Essays on the Impact of Economic Freedom, Climate Change, and Household Decision-Making on Women's Well-Being

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Declaration

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Dedication

To my father

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List of Acronyms and Abbreviations

°C	Degree Celsius
CIRI	Cingranelli-Richards Human Rights Dataset
CO_2	Carbon dioxide
DHS	Demographic and Health Surveys
EF	Economic freedom
FR	Fertility rate
FDI	Foreign direct investment
FE-IV	Fixed Effect Instrumental Variable
GDP	Gross domestic product
HDM	Household decision-making
IPCC	Intergovernmental Panel on Climate Change
IPV	Intimate partner violence
IV	Instrumental Variable
OECD	Organisation for Economic Co-operation and Development
UNDP	United Nations Development Programme
WBL	Women, Business, and the Law (World Bank index)

WDI	World Development Indicators
WHO	World Health Organization

Abstract

This thesis examines the complex connections between and the impact of economic freedom, climate change, and household decision-making (HDM) on gender dynamics and women's well-being within development economics. Divided into three main studies the thesis examines the worldwide issues concerning countries from both macroeconomic and microeconomic perspectives.

The first study examines the empirical link between economic freedom and fertility rates using panel data from developed and developing nations. Our fixed effects instrumental variable (IV) analysis shows global evidence of a negative impact of economic freedom on fertility behaviour. The influence is particularly pronounced in industrialised and high-income nations than in developing countries. Additionally, our instrumental variable quantile regression analysis reveals a more substantial negative effect for countries with a higher fertility rate. Lastly, we show that the negative impact operates through multiple channels, including income level, women's unemployment, and their decision to receive tertiary education.

The second study examines the associations between climate change indicators and legal gender disparity for a global group of developed and developing nations. Our results show that temperature shocks have a pervasive detrimental influence on gender equality. We link deviations from average temperatures to decreases in gender equality rights. This set of influences is more prevalent in developing than developed ones. We argue that less advanced stages of economic development, more reliance on agriculture, higher maternal mortality, and lower levels of democracy are potential mechanisms through which climate change affects

gender equality. Policies to improve women's rights and adapt to climate change may be necessary to prioritise and provide greater attention to these crucial intermediate channels.

The third study focuses on the relationship between women's participation in decision-making and emotional intimate partner violence (IPV) using cross-sectional data from Demographic and Health Surveys (DHS) encompassing nearly one million women across 50 developing countries. Our analyses, including OLS, 2SLS, and Bivariate probit, reveal a significant negative impact of women's decision-making on emotional IPV, particularly pronounced in Sub-Saharan Africa, South Asia, and Southeast Asia. Heterogeneity analysis indicates that increased decision-making authority notably reduces specific forms of emotional abuse, such as humiliation, threats, and insults. The protective effect is strongest among women aged 30-34, with diminishing effects in older age groups. Furthermore, this impact is more substantial in wealthier households, women whose husbands have completed secondary education or higher, and those currently employed. Conversely, the protective effects are less significant in poorer households. Collaborative decision-making across various domains is crucial for reducing emotional violence between partners and fostering equality and mutual respect.

The aim of the thesis is to comprehend how the elements revealed in each of these three studies intersect and shape broader development outcomes.

Chapter 1: Introduction

1.1. Introduction

The field of development economics explores the factors that drive economic growth and progress in various settings, from wealthy nations to developing ones. This thesis examines three critical aspects of development economics: the link between economic freedom and fertility patterns, the impact of climate change on legal gender equality, and the connection between women's decision-making power and spousal emotional abuse. This thesis is divided into three main studies, each comprising specific research into the study of development economics examining the worldwide issues concerning countries from both the macroeconomic and microeconomic perspectives. Using empirical analysis to investigate the issues, each of the three studies below reveals the complex interactions influencing socioeconomic advancement and obstacles to development. The primary aim is to comprehend how these elements intersect and shape broader development outcomes.

Economic development theory investigates the processes, policies, and mechanisms that empower nations to enhance their citizens' economic, social, and political well-being. It scrutinises the transition from low-income, less industrialised, predominantly rural societies to higher-income, more developed, and urbanised ones. The primary focus is identifying factors that facilitate sustainable growth, alleviate poverty, and promote equitable development. By analysing historical trends and the impacts of various development strategies, economic development theory seeks to provide insights into achieving enduring progress.

Classical theories provide foundational insights into how nations benefit from trade and the efficient allocation of resources. Adam Smith's theory of absolute advantage suggests that

countries should concentrate on producing goods where they hold a cost advantage, thereby facilitating beneficial trade. This specialisation enables countries to allocate resources more effectively, enhancing economic progress and prosperity (Smith, 1776). Building on this, David Ricardo's theory of comparative advantage emphasises that even if a country has an overall production advantage across multiple goods, it should specialise in producing those it manufactures most efficiently. This theory highlights the universal benefits of trade, as specialisation maximises global productivity and allows each nation to leverage its unique strengths (Ricardo, 1821).

The Malthusian theory, proposed by Thomas Malthus, provides a distinct perspective on the challenges of population growth. Malthus contended that if population expansion remains unchecked, it would ultimately surpass the capacity for food production, resulting in widespread poverty and stagnation (Malthus, 1986). This perspective emphasises the potential for resource scarcity to impede development, particularly as increasing populations place greater demands on limited land and food resources. Consequently, Malthusian theory underscores the necessity of incorporating population dynamics into development planning (Malthus & Winch, 1992).

Structural change models analyse how economic transitions across sectors drive development and influence income distribution. Arthur Lewis's Dual-Sector Model proposes that transferring labour from low-productivity agriculture to high-productivity industry stimulates economic growth, increasing overall productivity and raising income levels as the industrial sector expands (Lewis, 1954). Simon Kuznets's Inverted U Hypothesis complements this by examining the relationship between growth and income inequality. Kuznets argued that, initially, inequality rises as growth varies across sectors, but as development progresses, the benefits eventually diffuse, reducing inequality across society (Kuznets, 2019). These models

illustrate how structural economic changes promote growth and foster a more equitable income distribution.

Dependency theory posits that the global economy is organised to categorise nations into "core" (developed) and "periphery" (developing) countries, with core nations exploiting periphery nations for their resources and labour (Prebisch, 1962). Proponents of this theory argue that underdevelopment is not simply the absence of development but a consequence of historical exploitation and the inequitable relationships between developed and developing countries (Frank, 1970). This perspective suggests that such exploitative economic dynamics perpetuate global inequalities.

Modernisation theory suggests that developing nations can attain economic progress by mirroring developed countries' pathways, focusing on industrialisation, education, and social and cultural advancement (Inkeles, 1974). Advocates of this theory argue that foreign aid, investment, and reforms inspired by Western practices are crucial for facilitating these transformations, operating under the assumption that development progresses along a linear trajectory, guiding nations from traditional to modern societies (Rostow, 1990).

Endogenous growth theory, developed by economists such as Paul Romer, emphasises the significance of technology, knowledge, and human capital in achieving sustainable economic growth. The theory posits that innovation, education, and intellectual property protection are essential for growth as they enhance productivity from within the economy (Romer, 1986). By concentrating on the internal drivers of growth, endogenous growth theory advocates for policies promoting research and development, education, and cultivating a skilled workforce (Lucas Jr., 1988).

The human development approach, advocated by Amartya Sen, emphasises that economic development should extend beyond mere GDP growth to enhance individuals' capabilities and freedoms. This perspective prioritises health, education, and living standards to empower people to lead fulfilling lives and engage meaningfully in society (Sen, 2014; Bhanojirao, 1991).

Institutional theory emphasises the crucial role of institutions—such as legal frameworks, property rights, and governance structures—in influencing economic development. Strong institutions lower transaction costs, safeguard investments and promote productivity, which is vital for economic growth (North, 1990). In contrast, this theory posits that weak institutions impede development by creating inefficiencies and undermining investor confidence (Acemoglu & Robinson, 2013).

Environmental and sustainable development theories emphasise that sustainable growth must adhere to environmental limitations. They advocate for models that conserve resources and minimise greenhouse gas emissions (WCED, 1987). These theories support equitable development that fulfils the needs of the present without jeopardising resources for future generations, highlighting the importance of renewable resources and responsible environmental stewardship to ensure long-term economic advancement (Daly, 1994).

Inclusive growth theory advocates for development strategies that make economic benefits accessible to everyone, emphasising the need to reduce inequality and create opportunities for marginalised populations (Ali & Zhuang, 2007). This theory posits widespread participation in growth activities leads to a more stable and resilient economy (Ranieri & Almeida Ramos, 2013).

Critical policy implications highlight the necessity of trade, investment, and technology transfer to drive growth, with a particular focus on the well-being and equity of women. Policies that promote trade openness and attract foreign direct investment (FDI) not only enhance competitiveness and job creation but also yield transformative impacts on gender equity by broadening employment opportunities and facilitating skill acquisition for women. Investing in education and health is crucial for developing human capital; ensuring equitable access for women and girls boosts productivity, fosters innovation, and supports economic progress across generations.

Infrastructure development, institutional reforms, and initiatives promoting gender equity are essential components of a comprehensive growth strategy. Adequate transportation, energy, and digital infrastructure link markets and facilitate industrialisation. Moreover, accessible infrastructure—such as safe transportation—encourages women's full economic participation. Institutional reforms to strengthen governance, reduce corruption, and safeguard property rights create a stable environment in which everyone, particularly women, feels secure in their ability to invest, work, and innovate (Perkins et al., 2013). Policies supporting women's rights and their involvement in decision-making ensure that economic growth benefits all segments of society. In summary, a holistic approach that emphasises trade, human capital, infrastructure, governance, and gender equity is the foundation for sustainable, inclusive development and the well-being of women (Schumpeter & Swedberg, 2021).

Development economics and economic development are two interrelated yet distinct concepts within the field of economics. Development economics is a specialised area that focuses on understanding the factors contributing to improving countries' economic, social, and political well-being, particularly those with low income or in the developing stage. This field of research investigates processes aimed at enhancing living standards, alleviating poverty,

improving educational outcomes, and promoting health. Scholars in development economics explore a wide range of topics, including income distribution, structural transformation, institutional development, gender equity, and sustainability. The primary aim of this discipline is to generate insights into the mechanisms that drive economic growth and to identify effective policies that enhance living conditions, taking into account both microeconomic and macroeconomic perspectives (Sen, 2014).

Development economics is a multifaceted field that delves into the monetary elements that drive economic performance and the intricate social, cultural, and political dynamics that shape these outcomes. Researchers in this discipline examine various topics, including how households make decisions, the prevalence and implications of market failures, and the pivotal roles played by governments, non-profits, and international organisations in fostering sustainable development. This study area is crucial for crafting effective policies to enhance human well-being. It addresses pressing challenges such as unemployment, social inequality, and access to quality healthcare services. By integrating theoretical frameworks and practical applications, development economics offers comprehensive models and strategies that can effectively promote growth and prosperity in underdeveloped regions. This holistic approach aspires to create pathways for transformative change, helping uplift communities and improve their overall quality of life (Todaro & Smith, 2020).

Economic development is a multifaceted and systematic process through which a country or region enhances its citizens' overall quality of life. This transition typically involves moving from a low-income, less-industrialised economy towards a more diversified, higher-income one. Key to this transformation are significant structural changes that reshape the

economic landscape. These changes often include industrialisation, where economies shift from primarily agricultural activities to manufacturing and services, facilitating job creation and increasing productivity. Urbanisation also plays a vital role, with populations migrating from rural areas to cities, which fosters innovation, access to services, and improved living conditions. Additionally, technological advancements are crucial, as they can lead to more efficient production methods, better communication, and improved access to information, all of which contribute to higher productivity and income levels (Meier & Rauch, 1976).

Economic development is typically quantified using a variety of indicators. Among the most prominent are GDP growth, which tracks the increase in the value of goods and services produced and income per capita, which provides insight into the average economic output per person. Other vital metrics include poverty rates, which indicate the percentage of the population living below the national poverty line, and improvements in infrastructure—such as transportation, energy supply, and telecommunications—that are essential for supporting economic activities. Furthermore, health and education indicators are equally important, as they reflect the well-being of the population and the availability of skilled labour. Improvements in these sectors correlate with sustainable economic growth, as a healthier, better-educated workforce can drive innovation and productivity. Thus, economic development embodies a practical, observable transformation in the economy, showcasing the material progress and increasing prosperity of a society over time (Acemoglu & Robinson, 2013).

Development economics focuses on the theories, policies, and mechanisms that elucidate and promote economic development. Economic development is the practical process of enhancing a country's economic and social conditions. While development economics offers valuable analytical tools and insights, economic development represents the improvements that positively impact the lives of individuals within a nation or region. The relationship between

the two is mutually beneficial: development economics guides policy decisions that, when implemented successfully, result in meaningful economic development (Cypher, 2014).

In the field of development economics, integrating both macro and micro data is indispensable for obtaining a thorough understanding of the myriad factors that influence economic growth, alleviate poverty, and enhance overall well-being. Macro data generally consists of aggregate indicators, such as gross domestic product (GDP), inflation rates, trade balances, and national employment figures. These comprehensive indicators allow economists to analyse broad economic performance trends, assess income distribution across different segments of the population, and evaluate the effectiveness of various policies on overall growth and stability (Ravallion, 2014).

For instance, macroeconomic data can reveal significant insights, such as the correlation between a nation's GDP growth and its investments in education, providing evidence of how education can function as a catalyst for economic improvement. Similarly, examining trade policies can elucidate their impact on national income, showing how changes in trade agreements can directly affect a country's economic landscape. Focusing on the "big picture," macro data serves as a vital tool for policymakers, enabling them to devise and assess programs that promote economic stability and sustainable growth. Such initiatives are not merely beneficial; they are critical components for fostering long-term development and improving the quality of life for citizens.

In contrast, microdata delves into the intricate details of economic conditions by offering a wealth of information at the individual, household, or firm level. This rich tapestry of data captures the diverse economic experiences across different segments of society,

allowing economists and researchers to conduct detailed analyses of how economic shifts and policies specifically impact various demographic groups (Deaton, 1997).

For instance, examining microdata can reveal striking disparities in access to fundamental services such as education and healthcare. It highlights how urban residents might enjoy superior facilities and opportunities compared to their rural counterparts, who may face obstacles like inadequate infrastructure or limited resources. Additionally, this level of analysis can illuminate the complex interplay between household income and local economic conditions, such as the availability of jobs, prevailing wage rates, and access to a range of financial services—factors that collectively shape the economic well-being of families (Banerjee & Duflo, 2011).

These insights are not merely academic; they serve as a foundation for crafting targeted interventions that address the unique needs of different communities. For example, conditional cash transfer programs can provide immediate financial relief to low-income families, encouraging essential expenditures on health and education. Meanwhile, comprehensive job training initiatives can empower individuals by equipping them with relevant skills that enhance their employability in a rapidly changing job market. Furthermore, microfinance initiatives can open doors for marginalised populations, granting them access to credit and financial tools that were previously out of reach, thereby fostering entrepreneurship and economic self-sufficiency.

In essence, micro-level analysis is crucial in unearthing the layered complexities of economic inequality and vulnerability that might remain hidden in broader macro data. Providing a clearer picture of how different groups experience economic changes,

policymakers and organisations can develop informed, practical strategies that genuinely support those most in need, ultimately fostering a more equitable society.

Integrating macro and micro data is particularly potent in development economics, as it allows researchers to connect broad economic trends with individual behaviours and outcomes, thereby creating new opportunities for analysis (Bourguignon & Morrisson, 2002). For example, by combining macro-level growth data with micro-level household surveys, researchers can gain insights into how economic growth is distributed among various segments of society and whether it leads to significant poverty reduction. Utilising both types of data enables development economists to understand better the pathways through which macroeconomic policies impact individual well-being. This, in turn, facilitates the development of comprehensive, evidence-based policies promoting inclusive growth. Adopting this holistic approach is essential for tackling the complex challenges within development economics, as it permits the assessment of policies' real-world effects on both national and individual scales.

The Sustainable Development Goals (SDGs) constitute a comprehensive global framework that addresses the most urgent social, economic, and environmental challenges by 2030 (Colglazier, 2015). Established by the United Nations, these 17 goals encompass various issues, including poverty, hunger, health, education, and gender equality. The SDGs emphasise an integrated approach to development, recognising that advancements in one area often contribute to progress in others (Sachs et al., 2022). This holistic perspective is invaluable as it fosters solutions that harmonise economic growth, environmental sustainability, and social inclusivity. The thesis closely aligns with several SDGs, providing insights into the interconnections between economic independence, climate change, and women's

empowerment, thereby underscoring the significance of these goals in building a more resilient and equitable world.

