Benefits of Goal Clarity for Reducing Turnover Intention. *Journal of Public Administration Research and Theory: J-PART*, 24 (1), 209-234. [DOI:10.1093/jopart/mus058](https://doi.org/10.1093/jopart/mus058)
- Kennelly, B., O'Callaghan, M., Coughlan, D., Cullinan, J., Doherty, E., Glynn, L., Moloney, E & Queally, M. (2020). The COVID-19 Pandemic in Ireland: An Overview of the Health Service and Economic Policy Response. *Health Policy and Technology*, 9(4), 419-429. [DOI:10.1016/j.hlpt.2020.08.021](https://doi.org/10.1016/j.hlpt.2020.08.021)
- Kerpershoek, E., Groenleer, M., & de Bruijn, H. (2016). Unintended Responses to Performance Management in Dutch Hospital Care: Bringing Together the Managerial and Professional Perspectives. *Public Management Review*, 18(3), 417-436. [Doi:10.1080/14719037.2014.985248](https://doi.org/10.1080/14719037.2014.985248)
- Kober, R., & Thambar, P. J. (2021). Coping with COVID-19: The Role of Accounting in Shaping CCharities' Financial Resilience. *Accounting, Auditing and Accountability Journal*, 34(6), 1416-1429. [doi:10.1108/AAAJ-09-2020-4919](https://doi.org/10.1108/AAAJ-09-2020-4919)
- Kuhlmann, S., Bouckaert, G., Galli, D., Reiter, R. & Van Hecke S., (2021). 'Opportunity Management of the COVID-19 Pandemic: Testing the Crisis from a Global Perspective', *International Review of Administrative Sciences*, 87(3), 497–517. [DOI:10.1177/0020852321992102](https://doi.org/10.1177/0020852321992102)
- Lave, J. R. (1989). The Effect of the Medicare Prospective Payment System. *Annual Review of Public Health*, 10(1), 141-161. [DOI:10.1146/annurev.pu.10.050189.001041](https://doi.org/10.1146/annurev.pu.10.050189.001041)
- Lee, R. M. (2004). Recording Technologies and the Interview in Sociology, 1920–2000. *Sociology*, 38(5), 869-889. [doi:10.1177/0038038504047177](https://doi.org/10.1177/0038038504047177)

- Lee, R. & Miller, T. (2002). An Approach to Forecasting Health Expenditures, with Application to the U.S. Medicare System. *Health Services Research*, 37(5), 1365-1386. [DOI:10.1111/1475-6773.01112](https://doi.org/10.1111/1475-6773.01112)
- Lee, S. & Chen, G. (2021) 'Disaster Experience and Governments' Savings: The Moderating Role of Organizational Capacity', *Journal of Public Administration Research and Theory*, 32(3), 591-609. [DOI:10.1093/jopart/muab043](https://doi.org/10.1093/jopart/muab043)
- Lee, S. & Chen, G. (2022) 'Understanding Financial Resilience from a Resource-Based View: Evidence from US State Governments', *Public Management Review*, 1-24. [DOI:10.1080/14719037.2021.1955951](https://doi.org/10.1080/14719037.2021.1955951)
- Leoni, G., Lai, A., Stacchessini, R., Steccolini, I., Brammer, S., Linnenluecke, M., & Demirag, I. (2021). Accounting, Management, and Accountability in Times of Crisis: lessons from the COVID-19 Pandemic. *Accounting, Auditing and Accountability Journal*, 34(6), 1305-1319. DOI/10.1108/AAAJ-05-2021-5279. PMID: 27786431.
- Llewellyn, S., Chambers, N., Ellwood, S., Begkos, C., & Wood, C. (2016). Patient-Level Information and Costing Systems (PLICSs): A Mixed-Methods Study of Current Practice and Future Potential for the NHS Health Economy. [PMID: 27786431](https://pubmed.ncbi.nlm.nih.gov/27786431/).
- Llewellyn, S., Begkos, C., Ellwood, S., & Mellingwood, C. (2022). Public Value and Pricing in English Hospitals: Value Creation or Value Extraction? *Critical Perspectives on Accounting*, 85, 102247. doi.org/10.1016/j.cpa.2020.102247
- López-Nicolás, A. 1998. Unobserved Heterogeneity and Censoring in the Demand for Health Care. *Health Economics*, 7(5), 429-437. [DOI:10.1002/\(SICI\)1099-1050\(199808\)](https://doi.org/10.1002/(SICI)1099-1050(199808)7(5)<429::HEAL1099-1050(199808)>3.0.CO;2-1)
- Lopreite, M. & Mauro, M. (2017). The Effects of Population Ageing on Health Care Expenditure: A Bayesian Var Analysis Using Data from Italy. *Health policy*, 121(6), 663-674. [DOI:10.1016/j.healthpol.2017.03.015](https://doi.org/10.1016/j.healthpol.2017.03.015)

