

UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

A LONGITUDINAL COMPARATIVE ANALYSIS OF INEQUALITY TRAJECTORIES IN
OECD COUNTRIES DURING THE GREAT RECESSION AND COVID-19 PANDEMIC
ERAS, 2002-2021

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ERAS, 2002-2021

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF SOCIOLOGY

BY THE COMMITTEE CONSISTING OF

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With Deep Reverence, Dedicated To:

Humanity –

For its Resilient Power to Shape its Destiny,

For its Wisdom and Determination to Overcoming Boundaries,

And for its Indomitable Spirit in the Face of Adversity.

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For A Future of Global Understanding and Peace

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University of Oklahoma, United States

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Abstract

This dissertation investigates income, labor, health, and gender-based labor inequalities across Organization for Economic Cooperation and Development (OECD) countries, emphasizing how these disparities are exacerbated by the COVID-19 pandemic and the Great Recession. Employing a longitudinal comparative methodology grounded in Exogenous Shocks theory, Institutional theory, Welfare Regime Theory, and Skill-Biased Technological Change, this study employs Exploratory Data Analysis of time-series, Mixed Models for Repeated Measures (MMRM), and Generalized Estimating Equations (GEE) to identify evolving trends during these crises, assess their impact on welfare regimes, and conduct detailed analyses of gender-related labor market disparities.

The findings reveal rising inequalities, with notable spikes in income disparity in specific countries, heterogeneous trends during the crises, and varied effects on labor force inequality across countries. The pandemic exerted a substantial, though divergent, influence on health disparities, highlighting the widespread impact on income, labor, health, and gender labor disparities across OECD countries.

This research also evaluates the impact of global events on welfare regimes, uncovering diverse effects on income inequality and fluctuations in employment and unemployment rates. Findings indicate a decline in life expectancy across all regimes during the pandemic, accompanied by increases in infant mortality rates compared to the Great Recession period. The study highlights the varied influence of global crises on welfare regimes and their associated socio-economic disparities. Additionally, it undertakes a comparative analysis of gender labor inequalities during these periods, identifying a significant influence of the pandemic on the gender employment gap, differentiated effects on gender employment disparities, and a unique

interplay between the pandemic and the gender unemployment gap. Gross Domestic Product (GDP) emerged as a critical determinant, elucidating the overarching economic dynamics that influence gender disparities in the labor market during these crucial times. Finally, this study elucidates empirical evidence suggesting pathways for mitigating observed inequalities across OECD countries. It emphasizes the importance of reinforcing labor markets, bolstering gender equality in occupational contexts, and methodically revising economic paradigms to align with current and future needs. Moreover, the research posits that evaluating existing welfare regimes could yield a framework adept at confronting the multifaceted challenges posed by globalization, thereby enhancing societies' adaptive capacity to global crises.

Key Words: COVID-19 pandemic, Great Recession, income inequality, labor force inequality, health disparity, gender labor force inequality, OECD countries, welfare regime

Chapter 1: Inequality Trajectories in OECD Countries

Global Crises and Inequalities

Over the past two decades, rapid changes in social and economic landscapes have been observed due to increased interconnectivity across countries. These shifts have substantially shaped the dynamics of inequalities across various countries. While inequalities have been ingrained in societies for centuries, recent global events have dramatically intensified these patterns.

Two pivotal events – the 2008-10 Great Recession and the 2020 Covid-19 Pandemic – have left considerable imprints on these inequality trajectories. Each event, unique in its nature and impact, has propelled the issue of inequality to the forefront of global consciousness. The 2008-10 Great Recession exposed the vulnerabilities of the interconnected global economic system, revealing its potential to create or exacerbate inequalities. In stark contrast, the 2020 Covid-19 Pandemic illuminated how entrenched economic inequalities can amplify the impacts of a major health crisis. The 2008-10 Great Recession is viewed as an economic crisis, the 2020 Covid-19 Pandemic is a health crisis that in turn created an economic crisis.

This introduction provides an overview of the influence of these events on the inequality trajectories across OECD countries. First, the Covid-19 pandemic is evaluated. The exploration of its impact aims to highlight the depth and breadth of the changes it has catalyzed in inequality structures. This examination lays the groundwork for deeper discussions and serves as a precursor to the subsequent section. Next, this study focuses on the 2008-10 Great Recession. The objective here is to elucidate how this event has influenced patterns of inequality. By comparing between the Covid-19 pandemic and the 2008-10 Great Recession and examining

their respective impacts on inequality patterns, nuanced insights about the effects of two different types of structural disruptions on disparities can be noted and compared. This comparative approach allows us to consider the effect of global crises on inequality trajectories.

Pandemic: A Pivotal World Event

In the early months of 2020, the Covid-19 pandemic prompted widespread shutdowns, substantially impacting global economies, businesses, and educational institutions. The Covid-19 pandemic has emerged as a historical and pervasive event, leaving an indelible imprint on the global landscape. As the costliest catastrophe in documented history, it has inflicted trillions of dollars in losses on the worldwide economy due to substantial economic disruptions, and it has pushed the world towards a global recession (Lindstaedt 2021, Naidoo and Fisher 2020). The pandemic has not only precipitated a severe health emergency but has also magnified economic and social predicaments in numerous countries. The health, social, and economic ramifications are unparalleled in the 21st century (Blum and Neumärker 2021). This unprecedented challenge has had a substantial impact on the global economy, exacerbating pre-existing inequalities (Min and Perucci 2020). Furthermore, it has laid bare the ongoing disparities in production and globalization, perpetuating the divide between developed countries in the Global North and developing countries in the Global South (Stevano et al. 2021). The crisis has ignited a global social convulsion, impacting many facets of society such as family income, health, education, social life, and overall well-being. As a consequence, billions of individuals worldwide have experienced substantial alterations to their daily routines (Karabchuk 2020). This predicament has culminated in substantial socio-economic reverberations, a worldwide regression in human development, and a surge in the population living in extreme poverty (Min and Perucci 2020).

At the global level, countries have exhibited divergent responses to the pandemic, leading to a vast spectrum of mortality rate outcomes. Data from the World Health Organization (WHO) in 2023 indicate that specific countries, including Cuba, Ghana, New Zealand, Senegal, Singapore, Taiwan, and Vietnam, have successfully curtailed the proliferation of the coronavirus, resulting in lower mortality rates. Conversely, other countries have encountered major policy failures, culminating in tens of thousands of avoidable fatalities. These countries include Brazil, Ecuador, Hungary, India, Italy, the UK, and the United States (Saad-Filho 2021). The observed disparities in outcomes can be ascribed to variations in demographic attributes and the implementation of stringent measures in the context of the pandemic (Saad-Filho 2021).

The Covid-19 pandemic has triggered the most unequal recession in recent history, leading to economic crises (Goldin 2021, Long et al. 2020). The resulting challenges have impacted all societies, with substantial rises in unemployment rates (Bambra, Lynch and Smith 2021, Jackson 2021, Min and Perucci 2020). A recent report by *The Economist* showed that the GDP growth across 38 OECD countries has considerably slowed down since the start of 2021, with some even experiencing negative growth. In Finland employment rate has worsened since 2021, with the unemployment rate increasing by over a percentage point from its post-lockdown lows. This makes Finland the OECD country with the weakest employment performance, despite its advanced welfare system, low levels of income inequality, and high educational attainment (Andersson 2017). The weakened employment can be attributed to current economic challenges, such as rising energy prices, which also contributed to a decline in GDP by 0.6% in the fourth quarter of 2022. On the other hand, Japan's unemployment rate has fluctuated by only 3.5%, which is lower compared to the 9.5% average among other developed countries. This can be

explained by the strong financial position of many businesses, allowing them to withstand reduced revenues without the need to immediately reduce costs (The Economist 2023b).

The IMF (2020) reported that the pandemic has prompted a global fiscal response of nearly \$12 trillion, or 12% of global GDP (Furceri et al. 2021). In 2020, the global economy experienced a contraction of 3.2%, according to the IMF's October 2021 *World Economic Outlook*. The IMF also stated that advanced economies will continue to face economic challenges due to supply shortages in 2022, while low-income developing economies have seen a worsened outlook due to disparities in vaccine access and differences in economic policy support (Congressional Research Service 2021).

According to the International Labor Organization (ILO), the impact of the pandemic on the global workplace was substantial. As reported by the ILO, workplace restrictions during the pandemic affected 93% of the global workforce, resulting in a loss of 8.8% of global working hours in 2020 compared to the fourth quarter of 2019. This is equivalent to 255 million full-time jobs (Congressional Research Service 2021).

The OECD estimated in July 2021 that the recession caused by the pandemic led to the loss of 22 million jobs in OECD countries and 114 million jobs worldwide compared to 2019. Although government fiscal policies helped support workers' incomes and potentially mitigated the impact of shutdowns and social restrictions on labor markets, the OECD acknowledged that the crisis intensified and exacerbated inequalities based on factors such as skill levels, education, income, and gender in OECD countries, further aggravating existing trends toward increasing economic disparity (Monte 2021).

The COVID-19 pandemic has disproportionately affected low-income individuals, minorities, and vulnerable populations, particularly in densely populated areas with limited

resources for mitigation. This has been exacerbated by the high prevalence of chronic conditions and limited access to quality healthcare in these groups. Moreover, the pandemic has led to a global economic downturn, social isolation, and movement restrictions, which further exacerbate inequalities and disproportionately affect marginalized populations (Shadmi et al. 2020). Several factors have contributed to disparities in the impact of COVID-19, most rooted in long-standing systemic inequalities and structural racism (Bailey et al. 2017). Underlying health and social inequities have placed many racial and ethnic communities at a higher risk of contracting the virus, experiencing more severe illness, and dying from COVID-19. For example, employment disparities can increase the likelihood of occupational exposure to COVID-19, income inequality may hinder access to safe housing, transportation, or health services, thereby exacerbating the risk of exposure to the virus (Centers for Disease Control and Prevention 2020, Simmons et al. 2021).

The pandemic has exposed disparities in infection and recovery rates within the United States, influenced by factors such as race, ethnicity, gender, age, and socioeconomic status (Perry, Aronson and Pescosolido 2021). Moreover, the pandemic has intensified the existing disparities in poverty and well-being between racial and ethnic groups, with Black and Latino children being extensively affected by poverty and economic difficulties during the early phase of the pandemic when compared to their white counterparts (Parolin 2021). Additionally, COVID-19 has resulted in a disproportionate number of deaths among African Americans compared to the general population. Native Americans also face higher risk of the disease due to a higher incidence of underlying health conditions, such as heart disease and diabetes, which amplify potential complications from the COVID-19 disease (Van Dorn, Cooney and Sabin 2020). Furthermore, the Covid-19 pandemic has exacerbated gender health and income

disparities, with many groups being disproportionately impacted by higher unemployment or reductions in work hours (Stantcheva 2022, Van Dorn, Cooney and Sabin 2020). These groups have encountered substantial challenges in accessing healthcare and support services, intensifying the effects of the pandemic on their well-being and leading to increased poverty (Connor et al. 2020, Min and Perucci 2020, Thorpe, Jeffrey and Fullagar 2022). An analysis of data from 3,142 the United States counties revealed that most of the racial disparities in COVID-19 deaths persisted even after adjusting for 2019 mortality rates and COVID-19 cases per 100,000 people, suggesting that socioeconomic factors play a major role in these disparities (Khanijahani 2021).

From a demographic perspective, COVID-19 is characterized by a high proportion of severe cases among older populations, particularly those aged 70 and above (Onder, Rezza and Brusaferro 2020). This has led to a substantial number of deaths worldwide and a decrease in life expectancy (LE) (Marois, Muttarak and Scherbov 2020). According to Limb (2021) the pandemic has led to a decrease in life expectancy in four-fifths of OECD countries, and has caused considerable damage to mental health. Additionally, the pandemic has shown disparities in welfare regime, leading to disproportionate harm to marginalized groups (Parolin 2021). Prior research indicates that the type of welfare regime system can meaningfully influence the level of inequality (Eikemo et al. 2008, Kim 2017). Different welfare regimes impact the level of support provided to individuals and households during the crisis, leading to varying levels of inequality. Based on this assumption, the social democratic regimes are in better health than their counterparts in other welfare state regimes (Brennenstuhl, Quesnel-Vallée and McDonough 2012). Parolin (2021) pointed out that the pandemic exposed the inadequacy of the welfare state in the United States in supporting low-income families, particularly minorities who are not

treated equally as white families. Moreover, the pandemic has unveiled stark racial and ethnic disparities in various aspects of life, including health, income, life expectancy and overall well-being (Chandler et al. 2021). In a recent study across OECD countries, Tridico (2018) proposes that the type of welfare regime can serve as the primary source of financial support for unemployed individuals and provide essential social services. The welfare regime is viewed as the primary public institution for income redistribution, serving as both a source and regulator of employment levels.

Disparities in COVID-19 infections, symptom severity, hospitalizations, and deaths across countries became evident in the early stages of the pandemic in June 2020 (Bambra, Lynch and Smith 2021). It is crucial to consider that even prior to the pandemic, income inequality was on the rise in many parts of the world, and the pandemic has laid bare and intensified these pre-existing conditions (Goldin 2021). Also, it is notable that the pandemic disproportionately impacted low-income households, as they were more susceptible to severe economic consequences (Carreras, Vera and Visconti 2021). Furthermore, unemployment rates, income, and economic hardship have disproportionately affected the less educated and lower-income strata (Adams-Prassl et al. 2020, Perry, Aronson and Pescosolido 2021, Witteveen 2020). In addition, the pandemic has inflicted disproportionate damage to sectors employing more women than men, such as retail stores, restaurants, and the hotel and hospitality industry (Djankov et al. 2021). The pandemic has intensified existing disparities in the job market, largely due to the correlation between the ability to work remotely and the level of education. This has resulted in a more severe impact on low-skilled and less-educated workers in terms of job and income losses (Ferreira 2021). Hence, the Covid-19 crisis is not only a virus-related pandemic, but a pandemic of inequality in health outcomes based on class, gender, ethnicity, migration

status, and place of residence (Benach 2021). Emcke (2020) described the pandemic as a ‘contrast medium’ for social relations, a magnifying glass for systemic cracks, vulnerabilities in society and magnifies existing inequalities.

The pandemic presents a novel challenge for OECD countries, as they have not faced a crisis of this magnitude and extent in over a century (Tikkanen, Aboulafia and Williams 2020). The pandemic's impact varies across these countries, influenced by factors such as demographic characteristics, employment, and income (OECD 2021b). The pandemic's impact varies across these countries, influenced by factors such as demographic characteristics, employment, and income (Boushey and Park 2020). As the pandemic's effects continue to grow, it has revealed the weaknesses of the United States healthcare system, including limited access, subpar quality, pervasive inequalities, and an undervalued public health sector (Geyman 2021). It has also exposed the vulnerability of healthcare systems in Eastern European countries (Lupu and Tiganasu 2022). The pandemic has widened the gap in health outcomes and economic stability between the affluent and the less fortunate. In the United States and the UK, major differences in COVID-19 outcomes have been observed based on race and ethnicity, with higher death rates among minority populations compared to the white population (Bambra, Lynch and Smith 2021). Health inequalities rooted in socioeconomic status and deprivation levels persist in developed countries like the United States, UK, France, and Norway (Bambra, Lynch and Smith 2021). The pandemic has led to a substantial rise in global fatalities, accentuating the pronounced disparities in mortality rates among at-risk populations. Groups such as the elderly, residents of densely populated areas, individuals with limited financial resources, migrants, and minority communities are more likely to contract COVID-19 due to preexisting chronic health conditions. This heightened vulnerability also exposes them to an increased risk of severe outcomes (Shadmi

et al. 2020). Furthermore, the pandemic has introduced additional risks for pregnant individuals, owing to their increased susceptibility to the virus and the immense strain it has imposed on healthcare facilities (The Economist 2023a).

Over the past two decades, leading up to the global economic crisis, there has been an increase in income inequality in most OECD countries (Caminada and Goudswaard 2001, Cingano 2014a, Cingano 2014b, Tridico 2018). According to Tridico (2018) the increase in income gap in OECD countries in recent times is due to a radical transformation in their socio-economic model, characterized by a shift towards financialization, increased flexibility in the labor market, a weakening of trade unions, and reductions in public social spending. Wisman (2013) suggests that the growing inequality since the 1990s played a role in the 2008-10 Great Recession. The Great Recession had a profound impact on global economy, particularly on income inequality (IMF 2009). The Great Recession was a major global economic downturn that occurred in the late 2000s. It was characterized by the collapse of the housing market and the failure of major financial institutions, leading to a widespread and rapid economic impact. This event resulted in one of the most severe global recessions since the conclusion of World War II (Verick 2011), causing widespread job losses, wage cuts, and a considerable decrease in personal wealth. This resulted in a heightened income inequality, exacerbating existing inequalities between countries and regions.

The Great Recession

Prior to the COVID-19 pandemic, the 2008-10 Great Recession was considered the most profound blow to the worldwide economy in over seven decades (Chen, Mrkaic and Nabar 2019). This economic downturn, which commenced at the beginning of 2008, led OECD

countries into a deep recession (OECD 2009). The Great Recession has been extremely costly in terms of lost output and jobs (Ollivaud and Turner 2014). In the aftermath of the Great Recession, 91 economies, representing two-thirds of the world's GDP in purchasing-power-parity terms, saw a decrease in output in 2009. This was a important increase from the 1982 global recession, during which only 48 economies accounting for 46% of world GDP reported a drop in output compared to the previous year (Chen, Mrkaic and Nabar 2019). The Great Recession was by far the most widespread and costly of all the crisis analyzed. The cumulative output loss in most countries was greater than the losses experienced during previous crises since 1970, with a substantial number of advanced economies suffering losses exceeding 10% of GDP (Laeven and Valencia 2012).

However, the impact of the Great Recession varied across countries, with advanced economies being more severely affected than emerging economies. The extent of the decline was also influenced by the health of a country's economic sector, with countries experiencing full-scale banking crises suffering output losses of almost 10%, compared to those with stable financial sectors, which saw losses of 7% (Sánchez et al. 2017). The Great Recession had a substantial impact on income distribution and employment rate across OECD countries, leading to widespread income loss and persistent high levels of unemployment (Sánchez et al. 2017). According to the OECD data, the Great Recession caused over 15 million workers to lose their jobs since the end of 2007, and the average unemployment rate rose from 5.7% in Q3 2007 to 8.6% in Q3 2009 (Verick 2011). Additionally, the Great Recession worsened inequality as it resulted in increased government deficits and debt across many countries (McKibbin and Stoeckel 2010, Ollivaud and Turner 2014, Wolff 1995). The aftermath of the Great Recession saw a record high of 8.7% unemployment in OECD countries. In the Euro currency area,

unemployment rose even further to 12% in 2013 (Thévenot 2017), with young people being particularly affected. Approximately one-quarter of young people were unemployed in France and Italy in 2009, while the situation was even more dire in Spain, where over 40% of young people are without work (Brian and Patrick 2010). The Great Recession had a larger impact on labor income as compared to disposable income, largely due to the role of redistribution (Pfeffer, Danziger and Schoeni 2013, Thévenot 2017). The Great Recession also had negative impacts on mental health, it has had varying impacts on both communicable and non-communicable diseases, as well as access to healthcare (Karanikolos et al. 2016). The Great Recession and COVID-19 pandemic crises have both exacerbated existing disparities in life expectancy, and disease-related death, particularly among marginalized groups such as women and racial minorities (Chandler et al. 2021). It goes without saying that these communities have historically suffered the greatest consequences on their health and well-being during infectious disease outbreaks (Perry, Aronson and Pescosolido 2021, Shadmi et al. 2020).

However, the COVID-19 pandemic is expected to have a greater impact in terms of increasing inequality. The pandemic constitutes the most critical crisis faced by high-income countries in recent history, surpassing previous economic downturns like the Great Recession or national recessions. Its impact extends beyond economic factors, encompassing both a prolonged health crisis and far-reaching social and economic crisis consequences, making it a multi-faceted crisis (Richardson et al. 2020, Van Dorn, Cooney and Sabin 2020). Although epidemics historically have had negative impacts on inequality, Scheidel (2017) argues the importance of studying societal changes after the pandemic, as throughout history, periods of economic development without major violent disruptions have been necessary for reducing inequality. Scheidel (2017), who has analyzed the history of inequality from the Stone Age to present day,

maintains that the pandemic has the potential to bring about changes in income distribution and reduce inequality by altering the balance between capital and labor.

Given the context and background of this study, the varying structural aspects of inequality across OECD countries during the COVID-19 pandemic and the Great Recession highlight the importance of examining the inequalities resulting from both crises. The primary objective of this study is to examine the impact of the Great Recession, and the Covid-19 pandemic, on the extent of inequalities observed across OECD countries and the efficacy of their welfare regimes. To accomplish this aim, the study undertakes a comparative analysis of inequality across OECD countries, comparing conditions precedent to and concurrent with the pandemic. This endeavor includes a meticulous review of pertinent literature, a comparison of inequality trajectories from pre-pandemic to pandemic era, and an in-depth investigation into the influence of both the Great Recession and the Pandemic on inequality trajectories across these countries. The intent is to achieve an integrative comprehension of the inequality framework as it exists across OECD countries.

Research Objectives

First, this study utilizes a longitudinal comparative approach to investigate income, labor force participation, and health disparities across OECD countries, with a particular emphasis on Europe and the United States. Spanning from 2002 to 2021, the analysis employs key indicators including the Gini index, employment and unemployment rates, life expectancy, infant mortality rates, and gender inequality in the labor force.

Second, the study examines the effects of two major global crises—the COVID-19 pandemic and the 2008-10 Great Recession—on these dimensions of inequality across five

distinct welfare regimes: Nordic, Liberal, Continental, Mediterranean, and Post-communist. Finally, it evaluates how the pandemic may have further intensified gender labor inequalities, initially present or exacerbated during the Great Recession, across various OECD countries and welfare regimes.

Statement of Problem

Despite extensive research on various aspects of inequality, a comprehensive understanding of the trajectories of inequality during the Great Recession, and Covid-19 pandemic across OECD countries remains elusive due to the lack of comparative longitudinal studies. The relationship between each aspect of inequality and COVID-19 is still largely unknown (Wildman 2021), underscoring the necessity for cross-national analysis to fully grasp the pandemic's impact on income inequality. This study compares the inequalities during two major crises: the Great Recession (2008-2010) and the COVID-19 pandemic (2020-2021). This differences in inequality trajectories across OECD countries during the financial and health crises underscore the importance of examining the inequalities provoked by both events. This study holds particular significance as the pandemic presents an unprecedented challenge for OECD countries.

The selection of OECD countries, including Europe and the United States, as the focus of this study is underpinned by several important factors. Primarily, OECD countries are high-income, developed countries with advanced economies. Analyzing inequality trajectories within this group enables a concentrated examination of the pandemic's impact on countries with analogous economic structures and development levels. Another advantage of focusing on OECD countries is the accessibility to reliable and consistent data regarding income, labor force,

health inequalities, and gender labor inequalities during the pandemic and Great Recession. Such comprehensive data provides a robust basis for analysis. Furthermore, despite their similarities in economic development, OECD countries display a broad range of welfare systems. Their comparability in terms of social welfare systems, despite this diversity, presents an opportunity to investigate how various approaches to social protection and redistribution may have influenced inequality trajectories during global crises.

Moreover, the pandemic's substantial impact on GDP, unemployment rates, and life expectancy across OECD countries underscores the importance of analyzing its effects on income, labor force participation, and health inequalities. This study's comparison of inequality patterns offers deeper insights into how global crises influence inequality and the effectiveness of welfare regimes in addressing such disparities during crises. Focusing on OECD countries for this examination sheds light on the multifaceted impacts of the Great Recession and the pandemic on inequality

Research Questions

1. What trends and patterns in income, labor force, and health inequality trajectories have prevailed across OECD countries from 2002-2021, emphasizing the Great Recession and the COVID-19 pandemic periods?
2. How have the varying impacts of the global crises—including both the Great Recession and the pandemic—on different forms of inequality (income, labor force, and health) been evident across OECD countries?

3. What is the impact of the COVID-19 pandemic and the Great Recession on welfare regimes, and how do different types of these regimes influence the resulting changes in income, labor force participation, and health inequalities?
4. Did the pandemic further intensify gender labor inequalities already present or exacerbated during the Great Recession across OECD countries, and is the influence of these inequalities statistically significant across various OECD countries and welfare regimes?

Dissertation Structure

This dissertation is structured into seven comprehensive chapters. The first chapter delivers an in-depth background of the study, elucidating its purpose and problem statement, posing research questions, and outlining the structure of the entire dissertation. Following this, in Chapter 2, income, labor force, and health inequalities are considered through a review of the associated literature. This chapter critically evaluates the institutional and welfare regimes theories that serve as the framework of the study and incorporates elements of exogenous shocks theory, globalization theory and skill-biased technological change theory to rationalize the notable surge in inequality witnessed during the two preceding global crises. Chapter 3 details the research methodology, providing a discussion of the data sources, sample collection methods, variables, and the statistical techniques utilized. The findings derived from Exploratory Data Analysis of time series and Fixed Effect Model analyses across various countries are presented in Chapter 4. Chapter 5 evaluates the influence of welfare regimes on mitigating inequalities during the pandemic and examines how each region was impacted by the crisis. Chapter Six utilizes the Mixed Model for Repeated Measure and Generalized Estimating Equations to examine the

impact of the Great Recession and Covid-19 pandemic on gender labor inequalities across OECD countries and across different welfare regimes. The final chapter summarizes the key findings of the study, outlines its theoretical implications, underscores its limitations, presents direction for future research, and finally, reflects on the implications of these findings in the broader context of understanding and combating inequality.

The subsequent chapters embark on a review of the literature on income, labor force and health and gender labor inequality and relevant theories.

Chapter 2. Literature Review and Theoretical Framework

Contextual Overview

This chapter provides a comprehensive review of the literature on the following dimensions of inequality: income, labor force, health, and gender disparities in the labor force. Recognizing the multifaceted nature of inequality is essential for the subsequent exploration of relevant theoretical frameworks.

The research starts by establishing inequality as a core element of social stratification. Building on this, the discussion delves into the various dimensions of inequality, systematically analyzing each to illuminate their interconnected dynamics. The narrative progresses by examining the following theoretical perspectives: Exogenous Shocks, Institutional Theory, Welfare Regime Theory, Globalization Theory, and Skill-Biased Technological Change (SBTC). These theories provide the basis for this study's research hypotheses, facilitating a clearer understanding of the complexities inherent in inequality discussions. This dissertation further seeks to make clear the complexities of inequalities observed across OECD countries and between welfare regimes, specifically considering the potential varied impacts of two distinctive global crises on these disparities.

Framing Inequality

Inequality invariably operates as a part of the social stratification process (Domhoff 2010). From a sociological perspective, it is considered a central factor underlying the formation of social structures and is thought to have far-reaching consequences for various social phenomena (Wright 1979). The impact of inequality on health is pervasive across all societies, as it influences social and economic pathways such as income distribution and employment,

according to a study by McCartney et al. (2021). Over the past two decades, there has been a marked increase in interest in economic inequality patterns, driven by concerns surrounding income distribution during the process of globalization (Korzeniewicz and Moran 2010). In this time frame, income inequality has risen in the majority of OECD countries, fueled by the Great Recession and further exacerbated by the pandemic (OCED 2020). The degree of inequality varies substantially between countries (Bhardwaj 2018). Tridico (2018) suggests that the shift in the political economy in the United States and Europe after 1980 has contributed to a decline in income distribution. According to Tridico (2018) factors such as the growth of financialization, the decline of trade unions, increased labor flexibility, and reduced welfare state programs have all played a role in the rise in inequality in recent years. Additionally, numerous studies have demonstrated that changes in labor market institutions and technology have contributed to a decrease in labor shares and a concentration of income among the top, exacerbating inequality (Piketty 2017, Stiglitz 2012). These findings underscore that the interplay of social, economic, and political institutions, along with technological changes, plays a critical role in explaining the increase in income inequality in OECD countries (Cingano 2014b).

In addition, Major epidemics of the last two decades (e.g. SARS, H1N1, MERS, Ebola, and Zika) have been succeeded by surges in inequality (Furceri et al. 2021). Consequently, this research assumes that the pandemic has exacerbated pre-existing inequalities in OECD countries (Furceri et al. 2021). This assumption is corroborated by historical records indicating that previous pandemics have resulted in increased economic disparity. Furthermore, the pandemic has exposed disparities in health, education, income, and well-being between racial and ethnic groups, becoming more apparent (Parolin 2021). Although initially labeled as an equalizing issue, the most vulnerable groups and societies have suffered disproportionately. The pandemic

also poses a substantial threat to vulnerable populations in numerous countries who experience social determinants of health, such as poverty, lack of essential services, and environmental pollutants (Benach 2021). As a result, the pandemic has amplified inequality and disproportionately affected social structures (Robinson et al. 2021). Notably, individuals often encounter multiple, intersecting dimensions of inequality, including gender and occupation. Each axis of inequality influences their health and how they experience the pandemic (Bambra, Lynch and Smith 2021).

Recognizing that demographic dynamics differentially exacerbate inequality is essential. Scheidel (2017) correlates higher immigration and population diversity with increased inequality. The pandemic has precipitated not just income losses but diverse societal impacts, both engendering new inequalities and exacerbating existing disparities in income, employment, health, and other socio-demographic domains (Blundell et al. 2020).

Existing literature asserts that the COVID-19 pandemic has intensified disparities in income, employment, and health—central facets of inequality examined in this research. The crisis triggered a marked rise in joblessness and underutilization of the workforce, deepening inequalities within the labor market. It has also disproportionately burdened lower-income individuals and ethnic minorities, magnifying the disparity in earnings. This economic downturn has imposed major hardships on these demographics, highlighting the intricate nexus between socioeconomic status and health inequities (Kasprzak 2022, Wilson 2020). Moreover, the pandemic has not only shone a light on but also sharpened health disparities, with marginalized groups experiencing alarmingly high rates of morbidity and mortality from COVID-19, thus revealing stark health inequities among various social strata (Chandler et al. 2021).

This comprehension of the multifaceted nature of inequality, allied with the theoretical constructs that illuminate the genesis of these disparities, establishes a rigorous foundation for the empirical exploration of the hypotheses posited in this dissertation.

Inequality Impacts on Global Crises

Inequalities shape and drive global crises while simultaneously stemming from them, creating a complex interplay where pre-existing disparities exacerbate crisis severity and onset (Menon 2023). This dynamic reveals how inequality acts both as a catalyst for and a magnifier of crises, exposing vulnerabilities within social, economic, and health systems (Berkhout et al. 2021, Stiglitz 2012). Inequality leads to economic instability by concentrating wealth, reducing consumption necessary for growth. Piketty (2017) highlights that wealth concentration diminishes spending, setting the stage for financial crises, a precursor to the Great Recession. Rajan (2011) adds that income inequality, through increased debt levels among lower-income households aiming to offset wage stagnation, spurred the Great Recession.

Similarly, disparities in healthcare access worsen pandemic outcomes, with marginalized communities facing higher transmission, illness, and mortality rate (Khanijahani 2021). This uneven vulnerability hampers societal pandemic responses. Moreover, social inequality undermines public health measures, with Bambra et al. (2020b) demonstrating how distrust and disparities lead to varied compliance with health directives, exacerbating pandemic spread.

This evidence highlights inequality's role in precipitating and intensifying crises like pandemics and economic recessions. The cyclical nature of this relationship underscores the importance of addressing inequalities to prevent and mitigate future crises (Stiglitz 2012).

Dimensions of Inequality

Inequality, manifested in various dimensions, plays a key role in shaping socio-economic structures. While income inequality is frequently cited as a primary source of disparities, particularly in developed countries (Wildman 2021), it provides only a partial view of the wider and more complex scenario of inequality. As emphasized by Stiglitz (2012), the multifaceted nature of inequality is not easily captured by a solitary metric. Considering this, the present study embarks on an analysis of inequality across four distinct dimensions: income, health, labor force and gendered labor force participation. Within the labor force dimension, special attention is given to gender-based disparities, focusing on the unique challenges and patterns it presents. Moreover, the inclusion of gender-based disparities in the labor market in this study is of particular significance when examining global crises; such disparities provide valuable insights into broader gender-related consequences in both income and health contexts.

Income Inequality

Income inequality pertains to the unequal distribution of income among individuals, households, or on a per capita basis. Global income disparity is vast and persistent, reflecting unequal economic power among groups across different periods and locations (McCartney et al. 2021). Income inequality evolves over generations (Maresca 2014). The global income distribution witnessed an increase until 1988, but later stabilized from 1993 onward at a historically high level. Nonetheless, the growing inequality within societies continued. Inequality between societies still accounts for the majority of total material inequality worldwide, even in the early 21st century, following the end of decolonization. Most countries have experienced a rise in income inequality during both the global economic downturn from 1973 to 1992 and the

subsequent global economic upswing that began in 1992. Data from 1990 to 2000 indicates a slight intensification in the trend of increasing internal inequality, which is more pronounced in affluent societies (Bornschiefer 2010).

The shifts in income inequality levels observed in OECD countries mirror a comparable trend. Atkinson (2008) found that over the prior 25 years, the earnings of workers in the bottom decile had diminished in numerous countries, while the earnings of those in the top decile had grown. For instance, the bottom decile in the United States experienced a 5% decline in earnings, while the top decile witnessed an approximately 15% increase. In the UK, the bottom decile observed a marginal decrease in earnings, while the top decile experienced a substantial increase (Atkinson 2008). This trend, in which the earnings of the bottom decile decrease relative to the median and the earnings of the top decile increase relative to the median, is commonly referred to as "fanning out" (Western and Chesters 2008).

Over the past three decades, income distribution has grown increasingly unequal in most OECD countries, with some reaching unprecedented levels of inequality (Causa, de Serres and Ruiz 2014). In contrast, the Nordic countries exhibit relatively greater equality compared to other OECD countries (Forster, Llana Nozal and Thévenot 2017). In 2014, Iceland, Norway, and Denmark ranked as the most equal OECD countries, with Finland in fifth place and Sweden in tenth (Thévenot 2017). Conversely, the United States has witnessed a substantial rise in income inequality over the past 30 years (Volscho and Kelly 2012). When compared to European countries, the escalation of economic inequality in the United States has been more pronounced (Jacobs and Dirlam 2016). Thus, it is crucial to examine the trends in income inequality, especially when comparing the disparities experienced during the pandemic between OECD countries. Additionally, the level of income per capita places Nordic countries among the top

ranks of OECD countries, alongside the United States, Germany, Switzerland, and Luxembourg. Remarkably, despite their high-income levels, the Nordic countries maintain a very low degree of income inequality, well below the OECD average. This contrast underscores the effectiveness of their economic policies in balancing wealth distribution (Frelle-Petersen, Hein and Christiansen 2020).

In the 1960s, the United States experienced moderate levels of income inequality relative to other developed countries, whereas West Germany and the UK exhibited the lowest levels. However, by the 1970s, income inequality in the United States had peaked and remained at this level for the subsequent two decades. During this period, several European countries, including Denmark, Finland, Norway, and Sweden, achieved lower levels of income inequality than the United States (Kerbo 2006). Income inequality in the United States surged dramatically in the 1980s, stabilized in the 1990s, and subsequently grew at a slower pace (Mouw and Kalleberg 2010). Throughout the 2000s, income inequality persisted as one of the most salient issues in American society (Kerbo 2006, McCall 2001), while Sweden and Germany maintained the lowest levels of income inequality (Kerbo 2006). As Scheidel (2017) notes, income inequality in the United States reached historic heights in 2012, surpassing the records established in 1929. Specifically, the top 1 percent of income shares and the proportion of private wealth owned by the wealthiest 0.01 percent of households exceeded previous peak levels.