SDG 3 (Good Health and Well-being) and SDG 5 (Gender Equality) are highly pertinent to the issues of economic freedom and fertility rates (United Nations, 2015). Economic freedom typically enhances access to education and healthcare, especially for women, which can influence reproductive choices and lower fertility rates. Improved maternal and child health outcomes—an essential aspect of SDG 3—are often realised when women possess greater autonomy in family planning. By implementing economic freedom policies, governments can empower women to make informed reproductive decisions, thereby contributing to healthier populations and more sustainable family structures. This approach aligns with the goals of SDG 3 and highlights how economic policies that advocate for individual freedom can further global health objectives.

The thesis centres on the intersection of climate change and gender inequality, directly aligning with Sustainable Development Goal 5 (Gender Equality) and Sustainable Development Goal 13 (Climate Action) (Conceição, 2020). Climate change disproportionately impacts women, particularly in developing regions where they are pivotal in agriculture and household management. Environmental challenges, such as water scarcity and crop failures, further amplify the burdens on women and exacerbate existing gender inequalities (Nagarajan, 2020). SDG 13 aims to enhance resilience and strengthen adaptive capacities in the face of climate-related disasters. SDG 5 advocates for gender-responsive policies that empower women across all facets of life (UN Women, 2018). The findings of this thesis highlight the critical need for climate policies that recognise and address these gendered impacts, reinforcing

the notion that effective, sustainable development must integrate both environmental resilience and social equity.

Sustainable Development Goal 5 (SDG 5), which focuses on gender equality, is intricately linked to the issues of intimate partner violence (IPV) and the empowerment of women. A key target of SDG 5 is the elimination of all forms of violence against women and girls, including domestic violence. Empowering women through involvement in decision-making processes and promoting financial independence has diminished IPV, as it enhances women's agency within their households and communities. The findings of this thesis support these objectives, indicating that policies designed to promote shared decision-making and gender equality can effectively reduce IPV and improve women's overall well-being. Addressing IPV through empowerment aligns with the broader aims of SDG 5, which strives to ensure that women everywhere can live free from violence and fear. This underscores the crucial role of gender equality in fostering safer and healthier societies (World Health Organization, 2023).

SDG 8 (Decent Work and Economic Growth) also aligns with the thesis's focus on economic freedom and women's economic participation. Economic freedom is crucial in fostering job creation, innovation, and financial independence, especially for women. When women have access to equitable employment opportunities and the autonomy to make financial decisions, they contribute to more resilient and diverse economies. SDG 8 advocates for inclusive growth and decent work for everyone, highlighting the importance of fair labor conditions, equal opportunities, and sustainable economic practices. By connecting economic freedom with women's empowerment and economic stability, the thesis resonates with SDG 8's vision of inclusive and sustainable growth that benefits entire communities (Sachs et al., 2022).

The thesis examines policies promoting gender equality, economic freedom, and climate resilience, emphasising the interconnectedness of sustainable development goals (SDGs). By addressing these areas concurrently, policymakers can avoid unintended trade-offs and develop strategies that support multiple objectives. For instance, climate policies that advance gender equality protect vulnerable populations and bolster resilience against environmental challenges, furthering both SDG 5 and SDG 13 (Sachs et al., 2022). Likewise, economic freedom that enhances educational and employment opportunities for women contributes to the achievements of SDG 5 and SDG 8. This thesis underscores the necessity for an integrated approach, wherein policies are crafted to tackle complex, overlapping issues, thus promoting the holistic vision of the SDGs for a sustainable and inclusive future.

Investigating the intricate relationship between economic freedom and fertility patterns is a vital study area within development economics. Economic freedom refers to the capacity of individuals and businesses to make independent decisions regarding production, investment, and consumption, free from excessive governmental interference and regulation. This freedom is essential, as it affects individual choices and broader economic outcomes.

Understanding how economic freedom influences fertility rates is particularly important since demographic trends can significantly impact a nation's labour supply, economic growth trajectory, and social structure (Gwartney et al., 2021). In many cases, countries that enjoy higher economic freedom tend to experience lower fertility rates. This phenomenon can give rise to what is known as a demographic dividend. This economic boost occurs when a more significant proportion of the population is of working age, contributing to increased productivity and economic vitality.

By delving into this complex relationship, policymakers can develop informed strategies that foster greater economic freedom and effectively address issues related to population dynamics. Such strategies can ultimately enhance economic stability and significantly increase growth potential, benefiting society (Kögel, 2004).

This thesis's crucial area of focus is the intricate relationship between climate change and gender equality. Climate change presents a range of significant risks that disproportionately impact vulnerable populations, with women in developing countries being particularly affected. As environmental conditions deteriorate, women frequently encounter heightened challenges related to food security, health, and access to livelihood opportunities (UN Women and UNIDO, 2023). These challenges not only threaten their immediate well-being but also serve to aggravate pre-existing social and economic inequalities.

For instance, as agricultural productivity declines due to unpredictable weather patterns and extreme climate events, women—who often play a central role in food production and household management—struggle to secure sufficient food for their families. Additionally, the health impacts of climate change, such as the spread of waterborne diseases and increased heat-related illnesses, disproportionately affect women, who may have less access to healthcare resources and services.

Understanding the complex interactions between climate change and gender equality is vital for formulating effective policies that address environmental challenges and promote social equity. This involves recognising how climate change impacts women and acknowledging their critical role in climate resilience and adaptation efforts.

The research emphasises the necessity of examining legal frameworks to better safeguard women's rights in the face of climate-related adversities. It calls for an integrated

approach that ensures sustainable development initiatives are environmentally sound, socially inclusive, and equitable. By advocating for policies that consider the unique circumstances of women in climate-affected areas, this thesis underscores the importance of fostering gender-responsive strategies that empower women, enhancing their capacity to adapt to changing environmental conditions while promoting broader social justice.

The intricate relationship between women's decision-making power within households and the prevalence of spousal emotional abuse offers vital insights into the underlying social dynamics that shape developmental outcomes. Research consistently highlights that when women are empowered to participate actively in household decision-making processes, this empowerment is associated with significant improvements in health, educational attainment, and economic stability for their families.

However, in numerous cultural contexts, entrenched traditional gender roles and persistent power imbalances contribute to the perpetuation of domestic violence. These societal norms often hinder women's agency, leaving them vulnerable to emotional abuse and other forms of violence. By examining how variations in decision-making power correlate with experiences of emotional abuse, this research aims to uncover critical patterns that can inform the design of targeted interventions. Such interventions would focus on reducing domestic violence and promoting women's rights within different cultural frameworks.

Moreover, fostering gender equality enhances individual families' well-being and cultivates healthier community environments. When women are empowered, they tend to prioritise investments in their children's education and health, creating a positive development cycle. This ripple effect contributes to broader societal progress as empowered women become pivotal agents of change, advocating for their rights and the rights of future generations.

Ultimately, addressing the nexus of decision-making power and emotional abuse is essential for creating sustainable pathways toward equity and improved well-being for all members of society.

Integrating economic policies, environmental changes, and social dynamics into development economics highlights the intricate interdependencies between economic and social issues. Each research study delves into how these diverse factors impact development outcomes across different contexts. For instance, it examines how specific economic policies can have ripple effects on societal well-being or how shifts in environmental conditions can alter a nation's economic growth trajectory.

This comprehensive approach is crucial for grasping the complex challenges countries encounter at various stages of their development. By addressing the interplay between economic indicators and social structures, researchers can identify the barriers that hinder progress and the opportunities that foster resilience.

Furthermore, analysing these multifaceted relationships offers valuable insights into how economic strategies can be effectively harmonised with social objectives. This alignment is vital for promoting sustainable growth that benefits all population segments, ensuring that development is not solely focused on economic metrics but also inclusive and equitable. Such a holistic perspective deepens our understanding of development economics and provides a blueprint for crafting policies that drive meaningful change in both economic and social spheres (Sachs, 2015).

In addition, the empirical analysis utilised in these studies also plays a crucial role in validating the theoretical frameworks underpinning development economics. By utilising robust quantitative methods to delve into these complex issues, the research offers valuable,

evidence-based insights that can guide policymakers and practitioners as they tackle pressing socioeconomic challenges. This meticulous and systematic approach bolsters the credibility of the findings and underscores the significance of making informed, data-driven decisions when formulating effective development policies. Integrating empirical evidence into policy creation ensures a more targeted and impactful response to the needs of diverse communities.

In conclusion, the topics examined in this thesis are relevant to development economics. By delving into the intricate relationships between economic freedom, climate change, gender equality, and internal societal dynamics, this research illuminates vital areas that profoundly impact socioeconomic progress. These investigations not only emphasise global challenges but also provide invaluable insights that can inform effective policy interventions aimed at promoting sustainable development and enhancing the quality of life for individuals and communities across the globe. Finally, the findings of this thesis contribute to a deeper and more nuanced understanding of development economics, highlighting the critical necessity for integrated approaches that harmoniously encompass both economic and social facets of advancement.

1.2. Chapter overview

The first study, presented in Chapter 2, will analyse the correlation between economic freedom and fertility rates using panel data from developed and developing countries. Economic freedom denotes the liberty for individuals and businesses to function within a free-market framework with minimal government intervention, and it is widely believed this influences various socio-economic outcomes, including fertility rates. This study contributes to the extensive research on the global determinants of fertility rates, explicitly focusing on economic freedom. The findings suggest that financial freedom, market accessibility, and the

inclination to participate in economic pursuits can influence individuals' decisions regarding family planning.

Using a fixed-effects instrumental variable approach in Chapter 2, the analysis utilises economic freedom data from the Heritage Foundation and fertility data from the World Bank. We employ regulatory quality from world governance indicators as an instrumental variable to demonstrate evidence of a negative impact of economic freedom on fertility behaviour. This impact is particularly pronounced in industrialised and high-income countries compared to developing countries. Furthermore, our instrumental variable quantile regression analysis finds a more substantial negative effect for countries with a higher fertility rate. Finally, we illustrate that the negative impact operates through various channels, including income level, women's unemployment, and their decision to pursue tertiary education.

Furthermore, Chapter 2 emphasises the significant role of economic freedom in shaping demographic patterns. It points out that economic freedom and fertility are inconsistent across different situations and influenced by a country's wealth, educational achievements, and unemployment levels. This variability suggests that while economic freedom generally results in lower fertility rates, the strength and nature of this connection can vary based on specific socioeconomic circumstances. By analysing these variations, the research presented in Chapter 2 enhances our understanding of how economic policies and freedoms affect demographic patterns, particularly in the context of economic progress and modernisation.

The second study, presented in Chapter 3, delves into the correlation between climate change indicators and legal gender disparity across a diverse set of developed and developing countries. This research aims to uncover the impact of temperature shocks and deviations from average temperatures on gender equality rights. Our work precisely aligns with Sustainable

Development Goal 10: To reduce inequality; and Sustainable Development Goal 13: underscoring the significance of addressing and mitigating the impacts of climate change.

The analysis uses a comprehensive dataset that includes climate change indicators such as temperature and precipitation. The data is sourced from the World Bank Group Climate Change Knowledge Portal (2024) using Climatic Research Unit annual data. Data on climate disasters is obtained from The Emergency Events Database provided by the Centre for Research on the Epidemiology of Disasters (CRED). Gender disparity is measured using the World Bank's Women, Business, and the Law (WBL) index, which covers a wide range of countries. This dataset encompasses developed and developing nations, allowing for a comparative analysis of how climate change affects gender equality across economic contexts.

Utilising fixed effects instrumental variable (IV) analysis, using carbon dioxide (CO_2) emissions per gross domestic production (GDP) as an instrument, we investigate the relationship between temperature fluctuations and the WBL index, which measures legal gender equality. This approach helps address endogeneity by considering unobserved country-specific factors that could otherwise impact the link between climate change and gender inequality.

Our findings suggest that fluctuations in temperature have a significant negative impact on gender equality. Specifically, deviations from average temperatures are linked to a decline in the WBL index, indicating a reduction in gender equality rights. This effect is more pronounced in developing countries than in developed ones. The study proposes several potential mechanisms through which climate change may influence gender equality, particularly in developing countries. These mechanisms include lower levels of economic development, greater dependence on agriculture, higher maternal mortality rates, and lower

levels of democracy. For instance, in regions heavily reliant on agriculture, where women play a significant role in farming, climate-related changes such as droughts or floods can undermine women's economic contributions and influence within households and communities. Targeted policies addressing these underlying factors could be vital for promoting women's rights and adapting to the adverse impacts of climate change.

In the third study, presented in Chapter 4, the discussion on gender equality is extended by examining the relationship between women's decision-making authority and emotional intimate partner violence (IPV) in developing countries. Emotional IPV is influenced by various sociocultural factors, including women's empowerment and their roles in household decision-making (HDM). This research focuses on understanding how these dynamics affect the prevalence of emotional IPV across different societies.

Chapter 4 thus illustrates how the empowerment of women, especially in roles involving decision-making within the household, significantly decreases the likelihood of experiencing emotional IPV. Women who participate in decision-making are more likely to have access to resources, education, and networks that can offer support and reduce their vulnerability to domestic violence. This third study further develops the themes presented in Chapter 2 and Chapter 3, by demonstrating that the advantages of economic freedom and legal rights are not fully realised unless women are empowered in their personal and domestic lives.

Chapter 4 thus serves as a crucial link to the other chapters as it delves into a particular social consequence, namely domestic violence, stemming from broader economic and gender policies. It underscores the significance of considering economic frameworks and societal standards when assessing the effects of development policies. While economic freedom and

gender equality legislation are indispensable, empowering women within households is pivotal for mitigating gender-based violence and promoting women's well-being.

The main objective of this Chapter 4 is to investigate the impact of women's involvement in decision-making processes on emotional IPV using a significantly larger dataset that includes around one million women across 50 developing countries. The analysis is conducted at the individual level using the comprehensive Demographic and Health Surveys (DHS) dataset. It aims to address gaps in the existing literature by examining whether empowering women in decision-making can decrease emotional IPV, promote gender equality, and how different forms of decision-making influence these outcomes.

Chapter 4 thus employs OLS, 2SLS, and Seemingly Unrelated Bivariate Probit methodologies to analyse the correlation between women's decision-making empowerment and emotional IPV. We utilise education attainment data as an instrumental variable. The results indicate that increased female involvement in HDM is significantly linked to reduced emotional IPV. By empowering women to participate in critical decisions actively, this research underscores the potential for reshaping power dynamics within households to mitigate emotional abuse, thus contributing to gender equality.

Thus, Chapter 4 provides a valuable contribution to the literature by connecting the microeconomic analysis of women's decision-making in the context of emotional IPV to the broader framework of social progress in gender equality, violence against women, and empowerment. The combined impact of increased decision-making autonomy, higher educational attainment, improved access to resources, and changing cultural attitudes signifies a significant shift towards reducing emotional IPV. These developments indicate the potential

for relatively rapid progress aligning social norms for more significant equity and reducing IPV.

While each of the three studies presented in this thesis address distinct issues, they all share a common objective: to comprehend the multifaceted nature of development economics. Chapter 2 delves into the relationship between economic freedom and fertility behaviour, illustrating how economic policies can impact demographic outcomes. Building upon this foundation, Chapter 3 explores the intricate interplay between climate change and gender equality, adding further depth to the analysis. Finally, Chapter 4 shifts the focus to the micro-level, investigating how women's empowerment and social dynamics influence violence against women.

Overall, this thesis demonstrates how economic, environmental, and social factors shape development trajectories. They emphasise the importance of comprehensive policies that consider these interdependencies instead of addressing each factor in isolation. For example, while advocating for economic freedom can result in economic growth and reduced fertility rates, without considering environmental resilience and gender equality, such policies may unintentionally worsen inequalities and hinder long-term development objectives.

1.3. Contribution to literature

This thesis makes a valuable contribution to the existing literature by addressing gaps in cross-country analyses and taking a multi-dimensional approach to development. It highlights the significance of considering multiple factors simultaneously, offering a more comprehensive view of development that encompasses economic policies, environmental sustainability, and social equity. The findings have important policy implications, insinuating

that governments and international organisations must adopt integrated approaches that tackle economic freedom, environmental concerns, and social challenges. This thesis enhances our understanding of these interconnected issues and provides valuable insights for policymakers, researchers, and practitioners working to advance sustainable and inclusive development around the world. This thesis emphasises the importance of balancing economic growth with social and environmental considerations to achieve development goals that are both equitable and sustainable.