- Lorenzoni, L., Millar, J., Sassi, F. & Sutherland, D., (2017), Cyclical vs Structural Effects on Health Care Expenditure Trends in OECD Countries. *OECD Economics Department Working Papers*, No. 1507, OECD Publishing, Paris, [DOI:10.1787/27b11444-en](https://doi.org/10.1787/27b11444-en).
- Lu, C. J., Lee, T. S., & Chiu, C. C. (2009). Financial Time Series Forecasting using Independent Component Analysis and Support Vector Regression. *Decision Support Systems*, 47(2), 115-125 [DOI:10.1016/j.dss.2009.02.001](https://doi.org/10.1016/j.dss.2009.02.001)
- [Lucas, Robert E. "Understanding business cycles." *Essential readings in economics* \(1995\): 306-327.](#)
- Kerpershoek, E., Groenleer, M., & de Bruijn, H. (2016). Unintended Responses to Performance Management in Dutch Hospital Care: Bringing Together the Managerial and Professional Perspectives. *Public Management Review*, 18(3), 417-436. [Doi:10.1080/14719037.2014.985248](https://doi.org/10.1080/14719037.2014.985248)
- Kober, R., & Thambar, P. J. (2021). Coping with COVID-19: The Role of Accounting in Shaping Charities' Financial Resilience. *Accounting, Auditing and Accountability Journal*, 34(6), 1416-1429. [doi:10.1108/AAAJ-09-2020-4919](https://doi.org/10.1108/AAAJ-09-2020-4919)
- Manhart, M. & Thalmann, S. (2015). Protecting Organizational Knowledge: A Structured Literature Review. *Journal of Knowledge Management*, 19(2), 190-211. [DOI:10.1108/JKM-05-2014-0198](https://doi.org/10.1108/JKM-05-2014-0198)
- Marcucci, J. and Quagliariello, M., (2008). Is Bank Portfolio Riskiness Procyclical? Evidence from Italy using Vector AutoRegression. *International Financial Markets, Institutes & Money*, 18(1), 46-63. [DOI:10.1016/j.intfin.2006.05.002](https://doi.org/10.1016/j.intfin.2006.05.002)
- Marrs, C., (2020). An Eye to the Future: Preparing Public Finances for Life after Covid-19. *Public Finance*. [Online] 23rd June 2020. Accessed from: www.publicfinance.co.uk/2020/06/eye-future-preparing-publicfinance-life-after-covid-19. Accessed: June 23.