The growing income inequality in developed countries, including the United States, has been extensively examined and discussed by researchers such as Corak (2013) and Jacobs and Dirlam (2016). One of the key explanations for this trend is the influence of technological advancements and the rising demand for skilled labor that emerged in the 1970s. As technology has become an essential driver of economic production, the need for highly skilled workers has

led to a corresponding increase in their income relative to that of less-skilled workers. This phenomenon, known as skill-biased technological change, suggests that the market's "invisible hand" is a substantial factor contributing to the increase in income inequality during industrialization (Kristal and Cohen 2017).

Institutional factors also play a major role in contributing to mounting income disparities. The decline in union membership rates and the weakening of minimum wage laws have substantially impacted this trend (Scheidel 2017). Volscho and Kelly (2012) illuminate the difference in income inequality between the United States and European countries by emphasizing the relationship between public policy, and income inequality. Their research contends that the increase in income inequality in the United States results from several factors, including rightward shifts in the composition of Congress, a decline in labor unions, lower tax rates on high incomes, increased international trade due to neoliberalism, and asset bubbles in stock and real estate markets. Additionally, institutional changes such as dwindling union membership rates and eroding minimum wages have contributed to the widening income gap in the United States (Scheidel 2017). Atkinson, Piketty and Saez (2011) argue that changes in taxation, which have led to a less progressive tax system, are the primary drivers of rising inequality, particularly for those at the top of the income distribution.

Several scholars (Jacobs and Dirlam 2016, Kristal and Cohen 2017) emphasize institutional factors as key drivers of income inequality, arguing that the neoliberal approach is the primary explanation for the extraordinary increase in inequality. However, prior research posits that economic globalization is the main contributor to income inequality across countries. This perspective contends that the global flow of capital, goods, and labor undermines the bargaining power of workers in high-wage countries, particularly those with limited skills.

Consequently, among developed countries, international trade is positively associated with the level of income inequality (Lin and Tomaskovic-Devey 2013). Moreover, the neoliberal approach has had detrimental impacts on the working class in the United States. Since 1973, the wages of the working class have substantially decreased, with a decline of 12% for those with a high school diploma and a 26% decline for those without one. The working class has experienced a sharp decline in income, employment, and subsidized health insurance (Silva 2013). Notably, European countries faced similar pressures from global economic markets, international trade, and neoliberalist economic policies but have maintained income equality. Therefore, the difference in income inequality levels may stem from national public policies rather than global economic structures alone (Grusky 2021). However, Hoke, Känzig and Surico (2020) documented a rise in income inequality in the UK since the onset of the pandemic crisis. Aspachs et al. (2022) reported similar findings for Spain. Nonetheless, even before the pandemic, the United States had a substantially more unequal income distribution compared to most European countries (Beeghley 2016).

Furthermore, poverty and child poverty rates elucidate the social inequality between the United States and European countries (Smeeding and Thévenot 2016). Lareau (2011) noted that the child poverty rate in the United States is substantially higher compared to several European countries. Specifically, Sweden provides a child allowance, which has effectively eradicated child poverty. A study conducted by Mouw and Kalleberg (2010) across 18 developed countries found that the welfare system has a negative impact on inequality. For instance, the likelihood of poverty in the United States is 16.6 times greater than in Denmark (Mouw and Kalleberg 2010). In general, total government spending in Europe constitutes 48% of GDP, while in the United States, it accounts for 35.5%. The most major difference between the United States and European

countries pertains to income transfers to households and subsidies (Alesina, Glaeser and Sacerdote 2001). Alesina, Glaeser and Sacerdote (2001) posited that these differences in welfare systems result from racial heterogeneity in the United States and the role of political institutions.

Over the past two decades, income inequality within affluent countries, specifically across OECD countries, has witnessed a substantial increase (Tridico 2018). This rise has been further intensified by the recent pandemic (Aspachs et al. 2022, Hoke, Känzig and Surico 2020). Within this context, the United States has demonstrated a higher level of income inequality compared to its counterparts (Beeghley 2016). These disparities can be attributed to the variations in political and social institutions across these countries. Furthermore, public policies in the United States tend to lean more toward neoliberalism than those in Europe. Consequently, the United States is currently experiencing a surge in income inequality, which highlights gaps in the existing tax-and-transfer systems designed to counteract escalating market inequality (Dabla-Norris et al. 2015). The impact of globalization on income inequality has been a contentious topic among scholars (Auguste 2018, Heimberger 2020). Advocates of the notion that globalization extensively contributes to rising income disparities argue that the benefits derived from enhanced productivity over the past two decades have primarily, or in some instances exclusively, favored highly educated and skilled workers in OECD countries. This situation has created challenges for those with lower skill levels (Thévenot 2017). In conjunction with globalization, other contemporary explanations for income inequality include Van Reenen (2011), who contends that advances in information and technology tend to favor skilled workers, thereby exacerbating inequality (Allison et al. 2014, Thévenot 2017). In essence, they identify skill-biased technological change and income growth as the primary drivers of rising income inequality within countries (Tridico 2018).

Previous studies have underscored the significance of income inequality across OECD countries. The Great Recession led to an increase in income inequality, as job losses, wage reductions, and limited access to social services disproportionately impacted low-income individuals and households (Pfeffer, Danziger and Schoeni 2013). The Great Recession and the recent pandemic have had distinct impacts on aspects of inequality, influencing income distribution, workforce dynamics, and health outcomes differently. This study seeks to explore the disparate effects of these global crises on income inequality from multiple perspectives.

Labor Force Inequality

The employment and unemployment rates are standard measures of the proportion of the working age population in employment or actively seeking work in the local area, derived from the labor force (Bewley and Wilkinson 2015). Labor force in 1937 was defined to include everyone who worked, as well as those who were able to work and actively searching (Card 2011). The United States Census Bureau underscores the significance of both employment and unemployment levels as pivotal measures of the country's workforce state, further corroborating their utilization in this study (The U.S. Census Bureau 2023). Therefore, in this research, measurement factors are based on the labor force (employment and unemployment rate disparities). Both employment and unemployment have been central to sociological research, used to understand various forms of inequality throughout history. The foundational works of Weber, Durkheim, and Marx paved the way for this field, with the discourse on the relationship between labor force and inequality continuing to progress (Avent-Holt et al. 2020). Labor force remains a major factor in explaining economic inequality (Haupt and Ebner 2020).

The primary focus of sociologists has been the inequality within labor structures. The related concept such as unemployment. For instance, between 1980 and 2005 over one thousand articles with “unemployment” in the title were published in the economics journals. Twenty percent of these appeared in the top five journals of the field. Especially in recessionary times, the unemployment rate, along with the NEET (Not in Education, Employment, or Training) demographic, attracts much attention from policymakers and the public. Most professional economists understand that the unemployment rate represents the fraction of people in the labor force who are currently searching for work, while the NEET category further highlights those who are disengaged from both the job market and education system (Card 2011, Kelly and McGuinness 2014). The number of 15-to-29 year-olds classified as NEET (Not in Education, Employment, or Training) in nearly all OECD countries was over 40 million in 2015, higher than pre-crisis levels. This underscores the substantial impact of economic downturns on youth employment opportunities (OECD 2016).

Lenski (1966) found that occupational mobility is the key determinant of power in industrial societies. The ever-changing technology of industrial societies continuously alters the occupational landscape. As a result, persistent conflicts emerge over the division of capital, as the industrial society necessitates ongoing training (Grusky 2021). From this perspective, any shifts in the labor force structure could be essential in explaining inequality (Mouw and Kalleberg 2010).

In recent decades, concerns over the employment prospects of future generations have intensified due to globalization, which has led to more precarious and insecure employment, affecting all social classes (Beck and Beck-Gernsheim 2002, Blossfeld, Buchholz and Hofäcker 2006). Major sociological theorists such as Giddens (1991), Beck (1992), and Bauman (2000)

have been central to the discourse on precarity, as discussed in Kalleberg and Vallas (2018). They highlight the increasing '*ontological insecurity*' identified by Giddens (1991), the '*risk society*' characterized by Beck (1992), and Bauman's (2000) era of '*liquid modernity*,' where traditional stability is replaced by prevalent precariousness. These concepts collectively illustrate the profound transformations in contemporary life, driven by reflexive modernization, the side effects of economic growth, and the transition from industrial societies to a state of widespread vulnerability (Kalleberg and Vallas 2018).

Although labor market resources differ between the United States and Europe, previous studies indicate that patterns of employment inequality are consistent across all developed countries (Beeghley 2016). The link between employment and wage inequality is well-established, with wage distribution being one of the most extensively examined aspects of income inequality (Haupt and Ebner 2020). This highlights the strong connection between occupational positions and the social and economic structures in societies.

Notably, workplace structures are similar across industrial countries; however, some variations exist among developed countries concerning occupational inequality. According to Grusky (2021), working structures in developed countries are markedly divided based on sociodemographic factors. Age, gender, and ethnicity are key contributors to occupational inequality, resulting in unequal opportunities for women, as the "*glass ceiling*" serves as a systemic barrier impeding their occupational mobility. Furthermore, the United States exhibits greater gender-based occupational inequality compared to other developed countries (New York Times 2005). Data from 2019 reveal that Nordic countries had the highest women's participation rates in the labor market, exceeding 80 percent (Djankov et al. 2021).

Historically, major global events have exerted a profound impact on both employment and unemployment rates. Notably, the period between 1929 and 1933 witnessed a surge in the unemployment rate by over 20 percentage points according to the Lebergott series, or by 17 percentage points as per Darby's series (Margo 1993). For the remainder of that decade, the unemployment rate lingered in the double digits, revealing an economic landscape still grappling with the aftermath of the Great Depression. This era also marked the emergence of long-term unemployment—periods exceeding a year—as a major policy concern, with data from a 1934 Massachusetts state census indicating that a staggering 63% of unemployed individuals had been out of work for a year or more (Margo 1988).

Fast forwarding to the 21st century, the COVID-19 pandemic has disrupted labor markets on a similarly monumental scale. The International Monetary Fund (2022b) and the United States Census Bureau reported substantial declines in employment income, affecting 115 million people in the United States between March 2020 and February 2021 (Monte 2021). This disruption disproportionately impacted racial and ethnic minority workers, as observed in the considerable increase in unemployment rates among Latino food and agriculture workers, Black retail workers, and Asian healthcare workers (Crossley, Fisher and Low 2021). Furthermore, the pandemic revealed gender inequalities in the labor force, particularly in dual-income households where women disproportionately exited their jobs to manage childcare responsibilities and remote schooling (Bambra, Lynch and Smith 2021). Consequently, the United States saw an unprecedented exodus of women from the labor force. This historical overview highlights the essential role of employment and unemployment rates as barometers of labor force inequality, underscoring the need to study these measures during periods of global crises.

The Current Population Survey data reveals that the employment-to-population ratio declined more for women aged 25-55 than for men during the first nine months of the pandemic, following the widespread implementation of social distancing restrictions (Couch, Fairlie and Xu 2022). The pandemic and the global economic downturn it spurred have widened the labor force participation gap between men and women in some economies, potentially harming women's career prospects and pay (Djankov et al. 2021). The pandemic and resulting economic fallout caused major hardship. In the early months of the crisis, tens of millions of people lost their jobs. While employment began to rebound within a few months, unemployment remained high throughout 2020 (Edwards, Essien and Levinstein 2022).

Existing studies have also found that the pandemic has intensified the labor gap between men and women. Women were more likely to lose their jobs, be fired, or face reduced paid work hours compared to men. This is largely due to the concentration of women in service occupations directly impacted by COVID-related mandates and changes in consumer behavior (Leap, Stalp and Kelly 2022). Notably, even before the pandemic and during the Great Recession, employment in European countries declined by 2.5 million people between the first quarter of 2008 and the first quarter of 2009. Manufacturing and construction industries experienced the most considerable relative and absolute job losses, leading to a disproportionate number of young men in manual occupations becoming unemployed (Hurley et al. 2009). In recent decades, global shifts in labor force changes in OECD countries have resulted in welfare system crises and increased inequality (Migliavacca 2010). Globalization has negatively affected gender equality by promoting the growth of low-paying service sector jobs, often seen as "more suitable" for women, and reducing job stability for women (Blossfeld, Buchholz and Hofäcker 2006).

Previous research has explored the consequences of major crises such as Great Depression on labor force (Kalleberg and TM 2017, Margo 1993) highlighting the importance of analyzing shifts in labor structure before and during the pandemic. This study examines the impact of the global crises on labor force by with consideration given to welfare systems. By integrating these factors, the study seeks to provide a comprehensive understanding of how the Covid-19 pandemic and the Great Recession has affected the labor force.

Health Disparity

Health disparities persistently manifest as unjust variations in health outcomes among distinct societal groups within a larger population, with these variations often hinging on social status (McCartney et al. 2021). These systematic group differences are characterized as inequalities, being largely socially generated and thus widely deemed as unjust in society (Bambra, Lynch and Smith 2021). Two key measures of health disparities are life expectancy at birth and infant mortality rate. Both indicators are extensively acknowledged as reliable measures of health inequalities (Albert-Ballestar and García-Altés 2021, Permanyer, Spijker and Blanes 2022, Public Health Agency of Canada 2018, Shryock, Siegel and Larmon 1973, Singh et al. 2017, Wood et al. 2006). Life expectancy quantifies the average lifespan an individual can expect within a population, considering age-specific mortality rates (Schöley et al. 2022), whereas the infant mortality rate measures the number of infant deaths per 1,000 live births within a population (Dagher and Linares 2022), yielding insights into overall health during life's earliest stages.

In the context of a pandemic, health inequities emerge from disparities in exposure to social determinants of health—conditions encompassing individuals' living, working, and aging

environments, and factors like employment status, access to essential goods and services, housing, and healthcare access (Bambra et al. 2020a). These disparities mirror entrenched patterns of social inequalities in health, visible across numerous illnesses, causes of death, and previous pandemics (Scheidel 2017). Drawing on this evidence, additionally, the lowest death rates were recorded among men employed in professional occupations Ram (1993) examined life expectancy in 83 developing countries, taking into account factors like fertility rates and labor force participation. Studies suggested that wealthier countries tend to exhibit more meaningful gender differences in life expectancy compared to developing countries (Ram 1993).

The pandemic has greatly impacted the global economy, while also leading to severe consequences for public health (Gormsen and Koijen 2020, Singh, Shirazi and Turetken 2022). The effects of the pandemic have been disproportionately felt by certain vulnerable population segments, including healthcare workers, racial and ethnic minorities, women, and individuals with limited education (Béland, Brodeur and Wright 2023, Chandler et al. 2021, Tanne et al. 2020). This crisis has contributed to a surge in worldwide mortality rates and an unprecedented decline in life expectancy, unlike anything witnessed in the past 70 years (Schöley et al. 2022, Singh, Shirazi and Turetken 2022).

Chen et al. (2021) conducted a recent study that discovered a 22% surge in mortality among working-age adults during the initial stage of the pandemic from March to June 2020. Concurrently, the pandemic has prompted a major global increase in mortality and decrease in life expectancy. Schöley et al. (2022) observed that Western European countries experienced a rebound in life expectancy following initial losses, while Eastern Europe and the United States sustained substantial declines. A Wall Street Journal (2022) report stated that the pandemic contributed to a 5% increase in the death rate in the United States, causing a reduction in life

expectancy to 76.4 years in 2021, down from 77—the lowest level since 1996. Crucially, the decline in life expectancy has not affected all populations equally (Wernau and Kamp 2022).

Notably, substantial reductions in life expectancy have occurred among Alaska Native and American Indian populations, as well as Black and Hispanic individuals, and those with low levels of education and income, further exacerbating existing disparities in life expectancy in the United States (Padula 2022). The impact of the pandemic on life expectancy is primarily contingent upon age-specific death rates. Consequently, in all scenarios, losses are more substantial in regions with higher life expectancies, such as North America, Europe, and Latin America and the Caribbean, compared to Southeast Asia and sub-Saharan Africa. The smaller the number of survivors at older ages in the life table, the less impact the pandemic has on life expectancy, as the virus is especially lethal among older age groups (Marois, Muttarak and Scherbov 2020). Additionally, there is evidence from the United States indicating that the pandemic has exerted long-term effects on health disparities (Bambra, Lynch and Smith 2021). This unequal health burden encompasses mental health across various contexts. For example, two studies conducted in the UK revealed deteriorating mental health since the pandemic's onset and underscored inequalities within these outcomes. These studies determined that the pandemic primarily affected women's mental health (Bambra, Lynch and Smith 2021). Women have faced increased caregiving responsibilities due to the reduction or cancellation of on-site schooling and daycare, as well as the rise of remote learning. Moreover, they have encountered heightened caregiver roles for relatives, increased domestic violence, and challenges accessing gender-specific health services following the closure of women's health centers (O'Neill et al. 2021). Furthermore, the Covid-19 pandemic has disproportionately affected immigrants, who have experienced profoundly higher infection and hospitalization rates. This disparity is partially

attributable to the fact that immigrants frequently work in service-based occupations that necessitate close contact with others (Labberton et al. 2022).

European countries, such as the Nordic countries, provide comprehensive welfare systems, and their healthcare provision generally results in superior health outcomes compared to other European countries (Beckfield et al. 2015). In contrast, the United States faces with more social inequality than Nordic countries (New York Times 2005). Due to the limited social safety net in the United States, state-run and volunteer organizations that provide food, shelter, and basic healthcare became quickly overwhelmed during the pandemic (Aburto et al. 2021). The pandemic's impact has centered on virus-related infections and mortality, as well as the health consequences of policy responses implemented in most countries (Bambra et al. 2020a). The pandemic has profoundly affected the quality of life in OECD countries, leading to a decrease in life expectancy of over a year in 2021 compared to pre-pandemic levels. Furthermore, more than 90% of COVID-19-related deaths have been reported among individuals aged 60 and older. Notably, the mortality impact of the pandemic has been relatively lower in Nordic countries and considerably higher in Central and Eastern European countries (OECD 2022).

Data collected from 36 OECD countries suggest that countries with greater income inequality have experienced higher incidences of COVID-19 cases and deaths, potentially due to their more advanced healthcare systems. Specifically, the data reveal that a 1% increase in the Gini index correlates with an estimated 4% increase in cases per million and a 5% increase in deaths per million (Wildman 2021). Sepulveda and Brooker (2021) found that there was a substantial positive relationship between the disposable income Gini coefficient, a measure of income inequality at the national level, and COVID-19 mortality rates across all age groups.

Previous research has demonstrated that health disparities continue to persist across OECD countries. While the majority of OECD countries succeeded in preserving health coverage during the Great Recession, some countries, including Bulgaria and Greece, witnessed a decline in health insurance and diminished access to healthcare services. An OECD report asserts that individuals in low-income groups are twice as likely to encounter unmet medical and dental needs in comparison to the general population (OECD 2014). In light of these findings, the primary aim of this study is to investigate the structure of health inequality amid the pandemic, with a specific emphasis on understanding its impact on life expectancy rates.

Gender Labor Force Inequality

Gender labor force inequality persists as a focal issue in OECD countries, with its dynamics notably influenced by major global occurrences like the 2008-10 Great Recession and the 2020 Covid-19 Pandemic. The Great Recession greatly impacted sectors like large corporations and financial institutions, traditionally male-dominated, leading to notable gendered effects (Bluedorn et al. 2021, Cunningham 2018, Hoynes, Miller and Schaller 2012, Wall 2009). Although the gender labor gap may have experienced specific exacerbations during this time, the pronounced male orientation of the most afflicted sectors might have moderated its effects.

In contrast, the pandemic presented an entirely different array of challenges. The shift to remote work was revolutionary. While it brought about flexibility, it also highlighted and at times intensified the technological disparities between genders (Ng et al. 2021). In certain countries with distinct gender roles, women might have encountered limited access or familiarity with technology, which could intensify gender labor force disparity. Moreover, industries extensively

affected by the pandemic, such as the service sector, predominantly employ women, making them susceptible to job losses (Bluedorn et al. 2021).

The intersection of gender with other sociodemographic aspects can also modify these paths. Additionally, skill-biased technological change, which inherently privileges those with contemporary tech skills, might exacerbate the gender labor disparity, especially during events requiring quick technological adaptability. While the Great Recession presented its own set of obstacles for gender labor equality, the pandemic's technological ramifications could potentially have more lasting impacts on the gender gap (Sorgner and Cabot 2021). This research aims to provide an intricate exploration of these dynamics, illuminating the differential impacts of global events on gender labor force inequality.

Undoubtedly, the pandemic accentuated specific gender disparities within the labor market, emphasizing pre-established inequalities (Fry 2022, Min and Perucci 2020). Its influence on labor markets was distinctly uneven across genders. Studies indicate that women are predominantly in contact-intensive professions, which were most affected by the pandemic's economic downturn (Albanesi and Kim 2021, Mongey, Pilossoph and Weinberg 2021). Additionally, the closure of educational institutions, augmented childcare obligations, a responsibility predominantly borne by women (Adams-Prassl et al. 2020, Russell and Sun 2020). Furthermore, women are often in temporary or part-time positions, rendering their employment vulnerable in economic slumps (Blau and Kahn 2013, Bluedorn et al. 2021). These combined elements instigated the 'she-cession' early in the pandemic, leading to female unemployment rates outstripping male rates in numerous countries. This phenomenon paralleled the rapid shift to remote work and an increasing gender digital divide, underscoring the drivers of these imbalances (Guterres 2023).

The pandemic has notably exacerbated the gender labor force gap. Women disproportionately experienced job losses, terminations, or reduced hours, primarily due to their predominant presence in service roles, which were severely impacted by COVID-related shifts (Leap, Stalp and Kelly 2022). Krizsan, Skjeie and Squires (2012) highlight how gender dynamics, especially during global emergencies, play a central role in power distribution and perpetuating systemic disparities (Klasen 2002, Ziegler 2019). These institutional responses can either alleviate or amplify gender labor force gaps. Thus, analyzing national reactions provides insights into evolving equality frameworks and their implications for gender disparities in the labor force.

Amid this backdrop, factors like welfare systems, gender roles, the digital divide, and the rise of remote work warrant attention. The skill-biased technological change theory provides an important lens to understand the amplified gender gap during the pandemic, underscoring the magnification of pre-existing inequalities and fostering a comprehensive perspective on the complexities of inequality in this era.

Upon a comprehensive review of the literature on the multi-dimensional nature of inequalities and their complex manifestations across OECD countries, the study now shifts emphasis to the sociological theories that articulate these disparities. These theories not only provide an inclusive understanding of the structure of these inequalities but also provide a rigorous framework for formulating and testing the research hypothesis.

Theoretical Framework

This study harnesses the frameworks of exogenous shocks, welfare regime, institutional theory, globalization, and skill-biased technological change theory to analyze income, labor,

health and gender labor disparities across OECD countries, especially during the pandemic and the Great Recession. Notably, the globalization theory elucidates inequality trajectories between various welfare regimes and global crises. These intertwined theories underscore the complex interplay between socio-economic policies, institutions, and inequality, providing valuable context for interpreting our findings. The following virilization shows how these theories are interconnected and the cycle of inequality—globalization and exogenous shock is endless process. Following this visualization, each theory is discussed in detail.

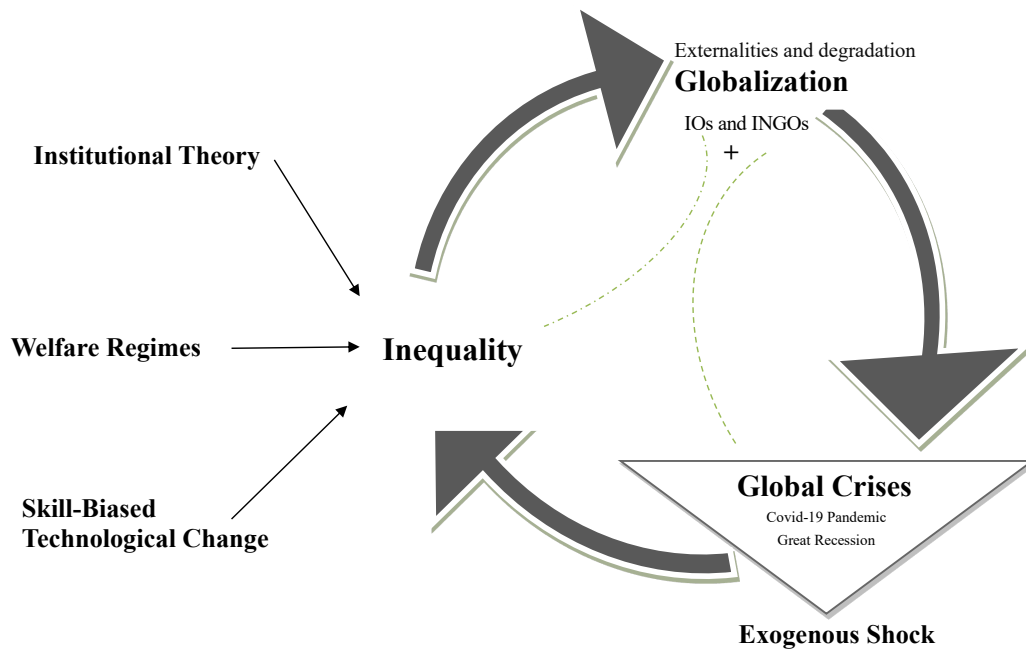


Figure 1. Theoretical Framework

Exogenous Shocks Theory

The exogenous shocks theory posits that economic growth is significantly influenced by external factors. It suggests that just one external shock is enough to trigger a cascade of crises, potentially causing a contagion effect across countries (Ganti 2023, Menon 2023). Ames et al.

(2001) further identifies exogenous shocks as a primary source of economic instability, highlighting their ability to disrupt economic equilibrium. These exogenous shocks can stem from a variety of sources, including terms of trade shocks, natural disasters, and reversals in capital flows, necessitating compensatory action. For many low-income countries with a narrow export base focused on one or two key commodities, fluctuations in the world prices of these commodities can have significant impacts on national income, underscoring the vulnerability of economies to such external disturbances (Ames et al. 2001).

The COVID-19 pandemic and the Great Recession stand out as quintessential examples of exogenous shocks in recent decades, unforeseen by economic models and originating outside the economic system. The pandemic, in particular, underscores how such shocks can intensify existing vulnerabilities within global value chains, impacting both demand and supply sides with broader implications for trade performance (Faria et al. 2023, OCED 2020).

Exogenous shocks are not merely external forces acting on economies; they can also serve as moments where underlying inequalities are exacerbated or become more visible. Smith (2020) underscores that these events can be consequential moments of inequality amplification, highlighting their dual role not only as creators but also as consequences of pre-existing disparities. This is particularly evident in how the pandemic has not only intensified inequality but also been shaped by it, complicating already fragile environments such as debt sustainability among low-income countries (Menon 2023).

Accordingly, the scope of this theory is clearly defined to measure the impacts of such crises on economic inequalities. This aligns with the imperatives for evaluating theory discussed by Walker and Cohen (1985) in *Scope Statements: Imperatives for Evaluating Theory*, which emphasize the importance of scope statements that enhance theoretical clarity. In this case, the

theory specifically addresses the mechanisms through which external shocks influence economic disparities, underlining a targeted area of investigation that directly relates to observed phenomena.

Therefore, the pandemic and the Great Recession illustrate the practical relevance of exogenous shock theory in analyzing the impact of such shocks on income, labor force, and health inequalities across OECD countries. These crises demonstrate how exogenous shocks can both precipitate and be compounded by inequalities, offering a comprehensive lens through which to evaluate their multifaceted effects.

Institutional Theory

Institutional theory focuses on the persistent and established elements of society that form its social structure. This theory is widely studied and used to analyze various systems, from micro-level interpersonal interactions to macro-level global frameworks (Scott 2005, Zucker 1987). According to Albiston (2010), institutions are variable and changeable and play a crucial role in shaping inequality and social structure by organizing social, economic, and political life (Ziegler 2019).

From a sociological perspective, an institution is a set of complementary social practices and meanings that form “taken-for-granted” background rules that shape social life (Albiston 2010). Many scholars argue that political institutions affect economic and social inequality (Rogowski and MacRae 2008). Therefore, institutional theory contributes to a better understanding of the structure of inequality in modern societies (Lepsius 2017). Sociologists emphasize the importance of institutions in constructing societal structures. They believe that institutions emerge from a historical process in which human beings develop patterns of conduct

and interaction. Consequently, institutional processes embed inequality as a product of social evolution (Berger and Luckmann 2016).

Marx (1848) linked the structure of production to the formation of institutions (Jerath 2021). Weber (1923) argued that social institutions are built upon the fundamental organizing principles of collective value systems, and that changes in economic institutions are interconnected with cultural evolution. From this perspective, economic culture can be understood primarily as institutional culture (Nau 2005). In Durkheim's view, sociology is primarily the science of institutions, which include collective ways of thinking, feeling, and acting (Deschamps 2019). Durkheim supported that sociology requires history to reveal the successive constitution of social institutions (Durkheim 1964). The works of Marx, Weber, and Durkheim can be categorized into two fundamental approaches: institutional and relational. The institutional approach focuses on the differentiation of institutions, while the relational approach deals with the relationships of inequality and involves different views on social structure (Lopez and Scott 2000).

Institutional inequality operates more at societal and socially constructed levels of analysis than other perspectives discussed above (Krieger 2000). For example, Rogowski and MacRae (2008) showed how exogenous changes in factor endowments, trade, and technology affect democratic political institutions. Also, they argued that these exogenous changes could alter levels of inequality by, among other ways, raising or lowering labor wages relative to capital. In this view, inequality results from the structural conditions that make up major social institutions such as the market, the family, and the state (Berger and Luckmann 2016).

Institutions are crucial because they embody historically determined conceptions of identities such as gender. Workplace institutions are also important sites for leveraging social

change because they actively construct the meaning of gender identity. According to Albiston (2010), changing institutions can potentially alter the social meaning of identities. Therefore, to tackle income inequalities, it is essential to implement institutional reforms that strengthen union power, increase minimum wages, improve employment opportunities for underrepresented groups, and establish federal jobs programs (Scheidel 2017). These patterns of inequality are deeply rooted in power structures that are manifest in institutionalized beliefs and rules dominating social and economic life. Such structures encompass economic and political ideologies, the class system, gender roles, social structures, discourses, and subject positions, all of which serve to reinforce societal inequalities Amis, Munir and Mair (2017) and Mair, Marti and Ventresca (2012) analyzed how social inequalities are reinforced when market access and opportunities are governed by local institutional arrangements. These arrangements consist of complex interlocks of formal institutions, such as constitutions, laws, property rights, and governmental regulations, as well as informal institutions. In contrast, Bhardwaj (2018) found that inequalities largely stem from institutional and policy failures, which create an environment of social exclusion and perpetuate unequal opportunities, ultimately blocking upward economic mobility across generations. Institutions, in this context, represent regularities in repetitive interactions among individuals. North (1992) characterizes institutions as humanly devised constraints that shape political, economic, and social interactions. These constraints consist of both informal restrictions and formal rules. Institutions play a vital role in determining transaction costs, and those that enable low transaction costs contribute to economic growth. Institutions are a crucial factor in economic changes and influence physical and human capital investments through both formal and informal channels (Ibrahim and Moberg 2020). Specifically, institutions distribute power, which in turn affects individuals' capabilities to choose

between different ways of living (Ziegler 2019). Sen (1999) underscored the significance of democratic political institutions in fostering an environment conducive to social choice and value formation, wherein all individuals can actively and equitably engage in open deliberation processes. These institutions are also implicated in gender inequality, affecting the distribution of power between men and women. A widely held consensus posits that gender inequality not only negatively impacts the affected women but also imposes substantial costs on society as a whole, manifesting in poor health, reduced human capital, inadequate governance, and stunted economic growth (Klasen 2002, Ziegler 2019). Furthermore, institutions can play a crucial role in mitigating income inequality by promoting universal access to optimal education, devising policies that facilitate workforce entry for all individuals, and implementing taxation and income redistribution mechanisms alongside the provision of government services (Keeley 2015). This theoretical framework aptly supports the structure of inequality in the United States and European countries, elucidating how institutional factors such as the rule of law, democracy, trade openness, corruption, and education influence disparities.

Numerous scholars have delved into the institutional factors associated with inequality. For example, Nassereddine (2012) demonstrated that democracy exerts a negative influence on income inequality. Uslaner (2008) explored the connection between corruption indices and income inequality using cross-national data, determining that elevated corruption levels exacerbate income inequality. Ahmad (2017) examined the interplay between legal systems and inequality, conceiving the legal system as an institutional element safeguarding property right under the rule of law, thereby widening the wealth gap between the affluent and the impoverished. His findings indicated that bolstering property rights protections contributes to increased income inequality. Polpibulaya (2015) investigated the relationship between trade

openness and inequality, concluding that heightened trade openness precipitates escalating income inequality. Lastly, Gregorio and Lee (2002) posited that expanding educational access reduces income inequality, as highly educated individuals tend to earn higher incomes than their less educated counterparts. They deduced that income inequality would diminish as education levels rise among the population. In summation, the theoretical argument posits that liberal institutional systems yield lower inequality due to increased public spending relative to Corporatist institutional systems. This study utilizes institutional theory as the cornerstone to comprehend shifts in income and labor market inequality across OECD countries.

Welfare Regime Theory

Welfare regime theory examines various types of welfare systems and their defining characteristics. This theory classifies welfare systems into distinct regimes based on their public policies, institutional arrangements, and the distribution of welfare services provided by the state (Spicker 2014). The core purpose of a welfare state is to provide government-protected minimum standards of income, nutrition, health, housing, and education as political rights for every citizen, rather than as charity (Wilensky 1974, Wilensky 2019).

The welfare regime can be approached from both individualistic and collective perspectives. From an individualistic standpoint, the welfare system is seen as the sum of the well-being of individuals within a population. In contrast, from a collective viewpoint, the well-being of society as a whole is distinct from that of its individual members, and welfare is necessary to ensure the survival and reproduction of societies. Collective criteria, such as societal well-being, are used to assess the welfare of a society (Spicker 2014). Various channels exist for delivering welfare systems. In line with this concept, Titmuss (1963) investigated the distributive

impact of social policy by dividing welfare redistribution into three categories: social welfare, fiscal welfare, and occupational welfare. He referred to this classification as the “social division of welfare” (Titmuss 1963).

Welfare regimes considerably differ in their impact on social inequality (Sachweh and Olafsdottir 2012). Welfare theory highlights how institutions shape social structures and emphasizes the role of interest groups in defining welfare. It also explains why certain groups often remain marginalized within the welfare system (Stoesz 1989). In developed economies, governments have sought to reduce inequality by implementing public policies, primarily utilizing progressive taxes and social transfers, such as public retirement benefits (Dabla-Norris et al. 2015). Caminada and Goudswaard (2001) discovered a correlation between changes in welfare policies and shifts in inequality in certain countries. For instance, the UK and the Netherlands experienced a higher-than-average increase in inequality alongside a decrease in the generosity of their welfare systems.

From the perspective of welfare regimes, Nordic countries feature a more comprehensive system for income redistribution. In these countries, inequalities are often mitigated through income redistribution via taxes and benefits. This can be achieved by reducing disparities in market income before taxation, or through a combination of both approaches (Bhardwaj 2018). Furthermore, the social-democratic welfare regime, as categorized by Esping-Andersen (1990), is recognized as the model with the most potent equalizing effects among the three distinct regime types.