This thesis distinguishes itself within the existing body of literature by embracing a distinctive and innovative methodology. Unlike many studies that focus on singular aspects of development, this research comprehensively addresses the gaps in cross-country analyses. It adopts a multidimensional perspective on development, intricately weaving together economic policies, environmental sustainability, and social equity into a cohesive framework, thereby offering a richer, more nuanced understanding of what development entails. By incorporating extensive empirical analysis across various contexts, this study emphasises the critical importance of exploring the complex intersections among economic freedom, climate change, and gender dynamics. Such intersections are pivotal to unravelling how these elements collectively influence development outcomes. Furthermore, the research acknowledges that actual development transcends mere economic growth; it encompasses creating social and environmental conditions that foster long-term stability, inclusivity, and resilience for all members of society.

A critical insight of this thesis is its focus on the relationship between economic freedom and social outcomes, such as fertility patterns. While many studies have examined economic freedom in isolation, this thesis highlights how economic policies can influence family planning and demographic trends, eventually affecting a country's economic trajectory.

For example, lower fertility rates, often linked to higher economic freedom, may lead to a demographic dividend—a temporary opportunity for accelerated growth due to an increased working-age population. By examining these dynamics, the thesis provides valuable perspectives on how policymakers can leverage the advantages of economic freedom while ensuring that demographic changes contribute to sustainable growth and social stability.

Furthermore, research on climate change and legal gender equality reveals a crucial yet underexplored area within development economics. Climate change intensifies gender inequalities, often placing a disproportionate burden on women, particularly in developing nations where resources are limited. This thesis emphasises the necessity of gender-sensitive climate policies, advocating for legal frameworks that effectively protect and empower women to address environmental challenges. In doing so, it contributes to the expanding body of literature that promotes gender equality as both an essential development goal and a vital means of enhancing resilience against climate-related shocks. By linking environmental sustainability with gender equality, these findings offer a model for crafting development policies that are more comprehensive and responsive to the realities faced by those most affected by climate impacts.

The examination of women's decision-making power and its relationship to intimate partner violence offers an essential dimension to the thesis. While many studies have explored domestic violence, this thesis takes a broader approach by contextualising the issue within a comprehensive development framework that links women's empowerment to social and economic advancement. Enhancing women's involvement in household decision-making promotes their safety and well-being and yields significant societal benefits, including improved health and educational outcomes for future generations. These findings underscore the necessity of addressing entrenched social norms and inequalities that restrict women's

agency to achieve sustainable development. As a result, this research highlights the critical need for gender-inclusive policies that empower women in both private and public spheres.

Moreover, the thesis carries significant policy implications for governments and international organisations striving for sustainable and inclusive development. The findings indicate that isolated economic or social policies frequently fall short of addressing the intricate challenges of development. Instead, integrative approaches that blend economic freedom, gender equity, and climate resilience are crucial for fostering sustainable advancement. For policymakers, this entails adopting strategies that harmonise economic growth with environmental stewardship and social inclusivity, acknowledging that development is a multifaceted process that requires cross-sector collaboration. By highlighting the interdependence of these elements, the thesis offers actionable insights that can inform comprehensive policies aimed at alleviating poverty, promoting gender equality, and enhancing climate adaptation.

Finally, this thesis significantly advances our understanding of development by offering a model for addressing interconnected challenges in an increasingly globalised world. It illustrates that development is not a one-size-fits-all concept; it necessitates tailored strategies that consider specific social, economic, and environmental contexts. As globalisation intensifies and new challenges arise—such as climate change and evolving demographic patterns—the urgency for adaptable and integrated solutions becomes even more paramount. This research provides valuable insights for policymakers, researchers, and practitioners committed to advancing sustainable development goals, thereby contributing to a more equitable and resilient global economy.

In conclusion, this thesis significantly advances the field of development economics by underscoring the necessity of aligning economic growth with social and environmental considerations. Its empirical analysis of complex, cross-country issues offers a valuable framework for sustainable and inclusive development, informing future research and policy decisions. By exploring the intersections of economic freedom, climate resilience, and gender equality, the thesis becomes an essential resource for understanding and tackling contemporary development challenges, ultimately promoting a more inclusive and sustainable future for all.

Chapter 2: Economic Freedom and Fertility Behaviour

This chapter as a research paper, "Economic Freedom and Fertility Behaviour: Evidence from Cross-Country Panel Data", under review in Journal of Population Research at the time of submitting this thesis, works as part of my PhD thesis. I confirm that I undertook all aspects of this work, including Conceptualisation, Data Collection and Analysis, Methodology Development, Writing – Original Draft and Writing – Review and Editing. My supervisors, Ilke Onur, Rong Zhu, and Tony Cavoli, provided guidance and feedback throughout the process to ensure the successful completion of this research. Their support was instrumental in refining the work's ideas, methodologies, and presentation. I confirm that this work is my independent contribution to the field, completed under their supervision.

2.1. Introduction

This chapter will examine the connections between economic freedom and fertility behaviour with evidence from cross-country panel data. In advanced economies, low fertility rates are often linked to lifestyle choices influenced by economic prosperity, better healthcare, access to contraception, and raised child-rearing costs (Billari & Kohler, 2004). Women with higher education and careers often delay having children (Nargund, 2009). The economic burden of raising children in today's society has become a significant financial decision. Consequently, economic factors play a significant role in determining individuals' decisions to have children, leading economists to develop theoretical frameworks to understand the primary factors influencing fertility decision-making (Easterlin, 1975).

Economic freedom refers to individuals' ability to make economic decisions without government interference or anti-competitive practices (McMahon, 2014). This freedom often results in higher costs of raising children, increased female participation in the labour force, improved access to education, and better reproductive health services, all of which can lead to reduced fertility rates. However, greater economic freedom can also lead to economic growth, improved wages, and higher living standards (Graafland, 2020), which may incentivise larger families and increase fertility rates. The relationship between economic freedom and fertility behaviour is intricate and requires thorough comprehension.

The correlation between economic freedom, economic growth, and health has been extensively researched (Ahmed et al., 2023; Jordaan, 2023; Sharma, 2020), but its connection to fertility behaviour requires further elucidation. The impact of economic freedom on fertility rates is intricate and influenced by social, cultural, and economic factors (Țarcă, Țarcă & Luca., 2022). In nations with high economic freedom, increased income and improved access to resources, education, and healthcare may decrease fertility rates, as families may opt to have fewer children when they feel more financially stable (Ashraf, Weil & Wilde, 2013).

The presence of economic freedom often leads to urbanisation and a shift from agrarian to urban industrial economies. Urbanisation is typically associated with lower fertility rates due to increased living costs, limited housing, and a stronger emphasis on education and careers (White et al., 2018). With economic freedom, the cost of living tends to rise, causing families to have fewer children due to financial constraints (Nargund, 2009). Economic freedom also improves women's access to education, empowering them to make informed family planning decisions, often resulting in smaller families as women prioritise careers (Phan, 2013). Furthermore, economic freedom enhances access to healthcare, reducing maternal and child mortality and diminishing the need for larger families (Comfort, Peterson & Hatt, 2013). In

addition, robust social safety nets in economically free countries can influence family size decisions (Nargund, 2009).

It is essential to acknowledge that the relationship between economic freedom and fertility rates is not inherently causal (Fox, Klüsener, & Myrskylä, 2019). Numerous factors contribute to this dynamic, including government policies, access to contraception and family planning resources, societal norms, and other elements. Empirical studies on this topic have produced conflicting results; some have found a negative correlation between economic freedom and fertility rates, while others have indicated a minimal or non-existent connection (Dkhili & Dhiab, 2018; Wang & Sun, 2016; Sobotka, 2002). The impact of economic freedom on fertility behaviour varies significantly across countries, highlighting the need to consider a wide range of factors when examining this relationship.

Numerous factors can impact the relationship between economic freedom and fertility rates. Economic freedom could increase income inequality, giving wealthier individuals more children (Cingano, 2014). It can also reinforce traditional family values, raising fertility rates (Nargund, 2009). Expanding various industries under economic freedom may necessitate a larger workforce, prompting families to have more children (Radfar, et al., 2018). In countries with limited social programs, higher fertility might serve as a form of security for old age (Anderson, 2014). Furthermore, economic freedom could attract immigrants from regions with higher fertility rates (Götmark & Andersson, 2020).

This research contributes to the extensive body of work on the global factors affecting fertility rates by examining the role of economic freedom. This chapter proposes that financial independence, market accessibility, and the inclination to participate in economic pursuits can influence individuals' choices regarding starting a family. The study analyses economic

freedom data from the Heritage Foundation and fertility data from the World Bank, employing a fixed-effects instrumental variable approach. Additionally, it uses regulatory quality from world governance indicators as an instrumental variable to illustrate a consistent correlation between increasing economic freedom and declining fertility rates over time. The study also highlights various mechanisms through which this negative impact operates, including income levels, women's employment status, and their pursuit of higher education.

This chapter will firstly present the literature review, then provide an overview of the data. The empirical approach used here will be outlined and then an analysis of the empirical results will be provided, followed by a conclusion.

2.2. Literature review

Heer (1966) has delved into two opposing schools of thought on the correlation between economic development and fertility. One school, represented by scholars such as Thompson, Blacker, Kingsley Davis, and Frank Notestein, posits that economic development leads to lower fertility rates. Conversely, scholars such as Thomas Malthus argue that economic growth stimulates higher fertility. Heer (1966) aimed to reconcile these two opposing views by highlighting that while economic development is often assumed to increase fertility, it typically introduces factors—such as higher education levels and reduced infant mortality—resulting in a fertility decline. Other researchers have also investigated various determinants of fertility, including contraceptive use, women's empowerment, education, and the impact of inflation (Bailey, 2012; Lal et al., 2021; Impicciatore & Tomatis, 2020; Chen & Li, 2009; Atake & Gnakou, 2019).

Many studies have examined the correlation between fertility rates and factors such as female education, child mortality, GDP per capita, and urban population. For example, Ahinkorah et al. (2021) found that women from wealthier backgrounds in Ghana are less likely to have more children. Angko, Arthur, and Yussif. (2022) demonstrated a link between high fertility rates and infant mortality in Ghana: Women who have lost a child or live-in areas with high child mortality often have more children to compensate for the loss, while women with higher levels of education tend to have a lower fertility rate and are less likely to have children, even in places where infant mortality is high. However, Kulu (2013) found that fertility rates were lowest in large cities and highest in small towns and rural areas. Cheng et al. (2022) demonstrated a correlation between fertility rates, GDP per capita, life expectancy, and female education, and indicate an inverted U-shaped relationship between fertility rates, GDP per capita, and life expectancy.

Fertility rates have also been the subject of investigation by Ahmed Shallo (2020), Lal et al. (2021), Munakampe et al. (2021), Bongaarts and Hodgson (2022), and Adhikari (2010). Ahmed Shallo's (2020) research in Ethiopia observed that since 2005 contraception use, postpartum fertility, and abortion rates have contributed to a decline in fertility. Lal et al. (2021), Munakampe et al. (2021), and Adhikari (2010) have also noted a negative correlation between fertility rates and factors such as contraceptive use, female labour force participation, and inflation.

Multiple studies such as those conducted by Rogoz et al. (2022), Guzel, Arslan, and Acaravci. (2021), Campbell, Prata, and Potts (2013), and Gwartney and Lawson (2004) have delved into the connections between economic freedom, health, and economic growth. According to Campbell, Prata, and Potts. (2013), access to contraceptives, accurate information, and safe abortion services has been found to lower fertility rates. Furthermore,

Rogoz et al. (2022) demonstrated that economic freedom and education correlate with increased life expectancy. Gwartney and Lawson (2004) also highlighted that economic freedom is pivotal in enhancing economic development by influencing investment rates and resource productivity. In addition, Guzel, Arslan, and Acaravci (2021) concluded that globalisation and democracy contribute to improved life expectancy.

Fertility rates are affected by various factors, such as social, demographic, economic, environmental, and institutional factors (Majumder & Ram, 2015; Götmark & Andersson, 2020; Vollset et al., 2020). Numerous studies have investigated the connections between economic freedom, health outcomes, and economic growth (Doucouliagos & Ulubasoglu, 2006; Geloso, Hyde, & Murtazashvili, 2022). This thesis seeks to address the gap in the existing literature by examining the impact of economic freedom on fertility rates.

The research on the connection between economic freedom and fertility rates is limited. Piano and Stone (2023) discovered that greater economic freedom in the United States of America is linked to women pursuing careers that support family life, resulting in a significant negative correlation between economic freedom and the fertility gap. Meanwhile, Wang and Sun (2016) investigated how social, economic, political, and population policies affect fertility rates in various-income nations. They observed that political freedom impacts attitudes toward fertility differently: in upper-middle-income countries, reduced political freedom decreases fertility rates, while in lower-middle-income and low-income countries it raises fertility rates.

Fotros, Akbari, & Mirzaee (2013) discovered a positive correlation between economic freedom, economic growth, and longevity. Similarly, Sharma (2020) investigated the impact of economic freedom on infant mortality, under-five mortality, and life expectancy in 34 sub-Saharan African countries. The study found that higher economic freedom is associated with

lower death rates and increased life expectancy. Extensive research on fertility rates indicates that various factors play a role, including economic growth, globalisation, women's education, infant mortality, GDP per capita, contraception usage, and urbanisation. Surprisingly, the impact of economic freedom has yet to receive sufficient attention.

This present study thus seeks to fill this gap and significantly contribute to our understanding of the health, economics, and demographic shifts in three main ways. First, it examines the relationship between economic freedom and fertility behaviour in developed and developing countries, providing a broader global perspective than prior research. Second, using a fixed-effects instrumental variable approach with regulatory quality as an instrument this research addresses endogeneity and offers more robust evidence on the impact of economic freedom on fertility. Third, this present study investigates how economic freedom affects women's empowerment, employment, income, and access to education and health care, shedding light on the mechanisms that drive fertility decisions. It also clarifies the conflicting findings in previous studies and adds depth to our understanding of how different dimensions of economic freedom shape fertility decisions.

2.3. Data

We have compiled a panel dataset covering the fertility rate, Economic Freedom Index, and various control variables for 166 countries, totalling 4,482 observations over 27 years. The complete list of countries is provided in Appendix 1, while the sources and definitions of the variables are detailed in Appendix 2. It is important to note that data for the Economic Freedom Index is only available from 1995 onwards, which marks the starting point of our analysis.

2.3.1. Economic freedom index

The economic freedom index used in this study is the independent variable (Rogoz et al., 2022; Sharma, 2020). It measures an individual's right to control their work and property, reflecting economic freedom. In societies with high economic freedom, individuals can work, produce, consume, and invest freely (Love, 2020). Countries characterised by high economic freedom allow the free movement of labour, capital, and goods, with governments intervening only to protect and preserve freedom (Heritage Foundation, 2023).

The index comprises twelve core indicators grouped into four pillars: rule of law, size of government, regulatory efficiency, and market openness. The Heritage Foundation (2023) obtains these indicators from objective, verifiable data, except for the rule of law, which depends on expert assessments. All indicators and the overall economic freedom score range from 0 (lowest) to 100 (highest).

Property rights are the first rule of law category: private property and wealth drive workers and investors in a market economy (Miller & Kim, 2013). Second, judicial effectiveness ensures that legal systems protect citizens and enforce laws (Miller & Kim, 2013). Third, corruption in government, like bribery, extortion, nepotism, and embezzlement, undermines economic freedom by creating insecurity and coercion (Korle et al., 2020; Heritage Foundation, 2023).

The size of the government and the ratio of government spending to GDP determines the weight of government spending in the government expenditure component (Gwartney, 2008; Olson, 2014). The tax burden includes marginal tax rates on personal and corporate income and the overall level of taxes as a percentage of GDP. Finally, fiscal health is deteriorating due to government budget mismanagement, leading to growing deficits and rising

debt burdens, which contribute to macroeconomic instability and uncertainty. Debt results from accumulated budget deficits, measured as a proportion of GDP, along with total debt as a share of GDP (de Haan & Sturm, 2000; Miles et al., 2004; Heritage Foundation, 2023).

Regulatory efficiency includes businesses' freedom regarding access to power, business climate risks, regulation quality, and women's economic inclusion. Labour freedom considers minimum wage, union rights, paid leave, redundancy rules, labour productivity, participation rate, and overtime restrictions. Monetary freedom assesses inflation rates and government price controls (Heritage Foundation, 2023).

The trade-weighted average tariff rate impacts trade freedom, regulations, and limits. Eliminating barriers to money flow ensures investment freedom and fair regulations, enabling individuals and businesses to allocate resources across borders freely (Organisation for Economic Co-operation and Development [OECD], 2015). Financial freedom assesses the effectiveness of banking and its independence from government control (Olson, 2014). The Index of Economic Freedom assigns equal weight to its 12 elements, providing an impartial overall score encompassing all aspects and political trends. While the twelve freedoms are interconnected, the specifics of their relationship require clarification (Heritage Foundation, 2023).