- Massaro, M., Dumay, J. & Garlatti, A. (2015). Public Sector Knowledge Management: A Structured Literature Review. *Journal of Knowledge Management*, 19(3), 530-558. [DOI:10.1108/JKM-11-2014-0466](https://doi.org/10.1108/JKM-11-2014-0466)
- Massaro, M., Dumay, J. & Guthrie, J. (2016). On the Shoulders of Giants: Undertaking a Structured Literature Review in Accounting. *Accounting, Auditing and Accountability Journal*, 29(5), 767-801. [DOI:10.1108/AAAJ-01-2015-1939](https://doi.org/10.1108/AAAJ-01-2015-1939)
- Mateus, C., (2011). Portugal: Results of 25 Years of Experience with DRGs. Diagnosis-Related Groups in Europe: Moving Towards Transparency, Efficiency and Quality in Hospitals. New York: McGraw Hill, 381-400. [PMID: 27786431](https://pubmed.ncbi.nlm.nih.gov/27786431/).
- Mauro, S. G., Cinquini, L., Pianezzi, D. (2021). New Public Management Between Reality and Illusion: Analysing the Validity of Performance-Based Budgeting. *The British Accounting Review*, 53(6), 100825. [doi:10.1016/j.bar.2019.02.007](https://doi.org/10.1016/j.bar.2019.02.007)
- McCarthy, T., Lindbert, C., O'Malley, C., (2022). Spending Review: Towards Population Based Funding for Health: Evidence Reviews & Regional Profiles. Department of Health. Available at: <https://assets.gov.ie/233689/57e2174e-39da-4474-bd56-87b269375918.pdf>, Accessed: June 2023.
- McDaid D, Wiley M, Maresso A and Mossialos E. (2009). Ireland: Health System Review. *Health Systems in Transition*, 2009; 11(4): 1 – 268.
- McQuestin, D., Noguchi, M. & Drew, J. (2022) The Association Between Budget Inaccuracy and Technical Efficiency in Australian Local Government. *Public Money and Management*, 42(4), 251-261. [DOI:10.1080/09540962.2021.1893464](https://doi.org/10.1080/09540962.2021.1893464)
- Meyers, R. T. (2009). The “Ball of Confusion” in Federal Budgeting: A Shadow Agenda for Deliberative Reform of the Budget Process. *Public Administration Review*, 69(2), 211-223. [DOI:10.1111/j.1540-6210.2008.01967.x](https://doi.org/10.1111/j.1540-6210.2008.01967.x)

- Mikesell, J. L. (2018). Often Wrong, Never Uncertain: Lessons from 40 Years of State Revenue Forecasting. *Public Administration Review*, 78(5), 795-802. [DOI:10.1111/puar.12954](https://doi.org/10.1111/puar.12954)
- Mikesell, J. L. & Ross, J. M. (2014). State Revenue Forecasts and Political Acceptance: The Value of Consensus Forecasting in the Budget Process. *Public Administration Review*, 74(2), 188-203. [DOI:10.1111/puar.12166](https://doi.org/10.1111/puar.12166)
- Muhrer, J. C. (2021). Risk of Misdiagnosis and Delayed Diagnosis with COVID-19: A Syndemic Approach. *The Nurse Practitioner*, 46(2), 44. [DOI: 10.1097/01.NPR.0000731572.91985.98](https://doi.org/10.1097/01.NPR.0000731572.91985.98).
- Myrdal, G. (1972). *Asian drama; an inquiry into the poverty of nations* (Vol. 1). Pantheon.
- Nakrošis, V., Šiugždinienė, J. & Antanaitė, I. (2020). New development: Between Politics and Strategic Planning—the Management of Government Priorities in Lithuania. *Public Money and Management*, 40(4), 299-303. [DOI:10.1080/09540962.2020.1715096](https://doi.org/10.1080/09540962.2020.1715096)
- National Bureau of Economic Research (2022). Business Cycle Dating Procedure: Frequently Asked Questions. Available at <https://www.nber.org/research/business-cycle-dating/business-cycle-dating-procedure-frequently-asked-questions>. Accessed: November 2022.
- NTPF, (2022) National Waiting List Data. <https://www.ntpf.ie/home/nwld.htm>. Accessed: March 2022.
- OECD (2015), *Fiscal Sustainability of Health Systems: Bridging Health and Finance Perspectives*, OECD Publishing, Paris, [DOI:10.1787/9789264233386-en](https://doi.org/10.1787/9789264233386-en).
- OECD (2016), Irish GDP up by 26.3% in 2015? Available at: <https://www.oecd.org/sdd/na/Irish-GDP-up-in-2015-OECD.pdf>, Accessed: March 2022.