Compared to the United States, European countries typically exhibit lower levels of income inequality and financialization, coupled with higher levels of labor market regulation, trade union density, and social spending (Tridico 2018). These features stem from the expansive

and generous nature of European welfare regimes, which provide broad coverage and are supported by more progressive tax systems. Additionally, these regimes are defined by detailed regulatory frameworks designed to protect vulnerable and low-income groups (Alesina, Glaeser and Sacerdote 2001). Alesina, Glaeser and Sacerdote (2001) link the variation in welfare systems to the differing impacts of institutional structures on resource distribution. These structures often limit the political power of minority groups while concurrently ensuring strong protections for private property rights.

Esping-Andersen (1990) categorizes welfare regimes into three types based on the degree of decommodification and the nature of societal stratification they produce: social democracy, corporatism, and liberalism. Notably, his work portrays the welfare state not just as an entity intervening in or potentially correcting the structure of inequality, but as a system of stratification in its own right (Sachweh and Olafsdottir 2012). This classification is founded on the concept of social stratification indices. In a liberal welfare system, the state's role in providing social security is limited, giving market forces a greater influence in determining security levels with minimal state intervention. Countries like the United States, the UK, and Australia exemplify the liberal welfare system, characterized by reduced state intervention and a more pronounced role for market forces in shaping social safety (Esping-Andersen 1990, Sachweh and Olafsdottir 2012). In contrast to liberal welfare systems, corporatist welfare regimes—exemplified by countries such as Italy, France, and Germany—provides more generous benefits that are based on insurance contributions. At the most interventionist end of the spectrum lies the social-democratic welfare regimes, or the Nordic model, as seen in Sweden, Norway, Iceland and Denmark. These regimes are characterized by providing universal benefits at higher levels, ensuring a remarkable degree of equality of opportunity, and exhibiting low levels of child

poverty (Sachweh and Olafsdottir 2012). The examples of Sweden, Norway, and Denmark within the Scandinavian region are particularly noteworthy for their achievement in these aspects.

Esping-Andersen's approach suggests that variations in welfare state policies across countries arise from the formation of cross-class coalitions and the ability of labor movements to effectively organize and influence politics (Esping-Andersen 1990). For example, a weak coalition between left-leaning classes prevented the establishment of a comprehensive welfare state in Anglo-American countries, while a strong coalition between left-leaning classes resulted in the creation of a social democratic welfare system with universalistic policies in Nordic countries (Deeming 2017). From the perspective of the Nordic welfare model, Sweden stands out as it has achieved both higher per capita income (ranked 8th across 38 OECD countries in 2017) and lower income inequality (ranked 9th among OECD countries) (Andersen 2019).

According to the specified classification, the nature of a country's welfare system correlates with its level of income inequality. In this context, the Nordic countries are considered among the most equitable. These countries – Finland, Iceland, Norway, Denmark, and Sweden – have a consistent approach to social welfare. Their strategy encompasses providing a comprehensive social ‘safety net’, carrying out reforms in the public sector, and enhancing economic competitiveness in response to disruptive changes (Frelle-Petersen, Hein and Christiansen 2020). Meanwhile, Central-Eastern European countries, such as Slovenia, the Czech Republic, and Slovakia, also exhibit lower levels of income inequality (OECD 2017). In contrast, Western European countries, including France, Germany, and the Netherlands, align closely with the European average in terms of income inequality, while all Southern European countries show above-average income inequality (Bhardwaj 2018).

Since the 1990s, the classification of welfare systems has evolved, particularly in Central and Eastern European countries that have experienced considerable political and economic changes as they transitioned from communist to market-oriented economies. Numerous studies have built upon Esping-Andersen's classification of welfare systems to address its limitations, with scholars proposing alternative classifications (Aidukaite 2009, Deacon 2002, Fenger 2007, Ferrera 1996).

Ferrera (1996) expanded Esping-Andersen's classification by identifying four common welfare state models: the Social Democratic Model (Nordic Model), the Corporatist Model (Continental Model), the Liberal Model (Anglo-Saxon Model), and the Mediterranean Model (Southern European Model). The Mediterranean Model was introduced to better account for the unique characteristics of Southern European countries.

Deacon (2002) assessed policy changes in the Czech Republic, Hungary, Poland, Estonia, and Slovenia, concluding that these welfare states were evolving into variations of the Western-European welfare state. Deacon argued that these welfare states integrated elements of Bismarckian insurance and Scandinavian financing systems. He proposed that Central Eastern post-communist European countries should be classified as an additional welfare regime system. In contrast, Hall and Soskice (2001) suggested an alternative distinction between types of welfare systems based on how firms organize their structures and processes in relation to market mechanisms, presenting a dualist model.

Cerami (2008) investigates the economic and social transformations occurring in post-communist societies, leading to changes in labor structures, employment relations, demographic shifts, and alterations in family and household composition. These transformations also result in the individualization of responsibilities and the monetization of economic and social relations. In

light of these changes, Cerami (2008) emphasizes the necessity to strengthen the welfare system following communism. He suggests that the new welfare state should consist of four fundamental pillars: a guaranteed minimum income, a basic income for children, state investments in education and human capital formation, and a guaranteed basic pension. These pillars are designed to augment each individual's human capital while fostering inclusion, coverage, and a more equitable distribution of risks throughout a person's life course. Furthermore, Fenger (2007) proposed a threefold classification for Eastern European countries: Post-socialist Conservative (Poland, Hungary, Czech Republic, Slovakia), Post-socialist Social Democratic (Slovenia), and Post-socialist Liberal (Estonia, Latvia, Lithuania).

Cerami (2008) and Aidukaite (2009) underscore the diversity of welfare regimes in Eastern Europe and stress the significance of understanding the historical context and policy legacies that shape these welfare systems. Although they do not provide strict categorizations, they recognize the impact of the post-communist transition on the development of welfare systems in these countries.

Welfare states play a pivotal role in shaping the landscape of social inequality both within and across countries (Sachweh and Olafsdottir 2012). As such, the typology of welfare regimes becomes an essential analytical tool for examining the interplay between social support systems and patterns of inequality, particularly during crises like the pandemic. The pandemic has cast a spotlight on the inherently social nature of economies, underscoring the deep interdependencies that exist among individuals and sectors (Saad-Filho 2021). Across the OECD, a diverse range of welfare regime responses to the pandemic has emerged, illustrating the varied nature of these models, which span from liberal to post-communist systems (Cook and Titterton 2023).

By analyzing shifts in income, employment, and health inequality across OECD countries before and amidst the pandemic, this theoretical approach sheds light on the efficacy of different welfare regimes in confronting these challenges. Such a framework is invaluable not only for comprehending the influence of welfare policies on mitigating inequality during crises but also for formulating and testing hypotheses.

Globalization Theory

The neoliberal approach is widely acknowledged as a key driver behind globalization, leading to considerable transformations in social, economic, and political spheres (Blum and Neumärker 2021). Globalization has had a positive impact on many economies, particularly in developing countries. However, it has also exacerbated inequality through specific neoliberal policies, posing a threat to sustainable growth (Frank, Hironaka and Schofer 2000, Furceri, Loungani and Ostry 2016). Burns, Davis and Kick (1997) attribute environmental degradation to the exploitation of natural resources and economic inequality, noting variations in environmental problems based on a country's position in the global economic system. Studies indicate that integration into the world-system has adversely affected socio-economic conditions and the environment, especially in peripheral countries (Alderson and Nielsen 2002). Despite globalization's benefits, such as increased production efficiency and greater economic integration via goods and capital flow (Lam 2001), it has led to the dismantling of national social contracts without suitable regional replacements. This underscores the importance of addressing the negative consequences of neoliberal policies and filling the gaps in social support (Amin and Luckin 1996). Consequently, globalization contributes to growing inequalities between countries, with peripheral regions feeling the most negative effects (Bunker and Ciccantell 2005).

Milanovic (2005) presents a nuanced perspective on the relationship between globalization and inequality, describing it as a complex phenomenon with both positive and negative impacts. While some states benefit from globalization, others are adversely affected, impeding the convergence of income levels. Many scholars assert that globalization should ultimately reduce inequality as poorer states improve economically (Dowrick and DeLong 2003). Yet, globalization is linked to increased inequality in many developed countries (Alderson and Doran 2011, Beckfield 2010a).

Van der Hoeven (2023) emphasizes the detrimental impact of globalization on income inequality over the past three decades, exacerbated by national policies negatively affecting income distribution. Monetary policies focusing on price stability over economic growth and labor market policies weakening workers' bargaining power have contributed to this trend. Moreover, the pursuit of growth, and in some cases, the acceptance of inequality as a means to achieve growth, highlights the potential downsides of this approach (Chow 2019). Globalization is widely regarded as a major source of inequality, posing challenges for national economies and governments, such as exacerbating domestic and global inequality and threatening the stability of welfare states (Tridico 2018).

Extensive literature explores the relationship between globalization and inequality (Goldberg and Pavcnik 2007, Robertson 2004). The Stolper-Samuelson theorem illustrates how market integration can intensify inequality and vulnerability, as international trade results in higher earnings for those with abundant resources and lower earnings for those with scarce resources (Stolper and Samuelson 1941). The impacts of neoliberalism on inequality have been inconsistent; while globalization's inception was associated with increasing or stable inequality, it decreased from 1914 to 1940, primarily due to World War I and the Great Depression. However,

a study of about 80 countries between 1970 and 2005 shows that liberalizing international trade and deregulation led to a substantial rise in inequality (Scheidel 2017). Despite the potential for economic growth through this approach, addressing its negative consequences and implementing policies promoting equitable growth is essential. Furthermore, globalization's negative consequences, such as environmental impacts on economic growth (Davies 2010), can lead to detrimental effects, including health issues and pandemics like COVID-19. The pandemic has highlighted the effects of a globalized system that prioritizes expanding the division of labor and increasing productivity, resulting in greater social differentiation and inequality (Lugo-Morin 2020).

Researchers have connected the pandemic crisis and inequality to the globalization process (Fitzpatrick 2020, Jacobs 2020), emphasizing the need for greater consideration of social and environmental factors in economic policies. From the neoliberal perspective, environmental problems caused by globalization are linked to social and political relationships and inequalities. Neoliberal policies, such as healthcare privatization, have weakened the response capacity of many European and American governments to the pandemic (Navarro 2020). The ongoing global environmental crisis and pandemic are seen as results of decades of increasing globalization and its effects on the environment and ecological systems (Gills 2020, Saad-Filho 2021). Consequently, the neoliberal approach has been inadequate in regulating environmental protection, health policies, or addressing unequal income distribution through social policies (Bergman 2020, Lucchese and Pianta 2020, OECD 2020).

It is crucial to recognize that civilization's progress has always been a double-edged sword, providing both opportunities and challenges, a concept acknowledged since ancient Greek times (The Economist 2020). This perspective emphasizes the importance of weighing

both the positive and negative impacts of societal advancements, particularly globalization, in influencing economic growth. Despite this, incorporating this theory provides valuable insights into the fundamental causes of inequality that have surfaced in recent decades, including those highlighted during the pandemic. It also provides a framework to understand the study's findings within the broader context of ongoing inequality trends.

In the broader context of globalization's impact, as delineated in this theory, the role of International Organizations (IOs) and International Non-Governmental Organizations (INGOs) in global governance begins to take on considerable relevance. IOs and INGOs are pivotal in navigating the complexities of globalization, particularly in promoting sustainable and inclusive economic development (Boli and Thomas 1997). This theoretical backdrop sets the stage for examining how these organizations might be instrumental in addressing the challenges posed by globalization, particularly in the context of welfare regimes.

Skill-Biased Technological Change Theory

Skill-biased technological change (SBTC) has emerged as a key explanation for the rise in income inequality since the late 1970s, as job skill requirements have outpaced workforce education levels (Mishel, Schmitt and Shierholz 2014). This has led to a higher demand for skilled workers who can earn higher wages. The theory suggests that technology has contributed to wage inequality by increasing the demand for educated workers. Moreover, computerization has boosted employment in both high and low-wage occupations, causing job polarization, another aspect of the SBTC framework. Changes in employment patterns are driving shifts in overall wage patterns, leading to higher wages at the top and bottom compared to the middle (Mishel, Schmitt and Shierholz 2013). The theoretical framework posits that technological

progress can meaningfully widen income inequality by increasing the wage gap between highly skilled and less skilled workers (Acemoglu and Autor 2011).

Cross-country studies consistently reveal that countries with greater earnings inequality attract more college-educated immigrants to their labor markets (Grogger and Hanson 2011). The trend of highly educated migrants moving to developed countries is increasing, with the number of immigrants with tertiary-level education going to OECD countries growing by nearly 130% between 1990 and 2010 (Beerli, Indergand and Kunz 2017). Furthermore, empirical evidence shows a growing wage and employment gap between skilled and unskilled workers in the United States, UK, and other OECD countries since the early 1980s (Conte and Vivarelli 2007). Technological advancements, particularly the rise of microcomputers, have been identified as a possible cause for increasing wage inequality in the United States (Card and DiNardo 2002, Tridico 2018).

The enduring application of this theory in explaining inequality has become even more relevant in the context of the pandemic era. Another notable trend during this period is the accelerated adoption of technology across industries, commonly referred to as Industry 4.0. According to Rymarczyk (2020), industry 4.0 signifies the fourth industrial revolution, which has transformed manufacturing through the integration of various emerging technologies, such as big data, cloud computing, artificial intelligence, the internet of things, advanced machinery, and blockchain (Singh, Shirazi and Turetken 2022). As a result, SBTC through Industry 4.0 can provide valuable insights into the income and labor market disparities observed during the pandemic. Recent research indicates that the economic repercussions of the pandemic have disproportionately affected economically vulnerable populations, such as women, ethnic minorities, immigrants, and individuals with lower levels of education (Pierri and Timmer 2020).

The Covid-19 pandemic has prompted a substantial shift towards remote or hybrid work arrangements, leading to a widening income gap and a higher unemployment rate among workers with advanced education and technological skills compared to those without. Remote work has a differential impact on employees, with a pronounced effect on gender inequality. Women, particularly those with caregiving responsibilities, face reduced visibility and potential career advancement challenges in remote settings (Ng et al. 2021).

Prior to the pandemic, Americans spent only 5% of their working time at home, but by spring 2020, that number had surged to 60% (The Economist 2021). The rise in work-from-home arrangements has considerably impacted labor income inequality levels, exacerbating pre-existing labor market inequalities (Bonacini, Gallo and Scicchitano 2021). The increasing shift towards technology-based remote work has the potential to bring about substantial consequences in various aspects of society (Ng et al. 2021). This transformation has been underscored by the accelerated adoption of digital tools and the development of innovative work practices, enabling employees to work 100% remotely in new and innovative ways (Davison 2020). Such a paradigm shift has prompted organizations to advance their infrastructural and managerial frameworks to facilitate effective remote work, a change that would have been considerably more challenging in prior decades (Richter, Leyer and Steinhüser 2020).

In recent years, the working hours of less-educated individuals have declined, while those of more-educated individuals have increased. This suggests differing perspectives on the role work plays in their lives. Such disparities have the potential to deepen the divide between the less- and more-educated in terms of both earnings and the significance attributed to their work, ultimately leading to potential political and cultural repercussions (The Economist 2021). Oikonomou, Pierri and Timmer (2023) provided persuasive evidence that individuals with higher

and medium education levels reap substantial benefits from technology adoption, while those with lower educational attainment do not enjoy the same advantages. The research suggests that the pandemic may intensify inequality across educational groups due to skill-biased technical change. These findings are consistent with prior studies, which have shown that low-skilled individuals are disproportionately affected during economic downturns, resulting in reduced complementary technology skills and a persistently widening inequality gap (Heathcote, Perri and Violante 2020).

The pandemic-induced transition to remote work, driven by technological advancements, has had a considerable impact on existing gender inequalities in the labor force. The shift towards remote work has also exacerbated the gender digital divide, which United Nations Secretary-General António Guterres describes as "fast becoming the new face of gender inequality" (Guterres 2023). Guterres made this statement during the 67th Session of the Commission on the Status of Women. The impact of the pandemic, combined with the rise of cutting-edge technology and artificial intelligence, reaches beyond these examples. Societies are likely to undergo further transformations, and the world may face a widespread "pandemic of social change." Furthermore, according to Goldman Sachs, up to 300 million full-time jobs around the world could be affected by artificial intelligence (Toh 2023).

Based on these insights, it can be argued that pandemic-induced change in labor force participation have worsened pre-existing inequalities. Consequently, the skill-biased technical change (SBTC) perspective can provide valuable understanding of the partial phenomenon of inequality during the pandemic era. Although SBTC has been recognized as a factor contributing to the rise in wage inequality in recent years, it is crucial to acknowledge that labor force participation inequality is a complex issue that cannot be fully explained by the SBTC theory

alone. Other theories, such as neoliberal globalization, institutional theory, and social welfare theory, also play a substantial role in shaping the observed levels of inequality across OECD countries over the past two decades.

Summary

This chapter explores the intricate relationships between income, labor force, health, and gender labor inequalities across OECD countries. Over recent decades, many OECD countries have observed a rising trend of pronounced inequality, initially propelled by the Great Recession and further intensified by the pandemic. These events have intensified pre-existing disparities in income, employment, and health, thereby widening the gender divide in the labor force both within and across countries. This has resulted in various consequences, including reduced employment opportunities and uneven health outcomes, which manifest differently in each country as well as when comparing OECD countries and their welfare regimes. A review of existing literature reveals marked variations in inequality across OECD countries. Understanding these foundational causes is crucial for devising effective and inclusive socio-economic strategies. Through a critical examination of theoretical frameworks, including exogenous shock, institutional theory, welfare regime typologies, SBTC, and globalization narratives, this chapter provides nuanced insights into the dynamics and implications of these inequalities.

The subsequent chapter provides a comprehensive overview of the research, emphasizing theories as foundational elements for hypothesis formation. It delves into the discussion of variables and model contributions essential for gauging inequality trajectories at both national and welfare regime levels.

Chapter 3: Research Methodology

Research Overview

This chapter outlines the research design and methodology foundational to the study, creating a robust framework to investigate income, labor force, health and gender labor participation across OECD countries and welfare regimes. It is imperative to note that, for the scope of this research, when referencing OECD countries, the study is exclusively focused on those within Europe and the United States. Adopting a longitudinal comparative approach, the investigation revolves around five distinct hypotheses, each crafted to illuminate patterns and structural evolutions of inequality during the Great Recession and the pandemic, analyzed within the context of OECD countries and their corresponding welfare regimes.

To test these hypotheses, this study utilizes a detailed methodology, involving precise operationalization of variables, comprehensive data collection, and advanced analytical techniques. This chapter also highlights the strategic sample selection, provides clear definitions for the operationalization of variables, and elucidates the sources and methods employed in data gathering. Additionally, it provides insights into the analytical tools used for a systematic exploration of the relevant variables across timeframes. The overarching goal is to gain insights into the shifts in inequality experienced by OECD countries during the global crises.

The Research Design

Utilizing a longitudinal comparative framework, this study aims to reveal inequality trajectories in OECD countries across different periods. The methodology combines Exploratory Data Analysis (EDA) of time series with statistical methods like the Mixed Model for Repeated Measures (MMRM) and the Generalized Estimating Equations (GEE). This approach effectively

captures changes in income, labor market, and health disparities over extended durations (Fitzmaurice and Ravichandran 2008).

Covering a span of two decades, the research includes data from 27 OECD countries in Europe and the United States. The analysis identifies four distinct periods: 1) before the Great Recession, 2) the 2008-10 Great Recession, 3) the intervening period (2011-19), and 4) the 2020-21 Covid-19 Pandemic. Additionally, it examines five welfare regimes: 1) the Nordic Model (NM), 2) the Liberal Model (LM), 3) the Continental Model (CM), 4) the Mediterranean Model (MM), and 5) the Post-Communist Model (PM), providing insights into the complex dynamics of inequality during the Great Recession and the Pandemic.

Research Hypotheses

This study explores the effects of global crises on inequalities across OECD countries, using the theoretical frameworks outlined in Chapter 2. The analysis seeks to unravel the complexities of income, labor force, and health inequalities during the Great Recession and the COVID-19 pandemic. It incorporates relevant theories as foundational pillars, ensuring each hypothesis is well-grounded in scholarly discourse. This methodological approach allows for a detailed examination of disparities across various OECD contexts and welfare regimes. Following the primary objectives of the research, the hypotheses below are proposed for systematic exploration.

Income, Labor, and Health Inequalities Across OECD Countries

The theoretical underpinnings from exogenous shock theory suggest that unforeseen global events like the COVID-19 pandemic and the Great Recession disrupt socio-economic

equilibria significantly (Ames et al. 2001). These disruptions, marked by sudden onset and broad impact, provide a unique setting to explore how income, labor force, and health inequalities respond to major external pressures. The theory indicates that such shocks may exacerbate existing disparities, acting as catalysts that either widen or, occasionally, narrow inequality gaps due to differential impacts across socioeconomic strata and labor market segments (Faria et al. 2023).

Furthermore, the varied impacts of these events across OECD countries highlight the role of institutional resilience and policy effectiveness. Institutional theory underscores the importance of national institutions in shaping income distribution, labor dynamics, and health outcomes (Rogowski and MacRae 2008). Both the Great Recession and the COVID-19 pandemic have intensified income inequality across OECD countries, demonstrating the significant influence of institutional structures on the varied impacts of these crises (Chong and Gradstein 2007, Scheidel 2017). This institutional framework provides a relevant basis for hypothesizing the diverse effects of global crises on income, labor force, and health inequalities.

Countries with strong institutional frameworks often show greater resilience in mitigating the adverse effects of shocks. For example, labor force inequalities in OECD countries are closely linked to their socio-economic institutional structures (Chong and Gradstein 2007). Similarly, health disparities are closely tied to public policy nuances, particularly in healthcare. For instance, more comprehensive and robust healthcare systems, like those in the Nordic states, typically show better health outcomes (Beckfield et al. 2015).

This analysis is based on the premise that policy and institutional variability across OECD countries results in different outcomes, thereby affecting the direction and magnitude of socio-economic disparities following global crises. Integrating exogenous shock theory with

institutional theory offers a multidimensional perspective to examine the complex interactions between global crises, institutional structures, and socio-economic inequalities. Building on these insights, the following hypotheses are proposed:

Hypothesis 1. Income Inequality

H0: There is no significant variation in the impact of the Covid-19 Pandemic and the Great Recession on income inequality trajectories across OECD countries.

Ha: The Covid-19 Pandemic and the Great Recession have resulted in significant and varied effects on income inequality trajectories across OECD countries.

Hypothesis 2. Labor Force Inequality

H0: The impact of the Covid-19 Pandemic and the Great Recession on labor force inequality trajectories has not significantly varied across different OECD countries.

Ha: The impact of the Covid-19 Pandemic and the Great Recession on labor force inequality trajectories has significantly varied across different OECD countries.

Hypothesis 3. Health Inequality

H0: There is no significant variation in the impact of the Covid-19 Pandemic and the Great Recession on health inequality trajectories across OECD countries.

Ha: The Covid-19 Pandemic and the Great Recession have resulted in significant and varied effects on Health inequality trajectories across OECD countries.

Inequalities between Welfare Regimes

Exogenous shock theory and welfare regime theory together serve as a critical lens for examining the nuanced impacts of sudden, external shocks on inequalities, focusing on the differential effects across various welfare regimes. This integrated framework suggests that the distinct structural configurations and policy paradigms of different welfare regimes—from liberal to social democratic models—mediate the socio-economic repercussions of global crises (Santos and Simões 2021).

These theories highlight how welfare regime characteristics fundamentally influence the resilience and vulnerability of countries to external disruptions. Diverse approaches to social safety nets, labor market regulations, and healthcare systems are essential for understanding the trajectories of income inequality, labor dynamics, and health disparities during such crises (Ólafsson, Helgason and Stefánsson 2016). The interaction between welfare regime and public policies in OECD countries is crucial in shaping the direction and magnitude of inequalities during global crises.

Grounded in the perspectives of both exogenous shocks and welfare regime theories, this research anticipates a differential impact of shocks based on a country's welfare regime classification. This expected divergence reflects variability in policy effectiveness and institutional robustness and underscores the critical role of regime-specific mechanisms in either cushioning or exacerbating the effects of these shocks. The analysis seeks to investigate how different welfare regimes have modulated the progression of inequalities during these tumultuous periods. By integrating these theories, the following hypothesis aims to uncover the complex interplay between global crises and welfare regimes, offering insights into how the specificities

of a country's welfare policy system can substantially influence the direction and extent of inequalities.

Hypothesis 4. Inequalities between Welfare Regimes

H0 (Null Hypothesis): There is no significant difference in the trajectories of income inequality (Gini Index), labor force dynamics (ER and UR), and health inequality (LE and IM) between OECD welfare regimes during the Covid-19 Pandemic and the Great Recession.

Ha (Alternative Hypothesis): The Covid-19 Pandemic significantly altered the trajectories of income inequality (Gini Index), labor force dynamics (ER and UR), and health inequality (LE and IM) between OECD welfare regimes, diverging in magnitude or direction from those during the Great Recession.

Gender Labor Force Inequality

Exogenous shock theory explains the significant, yet varied, impacts of external shocks like the pandemic and the Great Recession on inequalities (Smith 2020). It highlights the role of welfare regimes in mediating these effects. According to this theory, the structural configurations and policy paradigms of welfare regimes determine a country's socio-economic resilience and vulnerability to disruptions. This framework also indicates how diverse approaches of these regimes shape labor dynamics during global crises, suggesting a differential impact of exogenous shocks on OECD countries based on their welfare regime classification.

Empirical evidence highlights the gendered nature of these impacts. The Great Recession predominantly affected sectors with high male employment, potentially reducing its impact on the gender labor force gap (Bluedorn et al. 2021, Cunningham 2018, Hoynes, Miller and Schaller

2012, Wall 2009). Conversely, the pandemic posed unique challenges to women's employment, especially through a significant shift to remote work that highlighted gender-based technological disparities. The service industry, heavily reliant on female workers, faced severe disruptions, and the increased demand for technological skills could widen the gender labor gap, favoring those with higher tech proficiency (Albanesi and Kim 2021, Mongey, Pilossoph and Weinberg 2021). The service industry, which relies heavily on female workers, faced severe disruptions, and the increased emphasis on technological skills could further exacerbate the gender labor gap, favoring those with higher tech proficiency (Bonacini, Gallo and Scicchitano 2021).

Given these observations, Hypothesis 5 investigates how the global crises have affected gender labor force disparities across OECD countries and their welfare regimes.

Hypothesis 5. Gender Labor Force Inequality

Country-Level

H_{01} : *There are no significant variations in the changes of the gender labor force gap across OECD countries during the Covid-19 Pandemic and the Great Recession.*

H_{a1} : *There are significant variations in the changes of the gender labor force gap across OECD countries during the Covid-19 Pandemic and the Great Recession.*

Welfare Regime-Level

H_{02} : *There are no significant differences in the gender labor force gap during the Covid-19 Pandemic and the Great Recession between welfare regimes.*

H_{a2} : *There are significant differences in the gender labor force gap during the Covid-19 Pandemic and the Great Recession between welfare regimes.*

Sample Strategy

This research utilizes a longitudinal comparative analysis to examine the progression of inequalities during global crises across OECD countries, focusing specifically on different welfare regimes within Europe and the United States. The study incorporates 540 observations from 27 OECD countries. The selection of countries within Europe and the United States as the primary focus areas was primarily driven by the availability and reliability of longitudinal data that aligns with the study's objectives and scope. Additionally, the choice was made to ensure comparability in terms of social welfare systems.

Following the selection, the data from these countries undergo analysis utilizing sophisticated statistical models tailored to accommodate repeated measures, consistent with the longitudinal and comparative framework of this research. The countries are further categorized based on a five-dimensional welfare regime typology, which has been used by other scholarship in this area (Aidukaite 2009, Esping-Andersen 1990, Fenger 2007, Ferrera 1996). The unique aspect of this study lies in the repeated measurement of the same variables across 20 distinct time points, providing a comprehensive view of the trajectories of inequalities.

In this study, the sample size, which exceeds 100, aligns with the statistical research consensus for sufficient statistical testing, established by Garson (2013), Schubert (2014), Thomas (2004), and Warner (1998). With a sample size of 540 (N=540), the study not only ensures reliability but also conforms to methodological norms, as demonstrated in previous research by Alderson and Nielsen (2002), Amendola (2022), Djankov et al. (2021), Muhammad et al. (2022), Sepulveda and Brooker (2021), Sepulveda and Brooker (2021), and Tridico (2018).

This research examines inequalities across 27 OECD countries, employing a multilevel framework that considers the nuances of individual country dynamics alongside the broader

context of their respective welfare regimes. The study seeks to uncover the intricate patterns of socioeconomic disparities, highlighting how factors at different levels—national and regime-specific—interact to shape these inequalities. The welfare regime classification embodies the structure of each country's social policy, representing the state's role in the economy, the distribution of social benefits, and the traditions shaping welfare provisions.

For this study, a modified version of Esping-Andersen's typology of welfare regimes is used to categorize these countries. Esping-Andersen (1990) initially proposed three welfare state regimes: 1) social democratic, 2) conservative, and 3) liberal. Later, Ferrera (1996) identified the Mediterranean Model for Southern European countries, and Fenger (2007) introduced a post-communist model for Eastern European countries. Accordingly, this research categorizes the welfare regimes into five distinct models: 1) Nordic, 2) Liberal, 3) Continental, 4) Mediterranean, and 5) post-communist. This classification is substantiated by an extensive literature review (Aidukaite 2009, Esping-Andersen 1990, Fenger 2007, Ferrera 1996, Frelle-Petersen, Hein and Christiansen 2020).

Variables Operationalization

This study conducts a longitudinal comparative analysis to test the hypotheses. It examines the trajectories of income, labor market, health, and gender labor force inequalities across OECD countries and across different welfare regimes. Table 1 outlines the variables and their respective indicators.

Table 1. Key Indicators for Evaluating Income, Labor, and Health Inequalities

Factors	Indicators
Income Inequality	Gini Index post tax
Labor Force Inequality	Employment Rate (ER) Unemployment Rate (UR)
Health Inequality	Life Expectancy (LE) Infant Mortality Rate (IM)
Gender Labor Force Inequality	Employment and Unemployment Gender Disparity Index
Gross Domestic Product	GDP per capita (PPP)

Sources: (Albert-Ballestar and García-Altés 2021, Bewley and Wilkinson 2015, Destefanis and Mastromatteo 2009, Public Health Agency of Canada 2018, Schöley et al. 2022, Sitthiyot and Holasut 2020).

First, income inequality is measured using the Gini index (0 represents perfect equality, and 1 represents perfect inequality) (DeNavas and Cleveland 1996). The Gini index is the most widely used and preferred indicator for assessing income inequality (Bhardwaj 2018, Furceri et al. 2021, Gastwirth 1972, Korzeniewicz and Moran 2010), as it captures the relative distribution of income and its trajectory toward more or less equality within a country over time (Furceri et al. 2021, Wildman 2021). The Gini index is calculated as the ratio of the area between the perfect equality line and the Lorenz curve (A) divided by the total area under the perfect equality line (A + B), taking values between 0 and 1 (Sitthiyot and Holasut 2020).

The post-tax Gini index was chosen for this analysis due to its ability to accurately reflect the impact of government policies on income distribution, a method supported by (Liu and Gastwirth 2020) and indicative of its widespread use among governmental and international agencies to quantify income inequality. This measure's consideration of taxation and transfers offers a precise depiction of household disposable income, making it a critical tool for evaluating fiscal policy effectiveness in addressing income disparity across countries.

Despite known limitations, such as the non-change bias, the impact of this limitation on the analysis is mitigated when focusing on the post-tax Gini index. This mitigation arises from the nature of fiscal policies aimed at income redistribution, which tend to produce more pronounced shifts in the index. Consequently, this allows for a dynamic and nuanced examination of changes in inequality over time periods within my research. Therefore, the Gini index post tax remains the preferred measure for analyzing inequality, as supported by Warrens (2018), (Berman, Ben-Jacob and Shapira 2016), and (Chen, Gozgor and Koo 2021), given its widespread acceptance and proven reliability in quantifying income disparities across academic research. The use of the Gini index post tax is especially valuable in this study, facilitating comparative analysis across different contexts, such as during the COVID-19 pandemic and the Great Recession. This application is chosen for its alignment with previous research (Chen, Gozgor and Koo 2021, Makhoulf 2023).

This research utilizes two key components of the labor force – the employment rate and the unemployment rate – to assess labor force conditions. Serving as complementary indicators, these rates provide distinct and critical insights into the dynamics of the labor force (Destefanis and Mastromatteo 2009, McCarthy and Potter 2012). As defined by Card (2011), the labor force encompasses both those actively employed and individuals capable of work who are in active job search. Within this framework, this study utilizes two integral components: the employment rate and the unemployment rate. The employment rate signifies the proportion of the population, aged between 15 and 64, who are engaged in work relative to the total labor force. In contrast, the unemployment rate measures the percentage of the labor force that, although unemployed, is persistently seeking employment (Card 2011, Dieterle 2017, IMF 2016, U.S. Bureau of Labor Statistics 2023). Employing both the employment and unemployment rate concurrently allows

for a more nuanced understanding of labor force disparities, revealing the quantity and quality of employment opportunities across diverse demographic landscapes. Both the employment rate and unemployment rate serve as proven indicators of the working-age population's engagement with the labor market, either through active employment or job-seeking activities (Bewley and Wilkinson 2015). The employment rate is an important gauge of the proportion of the population contributing to the economy, a vital factor for understanding potential economic growth (International Labor Organization 2015). Conversely, the unemployment rate, particularly sensitive to economic conditions, can reflect changes in the labor market that might not be apparent when solely looking at the employment rate (Öner 2010). In times of economic downturn, such as during a pandemic or a Great Recession, the unemployment rate might considerably rise even if the employment rate changes are relatively minimal (Bivens 2020, Edwards, Essien and Levinstein 2022). An example of this sensitivity can be seen in the wake of the COVID-19 pandemic, which led to a substantial economic fallout and subsequent rise in unemployment rates throughout 2020 (Edwards, Essien and Levinstein 2022, Gallant et al. 2020). This sensitivity positions the unemployment rate as a valuable gauge of job competition, the difficulty level of job-seeking, and potential wage pressure. Therefore, even relatively small changes in the employment counts can markedly effect on unemployment rate (Margo 1993). Moreover, in the context of cross-national comparisons, as pursued in this study, the combined use of both the employment rate and unemployment rate as an important macroeconomic gauge enables more comprehensive and insightful comparisons owing to the different labor market structures among countries. This approach will enhance the analysis of labor market efficiency and adaptability (Kenton 2023). Thus, the concurrent use of both rates ensures a more detailed understanding of labor force conditions within the context of this research.

To evaluate health disparities, this research utilizes two key indicators: life expectancy at birth and the infant mortality rate. These measures are foundational and widely acknowledged as reliable in assessing population health outcomes. Life expectancy and infant mortality rate collectively provide a comprehensive view of health inequalities, capturing aspects ranging from healthcare access to broader socio-economic conditions. The selection of these indicators is underpinned by their demonstrated relevance to the research questions and their capacity to provide insightful perspectives on health disparities. This methodological choice is strongly supported by a breadth of previous research, including studies by Albert-Ballestar and García-Altés (2021), Public Health Agency of Canada (2018), Permanyer, Spijker and Blanes (2022), Shryock, Siegel and Larmon (1973), Singh et al. (2017), and Wood et al. (2006). Collectively, life expectancy and the infant mortality rate are instrumental in providing a nuanced understanding of health inequality across various countries.