The economic freedom index increased globally from 57.3 in 1995 to 59.3 in 2022. The Heritage Foundation's 2023 report ranks Singapore, Switzerland, Ireland, and Taiwan as the most economically free nations, scoring 83.9, 83.8, 82.0, and 80.7, respectively. This upward trend highlights the potential for economic freedom to grow. Countries like Australia, Germany, and South Korea scored between 79.9 and 70, while the UK, Japan, and France range from 69.9 to 60. Nations like Benin, Jordan, and Brazil fall between 59.9 and 50, and repressed

countries such as Egypt, Haiti, and North Korea score between 49.9 and 0. North Korea, Cuba, and Venezuela had the lowest scores at 2, 24, and 25, respectively (Heritage Foundation, 2023).

2.3.2. Fertility rate

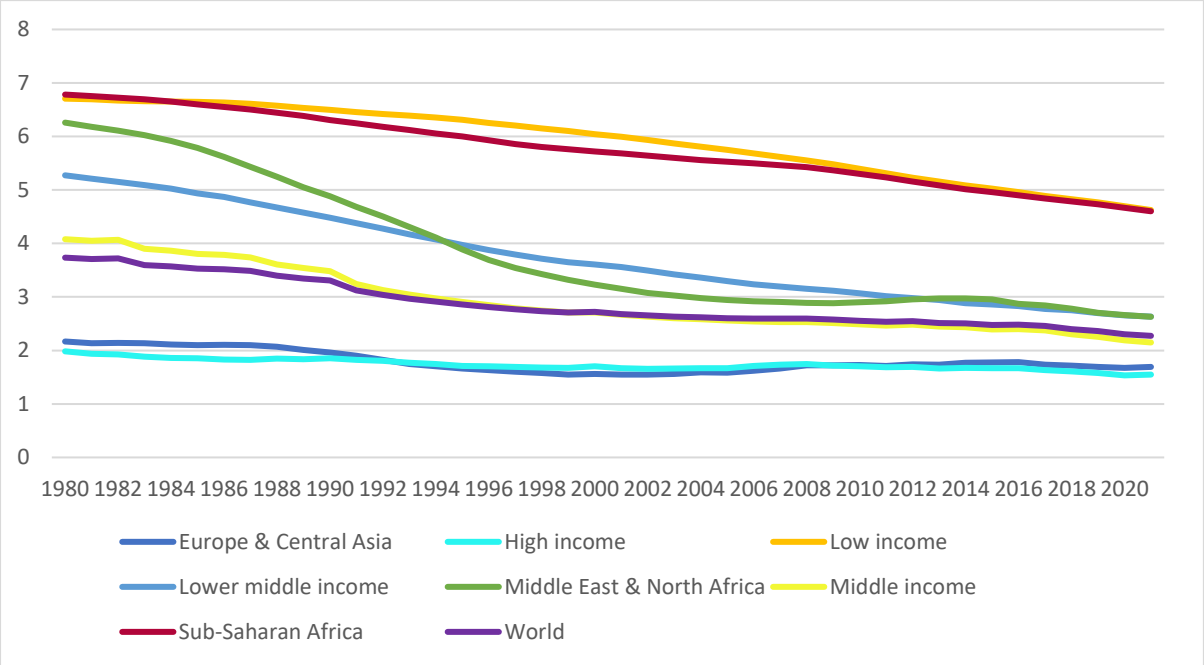
Although the global daily birth rate surpasses the death rate, population growth or decline varies significantly across countries. The fertility rate, which measures the average number of children a woman would have if current fertility rates remained constant (World Health Organization [WHO], 2008; Roser, 2014), is a critical metric for understanding this growth. The replacement rate, calculated from fertility and birth rates, indicates whether new citizens exceed or fall below the mortality rate, providing valuable insight into a country's population dynamics (Nargund, 2009).

The fertility rate is calculated based on two assumptions: first, that a woman's fertility follows age-specific trends, typically peaking in her early 30s, and second, that all women will survive through their childbearing years, typically ages 15 to 44 or 15 to 49. The fertility rate is a theoretical concept based on actual data. It represents the average number of children a woman in a particular country would have in her lifetime, also known as the total fertility rate (WHO, 2015; OECD, 2023).

The global fertility rate peaked at 2.3 children per woman in 2021 but has dropped by over 50% since 1961, particularly in developed countries such as South Korea, Australia, most European countries, and Hong Kong. These countries generally have lower fertility rates than less developed or low-income countries (see Figure 2.1). The decline is mainly attributed to reduced child mortality, increased access to contraception, and more women choosing to

pursue education and careers before or instead of starting families (Bongaarts & Hodgson, 2022).

A fertility rate of 2.1 children per woman is needed to stabilise the population (Sleebos, 2003). If it falls below this rate, it can lead to population decline and ageing. While low fertility can reduce the burden on social programs and infrastructure in overpopulated countries, it also brings challenges, such as a shrinking workforce and insufficient income to support social programs for retirees and the unemployed (Doepke et al., 2023).



Source: World Bank Group (2023)

Figure 2.1 Fertility rate, total (births per woman)

In Sub-Saharan Africa, the average fertility rate is 4.6 children per woman. Niger has the highest fertility rate at 6.8, followed by the Democratic Republic of Congo at 6.2, Somalia and Chad at 6.1, and Mali at 6.0. On the other hand, Tunisia has the lowest fertility rate on the continent at 2.1. High fertility rates in Africa are influenced by early and widespread marriage,

early childbearing, extended reproductive years, and high birth rates (Tabutin et al., 2004; Bongaarts & Hodgson, 2022).

In 2021, Hong Kong and South Korea had the lowest fertility rates globally, at 0.8 children per woman. India, a highly populated country, had a fertility rate 2.0, while China's rate was 1.2. Government policies and societal norms influence these rates (Yang, Jiang, & Sánchez-Barricarte, 2022; Singh, 2020). China's one-child policy, in place from 1980 to 2016, was relaxed in August 2021 to allow up to three children (Yang, Jiang, & Sánchez-Barricarte, 2022). Afghanistan's fertility rate, once among the highest at 7.7 in the 1990s, is now 4.6 due to more women joining the workforce and pursuing education (Nasir et al., 2019). Pakistan has a fertility rate of 3.5, which is considered moderate globally. The rapid population growth in Pakistan is often attributed to factors such as low adoption of family planning and birth control methods, as well as the influence of religious and political pressures (Naz et al., 2023).

In Europe, the fertility rates are low, with the highest being about 1.8. Several factors contribute to this trend, including changing gender roles, incentives to delay parenthood, a reduced desired family size, and limited access to childcare (Vignoli, 2020; Kalwij, 2010). France has the highest fertility rate in Europe at 1.8, below the replacement rate. Italy's rate is 1.3, and it has the oldest average age for first-time mothers in Europe at 31 years. Financial constraints and inadequate childcare support lead Italian women to delay childbirth, resulting in an ageing population (Salinari, Benassi, & Carboni, 2023; Rosina & Caltabiano, 2018). Norway also faces low fertility, with a projected rate of 1.6 in 2021, attributed to the high average age of first-time mothers (29.5 years) and a low occurrence of large families. The government is considering new initiatives to boost fertility, such as retirement benefits for mothers (Kravdal, 2016; Jalovaara et al., 2019).

2.3.3. Control variables

Our study selected specific control variables based on research that shows a connection between economic freedom and fertility rates. Previous studies have found that higher levels of education are associated with lower fertility rates, as individuals often priorities their education and careers, leading to delayed parenthood (Impicciatore & Tomatis, 2020; Götmark, 2020). Additionally, the decision of working women to balance work and family responsibilities can also lead to a delay or limitation in childbearing. Women's empowerment significantly influences fertility by impacting labour force participation, access to healthcare, and rights (Ma, 2016; Upadhyay et al., 2014; Sobotka, Skirbekk, & Philipov, 2011). To account for economic development, we use GDP per capita as a control variable, as it can influence fertility rates by increasing the opportunity costs associated with raising children (Fox, Klüsener, & Myrskylä, 2019; Sobotka, Skirbekk, & Philipov, 2011).

Furthermore, health outcomes affect fertility rates (Götmark, 2020; Bradshaw et al., 2023; Sharma et al., 2013). High infant and child mortality rates may lead parents to have more children to offset the risk of loss. We use infant mortality rates to gauge health improvements and access to healthcare. Economic uncertainty is also included, as individuals may delay life decisions like having children due to global instability (Giuntella, Rotunno, & Stella, 2022; Vignoli et al., 2020).

The urban population tends to have better access to healthcare, education, and job opportunities, associated with lower fertility rates (White et al., 2008). A higher age dependence ratio may indicate more dependents than working-age individuals, which can affect fertility (Hock & Weil, 2012). Women's economic empowerment, demonstrated by

higher wages and rates of salaried work, may be correlated with lower fertility (Behrman & Gonalons-Pons, 2020). The availability and use of contraceptives can directly impact fertility, with higher contraceptive prevalence often leading to reduced fertility (Bongaarts, 2017). Government effectiveness can influence levels of corruption, and reduced corruption can improve economic conditions and influence fertility decisions. Inflation can decrease purchasing power, making child-rearing more costly and impacting fertility rates. These factors have been considered as explanatory variables in this empirical analysis.

2.3.4. Summary statistics

This study explores various variables to examine their relationships and implications. The Fertility Rate, obtained from the World Development Indicators (WDI), indicates the total number of children a woman would have during her childbearing years, assuming that age-specific fertility rates remain constant. This differs from the Crude Birth Rate, expressed per 1,000 individuals in the total population and measures the number of live births occurring annually. While the fertility rate emphasises age-specific reproductive patterns, the crude birth rate offers a broader demographic perspective. Combined with the crude death rate, it facilitates the calculation of natural population growth.

The economic freedom index, developed by the Heritage Foundation, evaluates economic freedom across various countries by averaging scores on 12 elements, which are organised into four main pillars: rule of law (encompassing property rights, government integrity, and judicial effectiveness), government size (including government expenditure, tax burden, and fiscal health), regulatory efficiency (covering business, labour, and monetary freedom), and open markets (focusing on trade, investment, and financial freedom). Each

element is scored on a scale from 0 to 100, with the overall index reflecting the simple average of these components, thereby facilitating cross-country comparisons.

The Figure 2.2 depicts a negative correlation between fertility rates and economic freedom. Countries with higher levels of economic freedom—assessed through indicators such as property rights, regulatory efficiency, and open markets—tend to experience lower fertility rates. This pattern suggests that increased economic freedom may drive factors such as greater female labour market participation, enhanced access to education and healthcare, and improved availability of family planning resources, all contributing to reduced fertility. In contrast, nations with limited economic freedom often display higher fertility rates, likely reflecting socioeconomic structures that favour larger families, stemming from restricted access to modern contraceptive methods, diminished female empowerment, and a traditional reliance on family labour. The downward-sloping trend line effectively illustrates this inverse relationship.

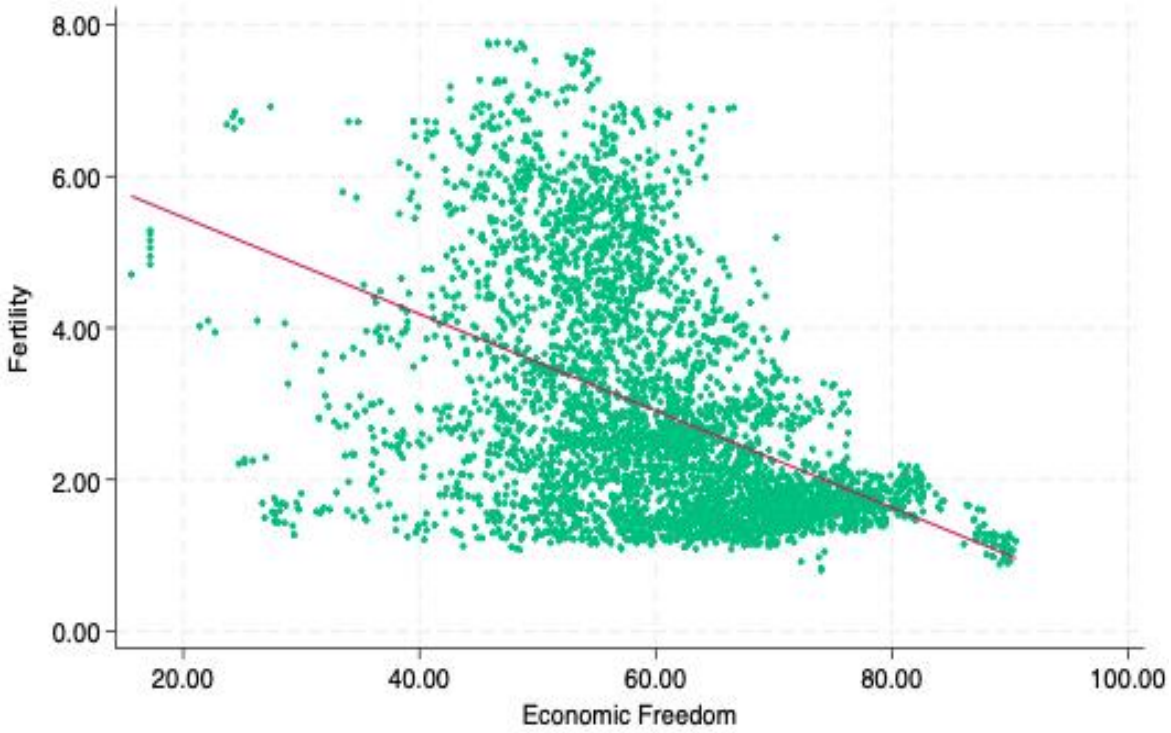


Figure 2.2 Two-way scatter between fertility rate and economic freedom

The world uncertainty index (WUI), developed using the Economist Intelligence Unit (EIU) reports, measures the frequency of the term "uncertainty" (and its variants) relative to the total word count in these reports, scaled to account for variations in report length. Expressed as the number of "uncertainty" words per 1,000 words, the WUI provides a standardised measure of global economic and political uncertainty over time and across countries.

GDP per capita growth, sourced from WDI, captures the annual percentage change in GDP per capita, calculated using constant local currency to account for inflation. It reflects a country's economic performance and capacity to improve living standards.

The urban population represents urbanisation as a percentage of the total population, which refers to the share of a country's total population residing in urban areas, as defined by national statistical agencies. This measure is capped at 100% because it represents the proportion of the population living in urban areas relative to the total population, not absolute numbers.

Key economic indicators include the consumer price index (CPI), which measures the annual percentage change in the cost of a fixed basket of goods and services consumed by the average household. This index serves as a standard measure of inflation. Another indicator, unemployment among females as a percentage of the female labour force, represents the proportion of women in the labour force who are unemployed but actively seeking work. It provides a gender-specific view of labour market dynamics.

The age dependency ratio as a percentage of the working-age population, derived from WDI, is the ratio of dependents (individuals under 15 and over 64) to the working-age population (ages 15–64). Expressed as dependents per 100 working-age individuals, it

highlights the demographic burden on the economically productive population. Similarly, female wage and salaried workers as a percentage of female employment measures the proportion of women in formal, paid employment instead of informal or self-employment roles, emphasising the structure of women's participation in the labour force.

Health and education indicators are critical for understanding societal development. The infant mortality rate per 1,000 live births, sourced from WDI, measures the number of infants dying before their first birthday per 1,000 live births annually. This metric is a widely used proxy for healthcare quality and access. The percentage of gross female school enrollment in tertiary education refers to the ratio of the total number of female students enrolled in tertiary education—regardless of age—to the population of females in the official age group for higher education. This ratio can exceed 100% due to early or late admissions or grade repetition and enrollment by students outside the conventional age range.

The contraceptive prevalence rate, sourced from the United Nations Department of Economic and Social Affairs, Population Division, measures the percentage of women (or their partners) using at least one method of contraception. This indicator reflects the availability of family planning services and broader health awareness.

Finally, governance and institutional quality are captured through two variables. The indicator of quality of government, derived from the International Country Risk Guide (ICRG), averages scores for corruption, law and order, and bureaucratic quality on a scale from 0 to 1, with higher values indicating superior governance. Regulatory quality, part of the Worldwide Governance Indicators, evaluates a government's ability to formulate and enforce policies that promote private sector development while minimising market-unfriendly practices and regulatory burdens.

Table 2.1 below presents the descriptive statistics for study variables, including fertility rate, economic freedom, global uncertainty index, and GDP per capita growth. The mean fertility rate was 3.02, and the mean economic freedom index was 60.03. There are significant variations among the countries in these variables. Niger recorded the highest recorded fertility rate per woman (7.78), while Hong Kong recorded the lowest (0.772). Hong Kong and Iraq both show the highest and lowest values of economic freedom, respectively. Venezuela had the lowest level of economic freedom among the sample countries in 2021, attributed to state interference and a deficient legal system. On the other hand, Singapore ranked the highest in economic freedom in 2021 due to its strong protection of property rights, effective anti-corruption legislation, competitive tax rates, and transparent regulatory environment.