- OECD (2017), European Observatory on Health Systems and Policies, Ireland: Country Health Profile 2017, State of Health in the EU, OECD Publishing, Paris/European Observatory on Health Systems and Policies, Brussels. [DOI:10.1787/9789264283435-en](https://doi.org/10.1787/9789264283435-en) Accessed: March 2022.
- OECD, (2022) Health Expenditure - OECD Health Statistics 2022. Available at: [OECD Data Explorer • Health expenditure and financing](https://data.oecd.org/health-expenditure/). Accessed: March 2022.
- OECD (2023a), Health Expenditure and Financing: Health Expenditure Indicators, OECD Health Statistics (database). [DOI:10.1787/data-00349-en](https://doi.org/10.1787/data-00349-en). Accessed: January 2023.
- OECD (2023b) Ready for the Next Crisis Investing in Health System Resilience. Available at: <https://www.oecd.org/health/ready-for-the-next-crisis-investing-in-health-system-resilience-1e53cf80-en.htm>. Accessed: June 2023.
- OECD (2023c), Health Systems Resilience. Available at: <https://www.oecd.org/health/health-systems-resilience.htm>, Accessed: June 2023.
- Our World in Data (2023), Ireland: Coronavirus Pandemic Country Profile. Available at: <https://ourworldindata.org/coronavirus/country/ireland>. Accessed: August 2023.
- Padovani, E., Iacussi, S., Jorge, S., & Pimentel, L. (2021). Municipal Financial Vulnerability in Pandemic Crises: a Framework for Analysis. *Journal of Public Budgeting, Accounting and Financial Management*, 33(4), 387-408. [doi:10.1108/JPBAFM-07-2020-0129](https://doi.org/10.1108/JPBAFM-07-2020-0129)
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E. & Chou, R., (2021). *The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews*. *Systematic Reviews*, 10(1), 1-11. [DOI:10.1186/s13643-021-01626-4](https://doi.org/10.1186/s13643-021-01626-4)

- PCRS. (2022). Primary Care Reimbursement Services Statistical Analysis of Claims and Payments 2022. Available: www.hse.ie/eng/staff/pcrs/pcrs-publications/annual-report-2022.pdf. Accessed: January 2024.
- Petticrew M., & Roberts, H. (2005). Systematic Reviews in the Social Sciences: A Practical Guide. *Malden, MA: Blackwell Publishing*.
- Pierson, P. (2002). Coping with permanent austerity: welfare state restructuring in affluent democracies. *Revue française de sociologie*, 369-406.
- Pool, S., De Haan, L. and Jacobs, J.P., (2015). Loan Loss Provisioning, Bank Credit and the Real Economy. *Journal of Macroeconomics*, 45, 124-136. [DOI:10.1016/j.jmacro.2015.04.006](https://doi.org/10.1016/j.jmacro.2015.04.006)
- Porter, M. E. (2010). What is Value in Health Care. *N Engl J Med*, 363(26), 2477-2481. [DOI: 10.1056/NEJMp1011024](https://doi.org/10.1056/NEJMp1011024).
- Posner, P. L. (2009). Budget Process Reform: Waiting for Godot. *Public Administration Review*, 69(2), 233-244. [DOI:10.1111/j.1540-6210.2008.01969.x](https://doi.org/10.1111/j.1540-6210.2008.01969.x)
- Rao, M., Musso, J. A., & Young, M. M. (2023). Resist, Recover, Renew: Fiscal Resilience as a Strategic Response to Economic Uncertainty. *The American Review of Public Administration*, 53(7-8), 296-315. [doi:10.1177/02750740231186424](https://doi.org/10.1177/02750740231186424).
- Raudla, R., Savi, R. & Randma-Liiv, T. (2015). Cutback Management Literature in the 1970s and 1980s: Taking Stock. *International Review of Administrative Sciences*, 81(3), 433-456. [DOI:10.1177/0020852314564313](https://doi.org/10.1177/0020852314564313)
- Rice, N., & Smith, P. C. (2001). Capitation and Risk Adjustment in Health Care Financing: An International Progress Report. *Milbank Q*, 79(1), 81-113; 112 preceding VI. [DOI:10.1111/1468-0009.00197](https://doi.org/10.1111/1468-0009.00197)