Life expectancy represents the average lifespan an individual can expect within a population, accounting for age-specific mortality rates (Schöley et al. 2022). In contrast, infant mortality rate reflects the number of infant deaths per 1,000 live births within a population (Dagher and Linares 2022), providing insights into overall health during the earliest stages of life. Life Expectancy and the Infant Mortality Rate serve as complementary indicators, with each providing distinct insights into the health status of a population. Importantly, both measures are responsive to global crises, mirroring fluctuations in health resources and socio-economic conditions. Specially, the Infant Mortality Rate is employed as a key health indicator in this study to unveil the indirect societal and health system impacts of the Covid-19 pandemic. Importantly, despite infants' relative resilience to severe Covid-19 symptoms, the pandemic has redirected health resources and disrupted essential services like routine immunizations,

influencing infant mortality rate (Reidpath and Allotey 2003, Sartorius and Sartorius 2014). Life expectancy and infant mortality are widely used indicators for studying health inequalities, as their inclusion provides a nuanced understanding of the impact global crises have on health disparities (Albert-Ballestar and García-Altés 2021).

In examining labor market disparities, a fourth dimension is considered - gender labor force inequalities. These inequalities are gauged through differential employment and unemployment rates between genders. The gender-specific employment rate gap provides insight into differential economic participation, while the unemployment rate gap reveals variances in job security across genders. These metrics collectively yield a comprehensive view of gender-related disparities in labor market engagement, thereby enhancing the granularity of labor force conditions assessment within this research.

Lastly, comparing GDP, insights can be gained into the relative economic strengths and weaknesses of different OECD countries. GDP is pivotal for understanding an economy's health (Brezina 2011, Callen 2008) and hence, plays an instrumental role in influencing income, labor force, health and gender labor disparities. Consequently, GDP is considered as a control variable in this research analysis. This consideration helps in accounting for the potential influence of economic conditions on the observed variations in inequality structures.

When factoring in GDP, the analysis is better poised to discern the specific impact of regions and the contrasting effects of the Great Recession and the pandemic on income, labor force, and health inequalities. This discernment occurs while simultaneously considering the underlying economic milieu of each country. Moreover, the inclusion of GDP as a control variable helps in capturing the potential impacts of economic conditions on the detected patterns of inequality. Such an approach bolsters the robustness of the examination concerning the

pandemic's impact on social welfare regimes. It also elucidates the divergent effects of the Great Recession and the pandemic on the structures of income, labor force, health inequalities, and gender labor force inequality across OECD countries and welfare regimes.

To enhance the precision and accuracy of the analysis, for the Fixed Effect Model, GDP was scaled to simplify coefficient interpretation and reduce multicollinearity. In contrast, in the Generalized Estimating Equations (GEE) Model, a log transformation of GDP was employed to stabilize variances and address heteroscedasticity, given the inherent disparities among the grouped countries.

Temporal Analysis of Inequalities

This research divides its timeline into four distinct periods: Time 1 (T1=2002-2007), Time 2 (T2=2008-2010), Time 3 (T3=2011-2019), and Time 4 (T4=2020 to 2021).

T1 (2002-2007): Representing the era of relative economic stability preceding the Great Recession. This period serves as a baseline for subsequent comparisons (International Monetary Fund 2019, RBA 2023). The study employs time dummy variables to segment the timeline, enabling a detailed examination of inequality trajectories during specific intervals and the shifts associated with economic shocks. This method provides a robust framework for analyzing the effects of economic shocks on inequality dynamics over time periods.

T2 (2008-2010): This phase corresponds to the onset and aftermath of the Great Recession. While this period was characterized by immediate economic disruptions, it also laid the groundwork for subsequent inequality trends that materialized in the following years.

T3 (2011-2019): Acting as an intervening period between the Great Recession's aftermath and the pandemic's onset, this segment unveils critical trajectories of persistent inequalities (The World Bank 2023). Through a temporally strategic segmentation, this research highlights both the post-Great Recession dynamics and the pre-Covid-19 Pandemic eras (intervening time). The timeframe underscores the potential role of the impending pandemic in catalyzing or exacerbating these pre-existing disparities across varying countries and welfare regimes (Li et al. 2022). This elongated pre-Covid-19 Pandemic period captures a substantial phase of post- Great Recession evolution, affording an intricate understanding of how individual countries and welfare regimes navigated these challenges. Consequently, the research is well-equipped to hypothesize about the pandemic's transformative influences on these established patterns. By emphasizing this extensive pre-pandemic span, the methodology provides deeper insights into the progression of inequalities during a phase of global economic recovery and sets the stage for analyzing the pandemic's subsequent impact.

T4 (2020-2021): Capturing the pandemic era, this phase is pivotal in deciphering how pre-existing inequalities were potentially exacerbated by global health and economic crises.

By segmenting the timeline in this manner, this study ensures a holistic grasp of post-Great Recession trajectories, the pre-pandemic, and the ramifications of the pandemic. This approach allows this research to explore how various countries and welfare regimes evolved during these periods, while also postulating the pandemic effects on this evolution. This research methodology therefore captures these pivotal temporal transitions, enriching the understanding of both the 2008-10 Great Recession and the Covid-19 Pandemic's multifaceted impacts across OECD countries and between welfare regimes.

Data and Scope

This study utilizes data spanning 2002 to 2021 and includes 27 countries (See Appendix Figure 2. Map of 27 OECD countries). This data set includes the following variables: GDP, the Gini index post tax, employment and unemployment rates, life expectancy, infant mortality rates, and gender labor force. The primary sources of this data are the OECD and the World Inequality Database (WID).

Specific metrics like GDP, employment rate, unemployment rate, life expectancy, infant mortality rate, and male and female labor force participation rates were gleaned from the OECD database. In contrast, the Gini Index post tax was extracted from the WID. Both databases are widely acclaimed in the academic world for their accurate and comprehensive economic, social, and political data. The OECD, in particular, stands out for its in-depth and reliable statistical data on a plethora of global economic, social, and environmental matters (Giovannini 2008). Tailored for comparing its member countries, the OECD dataset guarantees precise comparisons, providing insights that resonate with the unique economic attributes of the involved countries.

R Packages for Statistical Analysis

In this study, the diverse analytical capabilities of R were leveraged for Exploratory Data Analysis of time series, Mixed-Effects Modeling (MMRM), and Generalized Estimating Equations (GEE). The EDA of time series process, considerably enhanced by the “ggplot2” package, facilitated insightful data visualization (Wickham, Chang and Wickham 2016). Mixed-Effects Modeling was adeptly executed using the 'lme4' package (Bates et al. 2015), with the “lmer” and “lme4” function providing essential parameter estimates through Maximum Likelihood or Restricted Maximum Likelihood (REML) methods.

The GEE analysis utilized “geepack” and “geeglm,” integrating statistical criteria such as Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Quasi-Information Criterion (QIC) for comprehensive model selection and validation (Højsgaard, Halekoh and Yan 2005). Additionally, Variance Inflation Factor (VIF) calculations for assessing multicollinearity were performed using the 'car' package (Fischetti 2018). This approach, merging advanced statistic and visualization techniques, considerably enhanced the depth and clarity of the research findings.

Model Construction

This section evaluates three statistical methods: Exploratory Data Analysis (EDA) for time series, Mixed-Effects Modeling (MMRM), and Generalized Estimating Equations (GEE), chosen for their distinct analytical strengths. EDA identifies patterns and trends in time series data, providing a foundation for subsequent analyses. The study investigates the impacts of the pandemic and the Great Recession on inequality across OECD countries and between welfare regimes, employing MMRM and GEE. These methods are critical for analysis across various temporal dimensions and welfare regimes, varying by country size (Cui 2007, Hanley et al. 2003b). This approach allows for an understanding of how different welfare regimes' structures influence their response to these crises. MMRM examines country-level impacts across OECD countries, managing data with unbalanced impact durations—two years for COVID-19 and three years for the Great Recession. This method is effective in longitudinal studies where consistent time frames and balanced panels are challenging. Conversely, GEE assesses disparities between welfare regimes categorized by country size, providing insights into which regimes are more adversely affected by these global events. GEE excels in analyzing correlated data within

clusters, such as those categorized by welfare regime, enhancing the reliability of inter-group comparisons (Wang 2014).

These methodologies are selected for their robustness in analyzing longitudinal data amidst global shocks, which affect all regions to varying degrees (Henwood and Pidgeon 1992, Sanbonmatsu, Cooley and Butner 2021). Unlike traditional quasi-experimental designs that typically require unaffected control groups (Lopez Bernal, Andrews and Amirthalingam 2018), GEE and MMRM allow for comparative analysis without such constraints. These approaches provide a sophisticated framework to account for within-subject correlations and temporal changes, thus enabling a precise and comprehensive understanding of the impacts of global crises on inequalities. Employing GEE and MMRM aligns well with the scope of the data and the research hypotheses, enhancing our analysis of significant global events and their effects on inequality across OECD countries.

Initially, EDA provides an essential overview of the dataset, uncovering key trends and patterns. This initial step is vital for gaining an early understanding of the data and setting the stage for more detailed analyses. Following this, MMRM is employed, renowned for its capability in managing data variability and addressing missing data, challenges often encountered in longitudinal studies. Its particular effectiveness in analyzing data at the individual country level, while concurrently accounting for both random and fixed effects, sets it apart. Lastly, GEE is utilized, distinguished for its robustness in analyzing correlated data, such as cluster data found in welfare regimes. Its primary strength is in estimating average population effects, crucial for discerning broader trends over individual variations.

Together, these methods ensure a comprehensive statistical analysis: EDA of time series for initial exploration, MMRM for individual country analysis with variability considerations, and GEE for overarching population insights.

Exploratory Data Analysis

The methodology employed for this analysis was Exploratory Data Analysis (EDA) of time series. This approach is utilized to visualize and understand the patterns, and trends, longitudinal data over a period from 2002 to 2021. By plotting individual time series for each country and an aggregated average, substantial temporal trends and impacts of major economic events were identified. The visualization aids in preliminary investigations before any EDA or in-depth statistical analysis is conducted. This analysis commences with the application of exploratory data analysis to delineate patterns and trends in income, labor force, and health inequalities across OECD countries. Central to this analytical endeavor are key indicators, namely the Gini index, employment and unemployment rates, life expectancy, and infant mortality rates.

To measure and examine the trends spanning the 2002—2021, this time frame is divided into four distinct time periods. These time periods are visually distinguished through specific color schemes or line styles, ensuring an in-depth temporal comparison. Exploratory Data Analysis (EDA) of time series stands out as an invaluable instrument for performing temporal analyses (Chi and Kim 2016). Utilizing the EDA of time series allows for a thorough examination of these temporal trends and differences. This analytical approach provides an insight into variable shifts across the specified time periods. By merging EDA of time series, and

visualization methods, a detailed understanding of the impact of global crises on disparities across OECD countries is achieved.

Mixed Model

To evaluate the research hypotheses related at the country level, this study utilizes the Mixed Model for Repeated Measures (MMRM). The MMRM is fitted for longitudinal data with correlated outcomes. In addition, this method is well-suited for individual countries as it can handle variability within each country over time periods. Recognizing for its adaptability, robustness, and capability to handle missing data, it is a favored technique for data with repeated measures (Avent-Holt et al. 2020, Bartlett 2020, Bell and Rabe 2020, Caruana et al. 2015, Kim 2017, Lohse, Shen and Kozlowski 2020, Smith 2015).

The dataset's structure, featuring multiple observations across different periods for a range of countries, is ideally suited to the mixed-effects method. This approach efficiently combines fixed and random effects, thereby capturing the unique characteristics of each country and honing in on within-unit variations (Chow 2019, Fairbrother 2014, Fitzmaurice and Ravichandran 2008). Specifically, mixed models are adept at differentiating between-country variations, addressed through fixed effects, and within-country variations, addressed through random effects. These models excel in tracking each country's distinct time-based trajectory, adeptly balancing overarching trends (fixed effects) with nuances unique to each country (random effects). To incorporate fixed effects, the least squares dummy variable method is applied, assigning a dummy variable to each unit to effectively reduce biases (Dougherty 2016).

This MMRM framework utilizes a mixed-effects model to assess the impact of T2, T3, T4 on various dependent variables (Gini Index, ER, UR, LE, IM) across OECD countries. The model enhances interpretability by using specified baselines for time and country.

$$Y_{it}^k = \alpha + \beta_1 \times T_2 + \beta_2 \times T_3 + \beta_3 \times T_4 + \beta_4 \times GDP + \mu_i + \gamma_t + v_i + \varepsilon_{it}$$

In this equation:

Y_{it}^k : The k-th dependent variable for country i at time t.

α (Alpha): Constant term, setting the baseline level for T1 and Country1, serving as the fixed effect reference.

Time Variables ($\beta_1, \beta_2, \beta_3$): Coefficients for T2, T3, and T4, measuring their impacts relative to T1.

GDP (β_4): Fixed effect coefficient indicating the impact of GDP on the dependent variables.

μ_i (Random Effect for Country): Captures country-specific variations from the baseline.

γ_t (Year as Slope): Random slope effect for annual variations compared to Year1.

v_i (Differences Across Countries): Random effect for inter-country variations from Country1.

ε_{it} (Error Term): Residual error for country i at time t, capturing unexplained variations.

This structure provides a thorough approach for analyzing the multifaceted impacts on the dependent variables, capturing both time-specific and country-specific variations within the data. The unified equations not only illustrate the interactions between the dependent variables, time-sensitive independent variables, and GDP but also consider the nuances of each of the 27 OECD countries, using Time1 as the benchmark for comparison. Subtly integrated into this model is the inclusion of *Year* as a random slope, a method adept at examining nuanced time-related variations that may exist across different countries. This element of the model is

especially valuable in longitudinal studies for its ability to capture variable rates of change across countries, thereby identifying distinct temporal trends specific to each country's context.

To address hypothesis H5, which focuses on Gender Inequality in the Labor Force, a Mixed Effects Model is used at the country level. The goal is to analyze the effects of global crises on gender disparities in the labor forces of OECD countries. In this model, each country is treated as a unique case with its own random effects, capturing the unique variations of each country.

The variable Y_{it} represents the gender difference in each country (i) at each time point (t). Coefficients for different times (Time2, Time3, Time4) show how these gender differences change compared to the baseline time (Time1).

Z_{it} is another important variable in this model, representing the GDP of each country (i) at each time point (t), and is considered a fixed effect. It has a coefficient (γ) that shows how much the GDP affects the gender differences in the labor force.

α_i symbolizes the fixed effect for each country, representing constant unobserved characteristics unique to each country that do not change over time periods.

Lastly, the term ε_{it} is the error term in the model, representing the randomness and any unexplained variations in the gender differences.

Using Time1 as a reference, the model allows an in-depth understanding of variable relationships, factoring in the longitudinal nature of the data. Additionally, fixed effects models with country and time dummy variables are employed to control for unobserved, consistent heterogeneity across countries, ensuring accurate estimates.

Lastly, the assumptions of the Mixed Effect Model, such as linearity and homoscedasticity, are validated through an analysis of residuals. The VIF is used to evaluate

multicollinearity, serving as the most commonly employed technique for detecting multicollinearity (Fischetti 2018). Although VIF values above 5 (or 10 in certain contexts) hint at multicollinearity (Kyriazos and Poga 2023), for the models (Gini Index, Employment Rate, Unemployment Rate, Life Expectancy, and Infant Mortality Rate), VIFs remain below this threshold, signaling no multicollinearity issues. For optimal model selection, both the Akaike Information Criterion (AIC) and the BIC are considered. These metrics weigh model fit against complexity (Basavarajaiah and Murthy 2022), and the reported AIC and BIC values confirm the model's robustness.

Generalized Estimating Equations

Generalized Estimating Equations (GEE) are utilized to test hypotheses H4 and H5 for cluster countries (welfare regimes). The GEE approach is a prominent statistical method for analyzing longitudinal and clustered data (Cui 2007, Hanley et al. 2003b). Essentially, GEE is an extension of the Generalized Linear Model (GLM) that addresses correlated data and delivers population-averaged estimates (Cui 2007, Gueorguieva 2017, Wilson, Vazquez-Arreola and Chen 2020).

For this analysis, the GEE method is employed to assess clustered data, where countries are categorized by their welfare regime classifications (Wang 2014). GEE is widely used for analyzing clustered data, including categorizing countries into groups (Farewell 2010, Hanley et al. 2003a). One of the salient features of GEE is its ability for capturing intra-cluster correlations, which facilitates understanding the influence of welfare regimes on inequalities across various periods.

The strength of GEE modeling is evident in its capability to efficiently model average outcomes across various time points. GEE is particularly adept at handling variations in data points across different periods, accommodating the analysis of four distinct, dummy time intervals (Time 1 to Time 4). This flexibility makes GEE particularly suited to draw accurate parallels, even when cluster sizes differ, or the data set is skewed due to limited samples or imbalanced data (Fitzmaurice et al. 2008, Ma, Mazumdar and Memtsoudis 2012, Menard 2010, Tian et al. 2021).

GEE excels in estimating population-averaged effects, which is particularly relevant for clustered data analysis. Its primary focus on the average effects across groups, rather than individual variations within each group is essential for handling unbalanced data (Wedderburn 1974, Zorn 2001). This feature is beneficial in cases where clusters vary in the number of countries. The use of GEE ensures that comparisons across diverse groups are both accurate and representative, facilitating a comprehensive understanding of overarching patterns across different welfare systems at a global scale (Baturu 2014).

A noteworthy advantage of the GEE is its resilience concerning the correlation structure. It provides trustworthy standard error even if the correlation among data points within each observation period isn't precisely defined. This resilience becomes particularly useful in studies with fluctuating correlations across distinct periods. Unequal data structures are often characteristic of large-scale longitudinal studies (Gottman 1995), and GEE, tailored to manage such complexities, has garnered widespread acclaim (Fitzmaurice et al. 2008, Research and Training 2000). Notably, GEE effortlessly deals with unequal observation counts and irregular time intervals between them (Baye et al. 2019, Bird and Rowlands 2007, Delfino 2002, Katz

2006). This study utilizes GEE to analyze the impacts of the Great Recession and the Pandemic on inequalities, addressing Hypothesis 4. The fundamental equation is: $Y = X\beta + Z\gamma + \varepsilon$

Where:

Y: Represents the dependent variables.

X: Set of independent variables: T2, T3, and T4.

β : Series of regression coefficients for the independent variables.

Z: Control variables including welfare regimes (NM, CM, LM, MM, PM) and GDP.

γ : Coefficients for interaction terms involving control variables.

ε : Error term

Dependent Variables = constant + $\beta_1(T2) + \beta_2(T3) + \beta_3(T4) + \beta_4(CM) + \beta_5(LM) + \beta_6(MM) + \beta_7(PM) + \beta_8(GDP) + \gamma_1(T2*CM) + \gamma_2(T2*LM) + \gamma_3(T2*MM) + \gamma_4(T2*PM) + \gamma_5(T3*CM) + \gamma_6(T3*LM) + \gamma_7(T3*MM) + \gamma_8(T3*PM) + \gamma_9(T4*CM) + \gamma_{10}(T4*LM) + \gamma_{11}(T4*MM) + \gamma_{12}(T4*PM) + \varepsilon$

Constant: Includes the baseline effects of T1 and NM as reference categories.

β Coefficients (β_1 to β_3): Reflect changes from the baseline (T1) for T2, T3, and T4.

β Coefficients (β_4 to β_7): Represent the effects of each welfare regime (CM, LM, MM, PM) relative to NM.

β_8 (GDP): Direct effect of GDP on the dependent variables, treated as a control variable.

γ Coefficients (γ_1 to γ_{12}): Interaction effects between time points, and welfare regimes.

ε : Captures residual variations not explained by the model.

For model analysis, the Quasi-Likelihood under the Independence Model Criterion (QIC) was used. Specifically tailored for GEE, QIC accounts for the correlation inherent in the data, with a lower QIC indicating a better model fit and assisting in identifying the optimal model

relationship between variables (Deakin et al. 2016, Imori 2015, Nelder and Lee 1992, Shults and Hilbe 2014).

As proposed by Pan (2001), the QIC value guides the selection of the best working correlation structure and model fit in GEE analyses, allowing for rigorous evaluation across different longitudinal study settings (Cui 2007). Consequently, an autoregressive correlation structure of order 1 (AR1) was identified as most suitable for testing Hypothesis 4, which investigates inequalities across welfare regimes. This structure was chosen for its low QIC value, indicating a superior balance of model fit and complexity, thereby enhancing the reliability of the findings.

Similarly, for Hypothesis 5-2, which examines the gender labor gap, an exchangeable correlation structure was selected for its effectiveness in capturing homogeneous correlations among repeated measures over time periods, thus increasing the precision of the estimated effects (Cui 2007, Wang 2014). This choice ensures that the correlation among repeated observations is adequately accounted for, driven by the specific nature of the data and the type of inequality being analyzed (Cui 2007).

Concurrently, the VIF was determined for each predictor to ensure there was no multicollinearity, essential for the stability of the model's estimates (Vatcheva et al. 2016).

In both Mixed Effects Models and GEE analyses, the GDP variable was log-transformed and scaled to ensure normality and mitigate heteroscedasticity. The implementation of scaling was contingent on VIF and QIC diagnostics to confirm multicollinearity was not present, thereby preserving the precision of the analytical models.

In this research, the GEE model is employed to analyze Hypothesis 5, focusing on the gender labor force gap between different welfare regimes. The fundamental equation is:

$$Y = \beta_0 + \beta_1 T_2 + \beta_2 T_3 + \beta_3 T_4 + \beta_4 LM + \beta_5 CM + \beta_6 MM + \beta_7 PM + \beta_8 GDP + \gamma_1(T_2*LM) + \gamma_2(T_2*CM) + \gamma_3(T_2*MM) + \gamma_4(T_2*PM) + \gamma_5(T_3*LM) + \gamma_6(T_3*CM) + \gamma_7(T_3*MM) + \gamma_8(T_3*PM) + \gamma_9(T_4*LM) + \gamma_{10}(T_4*CM) + \gamma_{11}(T_4*MM) + \gamma_{12}(T_4*PM) + \varepsilon$$

In this equation:

Y: Dependent variable, representing gender labor participation.

β_0 (Intercept): Baseline level of gender labor participation at T1, with NM as the reference.

Independent Time Variables (T2, T3, T4):

$\beta_1, \beta_2, \beta_3$: Coefficients for T2, T3, and T4, indicating changes relative to T1.

Welfare Regimes: $\beta_4, \beta_5, \beta_6, \beta_7$: Main Effects of LM, CM, MM, and PM, compared to NM.

Interaction Terms: γ_1 to γ_{12} : Capture the interaction effects between specific time points (T2, T3, T4) and welfare regimes (LM, CM, MM, PM).

β_8 (GDP): Direct effect of GDP, treated as a control variable.

ε (Error Term): Captures residual variations not explained by the model.

This model allows for a nuanced analysis of how different time periods and welfare regimes impact gender labor participation, accounting for both main effects and interactions among the variables.

In summation, for analyses in H1-H3 and the initial part of H5, which aim to chart intra-country inequality trajectories, a fixed effects model is chosen. This model adjusts for non-observable, constant differences between countries, emphasizing changes within each country. In contrast, when contrasting groups of countries in H4 and H5 (2), the GEE model becomes the method of choice. The power of GEE is evident in its capability to delve into population-average impacts across groups, while addressing the innate correlation structure of panel data (Ballinger 2004, Zorn 2001).

The application of EDA, fixed effects, and GEE models is strategically employed for their proficiency in delineating the trajectories of inequality. These models adeptly navigate the variability inherent both within individual countries and across distinct welfare regimes. It is noteworthy that both GEE and mixed-effects models demonstrate exceptional robustness in analyzing datasets characterized by irregular and non-uniform temporal measurements, a frequent characteristic of longitudinal studies (Baye et al. 2019, Katz 2006). In particular, GEE develops as the more appropriate method for the analysis of clustered data, such as welfare regimes, while MMRM is identified as the method of choice for the analysis of individual country dynamics. Incorporating both within-subject and between-subject variations into GEE model fitting is essential. This approach substantially enhances the efficiency and power of estimation, enabling more precise and effective comparisons across different welfare regimes (Friedman, Furberg and DeMets 1989). Thus this model fitting turns out to be easier than mixed-effect models to measure cluster groups (Ford 2023, Hanley et al. 2003a, Wang 2014). Consequently, these analytical approaches provide deep insights into the evolving landscape of disparities across OECD countries and within the frameworks of welfare regimes, especially in the context of successive global disruptions, intervening periods, and the pandemic.

Summary

This chapter investigates inequality across OECD countries, examining income, labor, and health disparities during various global crises. The study is informed by five hypotheses, drawing on institutional theory, welfare regime theory, and concepts of neoliberal globalization. Data from 27 OECD countries are sourced from OECD and WID databases, aiming to trace inequality's evolution both at individual country levels and across different welfare regimes. To

address the research questions and hypotheses and to identify patterns of inequality during these upheavals, the study employs tools such as Exploratory Data Analysis (EDA) of time series, Mixed-Effects Model for Repeated Measures (MMRM) and Generalized Estimating Equations (GEE).

In the subsequent sections, the research will present detailed results, starting with EDA of time series at both country and welfare regime levels. This analysis provides a broad view of the dynamics of inequality within OECD countries and their clusters (welfare regimes). Following this, the Mixed Effects Model is applied at the cross-country level, addressing hypotheses H1-H3, and then across different welfare regimes to specifically explore hypothesis H4. The research then shifts to examining hypothesis H5 using Mixed Model and GEE techniques, focusing on gender disparities within the labor force at both the country and welfare regime levels. Each analytical phase prepares the ground for the next, progressively delving deeper into the findings and cumulatively enhancing our understanding of the complex interplay of inequality factors.

Chapter 4: Cross-Country of Inequality Trajectories

Introduction

This chapter explores the effects of the Covid-19 Pandemic and the Great Recession on the trajectories of income, labor, and health inequalities across OECD countries. Leveraging a longitudinal approach, the chapter delineates the shifts in inequality dynamics across global events and intervening time, providing understanding of global socio-economic transformations. The first segment concentrates on the analysis of OECD inequality dynamics. Building on this foundational understanding, the chapter transitions to a detailed examination of country-level divergence in inequalities through the mixed-model analyses. This portion of the study deepens comprehension of disparity variations across countries during global crises. Each section aims to investigate the intricate network of amplified inequalities during the pandemic, Great Recession, and intervening time, providing a comprehensive dissection of income, labor, and health disparities across OECD countries in past two decades.

Inequality Trajectories: Tracking from 2002 to 2021

Initially, Exploratory Data Analysis (EDA) of time series is utilized to delve into the diverse impacts of the Covid-19 Pandemic and Great Recession on income, labor force, and health inequalities across OECD countries. By employing EDA of time series, this investigation examines the trends of these inequalities both prior to and throughout the pandemic, affording a comprehensive perspective on their evolution.

GDP serves as the primary economic performance indicator, its pandemic trajectory acting as a benchmark for evaluating multifaceted inequalities. The subsequent findings of this dual analysis unveil the complex relationship between the pandemic and multifaceted

inequalities. As Figure 1 illustrates, Luxembourg possesses the highest average GDP amongst considered countries, with considerable fluctuation. Conversely, Latvia, despite its lower average GDP, shows a substantial GDP ascent from 2002-2022, while Greece evidences a consistent GDP trend, indicated by a minimal standard deviation. This assessment of annual GDP data reveals substantial economic shifts during the Great Recession and the pandemic, with the latter causing marked GDP contractions in many countries, such as Greece. Intriguingly, Poland's GDP mildly increased during these periods, signifying economic heterogeneity in global crisis responses. Leveraging GDP as a foundation, this analysis explores disparities in income, labor force dynamics, and health inequalities across global crises.

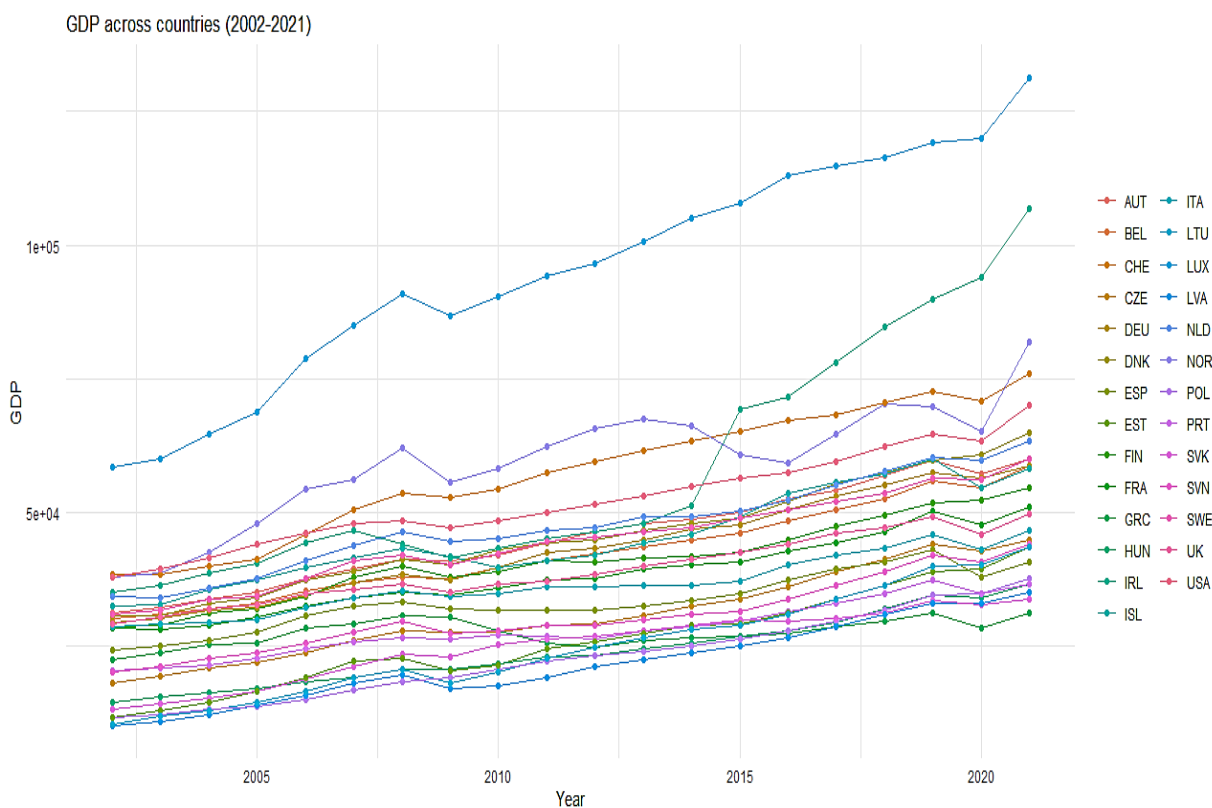


Figure 2. Comparative Analysis of GDP Trends

Income Inequality

An examination of Gini index post tax data across 27 OECD countries reveals a tapestry of income inequality levels, each influenced by distinct socio-economic events and national policies. The analysis not only sheds light on countries most impacted by major economic downturns such as the Great Recession and the Covid-19 pandemic but also traces the overarching patterns of income disparity from 2002 to 2021.

The period from 2002 to 2007 was marked by substantial income disparities within the OECD countries. The United States, exhibiting a Gini index of 0.468, reflected considerable income inequality, closely followed by Estonia with a Gini index of 0.465. Conversely, the Czech Republic and Norway presented a contrasting narrative, with Gini index of 0.253 and 0.261 respectively, indicative of a more equitable income distribution within their societies. Italy, Latvia, and Greece were also notable during this period, with Gini index that delineated substantial inequality at 0.459, 0.449, and 0.427 respectively.

In the context of early twenty-first-century economic volatility, scholarly focus pivots to the Great Recession (2008-2010). In this interval, the United States preserved its standing with a Gini index of 0.465, indicative of persistent income disparity. Concurrently, countries such as Latvia and Italy experienced augmented income inequalities, as demonstrated by Gini Indices of 0.435 and 0.433, respectively. In comparison, the Czech Republic sustained a comparatively lower disparity in income distribution, evidenced by a Gini index of 0.269. Meanwhile, Lithuania and Luxembourg reported coefficients of 0.420, exemplifying the heterogeneous fiscal responses to the Great Recession across OECD countries.

In the aftermath of the Great Recession, the intervening period (2011-2019) saw persistent patterns of income distribution. The United States continued to experience heightened

income inequality, with a Gini Indices of 0.486. This enduring disparity was mirrored in Italy and Lithuania, where the coefficients escalated to 0.452 and 0.450, respectively. In contrast, Norway and the Czech Republic remained exemplars of lower income disparity, maintaining their more equitable index of 0.255 and 0.260.

Following the intervening time, marked by the pandemic, witnessed a sharp escalation in income inequality in certain countries. Lithuania and Luxembourg's Gini coefficients surged to an unprecedented 0.629. Concurrently, the United States and Italy also struggled with high income disparities, with Gini index of 0.463 and 0.452. Contrasting this trend, the Czech Republic and Iceland maintained lower levels of income disparity (0.260 and 0.272).

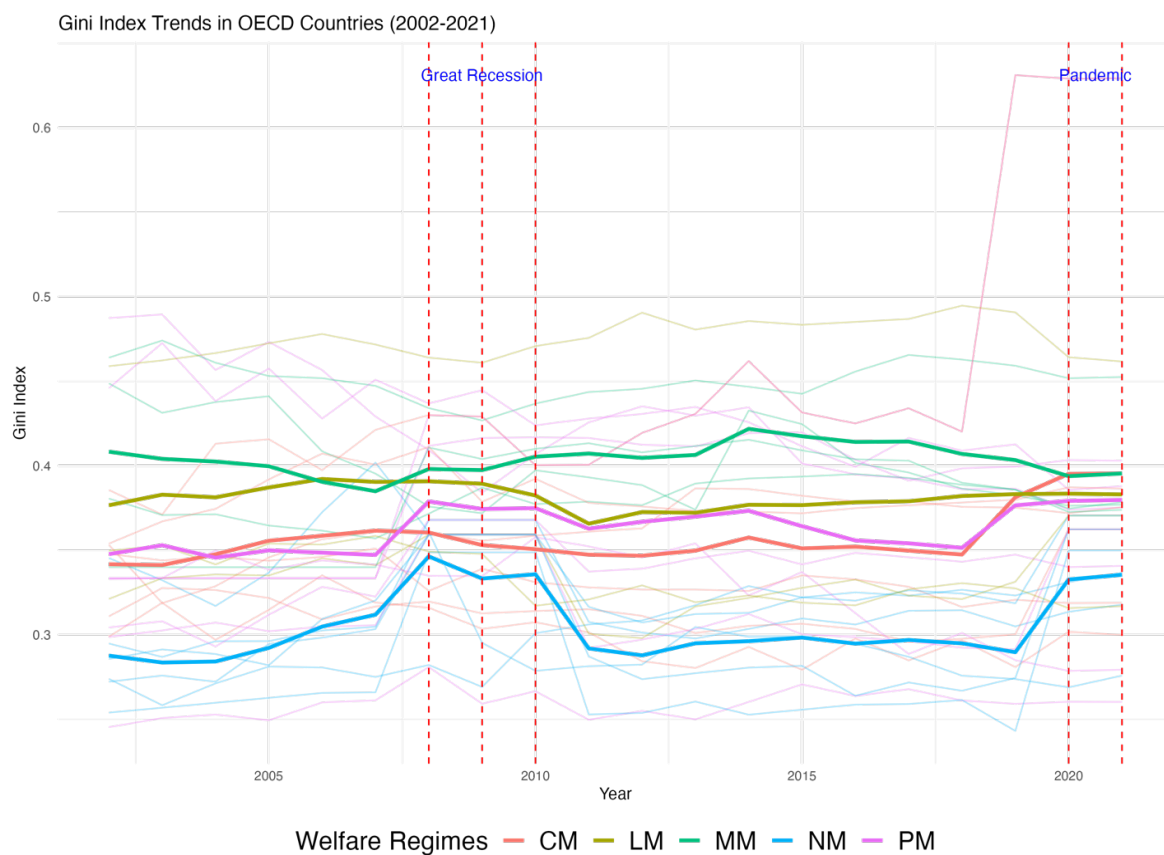


Figure 3. Comparative Analysis of Gini Index

In the comprehensive examination of Gini index post tax spanning from 2002 to 2021, discernible patterns have surfaced between OECD countries. Predominantly, the United States, Italy, and Luxembourg have been characterized by persistently high levels of income inequality, evidenced by their average Gini indices of 0.475, 0.451, and 0.449, respectively. In contrast, countries such as the Czech Republic, Norway, and Sweden are distinguished by their comparatively lower levels of income inequality, with average Gini indices of 0.259, 0.280, and 0.300.