Table 2.1 Descriptive statistics of variables

Variable	Observation	Mean	Standard deviation	Min	Max
Fertility rate	4,472	3.020	2.061	0.772	7.776
Crude birth rate	4,482	22.682	11.404	5.000	54.070
Economic freedom	4,075	60.036	10.989	15.600	90.500
World uncertainty index	3,670	1.354	8.124	-0.057	88.634
GDP per capita growth	4,396	2.215	5.896	-47.899	140.480
Urban population	4,480	56.262	23.107	7.211	100.000
Female unemployment	4,398	8.924	6.905	0.172	38.028
Age dependency ratio	4,480	62.637	18.795	16.172	115.568
Female wage and salaried workers	4,400	55.990	31.899	0.898	99.970
Infant mortality rate	4,453	30.368	28.913	1.600	164.800
Female tertiary school enrolment	2,790	42.380	32.286	0.135	156.148
Contraceptive prevalence	4,293	38.619	17.678	3.400	78.600
Quality of government	3,468	0.548	0.209	0.055	1.000

Inflation	4,113	10.370	83.648	-16.117	4145.106
Regulatory quality	3,789	48.750	28.664	0.000	100.000

2.4. Empirical strategy

We use fixed effects instrumental variable to quantify the impact of economic freedom on the fertility rate. The model is specified as follows:

$$\boldsymbol{FR_{it} = \beta_0 + \beta_1 EF_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it}} \ldots\ldots\ldots (1)$$

where FR_{it} takes the measure of the fertility rate, i denotes the country (i =1, …, 166) and t denotes the (t =1995, …, 2021). EF_{it} is the economic freedom index for country i through t. X_{it}indicates the collection of control variables. μ_i a vector of country variables that encapsulates an unobserved country fixed effect and in a panel regression model, the random error term (ε_{it}) is assumed to have a mean of zero, indicating the absence of systematic bias. Additionally, it is expected to have constant variance (homoscedasticity) and to exhibit no correlation over time or across countries, which helps prevent dependence between observations. These assumptions are crucial for obtaining unbiased and efficient estimates.

Endogeneity between economic freedom and fertility rates stems from several sources. First, reverse causality may occur, where changes in fertility rates affect economic freedom, such as through increased female labour force participation (Duranton, Henderson, & Strange, 2015). Beyond the effects of the labour market, reverse causality between fertility rates and economic freedom can also operate through fiscal and regulatory channels. A higher fertility rate often increases government spending on entitlement programs such as childcare subsidies, education, and healthcare, potentially leading to larger fiscal deficits (Wang et al., 2024). Greater public spending and higher taxation to support these programs may reduce economic freedom by expanding government intervention (Sleebos, 2003). Additionally, fertility rates

influence female economic inclusion, a key component of regulatory efficiency (Behrman & Gonalons-Pons, 2020). As more women enter or exit the labour force due to changing fertility patterns, governments may introduce policies affecting labour regulations, workplace protections, and business environments, thereby altering economic freedom.

Second, omitted variables are a common source of endogeneity, they are unlikely to be a major issue in this study. Institutional quality, which could influence economic freedom, is explicitly included as a control variable through the Quality of Government indicator. Additionally, cultural norms, which are harder to measure, are accounted for by incorporating country-specific fixed effects (μ_i) in the panel regression model. This approach ensures that unobservable, time-invariant country characteristics do not bias the estimation (Semadeni, Withers, & Trevis Certo, 2014). Lastly, measurement errors in economic freedom or fertility rates can distort their relationship (Hill et al., 2021). To account for the endogeneity of economic freedom and fertility rate, we use a fixed-effects instrumental variable approach. Equation (1) can be expressed using the following 2SLS.

$$\widehat{\boldsymbol{EF}}_{\boldsymbol{it}} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 X_{it}} + \boldsymbol{\alpha_2 RQ_{it}} + \boldsymbol{\lambda_i} + \mathrm{x}'_{\boldsymbol{it}} \ldots\ldots\ldots (2)$$

$$\boldsymbol{FR_{it}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1}\widehat{\boldsymbol{EF}}_{\boldsymbol{it}} + \boldsymbol{\beta_2 X_{it}} + \boldsymbol{\mu_i} + \mathrm{z}'_{\boldsymbol{it}} \ldots\ldots\ldots (3)$$

We use regulatory quality data as instrumental variable. Where RQ_{it} shows the regulatory quality in *j* and *t*. The definitions of the other variables are comparable to those in equation (1). The initial stage equation, equation (2), is used to isolate the impact of the EF. The fitted values of the second stage of $\widehat{EF}_{it}$ derived from equation (2) are incorporated into equation (3) to resolve the endogeneity issue between $FR_{it}$and EF_{it}.

Regulatory quality captures perceptions of a government's ability to formulate and implement sound policies and regulations that allow and promote private sector development.

Where 0 corresponds to the lowest regulatory quality, and 100 corresponds to the highest rank, Kaufmann and Kraay (2023) included the percentile rank as a component of the Worldwide Governance Indicators. Therefore, a strong relationship exists between countries with high regulatory quality and higher economic freedom.

Regulatory Quality (RQ), derived from the Worldwide Governance Indicators (World Bank), serves as a robust instrumental variable for Economic Freedom (EF), which is measured by the Heritage Foundation and comprises twelve distinct indicators. RQ plays a crucial role in shaping the institutional environment necessary for private sector development by reducing bureaucratic barriers, ensuring policy stability, and enhancing investor confidence. While RQ is a single indicator, EF encompasses multiple dimensions, making it unlikely that one governance measure directly influences each component of EF or any other specific indicator within it. Instead, RQ contributes to the broader regulatory framework that fosters higher EF at an aggregate level. Additionally, although RQ may indirectly affect social and economic factors such as access to education and employment, its direct impact on fertility rates is minimal. Fertility decisions are primarily driven by long-term structural factors such as cultural norms, education, and labour market conditions rather than the overall quality of governance. Therefore, any link between RQ and fertility operates through EF, reinforcing the validity of RQ as an instrumental variable.

Regulatory quality can contribute to a more favourable business environment by reducing bureaucratic obstacles, providing a transparent regulatory framework, stability and reliability for investors and companies, and facilitating the optimal distribution of resources. This improved regulatory environment may attract investments, stimulate economic activities, increase investor confidence, and facilitate economic freedom by encouraging entrepreneurship and investment, allowing businesses to allocate resources more effectively,

and increasing market participation. Thus, it enhances economic freedom (OECD, 2021; Schou-Zibell & Madhur, 2010; Stiglitz, 2002).

Regulatory quality may not directly impact fertility rates, but it can indirectly influence social and economic factors. For example, improved economic freedom from better regulations may increase access to education and employment opportunities, influencing fertility decisions (World Bank, 2010). Improvements in regulatory quality affect different segments of society in various ways. While economic actors may benefit, the impact on fertility decisions may be more subtle and depend on individual circumstances (Kim, 2023). Changes in economic freedom driven by regulatory improvements may take time to manifest in demographic shifts. Long-term factors like education, employment, and cultural norms often influence fertility decisions (McDonald, 2006). Although important for economic freedom, regulatory quality may be just one of many factors influencing fertility rates (Lal et al., 2021).

To enhance the effectiveness of our empirical approach, we also conducted empirical tests to determine the instrument's relevance. The regulatory quality has a strong and statistically significant correlation with EF, indicating that it meets the relevance criteria of a valid instrument (see Appendix 3). The excluded instrument's F-statistic is 61.92 in panel 2, can be seen in Table 2.2 below. We utilise the critical values of the Cragg-Donald Wald F-statistic, 248.620, as detailed by Stock and Yogo (2005), to evaluate the instrument's strength. Our instruments pass all standard validity tests. To check for weak identification, we report the Kleibergen-Paap F-statistic. The consensus is that the instrument meets the subsequent phase of exclusionary restrictions if the test statistic exceeds 10 (Kaufman, Mehrez, & Gurgur, 2019). Therefore, our instrument meets the requirements for being a valid instrument.

2.5. Results

2.5.1. Economic freedom and fertility rate

We consider the fertility rate as an outcome variable to test its association with the economic freedom index. Table 2.2 below presents the results that illustrate the impact of the economic freedom index on the fertility rate, as determined by both fixed effects and fixed effect instrument variable (FE-IV) estimation controlling for endogeneity. Panel (1) illustrates the effects of fixed effects, while panels (3, 5, and 7) demonstrate the same results for FE-IV estimation. Under the two empirical strategies, the economic freedom index has no significant effect on the fertility rate in the fixed effect estimation. However, after addressing endogeneity using the FE-IV approach, the negative effect of economic freedom on fertility rates becomes more pronounced.

Furthermore, the economic freedom index has a more significant adverse effect on fertility rates in all countries (-0.019). The F-statistic for the excluded instrument test in FE-IV exceeds the threshold value, demonstrating the validity and resilience of our instrument. Therefore, we establish a substantial and more pronounced inverse correlation between the freedom index and fertility rate by accounting for endogeneity.

Table 2.2 Estimating the impact of economic freedom on fertility rate

Variables	**Fertility rate**						
	Fixed Effects	Fixed Effects with IV (2SLS)					
Panel	(1) worldwide	(2) worldwide	(3) worldwide	(4) Developing	(5) Developing	(6) Developed	(7) Developed
		First stage	*Second stage*	*First stage*	*Second stage*	*First stage*	*Second stage*
Economic Freedom	**0.002 (0.003)**		**-0.019** (0.009)**		**-0.016** (0.007)**		**-0.032*** (0.009)**
Regulatory quality		0.225*** (0.028)		0.205*** (0.029)		0.198*** (0.034)	
World uncertainty index	-0.002 (0.003)	0.024 (0.015)	-0.002 (0.003)	0.029* (0.015)	-0.003 (0.002)	0.923 (0.694)	0.028 (0.043)

GDP per capita growth	-0.000 (0.000)	-0.133*** (0.036)	-0.010*** (0.002)	-0.142*** (0.032)	-0.009*** (0.002)	-0.083* (0.045)	-0.008*** (0.002)
Urban population	-0.002 (0.006)	-0.039 (0.081)	-0.002 (0.006)	0.109* (0.066)	0.010** (0.004)	-0.129 (0.070)	-0.027*** (0.005)
Female unemployment	-0.014*** (0.005)	-0.236*** (0.054)	-0.021*** (0.006)	-0.135** (0.063)	-0.020*** (0.005)	-0.218*** (0.050)	-0.022*** (0.004)
Age dependency ratio	0.027*** (0.003)	0.031 (0.046)	0.028*** (0.003)	-0.066* (0.039)	0.028*** (0.002)	0.088 (0.064)	0.026*** (0.003)
Female wage and salaried workers	0.009*** (0.003)	0.030 (0.057)	0.010*** (0.003)	0.026 (0.037)	0.008*** (0.002)	-0.021 (0.051)	0.000 (0.003)
Infant mortality rate	0.014*** (0.004)	-0.029 (0.042)	0.013*** (0.004)	-0.078* (0.039)	0.012*** (0.002)	-0.500*** (0.133)	-0.030*** (0.010)
Female tertiary enrolment School	0.003** (0.001)	0.015 (0.018)	0.004*** (0.001)	0.044** (0.018)	0.008*** (0.001)	-0.015 (0.012)	0.000 (0.001)
Contraceptive prevalence	-0.017** (0.008)	-0.090* (0.052)	-0.022*** (0.008)	-0.028 (0.052)	-0.031*** (0.005)	-0.044 (0.056)	-0.006* (0.003)
Quality of government	-0.324 (0.276)	-3.898 (4.222)	-0.314 (0.308)	0.247 (3.576)	-0.125 (0.263)	-1.623 (3.891)	-0.122 (0.201)
Inflation	-0.000 (0.000)	-0.001 (0.012)	-0.000 (0.000)	0.009 (0.008)	0.000 (0.000)	-0.043** (0.017)	-0.001 (0.001)
Weak identification test (Cragg-Donald Wald F statistic)	-		248.620		135.864		60.461
F-statistic on the excluded instrument		61.92		83.87		32.88	
Number of countries/Obs.	110/1924	107/1712	107/1712	70/992	70/992	37/720	37/720

Note: Panel (1) expresses the fixed effect estimates, and Panels 3, 5, and 7 display FE-IV estimates. We express all variables as real values. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. The parenthesis report heteroscedasticity and autocorrelation-robust standard errors clustered at the country level.

In panels 1 and 3, we examine the correlation between the economic freedom index and the total fertility rate on a global scale. Our results indicate that the economic freedom index has insignificant effect on the fertility rate in FE estimation. However, when we control for endogeneity, the results reveal a significant negative effect of the economic freedom on the fertility rate. To provide a precise analysis of the estimations, we show that a one-standard-deviation increase in the index of economic freedom, specifically an increase of 10.989 units in Table 2.1 above, correlates with a reduction of 0.175 children per woman. The magnitude of this change corresponds to 6.9% of the average value of the dependent variable, as stated in panel (3). The world uncertainty index, urban population, quality of government, and inflation did not significantly affect fertility. While both female unemployment and use of contraceptives effect negative on fertility. However, the age dependency ratio, infant mortality rate, female tertiary school enrolment, and female wage and salaried workers all positively and significantly impact the fertility rate.

Next, in panel 5, Table 2.2 we use data for developing countries to measure the effect of the economic freedom on fertility rates using FE-IV estimates.[1] Our analysis reveals that the EF has a significant and detrimental impact on the fertility rate. To precisely measure the estimations, we link a one-standard deviation rise in the index of economic freedom, equivalent to a 10.989 unit increase in Table 2.1, to a reduction of 0.208 children per woman. This change represents 5.8% of the mean value of the dependent variable. Comparing the two primary estimates, it is evident that economic freedom has a detrimental impact on the fertility rate, even after accounting for endogeneity. The control variables, including contraceptive prevalence, female unemployment rate, and GDP per capita growth, have a negative impact on

[1] All target economies are classified into developing or developed countries according to the United Nations Conference on Trade and Development (UNCTAD) statistics source.

fertility rates, as shown by their coefficients. The age dependence ratio, female tertiary school enrolment, newborn mortality rate, female wage and salaried workers, and the urban population all have substantial beneficial effects and align with the anticipated patterns.

In Panel 7, Table 2.2, we utilise data for developed countries to quantify the impact of the economic freedom on the fertility rate. Our analysis reveals that economic freedom significantly negatively impacts fertility rates.. A one standard deviation increases in the index of economic freedom, i.e., an increase of 10.989 units (see Table 2.1), is associated with a decrease of 0.351 children per woman. The size of this change is equivalent to 11.6% of the dependent variable's average. The coefficients of the control variables, such as the female unemployment rate and GDP per capita growth, effect natively on fertility rate. While the age dependency ratio show significant positive impacts. The infant mortality rate shows a significant positive impact worldwide and in developing countries while having a negative effect in developed countries and follow the predicted indications, the most exciting thing is that the urban population has a significant negative effect in developed countries but a significant positive effect in developing countries. In developed countries, the proliferation of contraceptives is less detrimental than it is in developing countries.

After considering different variables and controlling for endogeneity, the results in Table 2.2 collectively demonstrate that higher economic freedom is associated with lower fertility (-0.019, -0.016, and -0.032) worldwide in developing and developed countries. The effect of economic freedom on the fertility rate in developed countries is higher than in developing countries. This is due to several reasons, such as potentially lower levels of economic development and lower access to educational and working opportunities, especially for women in developing countries. Economic freedom may lead to different lifestyle changes and career advancement, substantially impacting fertility decisions (Silva & Klasen, 2021).

Having more children may be a cultural and social expectation in some societies. Economic freedom may not necessarily override the inherent cultural preferences of large families (Colleran, 2016).

Women may still have trouble getting an education and getting jobs because of traditional gender roles. If women have few options outside of traditional family roles, economic freedom may have less effect on their decisions about having children (Chen, 2022). High infant mortality rates may increase family size as parents anticipate losses. Concerns about child survival and the necessity for a more robust family support network may attenuate the effect of economic freedom on fertility rates (Nargund, 2009). Last but not least, the population structure of many developing nations is younger, with a more significant percentage of people in their reproductive years. This demographic structure may lead to higher fertility rates, and economic freedom may not significantly influence general fertility patterns (Blue & Espenshade, 2011).