- Richardson, W. S., Detsky, A. S., Guyatt, G., Cook, D., Gerstein, H., Hayward, R., Holbrook, A., Jaeschke, R., Juniper, E. & Levine, M. (1995). Users' Guides to the Medical Literature: Vii. How to Use a Clinical Decision Analysis B. What Are the Results and Will They Help Me in Caring for My Patients? *JAMA*, 273(20), 1610-1613. [DOI:10.1001/jama.1995.03520440064038](https://doi.org/10.1001/jama.1995.03520440064038)
- Roberts, J. (1999). Sensitivity of Elasticity Estimates for Oecd Health Care Spending: Analysis of a Dynamic Heterogeneous Data Field. *Health Economics*, 8(5), 459-472. [DOI:10.1002/\(SICI\)1099-1050\(199908\)8:5<459::AID-HEC454>3.0.CO;2-U](https://doi.org/10.1002/(SICI)1099-1050(199908)8:5<459::AID-HEC454>3.0.CO;2-U)
- Rodríguez-Tejedo, I. (2012). The Determinants of the Structure of Rainy-Day Funds. *Public Administration Review*, 72(3), 376-386. [DOI:10.1111/j.1540-6210.2011.02523.x](https://doi.org/10.1111/j.1540-6210.2011.02523.x)
- Rose, S. & Smith, D. L. (2012). Budget Slack, Institutions, and Transparency. *Public Administration Review*, 72(2), 187-195. [DOI:10.1111/j.1540-6210.2011.02491.x](https://doi.org/10.1111/j.1540-6210.2011.02491.x)
- Rutakumwa, R., Mugisha, J.O., Bernays, S., Kabunga, E., Tumwekwase, G., Mbonye, M. and Seeley, J., (2020). Conducting In-Depth Interviews with and Without Voice Recorders: A Comparative Analysis. *Qualitative Research*, 20(5), 565-581. [DOI:10.1177/1468794119884](https://doi.org/10.1177/1468794119884)
- Schwarz, Gideon (1978). Estimating the Dimension of a Model. *The Annals of Statistics*: 461-464. [DOI:10.1214/aos/1176344136](https://doi.org/10.1214/aos/1176344136)
- Seal, W. (2003). Modernity, Modernization and the Deinstitutionalization of Incremental Budgeting in Local Government. *Financial Accountability and Management*, 19(2), 93-116. [DOI:10.1111/1468-0408.00165](https://doi.org/10.1111/1468-0408.00165)
- Serritzlew, S. (2005). Breaking Budgets: An Empirical Examination of Danish Municipalities. *Financial Accountability and Management*, 21(4), 413-435. [DOI:10.1111/j.0267-4424.2005.00227.x](https://doi.org/10.1111/j.0267-4424.2005.00227.x)

- Shaver, F. M. (2005). Sex Work Research: Methodological and Ethical Challenges. *Journal of interpersonal violence*, 20(3), 296-319. [DOI:10.1177/0886260504274340](https://doi.org/10.1177/0886260504274340)
- Sims, C. (1972), "Money, Income and Causality," *American Economic Review*, 62, 540-53.
- Sims, C. A. (1980a). Macroeconomics and Reality. *Econometrica: Journal of the Econometric Society*, 1-48. [DOI:10.2307/1912017](https://doi.org/10.2307/1912017)
- Sims, C. (1980b), A Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered. *American Economic Review Papers and Proceedings*, 70, 250-7.
- Sims, C. (1982). Policy Analysis with Econometric Models. *Brookings Papers of Economic Activity*, 2, 107-52. [DOI:10.2307/2534318](https://doi.org/10.2307/2534318)
- Skelcher, C. (1980). From Programme Budgeting to Policy Analysis: Corporate Approaches in Local Government. *Public Administration*, 58(2), 155-172. [DOI:10.1111/j.1467-9299.1980.tb00397.x](https://doi.org/10.1111/j.1467-9299.1980.tb00397.x)
- Snow, D., Gianakis, G. A. and Haughton, J. (2015). The Politics of Local Government Stabilization Funds. *Public Administration Review*, 75(2), 304-314. [DOI:10.1111/puar.12317](https://doi.org/10.1111/puar.12317)
- Stark, A. (2014). Bureaucratic Values and Resilience: An Exploration of Crisis Management Adaptation. *Public Administration*, 92(3), 692-706. [doi:10.1111/padm.12085](https://doi.org/10.1111/padm.12085)
- Steccolini, I.. Accounting and The Post-New Public Management: Re-considering Publicness in Accounting Research." *Accounting, Auditing & Accountability Journal* 32.1 (2018): 255-279. [DOI: 10.1108/AAAJ-03-2018-3423](https://doi.org/10.1108/AAAJ-03-2018-3423)
- Stock, J. H., & Watson, M. W. (2001). Vector Autoregressions. *Journal of Economic Perspectives*, 15(4), 101-115. [DOI: 10.1257/jep.15.4.101](https://doi.org/10.1257/jep.15.4.101)
- Sunstein, C.R., (2013). *Simpler: The future of Government*. Simon and Schuster.