Comparative analysis of welfare regimes indicates that during the 2008-2010 Great Recession, the MM regime exhibited the highest average Gini index. In contrast, the Nordic regime showed the lowest income inequality. In the period of the COVID-19 pandemic, both the CM and MM regimes saw a noticeable increase in their Gini index. Notably, the CM regime showed a substantial increase from 0.355 to 0.395. The NM regime maintained the lowest level of income inequality during both periods. Meanwhile, the PM regime exhibited a moderate level of income inequality, with a slight increase during the pandemic period.

Overall, from 2002-2021, The results indicate that the NM demonstrated the lowest average level Gini index of 0.305. In contrast, the MM exhibited the highest average Gini index of 0.404, indicative of greater income disparity. Both the CM and PM regimes showed moderate levels of income inequality, with Gini index of 0.357 and 0.363, respectively. The LM displayed a relatively high average Gini index of 0.381, pointing towards substantial income inequality.

Labor Force Inequality

To examine the trend of labor force inequality, the main components of labor force – namely employment and unemployment rates (i.e., ER and UR) – were compared across OECD

countries. An analysis of Employment Rate (ER) from 2002-2021 reveals that OECD countries experienced various changes in their employment rates. Throughout the 20 years, two distinct periods emerge when examining the employment rate data: the Great Recession and the pandemic. In both instances, most countries witnessed considerable declines in employment rate.

During the Great Recession, a pattern of declining employment rates was evident across OECD countries, with Iceland maintaining the highest ER at 80.0%. Switzerland (78.6%), Norway (76.6%), and the Netherlands (75.5%) also exhibited high employment rates. Conversely, several OECD countries faced severe labor market challenges, with Hungary recording the lowest employment rate at 56.9%, followed by Italy (57.3%) and Greece (60.3%).

As the world struggled with the pandemic, Iceland demonstrated a resilient labor market by maintaining the highest employment rate at 80.0%. Netherlands (79.7%) and Switzerland (79.6%) also showcased strong employment rates. The Greek labor market persisted as the most challenged during the pandemic, with an employment rate of 55.5%. Italy's rate also remained low at 57.8%. In the United States, the employment rate fell to 68.2%, reflecting the pandemic's substantial impact, although it was less affected in the Great Recession.

The intervening time (2011-2019) presented a mixed picture of recovery and ongoing challenges. Iceland's employment rate rose to 83.2. Netherlands, Norway, Sweden, and Switzerland also experienced increases in their employment rates. In contrast, Belgium, with employment rate of 62.7%, Greece at 52.1%, Italy at 56.8%, and Spain at 58.8%, demonstrated continued challenges.

In a cumulative analysis of Employment Rate trajectories from 2002 to 2021, Iceland, Switzerland, Netherlands, Norway and Sweden exhibited high Employment Rate with an average, 82.5, 78.9, 75.6, 75.5, 74.1 respectively. In contrast, Greece, Italy, Poland and Spain

demonstrated a consistent trend of lower Employment Rate with an average of 60.5, 59.4, 57.1, 55.9 (Respectively).

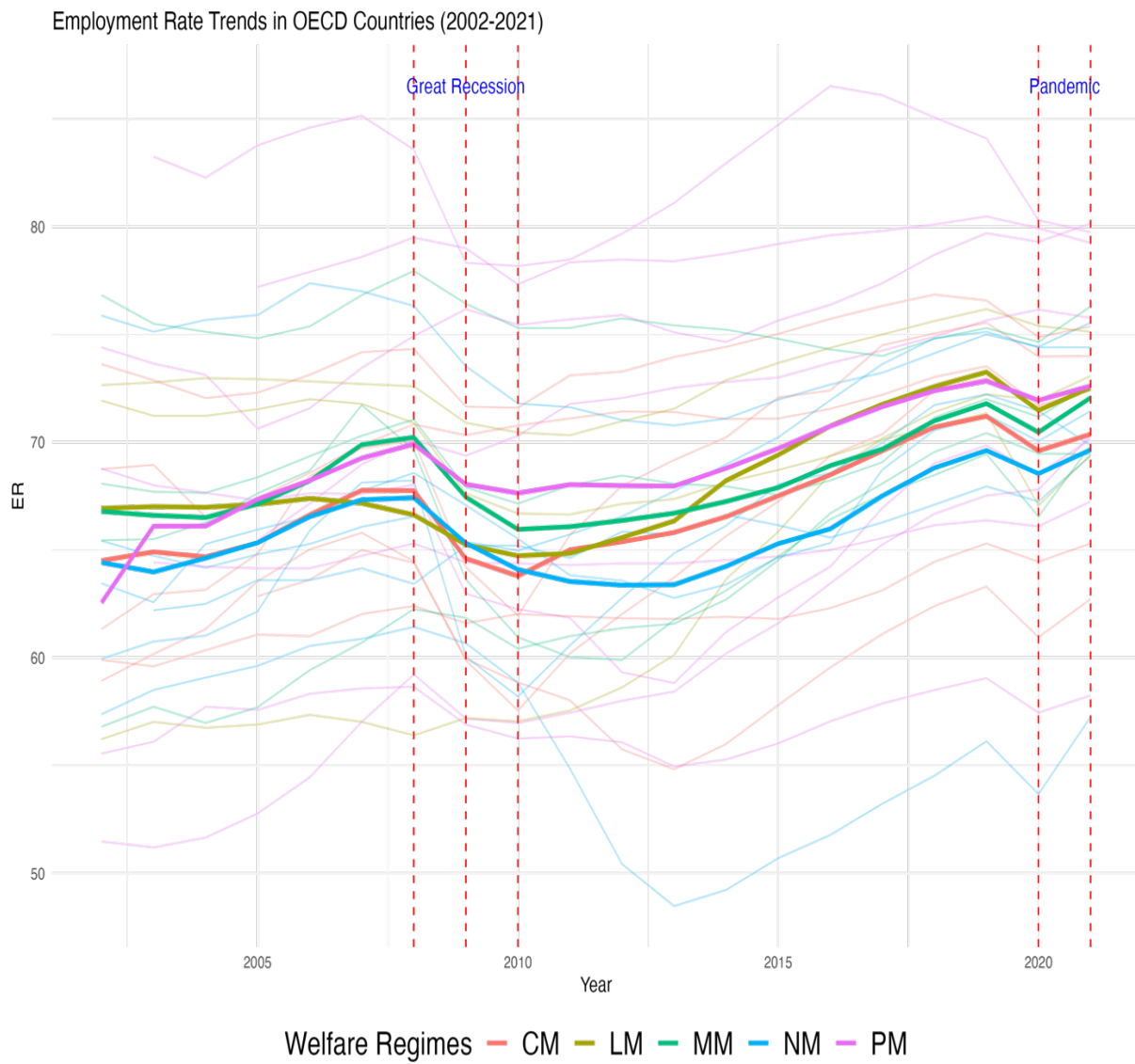


Figure 4. Comparative Analysis of Employment Rate

In assessing employment rates across different welfare regimes, this study focused on the average employment rates for five distinct regimes: CM, LM, MM, NM, and PM during the 2008-2010 Great Recession and the COVID-19 pandemic of 2020-2021 – alongside an overall trend analysis from 2002 to 2021.

During the financial crisis of 2008-2010, the employment rates varied marginally across the welfare regimes, with the PM recording the highest average employment rate at 68.5%, and the CM noting the lowest at 65.4%. The LM, MM, and NM regimes demonstrated closely aligned averages, with 65.5%, 67.9%, and 65.6%, respectively.

A notable shift was observed in the period of the pandemic, where all regimes experienced an increase in employment rates. The LM and PM regimes showcased the highest average ERs at 72.0% and 72.3%, respectively, indicating a considerable resilience in the job market despite the pandemic's economic impact. The CM also witnessed a noticeable rise to 70.0%. The NM, while showing an increase, had the lowest average ER during this period at 69.1%.

When considering the overall trend from 2002 to 2021, the PM consistently maintained the highest average ER at 69.2%, suggesting a sustained resilience in employment over the two decades. The MM and LM regimes both averaged at 68.3%, reflecting a relatively stable employment landscape. The CM and NM regimes recorded slightly lower averages at 67.1% and 66.0%, respectively.

Turning to the unemployment rate, the data reveal that the Covid-19 Pandemic had a more substantial impact on Unemployment Rates in OECD countries compared to the Great Recession. The Great Recession exposed substantial differences in unemployment rates, with Spain's labor market experiencing considerable strain, reflected in an unemployment rate of

14.6%. Similarly, Greece, Latvia, and Lithuania faced substantial unemployment challenges, with rates of 10.3%, 12.5%, and 13.8%, respectively. In contrast, Austria, Denmark, and Luxembourg evidenced labor market resilience, maintaining lower unemployment rates of 4.38%, 4.58%, and 2.56%, respectively. In the intervening period, Poland and Slovakia reported persistently high unemployment rates of 20.0% and 18.8%. Conversely, Ireland and the UK maintained low unemployment rates of 4.72% and 5.18%, reflecting effective labor market conditions.

The pandemic further amplified unemployment inequalities, with Greece's rate escalating to 16.2% and Spain to 15.2%. In stark contrast, the Czech Republic exhibited a low average Unemployment Rates of 2.7%, indicating a notably stable labor market. Throughout these periods of economic volatility, the United States maintained a UR of 5.78%. This consistency was observed despite a higher UR during the Great Recession at 7.5% and a pandemic rate of 6.7%. Prior to the pandemic, the United States. saw a declining trend in unemployment rate reaching about 3.5%.

In a comparative analysis of unemployment rate trajectories spanning from 2002 to 2021, Greece, Spain, and Slovakia exhibited elevated unemployment rates, averaging 16.3%, 16.2%, and 12.1% respectively. In contrast, Norway, Switzerland, Iceland, and Luxembourg displayed consistently lower unemployment rates, with averages of 3.96%, 4.73%, 4.81%, and 5.14%, respectively.

In conclusion, this analysis underscores marked declines in employment rates precipitated by the 2020 COVID-19 pandemic, with differential impacts discernible across countries. Comparatively, the 2020-2021 COVID-19 pandemic had a more profound effect on employment rates in certain countries than the 2008-2010 Great Recession, while others

registered comparable fluctuations during both crises. Notably, the pandemic imposed a more pronounced influence on unemployment rates than the economic downturn of 2008-2010. Throughout the duration of the Great Recession, countries such as Estonia, Greece, Latvia, Lithuania, Poland, Slovakia, and Spain encountered substantial unemployment challenges. Conversely, Austria, Denmark, Ireland, Luxembourg, the Netherlands, and Norway sustained unemployment rates below the 5% threshold, reflecting the resilience of their labor markets.

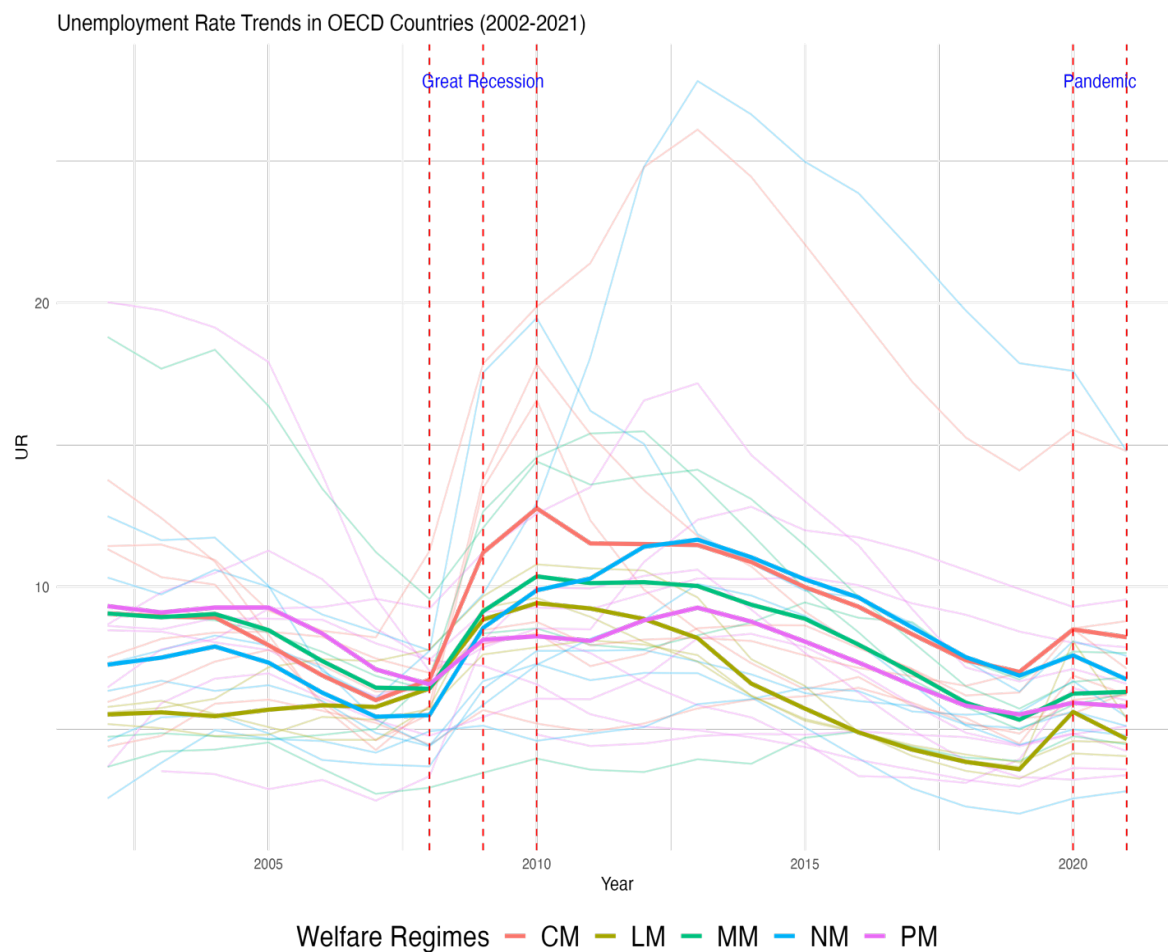


Figure 5. Comparative Analysis of Unemployment Rate

The analysis of unemployment rates (UR) across various welfare regimes during global events provides critical insights into the socio-economic impacts of these crises. The study focused on five welfare regimes: CM, LM, MM, NM, and PM, analyzing their mean URs during the 2008-10 Great Recession, the Pandemic, and an overall trend spanning from 2002 to 2021.

During the Great Recession, the unemployment trends varied across the welfare regimes, with the CM experiencing the highest average UR at 10.2%, indicating substantial labor market challenges. In contrast, the PM regime showed the lowest unemployment rate, averaging at 7.69%, reflecting relatively better labor market conditions during this period. The NM, MM, and LM regimes recorded URs of 7.98%, 8.64%, and 8.24%, respectively, suggesting varied impacts of the financial crisis on employment across these regimes.

A shift in unemployment trends was observed during the COVID-19 pandemic, where there was a general decrease in unemployment rates across all regimes. Notably, the LM and PM regimes showed the most significant decreases in unemployment rates, dropping to 5.12% and 5.86%, respectively. This reduction might be indicative of effective policy responses or structural economic resilience during the pandemic. The CM regime also saw a decrease in unemployment, recording an average UR of 8.37%. The NM, while showing a slight reduction, still had a relatively higher UR at 7.17% compared to the LM and PM regimes.

In analyzing the overall trend from 2002 to 2021, the CM had an average UR of 9.14%, suggesting a long-term challenge in maintaining low unemployment levels. The LM and MM had average URs of 6.20% and 8.13%, respectively, while the NM and PM showed closer averages of 8.37% and 7.73%, indicating moderate levels of unemployment over the two decades.

Health Disparity

During the pandemic, a substantial decline in life expectancy was observed across numerous countries. Prior to this period, the trend in life expectancy had been increasing from (T1) to (T3); however, a disconcerting decline of 0.233% was noted from T3 to T4. The data conspicuously highlight a pronounced decrease in life expectancy coinciding with the pandemic. The United States registered a reduction, by 2.04 years from 78.7 to 76.7 years, (approximately 745 days). Poland experienced a decrease in life expectancy of 1.51 years, declining from 77.5 to 76 years (approximately 552 days), while Slovakia reported a reduction of 1.14 years, from 76.9 to 75.8 years (approximately 416 days). The Czech Republic, Hungary, and the UK also encountered notable declines of 0.983 years, 0.867 years, and 0.600 years, respectively. Furthermore, Greece, Italy, Latvia, and Spain experienced additional reductions in life expectancy.

These reductions contrast starkly with the generally positive life expectancy trends before the pandemic, which were more in line with the increases noted during the Great Recession of 2008-2010. For example, Estonia's life expectancy surged by 2.82 years, Denmark and Norway posted gains of 2.52 and 2.25 years, respectively, and Ireland enjoyed an increase of 2.10 years. Lithuania's life expectancy rose by 2.02 years. Furthermore, Finland, Luxembourg, Latvia, Portugal, and Iceland all reported substantial increases ranging from 1.38 to 1.88 years.

The comparison of life expectancy trends before and during the pandemic highlights the varying responses and outcomes across OECD countries. It is evident that the Covid-19 pandemic has led to a more substantial decline in life expectancy compared to other periods.

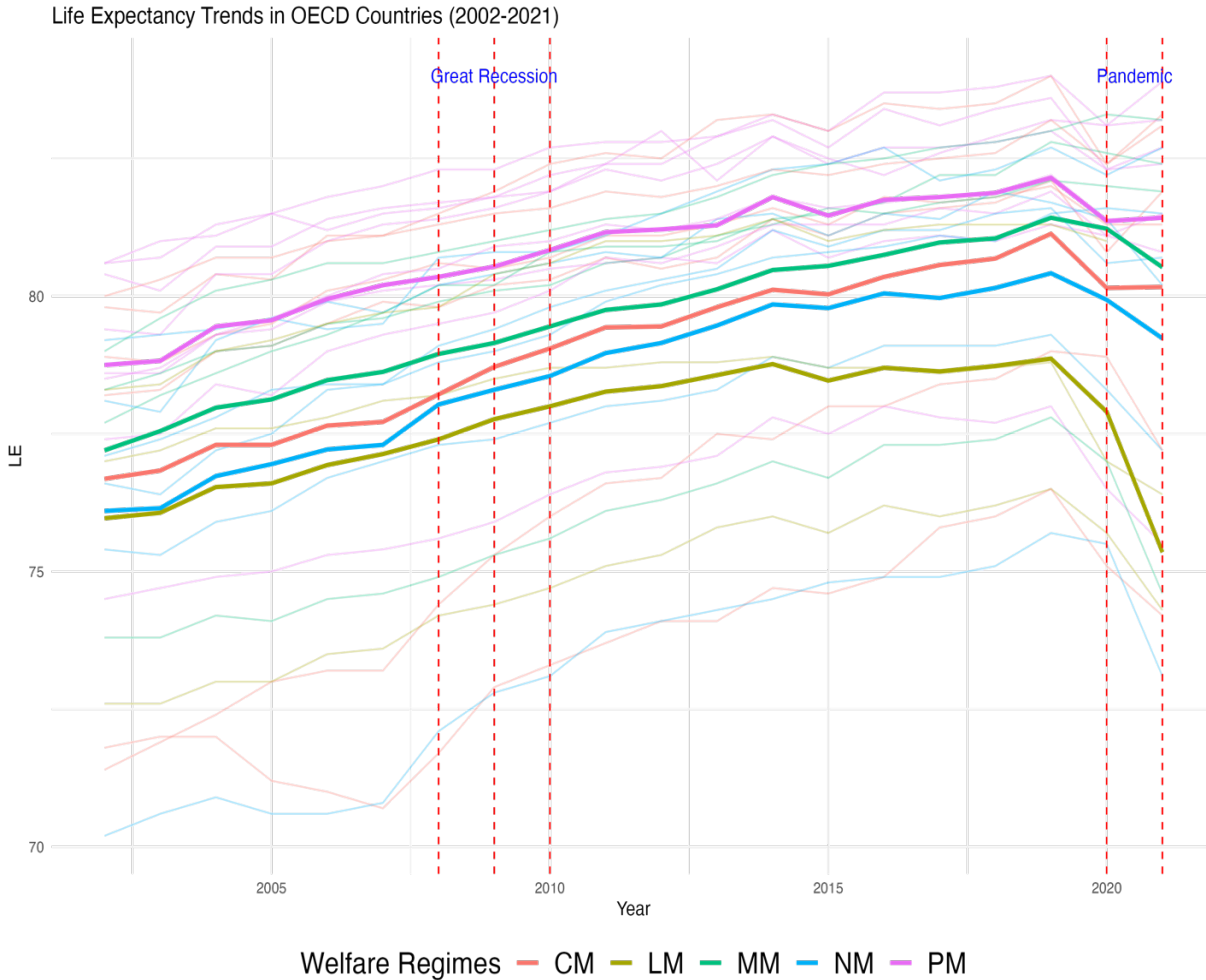


Figure 6. Comparative Analysis of Life Expectancy

Data from 2002 to 2021 indicates that Switzerland has the highest life expectancy at 82.6 years, with Italy, Spain, Iceland, France, and Sweden also reporting averages above 81 years. Conversely, the lowest life expectancies are in Latvia (73.1 years) and Lithuania (73.5 years), followed by Hungary, Slovakia, and Estonia.

Following this, the Infant Mortality rate was examined. The examination of the Infant Mortality Rate across OECD countries over the span of two decades reveals a general trend of improvement, with most countries experiencing a decline in infant mortality. Iceland's Infant Mortality Rate escalated substantially during this period, increasing from 1.59 to 3.1. On the

other hand, France and the Netherlands saw minor reductions in their Infant Mortality Rates, indicating some improvements in factors influencing infant mortality. The UK and Slovakia also experience declines in Infant Mortality Rates.

Data analysis indicates that Austria, Spain, and Sweden have seen declines in their Infant Mortality Rates. Conversely, Germany's increase in Infant Mortality Rate by 0.261 stands in contrast to this pattern. Compared to the higher Infant Mortality Rate recorded during the Great Recession, such as those in Austria and Spain, the variations during the pandemic period are distinct. Iceland's considerable rise in Infant Mortality Rate notably contrasts with the prevailing trend of declining infant mortality rates seen in other OECD countries.

The decline in infant mortality rates across OECD countries, notable from 2011 to 2019, faced a potential setback during the COVID-19 pandemic. While some countries sustained improvements, the pandemic halted progress in others. Estonia, Latvia, and Lithuania, however, exemplified resilience by continuing to reduce infant mortality rates amidst these global health challenges. In contrast, during the pandemic, countries such as France and Greece experienced a modest uptick in infant mortality rates, diverging from previous years' trends. The period before the pandemic was marked by considerable reductions in infant mortality; however, the pandemic has disrupted this positive trajectory, leading to stagnation or even regression in some cases.

Analyzing the life expectancy (LE) trends across various welfare regimes during the Great Recession and the COVID-19 Pandemic, alongside the overall trend from 2002 to 2021, reveals a critical pattern, particularly in the context of the pandemic's impact. The study encompasses five regimes: Conservative (CM), Liberal (LM), Mediterranean (MM), Nordic (NM), and Post-communist (PM).

During the Great Recession, the life expectancy figures were relatively stable across the regimes. The PM reported the highest average LE at 80.6 years, indicating robust health outcomes, while the lowest was observed in the LM at 77.7 years. The onset of the COVID-19 pandemic, however, marked a major shift. Contrary to the usual expectation of continual improvement in life expectancy, several regimes experienced a decline or stagnation, which is indicative of the pandemic's severe impact on global health.

Notably, the LM saw a decrease in life expectancy, dropping to 76.9 years. The CM and MM regimes, while experiencing an increase to 80.2 and 80.9 years, respectively, must be viewed in the context of the broader pandemic impact. Such increases could potentially be attributed to factors unrelated to the pandemic, or perhaps to successful health interventions or demographic changes. The NM regime, often known for high-quality healthcare systems, saw a slight increase to 79.6 years, but this too warrants a critical examination within the broader pandemic context. The PM maintained a trend of high life expectancy, increasing to 81.4 years, which could reflect certain resilience factors or demographic trends in these countries.

The overall trend from 2002 to 2021 shows a general improvement in life expectancy across all regimes. This long-term view, however, is nuanced by the interruptions in life expectancy improvements during the pandemic.

This analysis underscores the pandemic's profound impact on health outcomes, challenging the previously steady progress in life expectancy. The varied responses and outcomes across different welfare regimes highlight the complex interplay of healthcare systems, and policy responses in addressing unprecedented health crises.

In the comparative analysis of infant mortality rates across OECD countries, the United States exhibits the highest IMR at 6.23, followed by Latvia at 5.88, and Poland at 5.06. Lithuania and Luxembourg both record an IMR of 5.02, and Hungary reports a rate of 4.97. The UK's infant mortality rates stand at 4.34. Conversely, Iceland presents the lowest IMR at 2.00, with Finland at 2.38 and Sweden at 2.50. Slovakia, Norway, and the Czech Republic report mean infant mortality rates below 3, at 2.59, 2.60, and 2.89 respectively. Italy marks the lower end of the range with an infant mortality rate of 3.00, indicating substantial variation across the OECD.

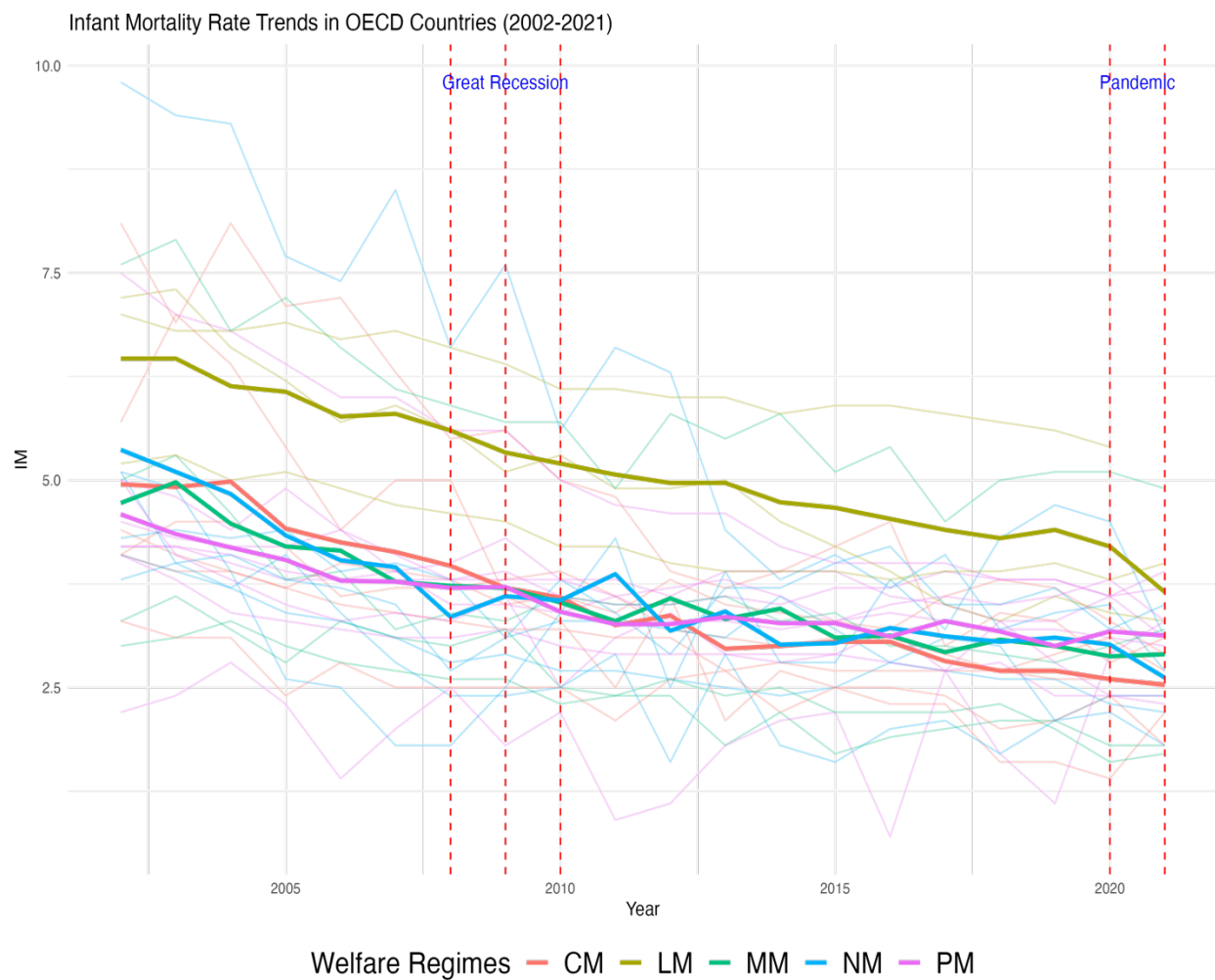


Figure 7. Comparative Analysis of Infant Mortality

The analysis of infant mortality rates across different welfare regimes over two periods, the Great Recession and the COVID-19 Pandemic, and the overall trend from 2002 to 2021, provides a comparative insight into the varying health outcomes for infants across these regimes.

In the period of the 2008-10 Great Recession, the highest average infant mortality was observed in the LM at 5.38, indicating substantial challenges in infant mortality rates. The lowest rates were noted in the NM at 3.5, suggesting more effective health measures for infants. The CM, MM, and PM showed closely aligned rates, with 3.75, 3.65, and 3.61, respectively.

During the pandemic, the LM regime, despite still having the highest rate, showed a substantial decrease in infant mortality to 3.98. The CM regime experienced the most substantial decrease, with the average infant mortality rate dropping to 2.57. The CM experienced the most substantial decrease, with the average IM dropping to 2.57.

The overall trend from 2002 to 2021 reveals that the PM and CM regimes had the lowest average IM rates at 3.54 and 3.55. The NM and MM regimes displayed slightly higher rates at 3.64 and 3.60.

This comparative analysis highlights the varying impacts of the Covid pandemic on infant health outcomes across different welfare regimes. Notably, the LM regime demonstrated substantial progress in reducing infant mortality rates. This variation underscores the differing effectiveness of health policies and interventions across these regimes.

In summary, the exploration of income, labor force, and health inequality trajectories across OECD countries unveiled diverse outcomes when comparing across the two global disruptions of the 2008-10 Great Recession and the 2020-21 Covid-19 Pandemic.

An analysis of the Gini index reveals substantial fluctuations across OECD countries. During the pandemic, United States and Estonia experienced the most pronounced increases in

their Gini indices. In contrast, during the Great Recession, the United States, Latvia and Italy observed more substantial escalations in income inequality.

The analysis of labor force inequality focused on the Employment and Unemployment Rates. Marked declines in Employment rate were documented during both the Great Recession and the Covid-19 pandemic, with varied impacts across countries. While some countries faced a more pronounced effect on their Employment rates during the pandemic, others showed similar trends between the two crises.

Health inequality was assessed by examining Life Expectancy and Infant Mortality Rate across OECD countries. Countries like United States, Poland and Slovakia, experienced meaningful declines in Life expectancy during the pandemic, with this period witnessing a more considerable decrease in Life expectancy. Infant mortality rate generally followed a downward trend from 2002, with the most substantial improvements before the pandemic. However, the rate of improvement decelerated or reversed for some countries during the pandemic. The Great Recession did not exert a lasting negative impact on Infant Mortality rate, but the pandemic halted or reversed progress in some OECD countries, hinting at a more substantial effect.

In the next section, The Mixed Model reveal the divergent influence of the Covid-19 Pandemic and the Great Recession on these inequality facets across OECD countries.

Country-Level Inequality Variations

This study utilized a mixed-effects model to assess the impact of the Covid-19 Pandemic and the Great Recession on income, labor, and health disparities across OECD countries. The model incorporated random effects to account for variations within countries, facilitating a detailed analysis of unique inequality trends in each country. Fixed effects, including time segments (T1-T4), were employed to identify consistent, overarching trends throughout all countries over the time periods. By combining random effects and fixed effects analyses with the temporal dynamics captured through the year slope, the study increased the accuracy of its findings, offering a comprehensive insight into the evolution of inequality in response to these major global crises.

Income Inequality

Table 2 presents the results of the Gini index, revealing disparities in income inequality across OECD countries over specific timeframes: the Great Recession (T2), the intervening years (T3), and the Pandemic (T4). GDP is incorporated as a control variable to provide a comprehensive perspective of each country's economic standing.

Before presenting the primary outcomes associated with the Gini index, multicollinearity was evaluated. VIF values for the predictors—GDP (1.22), T2 (1.29), T3 (1.56), and T4 (1.39)—indicate no evident multicollinearity, as all values are comfortably below the threshold of concern, typically cited as 10. Additionally, the random effects structure of the model underwent diagnostic checks to confirm its validity in capturing the variability of inequality trajectories across OECD countries.

The model integrates random effects to account for variations in the Gini index unique to each country, highlighting distinct factors that influence income inequality. The variance of the random intercept is 0.003, with a SD of 0.051, indicating notable differences in average Gini indexes across OECD countries. This underscores the country-specific impact on income inequality. Additionally, a significant correlation of 0.25 between the country-specific intercepts and their time slopes suggests that countries with a higher initial Gini index often see a more pronounced change over time periods. The residual variance, at 0.001 (SD: 0.024), represents the unexplained variation in the Gini index. This value, though higher than in the previous model, still suggests that the predictors, including the random effects, account for a substantial part of the variation in income inequality.

The REML criterion at convergence for the model stands at -2268, hinting at a good model fit. The distribution of scaled residuals, with a minimum value of -3.786, and a maximum value of 4.918, further verifies the model's robustness and validates its assumptions.

Turning to the fixed effects, the intercept estimates of 0.355 (SE: 0.011) is significantly different from zero ($p < 2e-16$), suggesting a non-zero average Gini index across countries. T2 referring to the 2008-10 Great Recession, and T4 referring to the Covid-19 Pandemic all show positive relationships with the Gini index, suggesting an increase in income inequality during the Great Recession and pandemic periods. T2 (Estimate: 0.016, SE: 0.004, $p = 1.4e-05$), and T4 (Estimate: 0.016, SE: 0.008, $p = 0.0455$) indicate significant effects, with the pandemic era showing a statistically significant impact.

Lastly, the GDP estimate of 0.015 (SE: 0.005, $p = 0.0062$) suggests a positive relationship with the Gini index.