The relationship between fertility and economic freedom differs in magnitude between developing and developed countries, though it remains negative in both contexts. In developed countries, the negative effect of economic freedom on fertility is stronger, likely driven by higher female labour force participation, career prioritisation, and widespread access to contraception and family planning services. In contrast, while the effect is still negative in developing countries, the magnitude is smaller, suggesting that factors such as limited labour market opportunities for women, weaker institutional frameworks, and cultural norms moderate the decline in fertility rates.

Furthermore, the coefficient of economic freedom is negative in developed countries, indicating that a higher degree of economic freedom can result in improved economic

prospects, employment opportunities, and a general rise in income levels (Ashraf, Weil, & Wilde, 2013). The presence of economic freedom can stimulate the process of urbanisation and industrialisation, leading to a shift from predominantly agricultural economies to urban industrial economies. Urbanisation is often associated with lower fertility rates, as individuals residing in urban areas tend to have fewer children for reasons such as higher costs of living, limited residential locations, and increased emphasis on educational pursuits and career advancement (White et al., 2008). Likewise, increased economic freedom can improve education, especially for women. As education levels grow, women make more informed decisions about family planning and may have fewer children to focus on careers and personal development (Phan, 2013). Thus, all these factors may lead to lower fertility rates in developed societies than in developing societies.

The differing effects of urban population and infant mortality rates in developing versus developed countries underscore significant economic and demographic dynamics. In developing nations, a rising urban population has a positive and notable impact, indicating that urbanisation may improve economic opportunities, enhance access to healthcare, and elevate overall living conditions, which could, in turn, influence fertility behaviour. Conversely, in developed countries, the relationship is negative, suggesting that increased urbanisation is linked to lower fertility rates, driven by factors such as a higher cost of living, prioritisation of careers, and delays in family planning. Similarly, the infant mortality rate shows an opposing trend between these two groups of countries. It has a positive and significant effect in developing countries, which may reflect higher fertility rates as a compensatory response to increased child mortality risks. In contrast, in developed nations with low infant mortality, the relationship becomes negative, corresponding with lower fertility rates and improved

healthcare systems. These contrasting effects highlight that urbanisation and infant mortality play distinct roles in shaping fertility patterns, depending on a country's level of development.

2.5.2. Heterogeneity analysis by income levels

In Table 2.3 below, we report the effect of economic freedom on the fertility rate by income level. The interaction between economic development and economic freedom differentially influences fertility decisions based on country income level. Panels 1, 2, and 3 show the results for the FE-IV estimation. The findings show that economic freedom has a significantly negative effect on fertility rates for all three types of income levels: low-income and lower-middle-income countries (0.009), upper-middle-income countries (0.022), and high-income countries (0.030) (see panels 1, 2, and 3).[2] We found that when endogeneity is considered, the effect of economic freedom on the fertility is greater and more important when a country's income rises.

Panel 1 in Table 2.3 shows the effect of economic freedom on fertility in low- and lower-middle-income countries using FE-IV estimates. Economic freedom is significant and is associated with a decrease in the fertility rate; that is, one standard deviation increase in the index of economic freedom is associated with a 0.10 decrease in the fertility rate. Compared to the mean of the dependent variable, this equals 3.3% of the mean score. There is an increase in adverse effects in upper-middle-income countries, and one standard deviation increase in the index of economic freedom is associated with a 0.24 decrease in the fertility rate. Compared to the mean of the dependent variable, this equates to 8% of the mean score. In addition, the coefficients of economic freedom also have a much more significant adverse effect on the

[2] We divided countries according to the World Bank's source for the level of GNI per capita in US dollars into three categories: low-income countries, lower-middle-income countries (together due to the number of observations), and upper-middle-income countries and then high-income countries.

fertility rate in high-income countries, meaning that one standard deviation increase in the index of economic freedom is associated with a 0.33 decrease in the fertility rate. Compared to the mean of the dependent variable, this equates to 11% of the mean score. Most of the time, the control factors show the predicted signs. In all specifications, the age dependency ratio is positive and significant, showing the ratio of dependent people younger than 15 or older than 64 to the working-age population. Those ages 15–64 have a positive effect on fertility. The GDP per capita growth, female unemployment, and contraceptive prevalence exhibit significant negative trends.

Table 2.3 Heterogeneity analysis by the income country level

Variables	**Fertility rate**					
	Fixed Effects with IV (2SLS)					
panel	(1) Low and Lower-Middle-Income Countries		(2) Upper-Middle-Income Countries		(3) High Income Countries	
	First stage	*Second stage*	*First stage*	*Second stage*	*First stage*	*Second stage*
Economic Freedom		**-0.009* (0.005)**		**-0.022*** (0.007)**		**-0.030** (0.013)**
Regulatory quality	0.249*** (0.026)		0.176*** (0.026)		0.172*** (0.030)	
World uncertainty index	-0.504 (0.976)	-0.100** (0.049)	0.043** (0.018)	-0.006*** (0.002)	0.023 (0.017)	0.001 (0.001)
GDP per capita growth	-0.157*** (0.049)	-0.006*** (0.002)	-0.050 (0.045)	-0.003* (0.002)	-0.162*** (0.036)	-0.010*** (0.003)
Urban population	0.270** (0.121)	0.007 (0.005)	-0.327** (0.073)	-0.015*** (0.005)	-0.163** (0.065)	-0.010* (0.005)
Female unemployment	0.119 (0.084)	-0.014*** (0.004)	0.076*** (0.018)	-0.005 (0.004)	-0.271*** (0.043)	-0.027*** (0.005)
Age dependency ratio	0.031 (0.047)	0.030*** (0.002)	0.198*** (0.052)	0.043*** (0.002)	0.048 (0.038)	0.026*** (0.003)
Female wage and salaried workers	-0.010 (0.046)	0.010*** (0.002)	-0.102** (0.046)	-0.002 (0.002)	0.064 (0.047)	0.007** (0.003)
Infant mortality rate	0.008 (0.047)	0.013*** (0.002)	0.022 (0.079)	0.001 (0.004)	0.044 (0.152)	0.024* (0.013)
Female tertiary enrolment school	-0.119 (0.084)	0.016*** (0.001)	0.076*** (0.18)	0.003*** (0.001)	-0.007 (0.010)	-0.001 (0.001)
Contraceptive prevalence	0.043 (0.055)	-0.034*** (0.003)	-0.297*** (0.066)	-0.013*** (0.004)	-0.147*** (0.043)	-0.011*** (0.003)
Quality of government	-8.214 (3.886)	-0.551* (0.297)	2.708 (4.213)	0.412** (0.211)	2.971 (3.696)	-0.221 (0.214)
Inflation	0.005 (0.007)	0.000 (0.000)	-0.044** (0.017)	-0.001** (0.000)	-0.196*** (0.050)	-0.017*** (0.005)
Weak identification test		110.725		45.071		47.786

F-statistic on the excluded instrument	86.55	44.86	31.41	
Number of countries/Obs.	40/590	27/387	40/735	

Notes: The dependent variable is the total fertility rate. Panels 1, 2, and 3 show FE-IV estimates according to the income country level. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Heteroscedasticity and autocorrelation-robust clustered at the country level.

2.5.3. Heterogeneity analysis by geographical regions

In Table 2.4 below, we employ alternative heterogeneity analysis by geographic regions.[3] It helps to determine if the link between economic freedom and fertility might differ in geographic regions. The results are mostly the same as those shown in Tables 2.2 and 2.3 above. Economic freedom significantly negatively impacts fertility in Europe and Central Asia, Latin America, the Caribbean and North America, the Middle East, North Africa, and Sub-Saharan Africa. The coefficient of economic freedom is -0.018 in Specification 1 and -0.025 in Specification 4, whereas it is insignificant in Specification 2 (FE-IV estimates). The Cragg-Donald Wald statistics indicate that our instrument is valid and resilient across all panels for the FE-IV estimates in specifications 1 and 4. Panels 2 and 3 demonstrate that our instrument is invalid. In line with previous findings, the control variables exhibit the anticipated signs and are statistically significant in most estimates, except specifications 2 and 3.

[3] The world by region divide to seven regions according to the World Bank "Europe and central Asia, Latin America and Caribbean, North America, Middle East and North Africa, Sub-Saharan Africa, East Asia and pacific, and South Asia". Because number of observations for analysis we divided regions for four categories Europe and central Asia, East Asia, pacific and South Asia, Latin America, Caribbean and North America, and Middle East, North Africa and Sub-Saharan Africa.

Table 2.4 Heterogeneity analysis by geographical regions

Variables	**Fertility rate**							
	Fixed Effects-IV (2SLS)							
panel	(1) Europe and central Asia		(2) East Asia, pacific and South Asia		(3) Latin America, Caribbean and North America		(4) Middle East, North Africa and Sub-Saharan Africa	
	First stage	*Second stage*	*First stage*	*Second stage*	*First stage*	*Second stage*	*First stage*	*Second stage*
Economic Freedom		**-0.018** (0.007)**		**0.045 (0.073)**		**-0.070* (0.038)**		**-0.025*** (0.008)**
Regulatory quality	0.226*** (0.036)		0.057 (0.045)		0.114** (0.045)		0.254*** (0.030)	
World uncertainty index	1.050 (0.720)	0.011 (0.037)	0.038 (0.027)	-0.011** (0.004)	-0.004 (0.022)	-0.001 (0.001)	-0.976 (0.895)	-0.080 (0.063)
GDP per capita growth	-0.031 (0.037)	-0.006*** (0.002)	0.066 (0.066)	-0.013* (0.007)	-0.237 (0.071)	0.016* (0.009)	-0.191*** (0.050)	-0.009*** (0.003)
Urban population	-0.012 (0.074)	-0.023*** (0.004)	0.195* (0.115)	-0.007 (0.014)	-0.308 (0.203)	-0.016 (0.018)	0.056 (0.108)	0.025*** (0.007)
Female unemployment	-0.215*** (0.049)	-0.019*** (0.003)	-0.505*** (0.186)	0.023 (0.044)	-0.045 (0.094)	-0.003 (0.008)	-0.076 (0.086)	-0.019*** (0.006)
Age dependency ratio	0.177** (0.070)	0.030*** (0.003)	-0.405*** (0.088)	0.035 (0.030)	0.014 (0.063)	0.038*** (0.006)	0.031 (0.049)	0.035*** (0.003)
Female wage and salaried workers	-0.019 (0.044)	0.002 (0.002)	-0.061 (0.056)	0.015*** (0.006)	0.183** (0.082)	0.014 (0.010)	-0.059 (0.062)	0.010** (0.004)
Infant mortality rate	0.405*** (0.088)	-0.012** (0.005)	0.176 (0.049)	-0.008 (0.014)	0.121 (0.117)	0.023* (0.012)	-0.009 (0.061)	0.017*** (0.003)
Female tertiary enrolment School	0.010 (0.013)	0.001** (0.000)	0.069* (0.038)	0.003 (0.006)	0.015 (0.026)	0.003 (0.003)	-0.037 (0.028)	0.008*** (0.002)
Contraceptive prevalence	-0.060 (0.090)	-0.009* (0.005)	0.098 (0.118)	-0.058*** (0.018)	-0.133* (0.078)	-0.017 (0.012)	0.047 (0.080)	-0.020*** (0.005)
Quality of government	-5.345 (4.175)	-0.165 (0.174)	14.411** (6.790)	-1.431 (1.326)	18.923*** (4.493)	1.750* (0.919)	-13.682*** (5.120)	-1.006** (0.463)
Inflation	-0.030*** (0.013)	-0.000 (0.000)	0.006 (0.080)	-0.008** (0.004)	-0.092 (0.065)	-0.007 (0.006)	0.007 (0.007)	0.001 (0.001)
Weak identification test		79.014		2.438		8.992		106.998
F-statistic on the excluded instrument	38.24		1.57		6.36		67.76	
Number of countries/Obs.		34/687		16/245		18/245		39/535

Notes: The dependent variable is the total fertility rate. Panels 1, 2, 3, and 4 show FE-IV estimates according to the geographical regions. We express all variables as real values. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Heteroscedasticity and autocorrelation-robust clustered at the country level t-statistics are in parentheses.

In Table 2.4, the Middle East, North Africa, and Sub-Saharan Africa have the highest significant negative effect of economic freedom on fertility (-0.025). That means that a one-standard-deviation increase in the index of economic freedom is associated with a 0.27 decrease in the fertility rate. Compared to the mean of the dependent variable, this equates to

9% of the mean score. In Europe and Central Asia, the impact of economic freedom on fertility was less significant (-0.018) than in panel 1. This implies that an increase of one standard deviation in the economic freedom index leads to a 0.19 reduction in the fertility rate. Compared to the mean of the dependent variable, this equates to 6.5% of the mean score. Economic freedom's effect on fertility is insignificant in the East Asia, Pacific, and South Asia regions. The result is significantly negative in Latin America, the Caribbean, and North America, but the instrument needs to be validated. The ratio of dependent individuals younger than 15 or older than 64 to the working-age population, ages 15–64, exhibits a significant positive correlation with fertility. In panels 1 and 4, the coefficients of GDP growth and female unemployment are negative and significant, respectively. At the same time, contraceptive prevalence is negative and significant in Panel 4.

Overall, Tables 2.2, 2.3, and 2.4 demonstrate a negative relationship between economic freedom and fertility globally, with developed countries experiencing a more pronounced negative impact on fertility than developing countries (see Table 2.2). When classifying countries according to income levels, economic freedom negatively affects fertility, and the magnitude of this effect is more significant in high-income countries, followed by upper-middle-income countries, than in low-income countries (see Table 2.3). After classifying geographical regions, we observed a negative correlation between economic freedom and the fertility rate, particularly in the Middle East, North Africa, and Sub-Saharan Africa, followed by Europe and Central Asia (see Table 2.4).

Economic freedom often provides enhanced opportunities for the workforce, especially for women; engaging in economic and occupational activities may increase the opportunity costs associated with childbearing. The results show that increased economic freedom improves economically independent communities and may encourage individuals to prioritise

personal and professional pursuits over creating larger families (Onarheim, Iversen, & Bloom, 2016). Economic freedom may be linked to improved access to family planning and education. Lower fertility rates and postponed family planning are associated with higher education levels. People can make more informed decisions regarding the number and timing of their children when they have better access to family planning services (Campbell, Prata, & Potts, 2013; Prata, 2009).

2.5.4. Instrumental variable quantile regression

We conducted a linear instrumental variable quantile regression analysis using smoothed estimating equations (Kaplan & Sun, 2017) to investigate how economic freedom affects fertility. Standard linear regression provides an average relationship between an outcome variable and a set of regressors. However, a more complete picture might be necessary to see the relationship between the outcome variable and the regressors at different points in the conditional distribution of the outcome variable. In the table 'Estimating the impact of economic freedom on fertility rate by Instrumental variable quantile regression' (see Appendix 4), we used country-level data from the 0.25, 0.50, and 0.75 quantiles to determine how the economic freedom index influences the fertility rate using instrumental variable quantile estimation. The results revealed that economic freedom has a significant adverse effect on the fertility rate. Specifically, a one standard deviation increase in the economic freedom index is associated with a decrease of 0.07 children per woman in the 0.25 quantile, 0.09 in the 0.50 quantile, and 0.12 in the 0.75 quantile (see Figure 2.2). This suggests that the impact of economic freedom on the fertility rate was negative, as indicated by the fixed effect IV estimation method.