- Szczesny, A., & Ernst, C. (2016). The Role of Performance Reporting System Characteristics for the Coordination of High-Cost Areas in Hospitals. *European Accounting Review*, 25(4), 635-660. [DOI:10.1080/09638180.2016.1210525](https://doi.org/10.1080/09638180.2016.1210525)
- Tacconelli, E. (2010). Systematic Reviews: Crd's Guidance for Undertaking Reviews in Health Care. *The Lancet Infectious Diseases*, 10(4), 226. [DOI:10.1016/S1473-3099\(10\)70065-7](https://doi.org/10.1016/S1473-3099(10)70065-7)
- Tallaki, M., & Bracci, E. (2020). Risk Perception, Accounting, and Resilience in Public Sector Organisations: A Case Study Analysis. *Journal of Risk and Financial Management*, 14(1), 4. [DOI/10.3390/jrfm14010004](https://doi.org/10.3390/jrfm14010004)
- Themsen, T. N. (2019). The Processes of Public Megaproject Cost Estimation: The Inaccuracy of Reference Class Forecasting. *Financial Accountability and Management*, 35(4), 337-352. [DOI:10.1111/faam.12210](https://doi.org/10.1111/faam.12210)
- Thompson, F. & Gates, B. L. (2007). Betting on the Future with a Cloudy Crystal Ball? How Financial Theory Can Improve Revenue Forecasting and Budgets in the States. *Public Administration Review*, 67(5), 825-836. [DOI:10.1111/j.1540-6210.2007.00771.2.x](https://doi.org/10.1111/j.1540-6210.2007.00771.2.x)
- Thomson, S., García-Ramírez, J. A., Akkazieva, B., Habicht, T., Cylus, J. and Evetovits, T. (2022) How Resilient is Health Financing Policy in Europe to Economic Shocks? Evidence from the First Year of the COVID-19 Pandemic and the 2008 Global Financial Crisis. *Health Policy*, 126(1), 7-15 [DOI:10.1016/j.healthpol.2021.11.002](https://doi.org/10.1016/j.healthpol.2021.11.002)
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, 14(3), 207–222. [DOI:10.1111/1467-8551.00375](https://doi.org/10.1111/1467-8551.00375)
- Turner, B. (2018). Putting Ireland's Health Spending into Perspective. *The Lancet*, 391(10123), 833-834. [DOI/10.1016/S0140-6736\(18\)30461-6](https://doi.org/10.1016/S0140-6736(18)30461-6)

- United Nations. (2015). Historic New Sustainable Development Agenda Unanimously Adopted by 193 UN Members. Available at: <https://www.un.org/sustainabledevelopment/blog/2015/09/historic-new-sustainable-development-agenda-unanimously-adopted-by-193-un-members/> Accessed: June 2023.
- van der Voet, J. (2022) Policy Preferences in Response to Negative Economic Prospects of COVID-19: A Survey-Experiment Among Local Politicians in Four European Countries', *Public Administration*, 100(2), 356-374. [DOI:10.1111/padm.12729](https://doi.org/10.1111/padm.12729)
- Van Hecke, S., Fuhr, H. & Wolfs, W., (2021). The Politics of Crisis Management by Regional and International Organizations in Fighting Against a Global Pandemic: the Member States at a Crossroads. *International Review of Administrative Sciences*, 87(3), 672-690. [DOI:10.1177/0020852320984516](https://doi.org/10.1177/0020852320984516)
- Vega, A., O'Shea, S., Murrin, C., & Staines, A. (2010). Towards the Development of a Resource Allocation Model for Primary, Continuing and Community care in the Health Services. *Dublin City Universit*, 2.
- Vollmer, H., Mennicken, A. & Preda, A. (2009). Tracking the Numbers: Across Accounting and Finance, Organizations and Markets. *Accounting, Organizations and Society*, 34(5), 619-637. [DOI:10.1016/j.aos.2008.06.007](https://doi.org/10.1016/j.aos.2008.06.007)
- Wei, W. (2021). Exploring Local Government Fiscal Slack in a Political-Budgetary-Managerial Framework. *Public Management Review*, 23(10), 1504-1526. [DOI:10.1080/14719037.2020.1764085](https://doi.org/10.1080/14719037.2020.1764085)
- Wren, M., C. Keegan, B. Walsh, A. Bergin, J. Eighan, A. Brick, S. Connolly and D. Watson (2017). Projections of Demand for Healthcare in Ireland, 2015-2030: First Report from the Hippocrates Model, *ESRI Research Series 67*, Dublin: ESRI, [DOI:10.26504/rs67](https://doi.org/10.26504/rs67)