Table 2. Mixed-Effects Model Analysis Results for Gini Index

Fixed Effects						
Variable	Estimate	Std Error	df	t value	Pr(> t)	Sig
(Intercept)	0.355	0.011	28.850	32.01	< 2e-16	***
GDP	0.015	0.005	186.570	2.77	0.0062	**
T2	0.016	0.004	507.390	4.39	1.4e-05	***
T3	-0.001	0.005	334.970	-0.14	0.888	
T4	0.016	0.008	383.120	2.01	0.0455	*
Random Effect						
Group	Name	Variance	Std Dev	Corr		
Country	Intercept	0.003	0.051			
	Year	0.000	0.019	0.25		
Residual		0.001	0.024			
Obs.	540					

Sig: ***< 0.001; ** < 0.01; * < 0.05

Figure 8, expanding on Table 2's findings, displaying the positive relationship between GDP, and T2, and T4 relative to T1 with the Gini index.

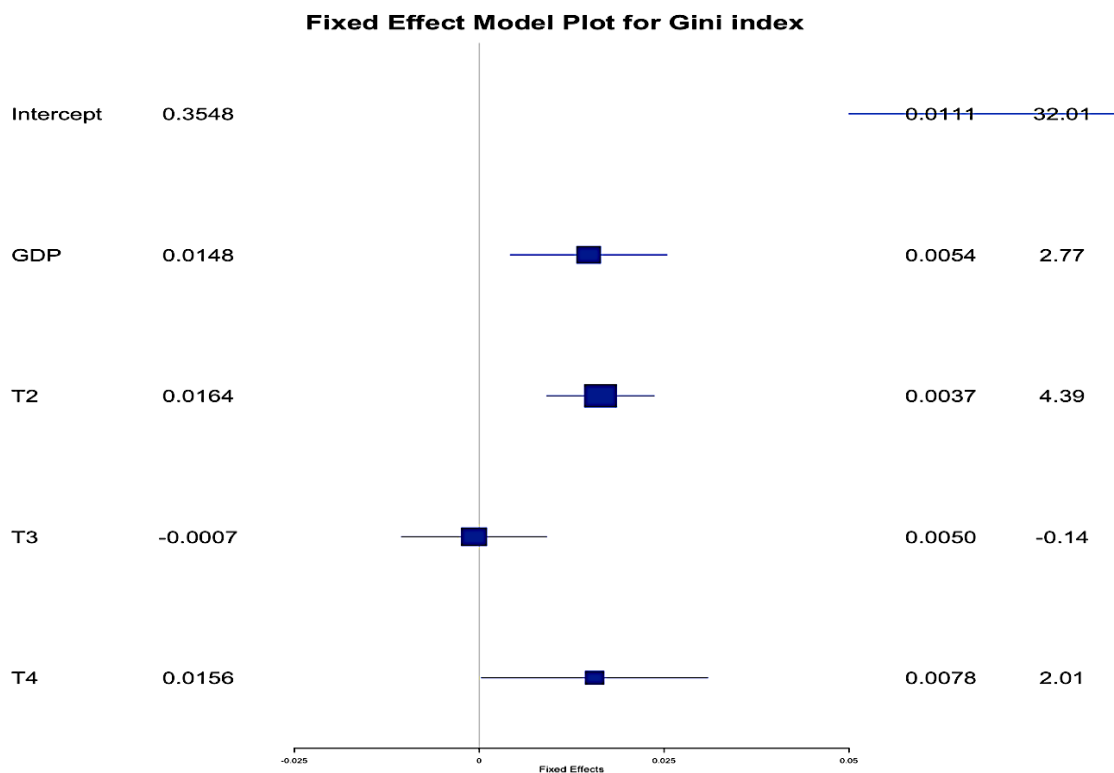


Figure 8. Mixed Model Plot for Gini Index

Evaluating Hypothesis (H1)

The examination of Hypothesis 1 assesses variances in the impacts of the Great Recession and the COVID-19 Pandemic on income inequality across OECD countries. Analysis from Table 2 reveals a clear divergence in the impacts of these two crises on income inequality. These findings support the alternative hypothesis, indicating that the Great Recession and the Pandemic had significant and distinct effects on income inequality in OECD countries, leading to varied patterns in income distribution as a result of each crisis.

Labor Force Inequality

Table 3 tests for the relationship between the Employment Rate (ER) and defined time periods. In the preliminary analysis of the employment rate model, multicollinearity was examined. The VIF values for the predictors were found to be GDP (1.21), T2 (1.32), T3 (1.60), and T4 (1.41). The model's random effects structure underwent diagnostic checks, confirming its appropriateness in capturing variations in exchange rate trajectories across countries.

The model uses random effects to encapsulate the inherent variability in the ER across various countries, thus highlighting the country-specific impacts on employment. The variance for the random intercept is 42.48 (SD: 6.52), signifying substantial variability in the average employment rates across OECD countries. This aligns with the research question's focus on variations across different countries.

The residual variance, calculated as 2.67 (SD: 1.64), represents the unexplained variation in the employment rate, indicating that a significant portion of the employment rate variance is captured by the model. The REML criterion at convergence for the model stands at 2264, suggesting a satisfactory model fit. The distribution of scaled residuals, ranging from a minimum

of -3.463 to a maximum of 3.237, further affirms the model's robustness and validates its assumptions.

The model's intercept presents an estimate of 69.947 with a SE of 1.208, which is statistically highly significant ($p < 2e-16$). The T2, T3, and T4 variables all display negative relationships with the Employment Rate, suggesting reductions in the employment rate during the Great Recession and pandemic periods. The estimates for T2 (Estimate: -2.322, SE: 0.267, $p < 2e-16$), T3 (Estimate: -4.036, SE: 0.377, $p < 2e-16$), and T4 (Estimate: -4.954, SE: 0.575, $p < 2e-16$) are significantly different from zero, indicating negative effects. The pandemic era and intervening time show the strongest impact on the employment rate.

Finally, the GDP estimate of 5.957 (SE: 0.439, $p < 2e-16$) demonstrates a highly significant positive relationship with the Employment Rate. In conclusion, the random effects when modeling the employment rate reveal considerable variability in the impact of the Great Recession and pandemic on employment rates across OECD countries.

Table 3. Mixed Model Analysis Results for Employment Rate

Fixed Effects:						
Variable	Estimate	Std Error	df	t value	Pr(> t)	Sig.
Intercept	69.947	1.208	27.176	57.90	< 2e-16	***
GDP	5.957	0.439	268.663	13.57	<2e-16	***
T2	-2.322	0.267	497.101	-8.71	<2e-16	***
T3	-4.036	0.377	394.555	-10.71	<2e-16	***
T4	-4.954	0.575	429.239	-8.61	<2e-16	***
Random Effect						
Group	Name	Variance	Std Dev	Corr		
Country	Intercept	42.48	6.52	0.32		
	Year	5.45	2.34			
Residual		2.67	1.64			
Observation	528					
Sig: *** p < 0.001						

Figure 9 provides a visual representation to intuitively understand the predictors' impact on the employment rate.

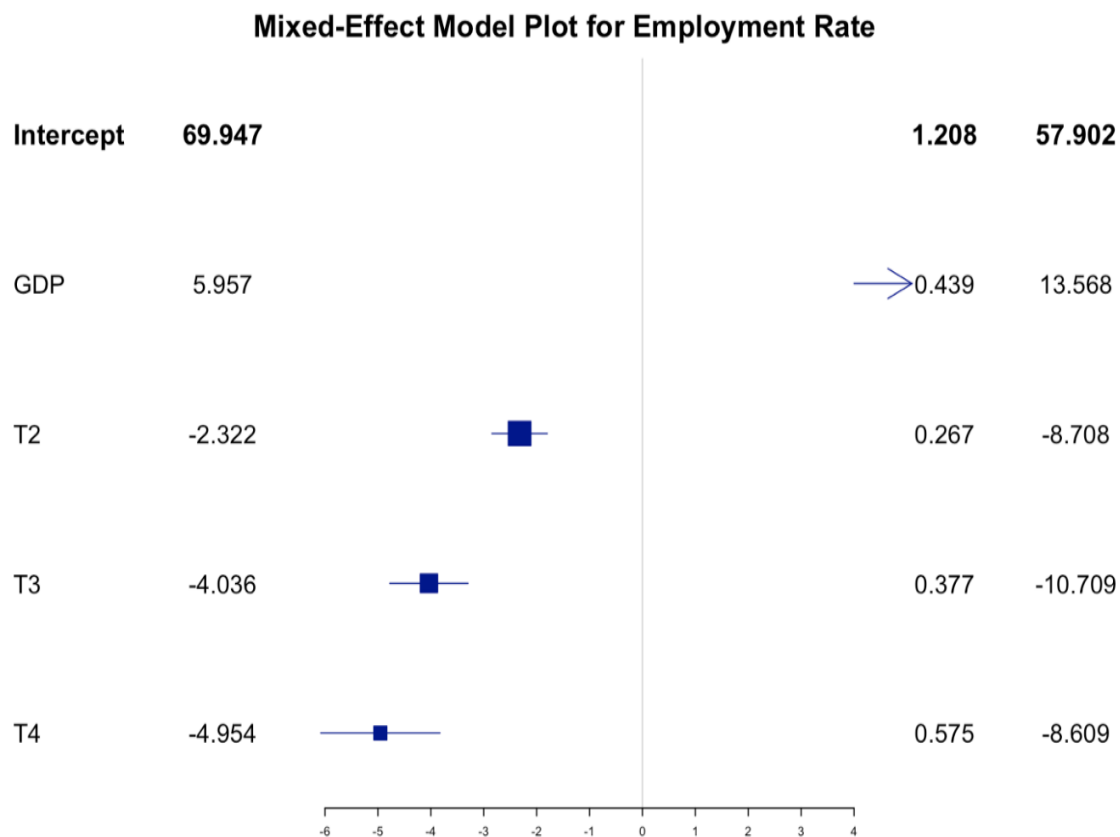


Figure 9. Mixed Effect Model Plot of Employment Rate

Table 4 investigates the relationship between the Unemployment Rate (UR) and the designated time periods (T2, T3, T4). With GDP introduced as a control variable, it provides a more nuanced perspective on the unemployment rate during these periods. For the Unemployment Rate, I first checked for multicollinearity. The VIF values were GDP (1.23), T2 (1.30), T3 (1.59), and T4 (1.41). These values, being below the threshold of 10, ensure the model's robustness against multicollinearity. The random effects structure of the model was also

validated through diagnostics, ensuring it accounts for potential differences in unemployment rate trajectories across countries.

Random effects in the model encapsulate the inherent variability in the Unemployment Rate across different countries, demonstrating the country-specific influences on unemployment. The variance for the random intercept is 14.20 (SD: 3.77), indicating substantial variability in average unemployment rates across the countries. This aligns with the research question's focus on variations across different countries.

The residual variance, calculated as 3.92 (SD: 1.98), denotes the unexplained variation in the Unemployment Rate. This suggests a significant proportion of the Unemployment Rate variance is captured by the model. The REML criterion at convergence stands at 2402, suggesting a satisfactory model fit. The distribution of scaled residuals, ranging from a minimum of -3.593 to a maximum of 4.400, further supports the model's validity and the robustness of its assumptions.

The intercept estimate of 13.224 (SE: 0.651) is significantly different from zero ($p < 2e-16$), indicating a non-zero average unemployment rate across countries.

Each of the time periods (T2, T3, and T4) shows a positive relationship with the Unemployment Rate, suggesting increases in unemployment rate during these periods. The estimates for T2 (Estimate: 2.597, SE: 0.318, $p < 2.8e-15$), T3 (Estimate: 4.783, SE: 0.428, $p < 2e-16$), and T4 (Estimate: 5.483, SE: 0.655, $p < 1.3e-15$) are significantly different from zero, indicating their significant effects. It is noteworthy that the pandemic era (T4) seems to have a stronger impact on the Unemployment Rate than the Great Recession, as evidenced by the higher estimate value for pandemic. Lastly, the GDP estimate of -5.086 (SE: 2.738, $p < 2e-16$)

demonstrates a highly significant negative relationship with the UR, underlining the inverse relationship between economic prosperity and unemployment.

In conclusion, the random effects presented in Table 4 show considerable variability in the impact of the Great Recession and pandemic on unemployment rates across OECD countries.

Table 4. Mixed Model Analysis Results for Unemployment Rate

Fixed Effects						
Variable	Estimate	Std Error	df	t value	Pr(> t)	Sig.
(Intercept)	4.767	0.569	29.184	8.38	2.9e-09	***
GDP	-5.086	2.738	131.700	-12.39	<2e-16	***
T2	2.597	0.318	499.469	8.16	2.8e-15	***
T3	4.783	0.428	324.504	11.19	< 2e-16	***
T4	5.483	0.655	362.372	8.36	1.3e-15	***
Random Effects						
Group	Name	Variance	Std Dev	Corr		
Country	Intercept	14.20	3.77			
	Year	3.61	1.98	0.76		
Residual		3.92	1.98			
Observation	531					

Sig: *** $p < 0.001$

Figure 10 delineates the trends, providing a lucid perspective on the interplay of predictors and their impact within the Mixed Effect Model Plot for the Unemployment Rate.



Figure 10. Mixed Effect Model Plot for Unemployment Rate

Evaluating Hypothesis (H2)

The evaluation of Hypothesis 2 examines labor force inequalities during the pandemic, specifically focusing on variations in employment and unemployment rates across OECD countries. Data from Tables 3 and 4 reveal substantial disparities in these labor force indicators. The findings underscore significant differences in employment rates and confirm the impactful variations caused by both the Great Recession and the pandemic on labor market inequalities across OECD countries. These results support the alternative hypothesis, indicating significant variations in labor force inequality trajectories across OECD countries.

Health inequality

Table 5 presents the results of Life Expectancy (LE). It brings additional dimensions to the understanding of Life expectancy by using GDP as a control variable. In Life expectancy model, multicollinearity was assessed with VIF values for predictors: GDP (1.22), T2 (1.29), T3 (1.56), and T4 (1.38). The model's random effects structure was also subjected to diagnostic checks, confirming its capability to capture variations in life expectancy trajectories across different countries.

The random effects encapsulate the inherent variability in life expectancy across different countries, thereby highlighting the country-specific influences on life expectancy. The variance for the random intercept is 12.623 (SD: 3.553), showing substantial variability in average life expectancy across the countries.

The residual variance is 0.150 (SD: 0.387), which indicates that the unexplained variation in life expectancy is relatively small, hence the model fits the data quite well. The REML criterion at convergence stands at 824, suggesting a good model fit. The distribution of scaled residuals, with a range from a minimum of -5.046 to a maximum of 2.723 further supports the model's assumptions and its goodness of fit. The intercept estimate of 81.3181 (SE: 0.534) is significantly different from zero ($p < 2e-16$), suggesting a non-zero average Life Expectancy across countries.

Examining the time periods, the Great Recession period shows a positive relationship with life expectancy (Estimate: 0.556, SE: 0.0643, $p < 2e-16$), suggesting an increase in life expectancy during this period. The period (T3) also shows a positive relationship with LE (Estimate: 0.837, SE: 0.0952, $p < 2e-16$), implying an increase in life expectancy before the pandemic. In contrast, the pandemic demonstrated a negative relationship with LE (Estimate: -

0.2612, SE: 0.1439, $p = 0.070$), indicating a potential decrease in life expectancy during the pandemic, which is marginally significant.

Similarly, GDP exhibits a positive relationship with life expectancy (Estimate: 1.903, SE: 0.1134, $p = 0.094$). This relationship underscores the association between economic prosperity and higher life expectancy, and it is also marginally significant. In conclusion, the findings highlight significant variability in the impact of the Great Recession and pandemic on life expectancy.

Table 5. Mixed Model Analysis Results for Life Expectancy

Fixed Effects:						
Variable	Estimate	Std Error	df	t value	Pr(> t)	Sig.
(Intercept)	81.318	0.5340	27.1534	152.3	< 2e-16	***
GDP	1.903	0.1134	330.4863	1.68	0.094	.
T2	0.556	0.0643	500.7233	8.64	<2e-16	***
T3	0.837	0.0952	498.2098	8.79	<2e-16	***
T4	-0.261	0.1439	505.0049	-1.82	0.070	.
Random						
Group	Name	Variance	Std. Dev.	Corr		
Country	Intercept	12.623	3.553			
	Year	0.914	0.956	-0.73		
Residual		0.150	0.387			
Observation	539					

Sig: *** $p < 0.001$; + $p < 0.1$

Figure 11 provides a clear graphical depiction of the relationships at play, elucidating the influence of the predictors on life expectancy.



Figure 11. Mixed Effect Model Plot for Life Expectancy

Table 6 presets the relationship between Infant Mortality and different time periods. GDP is included as a control variable. Before delving into the Infant Mortality model's results, we checked for multicollinearity. The VIF values for the predictors were: GDP (1.21), T2 (1.29), T3 (1.56), and T4 (1.37). These values, being well below the threshold of 10, confirm the model's robustness. Moreover, the model's random effects structure underwent diagnostic validation, ensuring it aptly captures variations in infant mortality trajectories across countries.

The random effects highlight the variability in Infant Mortality across different countries, suggesting country-specific factors influence the Infant Mortality. The variance for the random intercept is 1.219 (SD: 1.104), reflecting significant differences in average Infant Mortality across the countries. The residual variance is 0.155 (SD: 0.394), indicating that the unexplained variation in IM is relatively small, suggesting the model fits the data quite well.

The REML criterion at convergence stands at 770, indicating a good model fit. The distribution of scaled residuals, ranging from a minimum of -4.188 to a maximum of 4.368 further supports the model's assumptions and its goodness of fit.

In the fixed effects analysis, the intercept estimate stands at 3.739, with a SE of 0.2138, which is significantly different from zero, indicating a consistent baseline infant mortality rate across the countries examined. Result also shows the Great Recession period shows a significant negative relationship with infant mortality rate (Estimate: -0.426, SE: 0.064, $p < 8.8e-11$), indicating a decrease in infant mortality during this period. The intervening time (T3) also shows a significant negative relationship with infant mortality (Estimate: -0.451, SE: 0.092, $p < 1.4e-06$), implying a decrease in infant mortality before the pandemic.

During the pandemic period (T4), a significant negative association with infant mortality was observed (Estimate: -0.301, SE: 0.140, $p = 0.032$). This indicates a continued reduction in infant mortality rates throughout the pandemic. However, this effect is less pronounced when compared to the reduction observed during the Great Recession period, as reflected by a lower coefficient magnitude.

Finally, GDP has a significant negative relationship with infant mortality (Estimate: -0.253, SE: 0.0957, $p = 0.009$), suggesting that economic prosperity might be associated with lower infant mortality rates.

Table 6. Mixed Model Analysis Results for Infant Mortality Rate

Fixed Effects:						
Variable	Estimate	Std Error	df	t value	Pr(> t)	Sig
(Intercept)	3.739	0.2138	37.251	17.49	< 2e-16	***
GDP	-0.253	0.0957	182.707	-2.64	0.009	**
T2	-0.426	0.064	507.988	-6.63	8.8e-11	***
T3	-0.451	0.092	419.501	-4.90	1.4e-06	***
T4	-0.301	0.140	445.188	-2.15	0.032	*
Random						
Group	Name	Variance	Std Dev	Corr		
Country	Intercept	1.219	1.104			
	Year	0.382	0.618	-0.51		
Residual		0.155	0.394			
Observation	539					
Sig: *** p < 0.001; ** p < 0.01; * p < 0.05						

Figure 12 displays a plot of the Infant Mortality Rate, illustrating its trend.

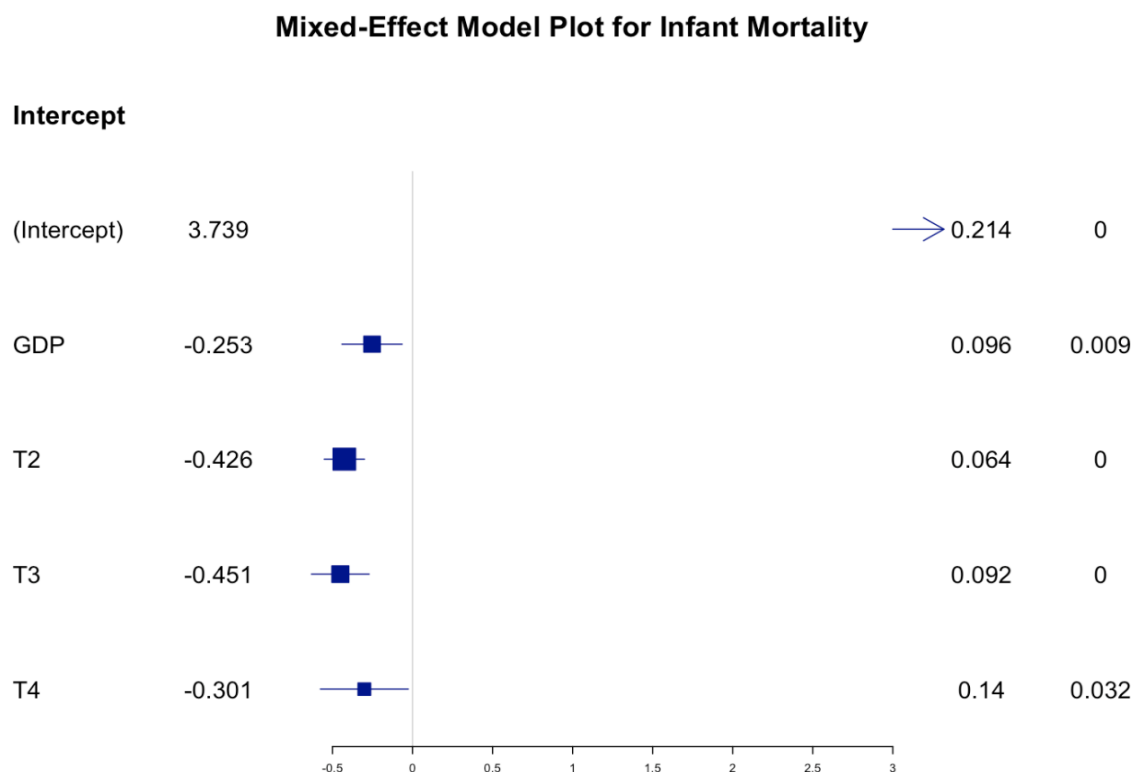


Figure 12. Mixed Model Plot of Infant Mortality Rate

Evaluating Hypothesis 3

The analysis reveals significant variations between the impacts of the Great Recession and the COVID-19 pandemic on health inequalities. Specifically, during the Great Recession, life expectancy improved, and infant mortality rates substantially decreased. In contrast, during the pandemic, life expectancy slightly declined, and the reduction in infant mortality, though significant, was less pronounced than previously. These findings confirm the alternative hypothesis, indicating distinct effects on health outcomes across OECD countries and highlighting divergent health inequality trajectories during these periods.

In summary, the evidence gathered from these interconnected models collectively substantiates the significant impact that global crises have had on income, labor force, and health inequalities. This conclusion aligns with findings from the Exploratory Data Analysis of time series data, further highlighting the disparities across OECD countries. These observations underscore a marked divergence in these key variables, emphasizing the varied effects of global events across OECD countries.

Discussion

This study investigates the distinct impacts of the Great Recession and the Covid-19 pandemic on income, labor force participation, and health inequalities across OECD countries. It identifies significant variations in income inequality during these periods, differing substantially across countries. This underscores the crucial role of socioeconomic factors in shaping health disparities. In alignment with these findings, Thomson et al. (2018), emphasize the strong linkage between socioeconomic determinants and income disparities. They highlight the importance of policy measures in addressing income inequality as a principal determinant of

health disparities, a viewpoint further supported by Miladinov (2020). Corroborating this perspective, (Smith 2020) articulates how exogenous shocks, such as pandemics, not only create but also magnify pre-existing inequalities, making an imperative case for robust and equitable economic policies.

Regarding labor force inequality, the research reveals significant heterogeneity in the impacts on employment and unemployment metrics during the pandemic. These differences can be analyzed within the framework of Institutional Theory and Skill-Biased Technological Change Theory. The noted variations might stem from distinct labor force regulations, varying degrees of social protection (Volscho and Kelly 2012), and uneven paces of technological progression, potentially disadvantaging individuals without the necessary digital competencies (Mishel, Schmitt and Shierholz 2013, Piacentini et al. 2022).

Examining different time periods reveals that the Great Recession correlates positively with an increase in life expectancy, a finding supported by Kristjuhan and Taidre (2012). Additionally, this study indicates a significant negative relationship between the Great Recession and the infant mortality rate. This aligns with research by Strumpf et al. (2017), which observed a decrease in all-cause mortality, including infant mortality, in the metropolitan United States during the same period. These results collectively suggest that despite economic hardships, some health outcomes, like life expectancy and infant mortality, may improve in times of economic recession in developed countries.

This study highlights the crucial role of GDP in addressing various aspects of inequality across OECD countries. It identifies GDP as a key mediating variable, emphasizing the importance of economic stability in mitigating inequality's impacts. However, the relationship between inequality and economic growth is both substantial and intricate, affected by a wide

range of factors (Cingano 2014a, Thomson et al. 2018). Moreover, the findings reveal that GDP is inversely related to infant mortality and positively associated with life expectancy, aligning with previous research (Miladinov 2020, Schwartz, Franco and Campbell 2023). Specifically, these results contribute additional insights to earlier studies, such as the one focusing on the connection between health and GDP across 13 OECD countries over the last two centuries. It was found that GDP significantly influences life expectancy in most of these countries (Miladinov 2020).

This research affirms the significant and differential ramifications of the pandemic on income, labor force, and health inequalities across OECD countries, aligning with projections by OECD (2021a) that the pandemic's repercussions possess a pronounced territorial dimension, exhibiting disparities in impacts and long-term effects across various countries. These divergences underscore the potential role of institutional structures (Bhardwaj 2018, Ibrahim and Moberg 2020) and the consequence of skill-biased technological change (Allison et al. 2014, Thévenot 2017, Van Reenen 2011) in escalating these inequalities.

In shifting focus to health inequality, the research sheds light on the role of institutional structures, particularly healthcare systems and social safety nets, in contributing to the observed differences. The resilience and adaptability of a country's health system to navigate crises like a pandemic, along with socio-economic influences, emerge as pivotal determinants of health outcomes (Bambra, Lynch and Smith 2021, Carreras, Vera and Visconti 2021, Goldin 2021, Leach et al. 2021).

The complex interplay between income, labor force, and health inequalities suggests that those with lower incomes or unstable employment could experience more severe health consequences during a pandemic. This contradicts Scheidel's (2017) assertion that significant

epidemics serve as ‘levelers’ by reducing societal inequalities. Instead, current findings indicate that the pandemic seems to heighten socio-economic disparities. However, these results reflect the current state during the pandemic and do not entirely refute Scheidel's theory for a post-pandemic context. With appropriate policy and interventions post-pandemic, there is a possibility of mitigating or even eradicating these heightened inequalities, which could potentially align with Scheidel's longer-term perspective.

Conclusion

This chapter investigates the complex effects of global crises on three key dimensions of inequality—income, labor force, and health—across OECD countries. The study uncovers substantial variations in the trajectories of these inequalities. Specifically, the Gini Index indicated significant increases in income inequality during the pandemic. The evidence from the mixed-effects model confirms the pandemic's diverse impact on income, labor, and health, supporting the hypothesis that both the Great Recession and the Covid-19 pandemic have had significant yet varied effects on each dimension of inequality.

Detailed findings from the mixed-effects model analysis elucidate how economic dynamics interact with disparities across these measures. There is a positive correlation between GDP growth and increases in income inequality, evidenced by rising Gini Index values during both the Great Recession and the pandemic, pointing to worsened economic disparities.

Labor market analysis reveals that GDP growth leads to higher employment rates, while economic downturns during the Great Recession and pandemic lead to significant declines in employment and increases in unemployment, demonstrating the labor market's susceptibility to economic fluctuations.

In the health sector, while GDP growth typically boosts life expectancy, the recessionary periods have mixed effects on health outcomes. For instance, life expectancy unexpectedly improved during the Great Recession, yet declined during the pandemic. Similarly, while infant mortality rates generally improve with economic growth, they worsen during crises, with the pandemic's effects being somewhat less severe than those of the Great Recession.

These insights underscore the complex interplay between global crises and inequalities, indicating that economic shifts profoundly affect income distribution, employment stability, and health disparities.

Chapter 5: Welfare Regimes and Inequalities

Introduction

Unraveling the complex interplay between global crises, welfare regimes, and disparities in income, health, and labor force, this chapter embarks on an analytical expedition by addressing Hypothesis 4. Leveraging the GEE model, this research investigates the interaction effects between crises – specifically the Great Recession and the Pandemic – and varying OECD welfare regimes. The exploration is framed within two opposing hypotheses and navigates through the shifts in inequalities across different timelines and welfare regimes.

Welfare Regimes: Global Crises and Inequalities

To test Hypothesis 4, this study investigates if global crises have significantly impacted income, labor force, and health inequality trends between welfare regimes. Employing a GEE model, it assesses interaction effects of the Great Recession and the Pandemic across diverse regimes. The analysis reviews changes in the Gini index, employment and unemployment rates, life expectancy, and infant mortality rates across five welfare regimes during these crises.

The QIC is employed to assess the fit of GEE models, with lower values indicating a more accurate model fit. In the analysis, the models show low QIC values, suggesting a robust capture of the data's intrinsic patterns. Specifically, QIC values are reported as follows: 622 for the Gini Index, 452 for the Employment Rate, 463 for the Unemployment Rate, 573 for Life Expectancy, and 501 for Infant Mortality. These values underscore the models' effectiveness in reflecting underlying data trends. Due to its optimal QIC value, an autoregressive correlation structure of order 1 (AR1) was selected as the most appropriate for testing Hypothesis 4, which focuses on inequalities across welfare regimes. Building on these findings, the study further

probes Hypothesis 4, investigating whether the Great Recession and the Pandemic have significantly shifted trajectories of income, employment, and health inequalities between the welfare regimes.

Income Inequality

Table 7 analyzes disparities in the Gini index across various welfare regimes. The regression model starts with an intercept of -0.193 and an SE of 0.144, yielding a non-significant p-value of 0.181. The interaction terms during the Great Recession reveal significant impact, particularly in the PM, where a p-value of 0.018 indicates a meaningful impact on income inequality.

Focusing on main effect, the model reveals that the Great Recession had a significant effect, with an estimate of 0.356 and a p-value of 0.005. On the contrary, the effects of the pandemic show a positive but non-significant trend towards increasing income inequality, evidenced by a p-value of 0.110. Examining disparities across welfare regimes, the model illustrates significant variations in the Gini index. Welfare Regimes such as LM, CM, and PM show a notable increase in income inequality compared to other welfare regimes, indicating diverging trends in income distribution across different welfare regimes.

GDP is identified as a significant predictor of income inequality, with a strong p-value of 0.001, highlighting its considerable influence on economic disparities. This model is constructed with an AR1 correlation structure combined with an identity link function. The carefully chosen approach results in a scale parameter of 0.903 (SE=0.232) for the intercept, and a correlation parameter α of 0.957 (SE=0.0169). These values highlight the model's strength and flexibility in analyzing trends in income inequality.

Table 7. GEE Analysis of Gini Index

Variable	Estimate	Std.Err	Wald	Pr(> W)	Sig.
(Intercept)	-0.193	0.144	1.79	0.181	
T2	0.356	0.127	7.91	0.005	**
LM	1.137	0.514	4.89	0.027	*
CM	0.498	0.184	7.31	0.007	**
MM	0.005	0.167	39.07	4.1e-10	***
PM	0.684	0.334	4.19	0.041	*
T3	-0.009	0.136	0.00	0.946	
T4	0.259	0.162	2.56	0.110	
GDP	0.531	0.155	11.67	0.001	***
T2:LM	0.063	0.118	0.28	0.595	
T2:CM	0.151	0.152	0.98	0.322	
T2:MM	0.472	0.246	3.68	0.055	.
T2:PM	0.614	0.260	5.56	0.018	*
LM:T3	-0.165	0.201	0.67	0.411	
CM:T3	-0.134	0.072	0.67	0.061	.
MM:T3	0.538	0.072	3.51	0.411	
PM:T3	0.418	0.276	2.30	0.129	
LM:T4	-0.121	0.086	1.97	0.160	
CM:T4	0.360	0.216	2.77	0.096	.
MM:T4	0.403	0.196	4.25	0.039	*
PM:T4	0.500	0.277	3.27	0.071	.

Sig: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$

Labor Force Inequality

Table 8 examines employment rate, revealing a significant intercept coefficient of -18.26 with an SE of 1.41 ($p < 0.001$). The interaction analysis indicates that during the Great Recession, significant interactions occurred with LM ($p=0.000$) and CM ($p=0.012$). Conversely, throughout the pandemic, LM ($p=0.0486$) and CM ($p=0.0001$) maintained their significance in terms of impact. Furthermore, the interaction involving MM approached significance ($p=0.097$). These findings highlight the deep interconnections between global crises and employment, mediated through the existing welfare regimes. Notably, during the pandemic, welfare regimes typified by LM and CM were disproportionately affected.

The main effects show that the Great Recession significantly decreased the employment rate by an estimated 0.066 ($p=0.012$). Following this, the pandemic caused a sharp decline in employment rate, estimated at -0.239, with a highly significant p -value of $1.6e-05$. In comparisons of welfare regimes, the LM regime's decrease of -0.025 is not statistically significant ($p=0.947$). Similarly, the CM regime's estimate of -0.51 and the MM and PM regimes' estimates of -0.319 ($p=0.424$) and -0.050 ($p=0.905$), respectively, also lack statistical significance. GDP displaying a strong positive association with employment rate. The GEE model with AR1 correlation and identity link function offers a comprehensive framework to efficiently analyze variable interactions and effects.

Table 8. GEE Analysis of Employment Rate

Variable	Estimate	St. Err	Wald	Pr(> W)	Sig
(Intercept)	-18.26	1.416	10.27	0.001	**
T2	-0.066	0.024	7.36	0.0125	*
LM	-0.025	0.371	0.004	0.947	
CM	-0.51	0.448	1.29	0.255	
MM	-0.32	0.399	0.64	0.424	
PM	-0.05	0.423	0.014	0.905	
T3	-0.11	0.039	7.8	0.005	**
T4	-0.24	0.055	18.7	$1.6e-05$	***
GDP	1.79	0.16	125	$< 2e-16$	***
T2:LM	-0.14	0.038	14	0.000	***
T2:CM	-0.107	0.046	5.42	0.012	*
T2:MM	-0.054	0.050	1.2	0.274	
T2:PM	0.004	0.046	0.01	0.927	
LM:T3	-0.179	0.039	20.8	$5e-06$	***
CM:T3	-0.097	0.091	1.13	0.287	
MM:T3	-0.135	0.10	1.81	0.178	
PM:T3	-0.016	0.053	0.09	0.77	
LM:T4	-0.36	0.183	3.89	0.0486	*
CM:T4	-0.27	0.078	12.1	0.001	**
MM:T4	-0.314	0.189	2.76	0.097	.
PM:T4	-0.076	0.093	0.66	0.415	

Sig: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$

Table 9 shows changes in unemployment rates across welfare regimes during global crises. The interaction results indicate that, against the backdrop of the Great Recession (T2), only the CM interaction proves to be significant, with a p-value of 0.0042. However, the interactions of T2 with both LM and MM approach marginal significance, with p-values of 0.0606 and 0.0862, respectively.

For the subsequent period T3, none of the interactions with the welfare regimes reach a significant threshold. Yet, during the pandemic (T4), pronounced interactions emerge with the CM ($p=0.0016$) and the MM ($p=0.002$). These interactions intimate that the pandemic's impact on unemployment rate is not consistent across all welfare regimes, with CM and MM enduring more evident effects. Comparing the effects on specific welfare regimes yields compelling results. The LM records a dip in unemployment rate, but it fails to achieve statistical significance at $p=0.55$. The other regimes—CM, MM, and PM—remain statistically unchanged in their UR with respective p-values of 0.257, 0.136, and 0.562.