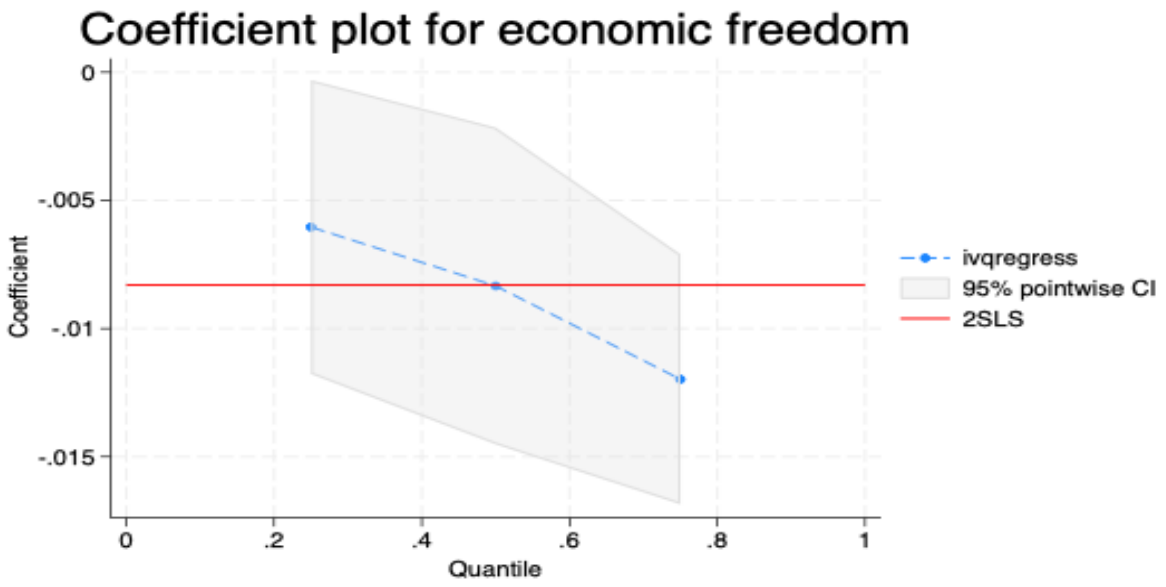


Figure 2.3 Quantile regression graphs of fertility and economic freedom

2.5.5. Potential mechanisms

Next, we examine the several mechanisms through which economic freedom might influence the fertility rate. Various variables, including economic growth, may influence a nation's fertility behaviour (Lal et al., 2021); Education may lead to postponement of childbearing; and women pursuing higher education may prioritise their academic and professional development. Delays in starting a family may lead to lower fertility rates as individuals postpone the process. (Götmark, 2020; Martin, 1995). In addition, economic freedom can make the labour market more diverse. As women become more involved in different parts of work, this could mean more job opportunities. A woman can be financially independent if she has economic freedom, but having a job may mean she delays having children. Women who value professional growth and career advancement may choose to have children later in life or with fewer children (Behrman & Gonalons-Pons, 2020). Hence, we investigate the correlation between EF and these possible pathways and provide the findings in Table 2.5. This study examines the relationship between Economic Freedom (EF) and various

potential mechanisms, as presented in Panel 1 of Table 2.5. The results demonstrate that higher levels of EF are associated with increased economic development, higher female enrollment in tertiary education, and lower rates of female unemployment.

The data clearly show a link between more economic freedom and unfavourable conditions in several aspects, such as higher levels of economic growth and education, as well as lower rates of unemployment.

Table 2.5 Economic freedom, EF-Mechanism Variable Interactions, and fertility outcome

Panel 1			**Fixed Effects with IV (2SLS)**			
Variables		**GDP**	**Female unemployment**		**Female tertiary enrolment School**	
Economic Freedom		**0.134****	**-0.444*****		**0.345***	
		(0.067)	**(0.096)**		**(0.188)**	
Weak identification test		305.16	77.58		251.39	
Number of countries/Obs.			1714/107			
			Fertility rate			
Panel 2			Fixed Effects with IV (2SLS)			
Variables	**High GDP (1)**	**Low GDP (2)**	**High unemployment (3)**	**Low unemployment (4)**	**High education (5)**	**Low education (6)**
Economic Freedom	**-0.018****	**-0.005**	**-0.011**	**-0.032*****	**-0.027*****	**-0.010***
	(0.009)	**(0.008)**	**(0.009)**	**(0.007)**	**(0.009)**	**(0.006)**
Regulatory quality (First Stage)	0.186***	0.207***	0.189***	0.207***	0.165***	0.192***
	(0.028)	(0.026)	(0.027)	(0.023)	(0.027)	(0.031)
World uncertainty index	-0.001	-0.083*	-0.008***	-0.001	-0.006	-0.002**
	(0.001)	(0.047)	(0.002)	(0.001)	(0.012)	(0.001)
GDP per capita growth	-	-	-0.010***	-0.006***	-0.014***	-0.005***
			(0.002)	(0.002)	(0.003)	(0.001)
Urban population	-0.014***	-0.006	0.003	-0.002	0.009	-0.009***
	(0.004)	(0.005)	(0.004)	(0.005)	(0.008)	(0.003)
Female unemployment	-0.017***	-0.013***	-	-	-0.021***	-0.014***
	(0.005)	(0.004)			(0.006)	(0.002)
Age dependency ratio	0.021***	0.029***	0.029***	0.023***	0.031***	0.025***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)
Female wage and salaried workers	0.004**	0.004***	0.016***	0.006***	0.006	0.001
	(0.002)	(0.003)	(0.002)	(0.002)	(0.004)	(0.001)
Infant mortality rate	0.010*	0.013***	0.012***	0.012***	0.014***	-0.027***
	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
Female tertiary enrolment School	0.001	0.013***	0.004***	0.002***	-	-
	(0.001)	(0.002)	(0.001)	(0.001)		

Contraceptive prevalence	-0.008*** (0.002)	-0.041*** (0.005)	-0.034*** (0.006)	-0.008* (0.004)	-0.022*** (0.005)	-0.008*** (0.002)
Quality of government	-0.362** (0.171)	-0.506** (0.249)	-0.470* (0.265)	-0.631* (0.318)	-0.169 (0.309)	0.114 (0.156)
Inflation	-0.001 (0.001)	0.000 (0.000)	-0.003** (0.001)	-0.000 (0.000)	0.000 (0.000)	-0.001 (0.001)
Weak identification test	110.333	74.901	77.399	115.691	59.797	90.155
F-statistic on the excluded instrument	54.38	56.19	46.02	79.37	35.71	38.36
Number of countries/Obs.	77/1091	55/612	70/852	70/850	64/709	68/999

Note: Panels 1 and 2 show FE-IV estimates according to the GDP, unemployment, and education levels. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Heteroscedasticity and autocorrelation-robust clustered at the country level, t-statistics are in parentheses.

To ascertain the impact of various mechanism variables, including GDP per capita, unemployment rate, and school enrolment, on the fertility rate, we conduct a comprehensive exercise involving the interaction of EF with these variables. For each of these mechanism variables, for example, if a country's GDP is higher than the median, the index assigns a number one; if not, it assigns a zero. If the unemployment rate is higher than the median, the index assigns a number one; if not, it assigns a number zero. Regarding school enrolment, the index assigns a one if the total enrolment is greater than the median and zero otherwise. The findings are presented in Table 2.5 below.

The findings show that the impacts of EF more severely affect the group of nations struggling with GDP per capita, female tertiary school enrolment, and female unemployment. Therefore, raising the population's percentage of female university enrolment, lowering the incidence of female unemployment, and boosting per capita GDP may all help to decrease fertility behaviour in these low-freedom nations. This study contributes to existing knowledge about the importance of mechanism factors in the relationship between fertility and economic freedom. It lowers fertility to about 2.1, which is generally believed necessary to maintain a population. In developed countries, economic freedom can contribute to lowering fertility rates

through various channels. As mentioned, factors such as increased access to education, career prioritisation, and delayed childbearing are associated with economic freedom and can lead to smaller family sizes. Therefore, some developed countries have experimented with economic incentives to encourage families to have more children. These incentives may include tax benefits, financial support for families, and other measures to reduce the economic burden of raising children (Raute, 2019).

We also perform two heterogeneity analyses based on countries' income levels and geographic locations. The results show that the countries with the most minor economic development, i.e., developing countries, are less affected by economic freedom than developed countries and high-income countries. Geographically, the Middle East, North Africa, and sub-Saharan Africa are the regions most impacted by this issue. Nations in Europe and Central Asia follow closely behind. The findings were reported and discussed above in section 2.5.2 and 2.5.3.

2.5.6. Crude birth rate outcome

This section examines the link between economic freedom and crude birth rate. In Table 2.6 below, panels A–C display the results of the FE-IV estimations. Table 2.6 also shows the average dependent variable to help understand the estimations. The data indicate a significant negative correlation between EF and the crude birth rate. These results remain consistent and are not affected by varying levels of dispersion and correlation between observations. According to panel A, a decrease of 1.8 births per 1,000 people is linked with a one standard deviation increase in the economic freedom index, equivalent to a 10.989 unit increase (as

indicated above in Table 2.1. This change represents 8% of the average of the dependent variable.

Table 2.6 Estimating the impact of economic freedom on crude birth rate

Variables	**Crude Birth Rate**			
Panel A		Development level		
	All countries (1)	Developing countries (2)	Developed countries (3)	
Economic Freedom	**-0.165** (0.070)**	**-0.168** (0.078)**	**-0.214* (0.120)**	
Regulatory quality (first stage)	0.255*** (0.028)	0.205*** (0.031)	0.198*** (0.051)	
Mean dependent variable	22.682	22.682	22.682	
Number of countries/Obs	107/1714	70/994	37/720	
Weak identification test	248.625	135.885	60.461	
F-statistic on the excluded instrument	61.99	43.54	14.52	
Panel B		Income levels		
	Low and Lower-Middle-Income Countries (4)	Upper-Middle-Income Countries (5)	High Income Countries (6)	
Economic Freedom	**-0.112** (0.046)**	**-0.165** (0.071)**	**-0.122 (0.102)**	
Regulatory quality (first stage)	0.250*** (0.030)	0.176*** (0.029)	0.172*** (0.033)	
Mean dependent variable	22.682	22.682	22.682	
Number of countries/Obs	40/592	27/387	40/735	
Weak identification test	111.401	45.071	47.786	
F-statistic on the excluded instrument	69.33	35.12	26.81	
Panel C		Geographical regions		
	Europe and central Asia (7)	East Asia pacific, and South Asia (8)	Latin America, Caribbean and North America (9)	Middle east, north Africa and Sub-Saharan Africa (10)
Economic Freedom	**-0.111** (0.052)**	**0.329 (0.565)**	**0.114** (0.045)**	**-0.199*** (0.060)**
Regulatory quality (first stage)	0.226*** (0.036)	0.058 (0.045)	0.198*** (0.051)	0.254*** (0.030)
Mean dependent variable	22.682	22.682	22.682	22.682
Number of countries/Obs	34/687	16/247	18/245	39/535
Weak identification test	79.014	2.536	8.992	106.998
F-statistic on the excluded instrument	38.24	1.63	6.36	67.76

Note: All panels are adjusted for factors such as the world uncertainty index, GDP per capita growth, urban population, age dependency ratio, female unemployment, female wage and salaried workers, infant mortality rate, female tertiary enrolment school, contraceptive prevalence, quality of government, and inflation. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Heteroscedasticity and autocorrelation-robust clustered at the country level, t-statistics are in parentheses.

2.6. Conclusions

Research on the impact of economic freedom on fertility, population, and women's health often concentrates on individual countries or small groups using household-level data.

This study has filled this gap as it has examined a dataset of 166 countries from 1995 to 2021, encompassing developed and developing nations across various continents. Our findings offer global empirical evidence that connects higher economic freedom with lower fertility rates. This connection remains consistent across different estimation techniques and even after considering endogeneity.

Our global analysis shows a link between higher economic freedom and lower fertility rates, consistent across various estimating techniques and after accounting for endogeneity. We have found that economic freedom is associated with lower fertility rates in both developing and industrialised countries. The negative correlation is more potent in industrialised nations. Additionally, our analysis reveals an adverse relationship between economic freedom and fertility rates across different income levels and geographic regions.

Our research indicates that economic freedom significantly impacts fertility rates in both developed and developing countries. In developing nations, lower economic development and limited access to education and career opportunities may lessen this effect (Silva & Klasen, 2021). Furthermore, cultural norms that support larger families can reduce the influence of economic freedom on fertility decisions (Colleran, 2016).

In developed countries, increased economic freedom has been found to boost economic potential, create jobs, and raise income (Ashraf, Weil, & Wilde, 2013). It also promotes urbanisation and industrialisation, leading to lower fertility rates due to higher living costs, limited housing, and a greater emphasis on education and careers (White et al., 2018). Moreover, economic freedom enhances education, particularly for women, leading to more informed family planning and fewer children (Phan, 2013). Additionally, it improves

healthcare, reduces maternal and child mortality, and decreases the need for large families as a safeguard against high child mortality (Comfort, Peterson, & Hatt, 2013).

The above findings have significant policy implications. Governments should promote economic freedom as it is associated with decreased fertility rates and enhanced women's health and economic progress. Initiatives to enhance women's access to education and employment, invest in maternal and child healthcare, and promote urbanisation can play a crucial role in reducing fertility rates. In developing countries, policies should consider cultural norms related to family size and be adapted to local variations.

Chapter 3: Climate Change and Gender Inequality

This chapter as a research paper, "Does Climate Change Exacerbate Legal Gender Inequality? Evidence from Cross-Country Panel Data", under review in The World Development Perspectives at the time of submitting this thesis, works as part of my PhD thesis. I confirm that I undertook all aspects of this work, including Conceptualisation, Data Collection and Analysis, Methodology Development, Writing – Original Draft and Writing – Review and Editing. My supervisors, Ilke Onur, Rong Zhu, and Tony Cavoli, provided guidance and feedback throughout the process to ensure the successful completion of this research. Their support was instrumental in refining the work's ideas, methodologies, and presentation. I confirm that this work is my independent contribution to the field, completed under their supervision.

3.1. Introduction

This chapter will examine if climate change exacerbates legal gender inequality with evidence from cross-country panel data. The sustainable development goals universally recognise gender equality as a fundamental human right (United Nations Development Program [UNDP], 2015). Goal 10 of sustainable development aims to reduce gender inequalities within and between countries (UNDP, 2022). Gender inequality persists globally due to insufficient policy interventions, resulting in disparities in access to fundamental human rights and higher rates of illness and death among females (Sahni et al., 2008; Kaplan et al., 2011). Additionally, millions of women worldwide face physical and sexual violence (Sen, 2003). Gender inequality hinders social development and global economic growth (Chaaban & Cunningham, 2011).

The Women, Business, and Law (WBL) Index was established by the World Bank in 2009 to gather data on legislation and policy frameworks evaluating gender equality progress (World Bank, 2024). This index aims to facilitate discussions on enhancing women's economic opportunities and empowerment (World Bank, 2024). It covers 190 countries from the years 1971 to 2024. The index comprises eight parameters: mobility, workplace, pay, marriage, parenthood, entrepreneurship, assets, and pension (World Bank, 2024).

Climate change substantially threatens human existence (Intergovernmental Panel on Climate Change [IPCC], 2022; MacGregor, et al., 2021; Pearse, 2017; Steffen et al., 2015; Anderson, 2014). climate change solutions classify into adaptation and mitigation (IPCC, 2018; IPCC, 2022). Due to the unequal global distribution of climate change impacts emphasising adaptation research in less developed countries (Global Gender and Climate Alliance, 2016; Pielke et al., 2007). Despite their importance, there are still significant gaps in the academic literature regarding the interaction between gender equality and climate resilience with gender equality advocacy (MacGregor, 2010; Global Gender and Climate Alliance, 2016; Andrijevic et al., 2020; McGee et al., 2020). The research presented in this chapter delves into the correlation between gender inequality and climate change.

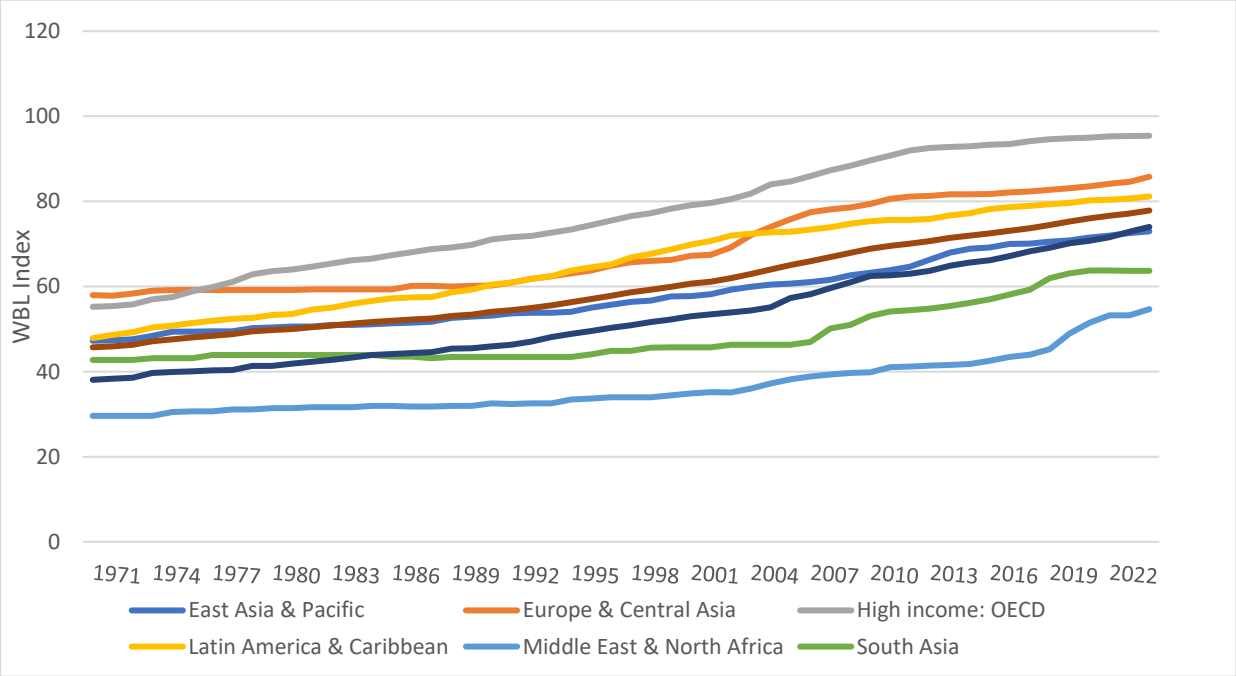
Climate change may exacerbate the problem of gender equality by affecting the roles and responsibilities of women in many societies (Lau et al., 2021). In rural areas, women often bear the burden of food production, water collection, and care, making them more vulnerable to the impacts of climate shocks, extreme weather events, water scarcity, and food insecurity (Desai & Zhang, 2021; Khine & Langkulsen, 2023). Women often play a crucial role in caring for children, the elderly, and the sick, which limits their participation in work, education, and community activities, reinforcing gender inequality (Sharma, Chakrabarti, & Grover, 2016; Akrofi, Mahama, & Nevo, 2021). Climate change worsens this by increasing caregiving

demands during environmental disasters, further restricting women's opportunities and deepening gender disparities.