White, J. (2013). Budget-Makers and Health Care Systems. *Health Policy*, 112(3), 163-171.

[DOI:10.1016/j.healthpol.2013.07.024](https://doi.org/10.1016/j.healthpol.2013.07.024)

World Bank (2022), Structured Literature Reviews Building Transparency and Trust in Standard Reporting Evidence. Available: <https://ieg.worldbankgroup.org/evaluations/structured-literature-reviews>. Accessed: July 2023.

World Health Organization (2022), Ageing and Health. Available: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>, Accessed: July 2023.

Appendix A: VAR Model Robustness Checks

Table 2: Lag Length for Three Variable Model

Lags	AICC	BIC	HQIC
0	1.6961854	1.8135734	1.7370375
1	-9.7974498*	- 9.3704401*	- 9.6765836*
2	-9.6744011	-9.0137651	-9.5495162
3	-9.2908112	-8.4928601	-9.2582188
4	-8.957505	-8.1468151	-9.1417814
The optimal model is 3 variables with 2 lags			

Table 3: Model Selection

Model	Variables	Mean	MAE	RMSE	Theil's U
1 Year Ahead					
<i>Univariate AR (1)</i>	GHE	0.05	0.05	0.07	0.75
<i>Univariate AR (2)</i>	GHE	0.03	0.05	0.07	0.73
<i>Bivariate (2)</i>	GHE GDP	-0.16	0.06	0.07	0.69
<i>3 Variable (1)</i>	GHE GDP PHE	-0.03	0.05	0.06	0.6
<i>3 Variable (2)</i>	GHE GDP PHE	-0.01	0.06	0.07	0.67
<i>4 Variable (2)</i>	GHE GDP PHE AI	0	0.05	0.06	0.65
5 Year Ahead					
<i>Univariate AR (1)</i>	GHE	0.26	0.26	0.26	0.62
<i>Univariate AR (2)</i>	GHE	0.28	0.28	0.28	0.67
<i>Bivariate (2)</i>	GHE GDP	-0.02	0.02	0.02	0.06
<i>3 Variable (1)</i>	GHE GDP PHE	-0.09	0.09	0.09	0.21
<i>3 Variable (2)</i>	GHE GDP PHE	-0.01	0.01	0.01	0.02
<i>4 Variable (2)</i>	GHE GDP PHE AI	0.02	0.02	0.02	0.04

Table 4: Impulse Response Function with alternative variable ordering:

Order	Variables	1	3	6	9
<i>GDP, GHE, PHE</i>	Response of GHE to a GDP Shock	0.01	0.05	0.07	0.07
<i>GDP, PHE, GHE</i>	Response of GHE to a GDP Shock	0.01	0.05	0.07	0.07
<i>PHE, GHE, GDP</i>	Response of GHE to a GDP Shock	0.00	0.04	0.06	0.06
<i>GHE GDP PHE</i>	Response of GHE to a GDP Shock	0.00	0.04	0.06	0.06
<i>GDP, GHE, PHE</i>	Response of PHE to a GDP Shock	0.00	0.01	0.04	0.06
<i>GDP, PHE, GHE</i>	Response of PHE to a GDP Shock	0.00	0.01	0.04	0.06
<i>PHE, GHE, GDP</i>	Response of PHE to a GDP Shock	0.00	0.01	0.03	0.05
<i>GHE GDP PHE</i>	Response of PHE to a GDP Shock	0.00	0.01	0.03	0.05

Figure A 1-1: Impulse Response Comparing Using First Differences and Log Value