Results also indicated increase in unemployment rate between welfare regimes during the pandemic, that is statistically significant at $p=2e-06$. This escalation overshadows the effects of both the Great Recession ($p=0.001$) and the subsequent time (T3, $p=0.0037$).

In summation, the pandemic effect on unemployment rates are evident, but their resonance varies across welfare regimes. Notably, the Corporatist and Mediterranean Models delineate distinct interactions during these global crises.

GDP negatively correlates with the unemployment rate, with a significant p-value of $<2e-16$, indicating that an increase in GDP typically results in a lower unemployment rate. This model is constructed with an AR1 correlation structure paired with an identity link function. The

scale parameters for the intercept are set at 0.779 (SE= 0.23), and the correlation parameter alpha has an estimate of 0.872 (SE= 0.0181).

Table 9. GEE Analysis of Unemployment Rate

Variable	Estimate	Std.Err	Wald	Pr(> W)	Sig
(Intercept)	17.2	2.1	66.94	3.3e-16	***
T2	0.195	0.061	10.2	0.001	**
LM	-0.273	0.457	0.357	0.55	
CM	0.461	0.407	1.29	0.257	
MM	0.508	0.341	2.22	0.136	
PM	0.189	0.327	0.336	0.562	
T3	0.281	0.096	8.42	0.0037	**
T4	0.478	0.101	22.6	2e-06	***
GDP	-1.74	0.195	79.8	2e-16	***
T2:LM	0.134	0.071	3.52	0.0606	.
T2:CM	0.376	0.132	8.19	0.0042	**
T2:MM	0.195	0.114	2.94	0.0862	.
T2:PM	0.029	0.101	0.09	0.77	
LM:T3	0.059	0.080	0.54	0.463	
CM:T3	0.365	0.244	2.24	0.135	
MM:T3	0.324	0.201	2.6	0.107	
PM:T3	0.123	0.119	1.07	0.3	
LM:T4	0.407	0.294	1.92	0.166	
CM:T4	0.703	0.222	9.99	0.0016	**
MM:T4	0.555	0.231	5.79	0.002	*
PM:T4	0.176	0.129	1.84	0.174	

Sig: *** p < 0.001; ** p < 0.01; * p < 0.05; + p < 0.1

Health Inequality

Table 10 illuminates the shifts in life expectancy between welfare regimes. The interaction between global crises and welfare regimes elucidates further nuances.

During the Great Recession, the LM's interactions achieve marginally significance at p=0.069 and PM at p= 0.004. Similarly, the PM's interplay during the pandemic presents significant findings, confirmed by a p-value of 0.024. Such results underscore that life expectancy's vulnerability to global events is not universally mirrored between welfare regimes.

However, it is worth highlighting that neither the MM nor the CM regimes exhibited significant interactions during the studied epochs.

The results highlight the significant impact of global events on life expectancy. Notably, during the pandemic period, there was a discernible downturn in life expectancy across all welfare regimes; however, this decrease was not statistically significant. Yet, the reduction in life expectancy during the pandemic becomes markedly pronounced when compared with the effects of the Great Recession ($p=0.001$) and the intervening period, T3 ($p=2.02e-05$).

Analyzing specific welfare regimes reveals varied patterns. The LM remains stable with $p=0.779$, suggesting minimal deviations in its life expectancy. In the realms of the CM and the MM, both exhibit a relative steadiness in LE, represented by p-values of 0.46 and 0.0488, respectively. In contrast, the main effect result shows an increase in life expectancy in PM regime, indicated by a p-value of 0.038.

GDP is positively correlated with life expectancy, evidenced by a statistically significant p-value of $2.85e-10$, indicating that higher GDP is linked to longer life expectancy.

The GEE model, it adopts an AR1 correlation structure paired with an identity link function. Detailed parameters include an intercept scale parameter estimated at 0.515 with a SE of 0.141, and a correlation parameter alpha estimated at 0.982, accompanied by a SE of 0.00572.

This analysis highlights the substantial impact of the pandemic on life expectancy across different welfare regimes. Specifically, the PM and LM models experienced notable declines, with p-values of 0.024 and 0.099, respectively. These results indicate a significant impact on PM regimes and a marginally significant impact on LM regimes. This differential effect underscores the pandemic's varied influence across welfare systems, revealing distinct patterns in the reduction of life expectancy. Details regarding the life expectancy are provided in Table 10.

Table 10. GEE Analysis of Life Expectancy

Variable	Estimate	Std.Err	Wald	Pr(> W)	Sig
(Intercept)	-8.25	1.14	52.1	5.39e-13	***
T2	0.17	0.053	10.3	0.001	**
LM	-0.158	0.562	0.07	0.779	
CM	0.394	0.533	0.55	0.46	
MM	0.35	0.504	0.48	0.488	
PM	0.924	0.445	4.31	0.038	*
T3	0.302	0.071	18.2	2.02e-05	***
T4	0.164	0.112	2.13	0.145	
GDP	0.726	0.115	39.8	2.85e-10	***
T2:LM	-0.111	0.061	3.32	0.069	.
T2:CM	0.003	0.076	0.00	0.964	
T2:MM	-0.096	0.066	2.13	0.144	
T2:PM	-0.15	0.051	8.55	0.004	**
LM:T3	-0.178	0.086	4.28	0.038	*
CM:T3	-0.045	0.087	0.27	0.603	
MM:T3	-0.16	0.075	4.57	0.033	*
PM:T3	-0.11	0.072	7.68	0.006	**
LM:T4	-0.34	0.203	2.73	0.099	.
CM:T4	-0.187	0.148	1.6	0.206	
MM:T4	-0.071	0.122	0.43	0.513	
PM:T4	-0.29	0.128	5.13	0.024	*

Sig: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$

Table 11 extends the analysis of the pandemic's impact on Infant Mortality Rate (IM) across welfare regimes. It reveals that changes during the pandemic are not statistically significant across these regimes. However, compared to the Great Recession, indicating notable variations between regimes and highlighting the pandemic's differential effects on health metrics.

The Liberal Model (LM) displays an infant mortality rate that evidenced by a p-value of 0.27. Conversely, the Corporatist Model (CM) shows a marked increase in infant mortality rate, with statistical support from a p-value of 0.0762. The MM and PM also demonstrates a rise in infant mortality, but this increase does not achieve statistical significance, as indicated by a p-value of 0.664 and 0.917 respectively.

The main effect of the pandemic did not show a statistically significant rise in infant mortality rates, evidenced by a p-value of 0.106. Additionally, interaction terms suggest a trend toward increased infant mortality, though this increase is not statistically significant. The Great Recession is marked by a significant decrease in infant mortality, supported by a p-value of 0.023. This contrasts with the pandemic's mild influence on infant mortality, highlighting the varied challenges and responses of economic and health crises.

GDP significantly correlates with lower infant mortality, evidenced by a p-value of 2.91e-08. The model, employing an AR1 correlation structure and an identity link function with an intercept value of 14.05261 (SE=2.71124) and a correlation parameter alpha of 0.949 (SE=0.0136). Details regarding the Infant Mortality are provided in Table 11.

Table 11. GEE Analysis of Infant Mortality Rate

Variable	Estimate	Std.Err	Wald	Pr(> W)	Sig
(Intercept)	13.9	2.6	28.5	9.51e-08	***
T2	-0.454	0.2	5.15	0.023	*
LM	1.22	0.553	4.9	0.027	*
CM	0.128	0.421	0.09	0.762	
MM	0.236	0.542	0.19	0.664	
PM	0.041	0.397	0.01	0.917	
T3	-0.302	0.165	3.37	0.066	.
T4	-0.396	0.245	2.62	0.106	
GDP	-1.32	0.238	30.8	2.91e-08	***
T2:LM	0.352	0.209	2.82	0.093	.
T2:CM	0.397	0.22	3.26	0.071	.
T2:MM	0.484	0.21	5.32	0.021	*
T2:PM	0.458	0.22	4.31	0.038	*
LM:T3	0.135	0.19	0.51	0.476	
CM:T3	0.206	0.218	0.89	0.346	
MM:T3	0.236	0.213	1.23	0.267	
PM:T3	0.248	0.187	1.76	0.185	
LM:T4	0.032	0.258	0.01	0.903	
CM:T4	0.179	0.294	0.37	0.543	
MM:T4	0.233	0.283	0.68	0.411	
PM:T4	0.415	0.273	2.31	0.129	

Sig: *** p < 0.001; * p < 0.05; + p < 0.1

Hypothesis Evaluation (H4)

The analysis conclusively rejects the null hypothesis (H_0) by demonstrating that the effects of the Covid-19 Pandemic and the Great Recession on income, labor, and health inequalities are significantly different across OECD welfare regimes. The findings affirm the alternative hypothesis (H_a), indicating distinct variations in the trajectories of the Gini Index, employment and unemployment rates, life expectancy, and infant mortality during these global crises.

Discussion

The intricate relationships between income, labor force and health inequalities during the 2008-10 Great Recession and the 2020-21 Covid-19 Pandemic are illuminated across various welfare regimes. In the realm of income inequality substantial differences are evident when comparing different welfare regimes. The Liberal Model, in particular, saw an exacerbation of income disparity with the onset of Covid-19 Pandemic, a trend that diverges from what was observed during the Great Recession. Alongside Liberal Model, the Corporatist Model, and Post-Communist Model also show a substantial increase in income inequality compared to the other welfare regimes. This observation can be further supported by the work of Frelle-Petersen, Hein and Christiansen (2020), which highlights that public spending in Nordic countries is higher than in many other developed countries. This is partly due to greater spending on benefits, and partly because of investments in services that generate an economic return through a healthy and well-educated workforce. The Nordic countries, especially Sweden, has shown a degree of resilience to the Great Recession, attributed to its flexible policies and sustained social investment (Hort, Kings and Kravchenko 2016, Palme 2019). This variation underscores the nuanced ways

different crises influence similar welfare systems and highlights the prevailing role of GDP in shaping disparities across the board.

Labor Force (Employment Rate and Unemployment Rate): A nuanced examination of diverse welfare regimes reveals distinct labor market behaviors. Specifically, the Post-Communist Model demonstrates resilience in labor force stability during the pandemic, in stark contrast to increased vulnerabilities exhibited by the Mediterranean, Corporatist, and Liberal Models. A comparative analysis of employment trajectories during the pandemic and the Great Recession period highlights the enduring influence of GDP on labor market dynamics. Overall, both the Great Recession and the Covid-19 pandemic have had significant effects on various welfare regimes, corroborating the historically consistent trend that major global events profoundly impact both employment and unemployment rates (Margo 1993). However, responses to crises have differed across welfare regimes. Notably, the Nordic countries' welfare regime has demonstrated a notable capacity to adapt and show resilience in the face of economic, technological, and social changes. This adaptability is largely due to the active support of social cohesion in these societies (Frelle-Petersen, Hein and Christiansen 2020).

Despite variations among different welfare regimes during periods of crisis, the CM regime consistently exhibited a decline in ER and an increase in UR during both crises. This trend suggests that, regardless of the specific nature of the crisis, the CM welfare regime shows a particular vulnerability in terms of employment stability. From welfare regime theory: Corporatist welfare regimes have regulated labor markets and strong worker protections, which ensure job security but can limit workforce flexibility during economic crises (Artazcoz et al. 2018).

Health outcomes (Life Expectancy and Infant Mortality Rate): Life expectancy exhibited diverse shifts across various welfare regimes in the wake of the pandemic. Similarly, the infant mortality rate, a pivotal health metric, manifested both shared and unique trends across these models in the context of global disruptions. When compared to the Great Recession, the main health outcomes attributed to the pandemic were not broadly statistically significant. However, a specific interaction with the PM yielded a statistically significant decline in life expectancy. In addition, the interaction between the pandemic and the Liberal Model regimes showed partial statistical significance.

This analysis yields two key insights. First, the nature of the crisis is critically important, as different welfare regimes exhibit varied responses to financial or health-related shocks. This suggests that, while these systems possess inherent characteristics, their adaptability or vulnerability is shaped by external events. The differential impact of crises on welfare regimes, as highlighted in this analysis, is corroborated by the principles of the Exogenous Shocks Theory. According to (Ganti 2023) and Menon (2023), external shocks such as financial or health crises determine the adaptability of these systems, thereby shaping their outcomes in response to such crises.

Second, GDP consistently stands out as a significant influence between welfare regimes, highlighting its extensive impact on macroeconomic factors. This is evident in the way GDP influences labor force dynamics; a decline in GDP corresponds to changes in employment and unemployment rates, reinforcing its pivotal role in maintaining economic stability Sologon et al. (2022). This aligns with the findings of Brezina (2011) and Jayathilaka et al. (2022), which underscore the essential role of GDP in economic evaluations.

Conclusion

This study's GEE analysis has illuminated the significant impact of economic and health crises on income inequality dynamics across different welfare regimes. Notably, the Great Recession exacerbated income inequality within the Post-Communist (PM) regime, while the pandemic had a pronounced effect on the Mediterranean Model (MM), with both the Continental (CM) and Post-Communist (PM) regimes experiencing marginal effects. Moreover, the persistent decline in employment rates and surge in unemployment rates within the CM regime during these crises underscore its vulnerability to destabilization, irrespective of the crisis type.

Further analysis reveals that during the pandemic, the PM regime encountered a significant reduction in life expectancy, whereas the Liberal Model (LM) displayed partially significant interactions. These outcomes underscore the critical influence of the nature of crises, demonstrating that welfare regimes react differently to varying adversities.

The findings from this analysis prompt a reevaluation of traditional welfare regime classifications, such as those articulated by Esping-Andersen (1990). While these classifications are foundational, they may not adequately capture the adaptability of welfare regimes to contemporary challenges. For instance, policy adaptations in Norway and reforms in Sweden highlight the potential for institutional resilience and modification within welfare states, as detailed by Dølvik and Oldervoll (2019) and Palme (2019).

Considering current global challenges, this study points to the necessity of a flexible framework that aligns core principles of established welfare regimes with the specific socio-economic conditions of individual countries. The evolving dynamics of global events, and the notable recovery displayed by countries such as Slovakia, Lithuania, Estonia, and the Czech Republic (International Monetary Fund 2021, International Monetary Fund 2022a), challenge the

sufficiency of the 'post-communist' designation. This development necessitates a refined understanding of welfare regimes, moving beyond conventional classifications. Although the categories applied in this research are based on prior scholarly work, the findings emphasize the need for updates to theoretical models. This research advocates for a responsive framework for welfare regime policies, designed for effective crisis management and enhanced recovery capability.

Chapter 6: Gender Labor Inequalities

Introduction

This chapter examines the hypothesis that gender disparities in the labor force were influenced by the 2008-10 Great Recession and the 2020-21 Covid-19 Pandemic. The analysis, using GDP as a control, unfolds in two stages: first, assessing gender labor disparities across OECD countries, and then between five distinct welfare regimes. Employing MMRM and GEE, the study reveals country-specific variations, particularly during the Great Recession and the Pandemic, while GEE models highlight overarching gender labor disparities and the impact of global crises on welfare regimes.

Country-Level: Gender Labor Inequalities

Upon executing the mixed-effects models to study gender differences in employment and unemployment rates, the following results are reported in Table 12 and Table 13, respectively. For the gender employment rate gap, the AIC value is 2362.05, while the BIC value is 2391.94. For the gender unemployment rate (UR) gap, the AIC value stands at 1587.19, and the BIC is at 1617.11. The AIC and BIC values provide insights into the quality of our model fits. Lower values are generally indicative of a better model, and our findings show that the models provide a reasonable representation of the observed data.

Table 12 presents the results of the model investigating the gender gap in employment rates with its random intercepts showing a variance of 26.62 and a SD of 4.96, clearly indicates this heterogeneity. Additionally, the residual variance is 3.91 with a SD of 1.98, providing further evidence of variability in the gender employment gap that is not explained by the model's fixed effects. The model's scaled residuals, ranging from -4.911 (minimum) to 2.918 (maximum), and

a median value of -0.072, reasonably meet the assumptions of normally distributed and homoscedastic residuals. This suggests that the model is robust and reliable.

The fixed effects findings continue to demonstrate a significant correlation between the Covid-19 Pandemic period (T4) and an increase in the gender employment gap, comparing to the baseline period T1. During the Covid-19 Pandemic period, the gender employment gap increased on average by 1.80 units ($p < 0.001$), indicating that the pandemic significantly amplified labor market gender disparities.

A similar trend was evident during the intervening time, with the gender employment gap increasing on average by 1.27 units ($p < 0.001$). This observation emphasizes the existence of gender labor disparities even in pre-pandemic conditions. However, the pandemic period exhibited a markedly stronger effect, highlighting its profound role in exacerbating gender inequality in the labor market. In contrast, during the Great Recession, the impact on the gender employment gap was not significant ($p = 0.39$).

The onset of the Great Recession, initially observed in the United States and subsequently influencing European countries, presents potential optimism for female labor force participation in the United States. Further, the pronounced widening of the gender labor force gap during the 2011-2019 interim, termed the T3 period, can be attributed to Europe's protracted recovery pace from the recession. Economists from the Federal Reserve Bank, (Arias and Wen 2015), have posited that divergent policy responses to the financial downturn led to the United States, experiencing a more rapid economic recovery compared to its European counterparts.

In the fixed-effects model, the role of GDP is not statistically significant ($p = 0.36$). This suggests that GDP does not exert a noticeable influence on the gender employment gap. However, the significant intercept variance in the random effects (26.62) underscores the

presence of varying relationships between GDP and the gender employment gap across different countries. This variability implies that the influence of economic prosperity on reducing labor market gender disparities is not consistent across all countries.

Overall, Table 12 makes clear that the pandemic has had a significant impact on the gender employment gap, which is one of two indicators this study uses to measure gender labor force inequality. However, it is also clear that gender employment disparities existed before the Covid-19 Pandemic and may not be related to economic prosperity, as evidenced by the non-significant GDP effect.

Table 12. Mixed Model Results: Gender Gap in Employment Rate

Fixed Effects						
Variable	Estimate	Std. Error	df	t value	Pr(> t)	Sig
(Intercept)	-9.661	0.960	26.150	-10.06	1.8e-10	***
T4	1.803	0.284	516.345	6.36	4.5e-10	***
T3	1.269	0.143	503.021	9.07	< 2e-16	***
T2	-0.172	0.199	504.467	-0.86	0.39	
GDP	0.246	0.270	522.013	0.91	0.36	
Random Effects						
Group	Name	Variance	Std. Dev.			
Id	Intercept	26.62	4.96			
Residual		3.91	1.98			
Obs:	528					

Sig: *** p < 0.001

Overall, this analysis reveals that the Pandemic (T4) and the Intervening Period (T3) play significant roles in predicting the gender gap in employment. In contrast, the Great Recession and GDP do not significantly influence the gender gap in employment, as they align with the line of no effect in the analysis. Additionally, this model considers the unique characteristics and variations of each country by incorporating random effects for the intercept and GDP.

Figure 13 illustrates the direction of the association for each of the predictor estimates in explaining the gender gap in employment. This figure presents predictor estimates along the left column, confidence intervals with the bar through the solid rectangles, and the statistical significance is indicated by whether the rectangle passes through the line of no effect at 0 along the horizontal axis.

Model 1: Forest Plot for Mixed-Effect Model: Gender Gap in ER

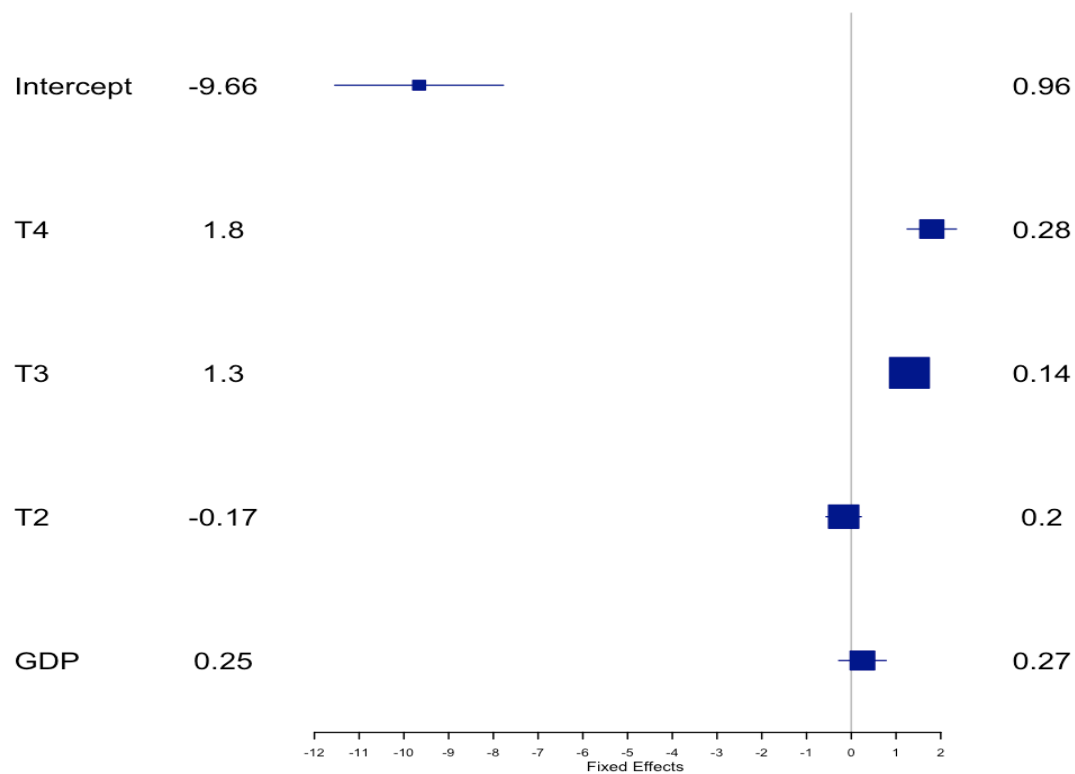


Figure 13. Mixed Model Plot for Gender Gap in Employment Rate

Table 13 reveals significant country-specific variability. This variability is illustrated by the Intercept variance of 4.201 and SD of 2.050 for the random intercepts. Additionally, the Residual estimate, which accounts for the random slopes shows considerable variation. This is demonstrated by a variance of 0.887 and a SD of 0.942.

Fixed effects analysis reveals significant associations between time periods and the gender unemployment gap. Notably, the Covid-19 Pandemic corresponds to an average increase of 0.335 units in the gender unemployment gap ($p = 0.012$), emphasizing the exacerbating role of the pandemic on gender unemployment disparities. The intervening time (T3) also shows a significant increase in the gap (0.293 units, $p < 0.001$), confirming pre-existing gender disparities in unemployment.

The period of the Great Recession reveals an Increase of 0.533 units in the gender unemployment gap ($p < 0.001$), indicating this period had a significant impact on gender unemployment disparities. When compared to the effect size during the Covid-19 Pandemic, the Great Recession had larger impact on the gender unemployment gap.

GDP demonstrates a significant negative association with the gender unemployment gap, indicating that as GDP increases, the gender unemployment gap typically decreases. However, the impact of GDP shows substantial variation across countries, underscoring the differential influence of economic prosperity on gender disparities in unemployment rate.

The model's assumptions of normally distributed and homoscedastic residuals are reasonably met as indicated by the scaled residuals, which range from -3.959 (minimum) to 4.284 (maximum), with a median value close to zero (-0.064).

In sum, Model 2 underlines the complex interplay between time periods (Great Recession, intervening time and pandemic), GDP, and gender disparities in unemployment rates in OECD countries. This highlights the necessity of tailored interventions, which account for these dynamic relationships and unique country contexts, to address the gender unemployment gap.

Table 13. Mixed Model Results: Gender Gap in Unemployment Rate

Fixed Effects						
Variable	Estimate	Std. Error	df	t value	Pr(> t)	Sig
(Intercept)	-0.340	0.3975	25.8957	-0.86	0.400	
T4	0.335	0.1337	521.5874	2.51	0.012	*
T3	0.293	0.0681	506.7134	4.30	2.1e-05	***
T2	0.533	0.0949	507.8141	5.61	3.3e-08	***
GDP	-0.546	0.1251	519.8446	-4.36	1.6e-05	***
Random Effects						
Group	Name	Variance	Std. Dev.			
Id	Intercept	4.201	2.050			
Residual		0.887	0.942			
Obs: 531						

Sig: *** $p < 0.001$; * $p < 0.05$

The Figure 14 illustrates the influence of each of the predictor variables on the gender gap in unemployment. The figure presents a visual depiction of the direction and magnitude of each estimate with the solid rectangle, their confidence interval with the bar through the solid rectangle, and their statistical significance indicated by whether the rectangle passes through the line of no effect at 0 along the horizontal axis. The Covid-19 Pandemic (T4), the 2011-19 Intervening Period (T3), the Great Recession (T2) are all significant, and GDP is significant in the opposite direction, so as GDP increases there is a negative effect on the gender unemployment gap.

Model 2: Forest Plot for Mixed-Effect Model: Gender Gap in UR

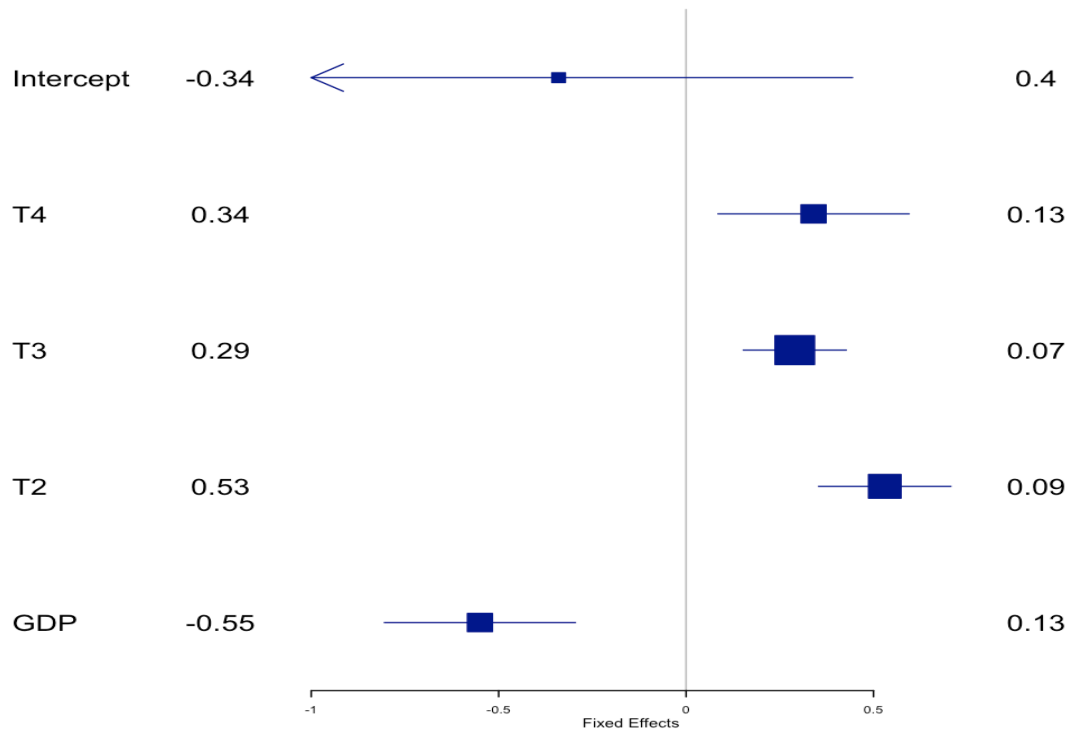


Figure 14. Mixed Model Plot for Gender Gap in Unemployment Rate

During the Covid-19 pandemic (T4), a significant exacerbation in both gender employment and unemployment disparities was observed, underscoring the crisis's role in intensifying pre-existing inequalities in the labor market. A meticulous comparative analysis involving the Great Recession (T2) and the subsequent intervening period (T3) unveils a progressive increase in gender disparities, reaching a height during the Covid-19 pandemic.

This comprehensive study highlights the persistent and amplifying nature of gender disparities in the labor markets across OECD countries, particularly in the face of formidable global crises. It unravels the nuanced trajectories of gender disparities in labor market outcomes, accentuating the profound imbalances that have been further aggravated during pivotal periods of global adversity such as the Great Recession and the Covid-19 pandemic.

In conclusion, the mixed model strongly supports the alternative hypotheses (Ha1) over the null (H0), highlighting significant gender variations in employment and unemployment rates in OECD countries, especially during global crises. This underscore pronounced gender disparities in labor markets.

Gender Labor Inequalities Across Welfare Regimes

In this study, gender labor disparities during the Pandemic (T4), and the Great Recession (T2) are scrutinized. The focus is on how different welfare regimes adapt to gender inequalities within the labor force.

For model fit assessment within the GEE models, the QIC is employed. This criterion is essential for comparing models, with lower QIC values indicating a better fit. The unemployment rate model shows a QIC of 2650, while the employment rate model has a QIC of 4204. These values suggest that the models align well with the data patterns, indicating robustness.

After comparing across other correlation structures, an exchangeable correlation structure is chosen as the most suitable for investigating Hypothesis 5, which explores gender labor force inequality across welfare regimes. This structure effectively captures the dependencies and correlations within the data, enhancing the robustness of the analysis. The choice is supported by the comparative analysis of QIC values, affirming that the exchangeable structure provides the best fit for both the employment and unemployment rate models.

During the pandemic, stark variations in the gender employment gap became evident across welfare regimes. Specifically, the LM, CM, MM, and PM regimes showcased conspicuous escalations in gender employment imbalances. For the LM, the interaction with the pandemic (T4: LM) manifests a significant coefficient estimate of 4.17, supported by a compelling p-value of 0.0138, indicating a notable gender employment gap during the pandemic.

The CM, during the same period (T4:CM), reveals a coefficient of 5.70 with a significant p-value of $4.1e-07$, underscoring a pronounced disparity in gender employment. The PM and MM also exhibited significant gender employment gaps, with coefficients of 1.64 ($p=0.070$) and 8.33 ($p=1.0e-08$) respectively, during the pandemic.

Delving into the Great Recession era, interactions across different regimes provide further enlightenment. The interaction of the Great Recession with the CM regime (T2:CM) reveals a coefficient of 1.49 and a p-value of 0.012, highlighting the susceptibility of the CM regime to gender employment gaps during the Great Recession, compared to the resilience of the Nordic Model (NM), which served as the baseline.

Examining the main effects of the welfare regimes on the gender employment gap, the LM, CM, MM, and PM all showed significant disparities. The LM had a coefficient of -8.69 with a highly significant p-value of $1.5e-05$, suggesting a considerable gender employment gap. The CM recorded a coefficient of -8.37 ($p=6.6e-10$), the MM registered a notable -16.73 ($p=1.5e-08$), and the PM presented a coefficient of -4.67 ($p=0.0038$).

The main effects from the study reveal that the pandemic profoundly Influenced the gender employment gap compared to the baseline period, evidenced by a coefficient of 1.38 and a p-value of 0.270. Nevertheless, the undeniable imprints of earlier periods like T3 (coefficient: 1.67, p-value: 0.002) and T2 (coefficient: 1.15, p-value: 0.039) provide a panoramic view of the trajectory of gender employment disparities. Intriguingly, GDP's association with the gender

employment gap was found to be insubstantial, as indicated by a coefficient of 0.008 and an insignificant p-value of 0.990.

The GEE model, with its exchangeable correlation structure, proves instrumental in this analysis. Its suitability for parsing repeated measures data that possess consistent inter-observation correlations is unrivaled.

In summation, while the Nordic model consistently presents itself as a paradigmatic reference, the dynamics of gender employment exhibit considerable heterogeneity across diverse welfare regimes, notably the LM, CM, MM, and PM. These dynamics undergo significant transformations in the face of economic recessions and pandemics. Comprehensive results are detailed in Table 14.

Table 14. GEE Analysis of Gender gap in Employment Rate

Variable	Estimate	St. Err	Wald	Pr(> W)	Sig
(Intercept)	-5.80	9.63	0.36	0.5467	
GDP	0.008	0.91	0.00	0.990	
T4	1.38	0.63	4.85	0.270	*
T3	1.67	0.53	9.82	0.002	**
T2	1.15	0.56	4.27	0.039	*
LM	-8.69	2.01	18.76	1.5e-05	***
CM	-8.37	1.36	38.13	6.6e-10	***
MM	-16.73	2.96	32.01	1.5e-08	***
PM	-4.67	1.61	8.39	0.0038	**
T4:LM	4.17	1.70	6.06	0.0138	*
T4:CM	5.70	1.12	25.66	4.1e-07	***
T4:MM	8.33	1.45	32.83	1.0e-08	***
T4:PM	1.64	0.90	3.29	0.070	.
T3:LM	2.83	1.91	2.19	0.140	
T3:CM	3.75	0.767	23.9	1.0e-06	***
T3:MM	7.51	1.54	23.87	1.0e-06	***
T3:PM	1.16	0.866	1.79	0.181	
T2:LM	3.01	1.74	2.99	0.084	.
T2:CM	1.49	0.59	6.30	0.012	*
T2:MM	3.63	1.56	5.42	0.020	*
T2:PM	1.45	1.06	1.87	0.172	

Sig: *** p < 0.001; ** p < 0.01; * p < 0.05; + p < 0.1

The relationship between distinct welfare regimes and the time periods is outlined in Figure 15. Each statistic on the graph represents an estimated coefficient, elucidating the change in the Employment Rate corresponding to a unit increment in the related predictor, with other predictors remaining constant. The horizontal bars demarcate the confidence intervals for each respective estimate. A centrally situated dashed line at $y=0$ acts as a reference point, symbolizing no effect or lack of impact. Data points situated to the right of this line suggest a positive association, while those positioned to the left indicate a negative relation.

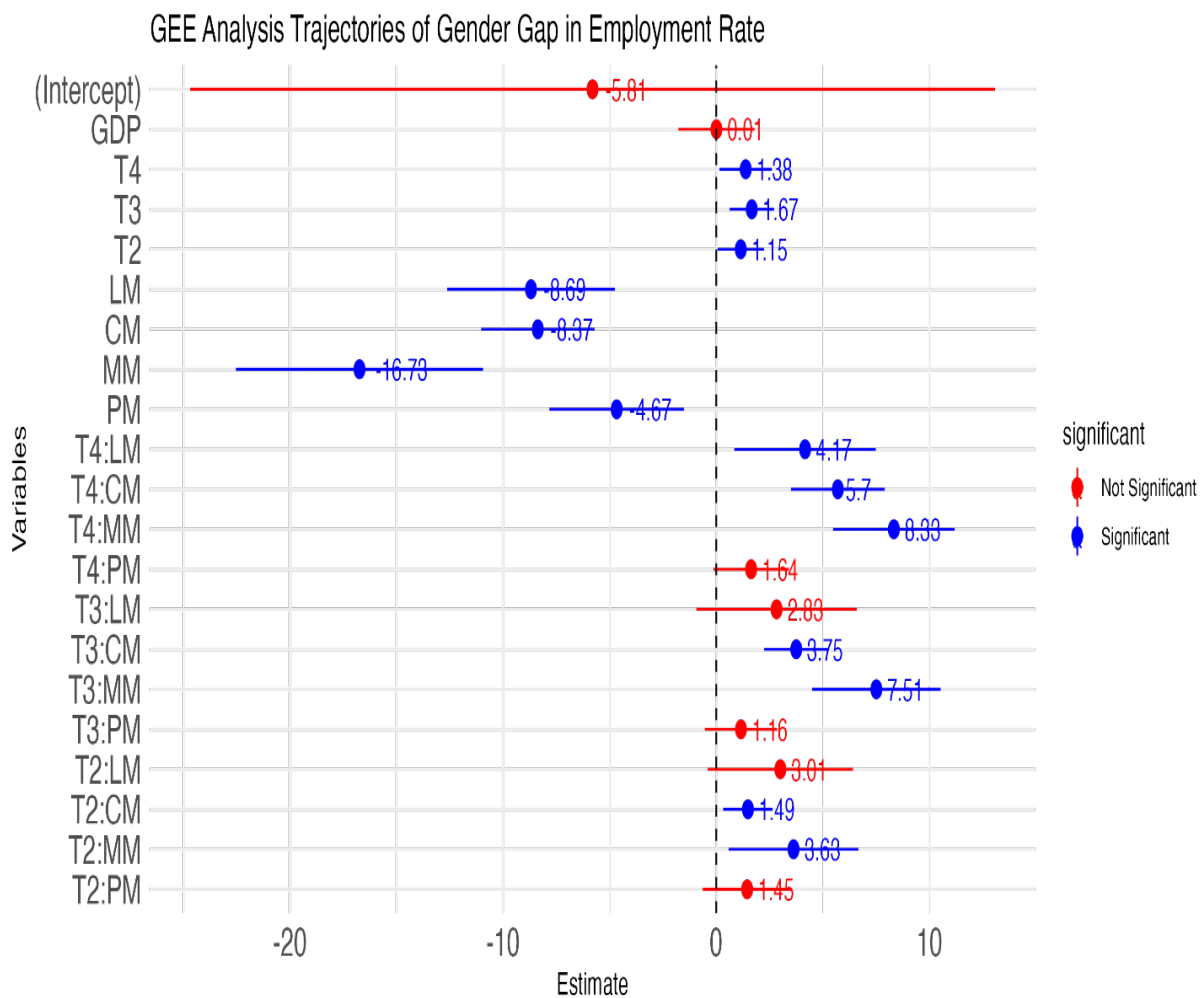


Figure 15. GEE Analysis of the Gender Gap in Employment Rate

Table 15 presents the estimates when modeling gender disparity in the unemployment rate (UR) by welfare regime during global crises and intervening time. Distinct variations are evident across welfare regimes during key periods. Both the pandemic and the Great Recession periods manifested heightened gender unemployment disparities, with coefficient estimates of 1.06 (p-value < 0.007) and 1.37 (p<0.00012) respectively.

The results illuminate disparities in gender unemployment across OECD welfare regimes. The Liberal Model regime, evidenced by a coefficient of 0.59 and a p-value of 0.042, reveals a gender unemployment disparity. Following this, the CM regime, with a coefficient of -1.048 and a p-value of 0.01165, further underscores the gender unemployment gap. The MM regime, however, stands out most notably, displaying a pronounced gender unemployment gap with a coefficient of -5.22 and a compelling p-value of 0.00033. Complementing these findings, the PM regime, marked by a coefficient of -1.94 and a p-value of 0.00030, confirms the prevailing trend. Collectively, these results draw attention to the pronounced disparities across welfare regimes in contrast to the Nordic Model.

During the Great Recession (T2), the gender unemployment gap increased significantly, as captured by a coefficient estimate of 1.37 (p-value < 0.00012). The interactions of the T2 period with the different welfare regimes, such as LM, CM, MM, and PM, did not show significant deviations, with p-values of 0.319, 0.275, 0.231, and 0.128 respectively, indicating that the Great Recession had a generalized impact across all welfare regimes without significant variations.

During the intervening phase, a discernible surge in the gender unemployment divide was marked by a coefficient estimate of 1.16 (p-value < 0.00014) at T3, the 2011-19 intervening period. A deeper probe into the T3 period, compared with the Continental regime, indicates a

pronounced elevation in the gender unemployment disparity, validated by a coefficient estimate of 0.7626 (p-value < 0.02368). Nevertheless, engagements with other regimes such as LM, MM, and PM did not substantiate any remarkable alterations in this divide. This finding agrees with the work of economics scholars (Arias and Wen 2015, Jiao and Wen 2012) for this post- Great Recession period or those intervening years as being especially difficult for CM, and it shows in the unemployment rate, and this unemployment was felt more by women than for men.

In the T4 period (pandemic), the interactions reveal that the CM and PM regimes had significant gender unemployment disparities with coefficients of 1.14 (p-value < 0.0049) and 1.211 (p-value < 0.010) respectively. The LM and MM regimes, however, did not show significant interactions, with p-values of 0.432 and 0.089 respectively, suggesting that the pandemic's impact was more pronounced in the CM and PM regimes. GDP emerged as a key influencer of the gender unemployment disparity, with a coefficient estimate of -1.71 (p-value < 0.0009), suggesting a potentially tempering effect of economic growth on gender-based labor disparities.

The employment of the GEE model with an exchangeable correlation structure yielded an alpha (correlation parameter) estimate of 0.713, with a SE of 0.0889, demonstrating the model's effective handling of correlated observations within clusters.

In summation, the findings illuminate distinct subtleties in the pandemic's variation of the gender unemployment gap across varied welfare regimes, particularly highlighting the pronounced disparities in the CM and PM regimes during the pandemic and a generalized impact during the Great Recession across all regimes.

Table 15. GEE Analysis of Gender Gap in Unemployment Rate

Variable	Estimate	Std error	Wald	Pr(> W)	Sig
(Intercept)	17.84	5.44	10.77	0.001	**
GDP	-1.71	0.52	10.97	0.0009	***
T4	1.06	0.398	7.12	0.007	**
T3	1.16	0.293	15.86	6.8e-05	***
T2	1.37	0.356	14.80	0.00012	***
LM	0.59	0.291	4.14	0.042	*
CM	-1.048	0.415	6.36	0.01165	*
MM	-5.22	1.45	12.92	0.00033	***
PM	-1.94	0.537	13.07	0.00030	***
T4:LM	-0.365	0.465	0.62	0.432	
T4:CM	1.14	0.407	7.91	0.0049	**
T4:MM	0.976	0.575	2.88	0.089	.
T4:PM	1.211	0.470	6.63	0.010	*
T3:LM	-0.001	0.724	0.00	0.999	
T3:CM	0.766	0.337	5.17	0.023	*
T3:MM	0.989	0.736	1.81	0.179	
T3:PM	0.707	0.459	2.38	0.123	
T2:LM	0.934	0.938	0.99	0.319	
T2:CM	-0.406	0.373	1.19	0.275	
T2:MM	1.061	0.887	1.43	0.231	
T2:PM	1.039	0.682	2.32	0.128	

Sig: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$

The interaction between each welfare regime and the two-time periods is captured visually in Figure 16. Each plotted point unravels the anticipated alteration in UR corresponding to a unit change in its predictor, while other variables remain unchanged. The accompanying horizontal lines demarcate the confidence bounds for each predictor estimate. A pivotal dashed line, drawn at $y = 0$, acts as a neutral reference, delineating the absence of influence. Coefficients situated above this demarcation imply an upward trend, whereas those beneath suggest a downward trajectory.

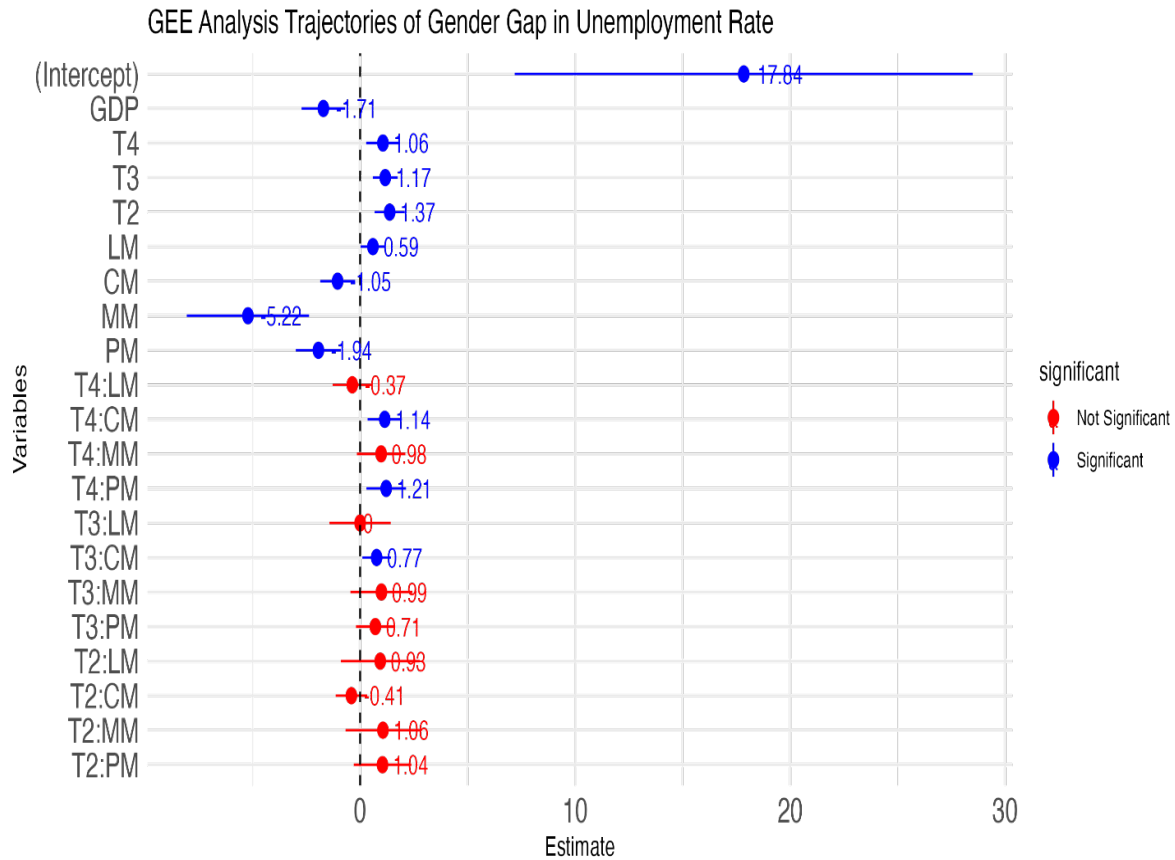


Figure 16. GEE Analysis of the Gender Gap in Unemployment Rate

Evaluating Hypotheses 5: Gender Labor Inequality

The analysis of Hypothesis 5 indicates significant disparities in gender labor force inequality both at country and welfare regime levels. The mixed-effects model shows a marked increase in the gender employment and unemployment gap during the Covid-19 pandemic compared to the Great Recession. Further scrutiny at the welfare regime level reveals clear differences. The CM, LM, and MM regimes saw increased gender employment gaps, with the CM particularly affected during the Great Recession. These results conclusively refute the null hypotheses (H_{01} and H_{02}) and confirm the alternative hypotheses (H_{a1} and H_{a2}), establishing significant variations in the gender labor force gap across OECD countries and between welfare regimes during the two economic downturns.

Discussion

This study reveals that both crises significantly influenced gender labor disparities. A notable finding was the widening of the gender employment gap by 1.80 units during the pandemic, echoing the ‘she-cession’ where female unemployment rates surged past those of males, as identified by Bluedorn et al. (2021) and Leap, Stalp and Kelly (2022). While these global events and GDP are key drivers, the other influence of unobserved, country-specific factors including socio-economic changes, gender norms, and gender segregation also plays a role (Bertay, Dordevic and Sever 2020). The study explores the relationship between GDP and gender inequities, contrasting previous findings that suggested the Great Recession might have narrowed gender disparities in male-dominated sectors (Bluedorn et al. 2021, Wall 2009).

Further insights from the GEE model reveal that during the pandemic, the CM, MM, and LM regimes experienced heightened gender disparities. This observation aligns with the findings of Blossfeld et al. (2015), who argue that regimes with more conservative structures tend to sustain gender inequities in labor outcomes. In stark contrast, the Nordic model is renowned for its gender-equitable labor market. This aspect of the Nordic model resonates with the societal norms discussions by Berger and Luckmann (2016), emphasizing progressive gender roles. Complementing this, Frelle-Petersen, Hein and Christiansen (2020), showcase the Nordic countries—Finland, Iceland, Norway, Denmark, and Sweden—as exemplars of balancing social welfare with economic stability, demonstrating effective social safety nets, strong public sector reforms, and sustained economic competitiveness, even amid global disruptions.

The pandemic significantly affected female-dominated sectors like hospitality, retail, and healthcare, causing major job losses for women. School and childcare closures forced women to reduce work hours for caregiving (Barua 2022). Additionally, skill-biased technological change

made women's jobs less adaptable to remote work, resulting in less stable employment compared to men (Ng et al. 2021). In contrast, the Great Recession primarily impacted male-dominated industries such as construction, while the pandemic had a wider effect on sectors employing many women (Şahin, Song and Hobijn 2010).

Conclusion

The analysis using a mixed-effects model indicates that the pandemic exacerbated gender disparities in the labor force. The GEE analysis comparing different welfare regimes revealed that the CM, LM, and MM models witnessed significant enlargements in gender employment gaps during the pandemic. Furthermore, the CM and PM regimes faced notable increases in gender unemployment disparities during the pandemic.

These findings highlight the pandemic's dual role: it exacerbated existing gender disparities and introduced new inequality dimensions, particularly a technological gap favoring those with advanced skills, aligning with the concept of SBTC by Acemoglu and Autor (2011). This study sheds light on how societal norms and structures mold gender disparities, which remain susceptible to transformation in response to economic shocks.

Addressing the gender employment gap is essential for cultivating a fair labor market, a sentiment echoed by the Council on Foreign Relations and the International Labor Organization. These organizations highlight the considerable economic benefits of advancing gender equality (Council on Foreign Relations 2023, ILO 2022). Furthermore, the World Bank reports that diminishing the gender employment gap could boost long-term GDP by an average of nearly 20% across various nations (World Bank 2023). This research reinforces the notion that tackling gender inequities is not just a matter of social justice but is also a critical strategy for economic growth.

Chapter 7: Conclusion

Introduction

This chapter serves as the conclusion of the study, which aimed to comparatively examine inequalities in the pre-pandemic and pandemic eras across OECD countries and relative welfare regimes. The objective of this chapter is to provide an overview of the key findings, discuss their implications for policy and practice, address the limitations encountered during the study, and explore potential avenues for future research. By revisiting the research questions and objectives and connecting them to the main findings and contributions, this chapter emphasizes the significance of the research in the broader context of social inequalities and policy development. Through a structured approach, this chapter synthesizes the results, outlines the theoretical and practical implications, and examines how the findings inform policy development in the face of existing challenges.

Comprehensive Analysis of Findings

Through an evaluation of income, labor force, and health and gender labor force inequality trajectories in OECD countries, the study unveils several findings. At the outset, a time series analysis revealed the pronounced influence of both the Covid-19 Pandemic and the Great Recession on salient forms of inequality in the areas of income inequality, employment and unemployment, life expectancy, and infant mortality rates.

The application of mixed-effects models in this study yields critical insights into the varied impacts of the Great Recession and the Pandemic on inequalities. These analyses conclusively indicate that both events have significantly and distinctly influenced different

aspects of inequality, underscoring their profound and varied effects on socio-economic structures.

Transitioning to the dynamics of welfare regimes amid these global upheavals, this analysis used GEE models to compare scenarios during the pandemic with pre-pandemic periods. This study finds the country context of having one of five different welfare regimes matters for that country's trajectories of income, employment, and health inequalities. Interestingly, while the pandemic has marginally modified income inequality across these regimes, notable shifts are especially evident in the employment and health sectors.

Broadening the analytical scope, this study examines variations in gender labor inequality across OECD regions during the Great Recession and the Covid-19 Pandemic periods. A key insight suggests that the health-centric crisis, exemplified by the Covid-19 Pandemic, had a more substantial impact on gender labor inequality than the Great Recession.

To conclude, this examination highlights the diverse effects of major global crises —the Great Recession and the Covid-19 Pandemic — on income, labor force, and health and gender labor disparities across OECD countries and welfare regimes.

Theoretical Implication

This study contributes to the existing academic discourse by offering insights that potentially expand and refine current theoretical frameworks. This is particularly pertinent in the realms of welfare regime theory and the globalization of governance. The findings align with established theoretical paradigms and introduce innovative perspectives and critical insights. Through the examination of these areas, this research seeks to enhance and broaden our understanding of key theories foundational to the study's subject matter. It places special

emphasis on reassessing traditional welfare regime classifications and highlights the growing importance of understanding the impact of globalization on governance.

Rethinking Welfare Regime Theory

A central aspect of this research is the exploration of inconsistencies when comparing individual country outcomes within the framework of traditional welfare regimes. These disparities become especially evident during global disruptions, such as the Great Recession and the Covid-19 Pandemic. In these times, the distinct paths taken by countries often deviate substantially from predictions based on their welfare regime typologies.

These observations call into question the reliability and current relevance of traditional classifications in today's ever-changing global landscape. This situation presents a pressing query: Were the global disruptions catalysts that transformed the very nature of welfare regimes, or did they spotlight existing, subtle nuances previously overlooked by classical categorizations?

One of the critical conclusions from this study is the need to reevaluate welfare regime classifications. Beyond academic ramifications, these classifications influence policy decisions. Relying on generic frameworks might lead to policy missteps, especially when outlining paths to recovery after crises. An updated understanding of welfare regimes, adapted to current global challenges, can pave the way for strategies more aligned with specific national and regional nuances.

In light of the recognized need to reevaluate existing welfare regime classifications, it is crucial to consider the distinctiveness of the Nordic model. This model sets itself apart from other welfare state systems primarily through its commitment to universalism concerning the rights to services and benefits. Central to this approach is the role of the public sector in service

provision and a strong emphasis on redistribution as a guiding principle for offering benefits. Characteristically, in the Nordic countries, a wide array of public services and benefits are made available to the entire population either free of charge or at a substantially reduced price, operating independently of market mechanisms (Frelle-Petersen, Hein and Christiansen 2020).

Historically, welfare regime classifications have been foundational in comparative welfare regime research. However, the findings of this study suggest that these models might not be as precise in today's context, especially when interpreting national responses to major global events. Considering the rapid shifts in global connectivity, technological progression, and climate change there is a need to reassess the underlying tenets of these classifications. They might no longer capture the complexity and diversity of modern countries adequately.

In conclusion, the world is undergoing considerable changes due to various factors, from technological advancements to geopolitical changes. These shifts make it crucial to develop a more contemporary framework for welfare regimes that aligns with the challenges and complexities of the modern world.

Redefining the Globalization of Governance

This study's examination of OECD inequalities underscores the impacts of the pandemic and the Great Recession revealing substantial differences in income, labor, and health outcomes. To adeptly navigate these complexities, the strategic involvement of International Organizations (IOs) and International Non-Governmental Organizations (INGOs) is critical. These entities are pivotal in shaping global policy, and guiding countries through integration and collaborative efforts to address socio-economic challenges (Beckfield 2010b, Boli and Thomas 1997).

Globalization, while complex, is an adaptive and enduring force that presents both challenges and opportunities. The role of IOs in this context is not just to respond to crises but to proactively shape a sustainable and inclusive global economy (Piketty 2017, Stiglitz 2012). Their influence extends to mitigating the adverse effects of economic downturns and leveraging globalization for the collective good. A prime example of this is the substantial changes in Eastern Europe and other developing regions over the past two decades. This shift towards democratic governance, substantially influenced by organizations like the United Nations and the World Bank, underscores their pivotal role in leveraging global trends for progressive change (Burns, Kick and Paz 2015).

In this era, the effectiveness of IOs and INGOs is paramount for fostering international collaboration, influencing policy convergence, and promoting stability. Their strategies notably affect global labor markets and income equity, thereby influencing societal welfare. Central to service delivery and policy formulation, these entities underscore their indispensable role in global governance and the advancement of society (Boli and Thomas 1997).

As the world becomes increasingly interconnected, the capacity of these organizations to support equitable development and respond adeptly to global economic fluctuations is more critical than ever. Therefore, this research underscores the vital role they play, highlighting the importance of their continued evolution and strength in managing the intricacies of global economic relations.

In essence, this research presents a groundbreaking argument for the reevaluation and updating of welfare regime theories in the broader context of evolving global economic relations. It underscores the necessity for a contemporary framework that aligns with the complexities of today's globalized world, recognizing the considerable role played by IOs and INGOs in

navigating these complexities. The findings of this study, therefore, mark a key step in advancing our understanding of the dynamics between welfare regimes and global governance, offering an essential and fresh perspective that is critical for the modern era.

Policy Implications and Recommendations

Based on the recent findings, several strategic recommendations can be formulated to address inequalities across OECD countries. Below are the brief implications and strategic suggestions derived from this study's results.

1. **Country-Specific Policy Responses:** As the variable impacts of global crises become evident, it is indispensable for policymakers to develop strategies tailored to each country's unique welfare system and challenges.
2. **Strengthening Labor Market Resilience:** Beyond broad strategies, the focus should shift to specific actions like targeted job creation and skills enhancement programs.
3. **Social Protection:** Tailored protective measures are essential to support the vulnerable segments of the workforce, aiming to revitalize employment figures.
4. **Addressing Gender Labor Disparities:** While promoting increased labor force participation for women is pivotal, policies must be sensitive to regional cultural and social structures. This ensures their viability and effectiveness.
5. **Re-evaluating Economic Growth:** There is a negative correlation between GDP and gender employment disparity, indicating the importance of a more comprehensive approach. Policymakers need to support economic growth strategies with additional specific interventions, considering the various factors involved.

In essence, analyzing disparities across OECD countries underscores the necessity for a nuanced, context-specific approach. This study highlights the critical role of integrating empirical data with theoretical frameworks to advance the understanding of socioeconomic inequalities and labor market dynamics within OECD countries.

Future Inequalities: Perspectives

The relationship between global shocks and inequality is complex, invoking divergent views among scholars and policymakers regarding their long-term effects on societal disparities. Despite this complexity, there is no shortage of proposals aimed at reducing inequality, as highlighted by Scheidel (2017).

On one hand, some argue that pandemics, like all crises, have the potential to be catalysts for positive change (WBCSD 2020). It is also possible that the pandemic spurs productivity by accelerating technology adoption, innovation, and a shift toward more productive sectors (di Mauro and Syverson 2020). In the short term, the consequences of the COVID-19 pandemic are overwhelmingly negative, with rightful attention focused on minimizing loss of life and mitigating impacts on health and wellbeing. However, due to its profound disruption of economic and political systems, there is potential for the pandemic to accelerate the emergence of what John Elkington refers to as "Green Swans." These transformations could ultimately reduce inequality by catalyzing structural changes in societies (Elkington 2020). Similarly, pandemics have been posited to act as "levelers" of inequality, driven by societal and economic disruptions that lead to major structural changes, reducing disparities. Historical instances where pandemics catalyzed shifts in labor markets, wealth distribution, and policy reforms support this view. For instance, Scheidel (2017) discusses how major crises historically led to tighter labor markets and increased wages for workers, using the Black Death as a precedent.

Adding to this discourse, Keynes (1936) highlighted how government intervention could counteract the negative spiral of economic crises by stimulating economic demand. He argued that during such disruptive events, involuntary unemployment due to inadequate demand could lead to a 'paradox of thrift,' where increased savings reduce consumption, further lowering aggregate demand and income. Without effective governmental action, this cycle could prolong economic depression, underscoring the critical role of policy in mitigating inequality during and after crises (Ólafsson, Helgason and Stefánsson 2016).

Similarly, Orszag, Rubin and Stiglitz (2021) note that crises often stimulate public demand for policy reforms, leading to enhanced social safety nets and progressive taxation. Supporting this perspective, Kingdon (1984) argues that crises open a “window of opportunity” for policy reform, suggesting a critical period when significant changes are more feasible.

On the other hand, there is contention that such crises exacerbate existing inequalities, leading to their amplification over time. Substantial research suggests that pandemics exacerbate pre-existing inequalities, with marginalized and lower-income groups suffering more due to limited access to healthcare and economic opportunities (Chandler et al. 2021, Monte 2021). Berkhout et al. (2021) report that the pandemic significantly increased income inequality, with wealthier individuals recovering rapidly while the poorest faced prolonged suffering. Isasi et al. (2021) and Shadmi et al. (2020) emphasize that pandemics leave lasting scars on marginalized populations, widening health disparities and entrenching social stratification.

The enduring effects of the pandemic reveal the potential for rapid, unified societal responses in times of emergency, setting a clear demarcation from the more measured reactions to environmental degradation, social stratification, and economic disparities. Throughout history,

societal disruptions have often precipitated transformative social change, driving progress and reformation (WBCSD 2020).

An increase in inequality is almost certain. Yet, the extent of this increase, the speed with which it is reduced, and the achievement of greater equality, are choices for governments across the world (Berkhout et al. 2021). Analyzing the pandemic, its repercussions on social inequities become apparent, contingent upon state interventions and community resilience. Historical analysis shows that pandemics can act as agents of social change, prompting shifts that diminish structural inequalities (Elkington 2020, Scheidel 2017). However, today's landscape presents novel potential for equitable reform. The impact of pandemics on inequalities is therefore intricately linked to the nature of governmental policy and its execution.

Limitations of the Study

All scholarly inquiries grapple with inherent limitations. Therefore, acknowledging these challenges is crucial, not only to fortify the study's credibility but also to pave the way for targeted exploration in future research endeavors. This section delineates some limitations faced in this research, elucidates their implications, and explicates the strategies employed to mitigate their impact.

Data Lag and Availability

This study, utilizing a dataset that extends up to 2021, specifically focuses on OECD countries within Europe and the United States, aligning with the research's scope. A limitation, however, is the absence of data from 2022, which presents an intriguing opportunity for future research endeavors to delve deeper and refine these initial findings. The validity of this approach

is further supported by numerous studies that have concentrated exclusively on data from 2020-2021. Despite these constraints, the study provides valuable insights into the complex dynamics of inequality across OECD countries and their welfare regimes. It contributes to the literature on inequality by comparing the impact of major crises on inequalities in different types of welfare regimes. This becomes particularly relevant against the backdrop of major global events like the Great Recession and the COVID-19 pandemic, highlighting the study's broader implications and relevance.

Transitioning to specific health metrics, foundational measures like life expectancy and infant mortality rate stand as critical indicators of a population's overall health and are essential for measuring health disparities. The aftermath of global events, including the recent pandemic and the preceding Great Recession, can introduce delays in discernible effects on these measures. In relation to Infant Mortality Rate, while some countries have managed to maintain or improve their rates amidst the pandemic, differences exist, such as those observed in the GEE model, which may not fully capture the immediate rise in infant mortality. These discrepancies could be attributed to factors such as data reporting delays and the cascading effects of prior global upheavals, as well as the inherent biological factors influencing infant mortality. While life expectancy can potentially encompass immediate disruptions as well as persistent health challenges, it is pivotal to understand that the ramifications of global episodes might unfurl over extended durations. This phenomenon is illustrated in the research examining the enduring impacts of the Great Recession (T2), which continued to be substantially evident throughout the intermediary phase (T3), spanning 2011 to 2019.

Analytical Strategies for Longitudinal Data

To address the complexities inherent in longitudinal data, this research utilizes a range of statistical methodologies, each selected for its suitability to the unique characteristics of the data and the hypotheses. The use of Exploratory Data Analysis (EDA) for time series provides initial insights, setting the stage for more in-depth analysis. The Fixed Effect model is instrumental in controlling for unobserved heterogeneity and endogeneity, ensuring a more accurate estimation of causal effects. Central to our analysis is the application of GEE, chosen for their strength in assessing population-averaged main and interaction effects of different welfare regimes.

This analytical approach is specifically chosen to address the challenges posed by potential imbalances in the sizes of each cluster and the complexities of analyzing data across varied regimes. MMRM is utilized to analyze data across OECD countries. Additionally, GEE is applied to assess the broader impact of global crises, which affect all countries, rendering the use of unaffected control groups impractical. This dual approach, employing both MMRM and GEE, enhances the robustness of our analysis. It allows us to effectively handle unbalanced time periods, variations in cluster size, and the universal impact of global crises.

Directions for Future Research

The presented research underscores considerable disparities spanning income, labor dynamics, and health metrics across OECD countries over the past two decades, with a focus on two global crises: The Great Recession and the COVID-19 Pandemic. Emerging from these findings are promising trajectories for further scholarly exploration:

- 1) **Geographical Expansion:** To gain a holistic understanding of global disparity trajectories and the impact of varying policy architectures, future studies might extend their geographical focus to encompass both OECD and non-OECD countries.
- 2) **Exploring Varied Inequality Metrics:** While this study primarily engaged with income, occupational, and health dimensions, upcoming research could delve into alternate facets of inequality. Elements like educational achievements, housing accessibility, and socio-economic mobility can shed light on the diverse aspects of disparities between countries.
- 3) **Impact of Technological Evolution:** Given the speed of technological advancements reshaping the labor market, a deeper understanding of their implications on income and employment disparities is paramount. Such explorations would also be invaluable for identifying policy interventions to counter any negative ramifications.
- 4) **Post-Pandemic Disparity Assessment:** As countries navigate the post-pandemic recovery phase, there is an imperative to examine disparity trends during this time. An intertwined analysis of policy effectiveness in the post-pandemic era could offer pivotal insights.
- 5) **Interdisciplinary Integration:** Fusing knowledge from diverse disciplines-ranging from economics and sociology to public health-can foster a comprehensive understanding of disparity dynamics. This integrative approach is instrumental for formulating all-encompassing policy responses.
- 6) **Using Mixed Methods:** Beyond quantitative analyses, future studies might benefit from qualitative methodologies. Incorporating tools like interviews or focus groups can unearth profound insights into the root causes and ripple effects of income, labor, and health disparities. By capturing the lived experiences and expert narratives, research can provide a more nuanced view of the subject matter.

- 7) **Assessing COVID-19 Strategies:** To thoroughly understand the intricate effects of the country's response to the pandemic, future research should consider a broad spectrum of methodological approaches. This includes integrating traditional statistical methods with experimental designs, such as synthetic cohort comparison groups and quasi-experimental frameworks, as one of several strategies. These approaches could offer insights into evaluating the effectiveness of various pandemic response strategies across countries.

Summary

This concluding section presents an analytical overview of the observed variations in inequality across OECD countries during global crises. It highlights substantial differences in key variables—such as income, labor, and health indicators—between the Great Recession and the COVID-19 pandemic. These distinctions highlight the complex relationship between global crises and the configurations of welfare regimes across these countries.

The discussion contributes to sociological discourse by urging a critical reevaluation of welfare models in light of shifting global dynamics and advocates for the adaptation of governance frameworks in times of crisis. The study stresses the necessity for comprehensive longitudinal research, detailed policy analysis, evaluations of social outcomes, investigations into post-crisis resilience, and the encouragement of diverse research methodologies.

In conclusion, while recognizing the limitations of its research scope, the study calls for more detailed investigations into structural inequalities. It expands our understanding of socio-economic stratification and the infrastructure of welfare systems across OECD countries, particularly in response to global challenges.

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Appendix

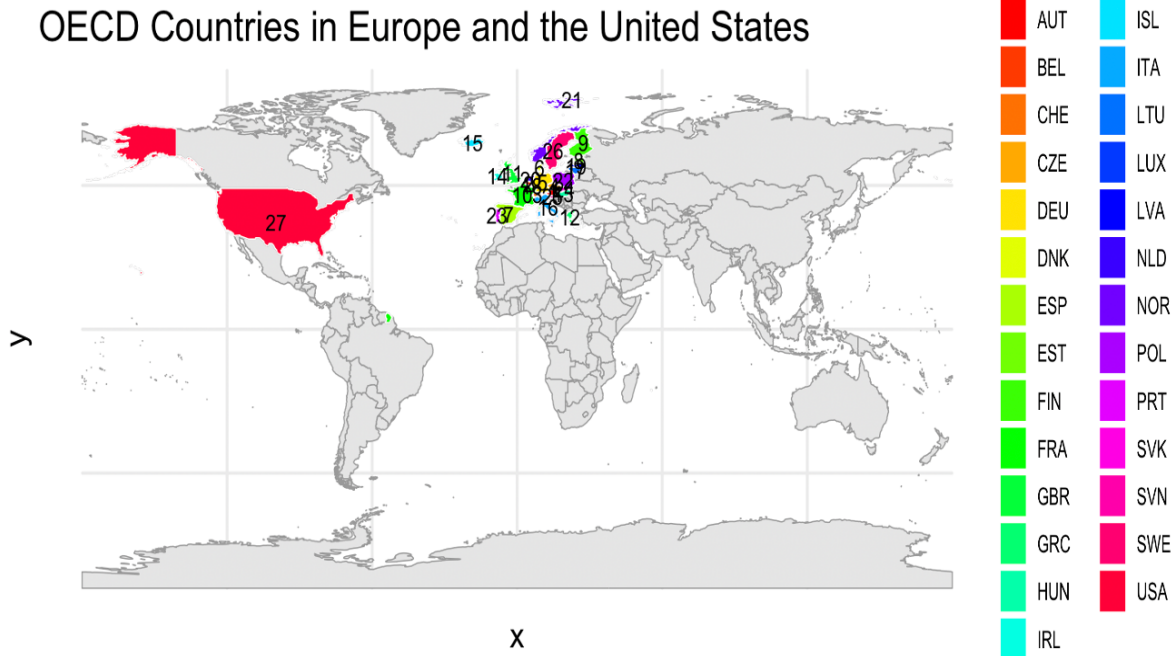


Table 16. List of OECD Countries and their welfare regimes

Welfare regimes	Country
Social Democratic (Nordic Model)	Denmark Sweden Norway Finland Iceland
Liberal Model	United States United Kingdom Ireland
Corporatist (Continental Model)	Germany France Belgium Austria Netherlands Luxembourg Switzerland
Mediterranean Model	Italy Spain Portugal Greece
Post-communist Model	Poland Hungary Czech Republic Slovenia Slovakia Estonia Latvia Lithuania

Note: This study classifies countries into welfare regimes following established scholarly works. While there may be overlaps with classifications in other studies, this research aligns with key sources (Aidukaite 2009, Esping-Andersen 1990, Fenger 2007, Ferrera 1996, Frelle-Petersen, Hein and Christiansen 2020).

Table 17. List of Acronyms and Abbreviations

Acronym/Abbreviation	Full Form
AIC	Akaike Information Criterion
AR1	Autoregressive Correlation Structure 1
BIC	Bayesian Information Criterion
EDA	Exploratory Data Analysis
ER	Employment Rate
GDP	Gross Domestic Product
GEE	Generalized Estimating Equation
IMR	Infant Mortality Rate
LE	Life Expectancy
LM	Liberal Model
MM	Mediterranean Model
MMRM	Mixed-Effects Model for Repeated Measures
NM	Nordic Model
OECD	Organization for Economic Co-operation and Development
PM	Post-Communist Model
QIC	Quasi-Information Criterion
SBTC	Skill-Biased Technological Change
UNDP	United Nations Development Program
UR	Unemployment Rate
VIF	Variance Inflation Factor
WID	World Inequality Database

Table 18. The Operational Definitions of Terms Used in the Analysis

Terms	Definitions
Across	The term across is used to examine overall trends or patterns that span all 27 countries included in the analysis.
Between	Between denotes comparisons made specifically from one welfare regime to another within the study.
Country-Level	Refers to analyses conducted across 27 selected OECD countries.
Gini Index	Refers to the measurement of income distribution based on post-tax data.
OECD Countries	In this study, the term OECD countries specifically applies to a selected group of 27 countries, focusing on Europe and the United States.
Within	Within refers to comparisons or observations made inside a single country or a single welfare regime.