The migration prompted by climate change can disrupt social networks and support systems, making women more vulnerable to abuse, exploitation, and trafficking due to disparities in resources and mobility between genders (McAdam, 2019). Climate change disrupts crop yields, water, and soil quality, impacting women in rural agriculture. With limited access to resources like land and credit, they face more significant economic strain, worsening poverty and inequality (Gitz et al., 2016). Climate change also intensifies pressures on resources such as water and arable land, further hampering women's ability to adapt to environmental changes and improve their economic conditions (Lau et al., 2021).

It is vital to analyse how climate change impacts gender disparities to address persistent inequality. Between 1971 and 2024, the Women, Business and the Law (WBL) index increased from 45 to 77, reflecting significant progress in gender equality through approximately 2,329 legal reforms. In 2009, countries such as Australia, Botswana, Jordan, Nicaragua, San Marino, Sierra Leone, Slovenia, Thailand, and Vietnam enacted laws to protect women from domestic violence and strengthen their marriage rights. More recently, in 2023, China, Malta, and the Netherlands introduced paid parental leave, promoting shared childcare responsibilities. Additionally, Senegal implemented legislation prohibiting the dismissal of pregnant women, ensuring greater job security for expectant mothers. Further reforms in countries like Costa Rica, Côte d'Ivoire, Gabon, Kazakhstan, and Senegal removed restrictions on women's employment, expanding opportunities for women across various industries. These advancements are highlighted in the World Bank's Women, Business and the Law, Reforms 2024 (see Figure 3.1) (World Bank, 2024). Higher gender equality ratings seem to be connected to stricter legal standards in certain countries (World Bank, 2024). The North Africa and

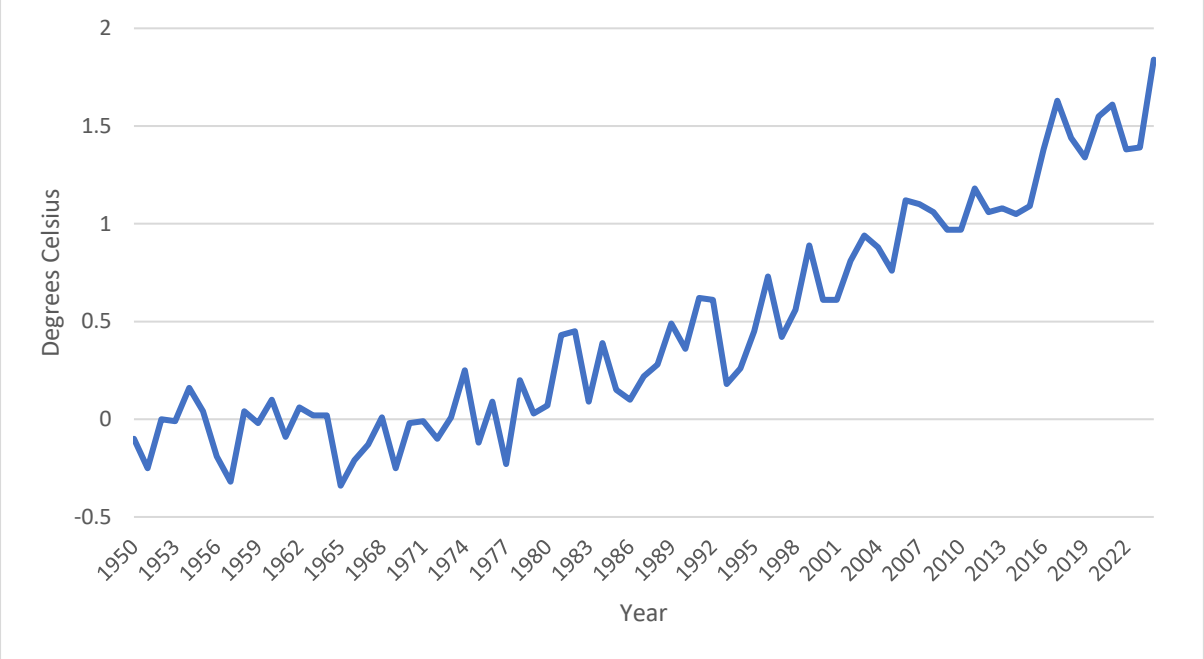
Middle East regions exhibit significant inequality in economic opportunities for women, with an average score of 54 points on the WBL index. OECD economies demonstrate the highest level of gender equality, emphasising the need to strive for more rigorous standards continuously. Countries with a history of greater gender inequality are undergoing rapid transformation, particularly in Sub-Saharan Africa, North Africa, and the Middle East, such as Botswana, Togo, South Africa, Saudi Arabia, Bahrain, and Indonesia (World Bank Group, 2023).



Source: World Bank, 2024.

Figure 3.1 Women, Business and Law Index (WBL)

The global average land temperature is a crucial indicator of climate change. Over the years, it has increased by 0.1°C to 1.84°C, with yearly variations during this period (see Figure 3.2). There has also been a significant increase in natural disasters, with the number rising from around 100 in 1980 to over 350 in 2022 (Emergency Events Database, 2023). The leading cause of climate change is the accumulation of greenhouse gases from human activities, such as burning fossil fuels, deforestation, and industrial processes (Hardy, 2003). These gases trap heat in the atmosphere, leading to global warming, which alters global weather patterns and worsens the frequency and intensity of extreme weather events, including droughts, heat waves, hurricanes, and floods (Shivanna, 2022).



Source: National Centres for Environmental Information (2024)

Figure 3.2 Global Land Average Temperature Anomalies

This study focuses on two primary factors. Firstly, Sustainable Development Goal 10 aims to address inequality, while Sustainable Development Goal 13 emphasises the urgency of addressing and reducing the effects of climate change. The study aims to explore the global impact of climate change on gender disparity and investigate the potential mechanisms through which temperature influences the WBL index. The fixed effect-instrumental variable analysis shows a consistent increase in global temperature trends correlated with a decreased WBL index over time. This could potentially affect gender equality through various mechanisms, including levels of economic development, agriculture, maternal health, and democracy.

This study contributes to the existing literature on global gender inequality, building upon and diverging from Eastin's (2018) analysis in several noteworthy ways. While Eastin's research utilised the Cingranelli-Richards Human Rights Dataset (CIRI) to examine gender equality in developing countries, our study employs the World Bank's Women, Business, and the Law (WBL) index in conjunction with climate change indicators, such as temperature fluctuations. This methodological and contextual shift enables our analysis to address specific limitations in Eastin's approach and offers new insights into the relationship between legal gender equality and climate change.

The WBL index provides a more nuanced and detailed perspective on the legal and regulatory barriers to women's economic participation than CIRI. While CIRI addresses various human rights issues, including women's rights, the WBL index evaluates gender-related legal frameworks across eight key domains: mobility, workplace rights, pay, marriage, parenthood, entrepreneurship, assets, and pensions. By concentrating on these specific legal dimensions, this chapter offers a more targeted analysis of the legal determinants of gender equality, delivering policy-relevant insights that may be less visible in broader datasets such as CIRI.

This study utilises more recent and comprehensive data spanning 32 years (1990–2021) across 169 countries, resulting in 5,408 observations. This extensive temporal and geographic scope not only enhance the relevance of the findings to contemporary global challenges but also facilitates a cross-national comparative analysis that was not possible in Eastin's research, which concentrated on developing countries.

From a methodological perspective, this chapter employs a more rigorous econometric framework that addresses potential endogeneity concerns by implementing a two-stage least squares (TSLS) approach utilising instrumental variables (IV) within a panel data set. This enables a robust identification of causal relationships between climate change and legal gender equality, representing an improvement over Eastin's methodology, which did not explicitly consider endogeneity in this context. Furthermore, the utilisation of panel data allows us to leverage within-country variations over time, thereby enhancing the precision and reliability of our estimates.

The WBL index by the World Bank provides a more detailed and comprehensive review of the specific legal and regulatory obstacles to women's economic participation compared to CIRI. While CIRI covers a wide range of human rights issues, with women's rights being just one component, the WBL index focuses on eight specific domains: mobility, workplace rights, pay, marriage, parenthood, entrepreneurship, assets, and pensions. This allows for a more detailed analysis of how legal frameworks affect women's economic opportunities across various aspects of life. Additionally, the WBL index is updated annually, providing more recent and regularly updated data than CIRI, which only goes up to 2011. This consistent availability of up-to-date information in the WBL index makes it a more effective tool for analysing and guiding gender-related legal reforms and economic policy interventions over time (World Bank, 2024; Cingranelli & Richards, 2010).

This chapter will firstly present a literature review, then the data will be described followed by a discussion of the empirical strategy employed here, and then the analyses of these empirical results. Finally, the conclusions will be presented.

3.2. Literature review

Numerous prior studies have delved into the factors contributing to gender inequality. Recent research has honed in on the significant influence of macroeconomic factors on gender equality. For instance, Sangaji and Kurnia (2018) found that GDP per capita, trade, and foreign direct investment (FDI) hurt gender equality in eight Asian countries. Onaran, Oyvat, and Fotopoulou (2022) highlight the pivotal role of overall equality in propelling economic growth. Additionally, Berik, Rodgers, and Seguino (2009) demonstrated the interconnected nature of macroeconomics and gender dynamics with the economy's structure and job distribution.

Khurshid et al. (2022) found that CO_2 emissions and average temperature affect short- and long-term economic growth differently. Tol (2018) suggests that although climate change may initially have some positive economic effects, its negative impacts eventually outweigh the benefits, especially for economically disadvantaged, arid, and low-lying countries. In a study of the economic impact of climate change in Nanjing, southeast China, using data from 1996 to 2017, Lu et al. (2019) found that increased rainfall and decreased temperatures had less severe economic impacts. The study also found that climate change encourages capital investment, but significant temperature changes hinder economic growth.

The existing body of research has predominantly focused on examining the correlation between climate change and socioeconomic inequality. Consequently, the development index is now linked with inequality indicators such as income inequality or UNDP gender equality.

Scholars have found that climate change exacerbates income inequality in developing nations (Beneria & Permanyer, 2010; Amin & Sabermahani, 2017), particularly in the agricultural sector (Cevik & Jalles, 2023a; Cevik & Jalles, 2023b; Palagi et al., 2022). Moreover, it leads to a U-shaped relationship in EU countries (Ada-Cristina & Lucian-Liviu, 2020). It amplifies income inequality in the United States due to rising temperatures (Chisadza et al., 2023).

In a recent study conducted by Rainard, Smith, and Pachauri (2023), they employed quantitative analysis to investigate the relationship between the Environmental Performance Index, the Gender Inequality Index, and the Global Gender Gap Index as an indicator of environmental sustainability. The GGGI, which incorporates measures of women's economic opportunity and political empowerment, exhibited a weaker correlation with the Environmental Performance Index than the GII. Furthermore, Bataka (2024) emphasised that engagement in global value chains positively mitigates gender inequality in sub-Saharan Africa.

Multiple studies (Adeosun & Owolabi, 2021; Battiston et al., 2023; Sangaji & Kurnia, 2018; Silva & Klasen, 2021; Iqbal et al., 2022) have extensively explored the factors influencing gender inequality, identifying a broad spectrum of social, demographic, economic, environmental, and institutional factors contributing to its various forms. There has been research on the correlation between climate change and its impact on the economy (Farajzadeh Ghorbanian, & Tarazkar, 2023; Roson & Mensbrugghe, 2012), which has led to the emergence of the concept linking gender inequality to climate change. To the best of our knowledge, this study represents the first endeavour to quantitatively measure the impact of climate change on gender inequality using the WBL Index.

Eastin's (2018) comprehensive literature review, which utilised panel data from developing countries from 1981 to 2010, examined the relationship between climate change

and gender equality. The findings indicate that climate shocks and disasters adversely affect gender equality, with deviations from long-term average temperatures and increased disaster frequency correlating with a decline in women's economic and social rights. These effects are particularly pronounced in less democratic countries with heavier reliance on agriculture and lower income levels. However, Shayegh and Dasgupta (2022) constructed a structural model to investigate the long-term impacts of climate and socioeconomic changes on labour supply and the wage gap between male and female and high-skilled and low-skilled workers. Their analysis of five waves of nationally representative micro-survey data in South Africa from 2008 to 2017 reveal that while climate change does not affect the availability of high-skilled labour, higher temperatures had a negative impact.

Luong et al.'s (2023) study examined the influence of climate change on individual migration decisions in Vietnam; rainfall shocks could perpetuate inequality, potentially discouraging women from relocating in response to climate change. Additionally, Mavisakalyan and Tarverdi (2019) discovered a correlation between increased female representation in parliament and the implementation of more stringent climate change policies, leading to reduced CO_2 emissions in various countries. Moreover, Aryal et al. (2022) identified disparities in climate change adaptation among 2279 Ethiopian farm families, finding that observable and unobservable household characteristics, led by males and females, played a role. Finally, Nandan and Mallick (2020) reported that gender equality contributes to economic growth and noted the impact of gender equality variations among states on per capita income in India.

Only a few studies have identified specific factors contributing to gender inequality in the literature we examined. Additionally, the significant impact of climate change on gender

inequality in developed and developing countries is frequently disregarded. Our study thus aims to address this gap by exploring the influence of climate change on gender inequality.

3.3. Data

We utilised data from 169 developed and developing countries, examining variables such as the WBL index, climate change, and other control variables in our empirical estimations. Our final sample consists of a balanced panel of approximately 5408 observations over 32 years with the analysis spanning between 1990 to 2021. A table detailing the definition of study variables and their sources is presented in Appendix 6, and Appendix 7 provides a list of the countries included in the sample.

3.3.1. Climate change

Climate change is broadly defined as long-term changes in temperatures and weather patterns. Such transitions can occur naturally due to changes in the sun's activity or significant volcanic eruptions (Moazami et al., 2019). However, human activities have been the primary driver of climate change since the 19th century, primarily through the burning of fossil fuels such as coal, oil, and gas (Wuebbles & Jain, 2001). Burning fossil fuels produces greenhouse gas emissions, acting as a blanket around the Earth, trapping the sun's heat and raising temperatures (Kweku et al., 2018). Carbon dioxide and methane, primarily produced by burning gasoline in vehicles or coal to heat buildings, are the primary greenhouse gases causing climate change. Additionally, the release of CO_2 occurs through land clearing and deforestation (Wuebbles & Jain, 2001).

The variable of interest would be climate change (Khurshid et al., 2022; Eastin, 2018; Shayegh & Dasgupta, 2022), represented by temperature. The Climatic Research Unit

developed the metrics to compile national-level data for each year, following Eastin (2018), Baarsch et al. (2020), and Paglialunga, Coveri, & Zanfei (2022), using the World Bank Group's (2024) Climate Change Knowledge Portal. For each country, with each year included in the Climate Change Knowledge Portal dataset, we used Climatic Research Unit annual data to index the temperature through the mean surface air temperature, the mean temperature in °C, over the collection period.

The most reliable measure for evaluating the impact of climate change is temperature, as positive temperature changes have the most significant overall effect. The most lasting environmental impact of climate change is temperature variability, which can negatively affect livelihoods and food security, particularly in developing nations in tropical and subtropical regions (Field & Barros, 2014). While rainfall changes can also influence these processes, their effects are consistently in different directions, complicating their overall impact (Eastin, 2016). Temperature is a valuable indicator of climate change because it is not influenced by existing social, economic, and political systems that can impact gender equality. However, measuring these factors at the country-to-year level presents challenges because it may obscure climate variability within a country and throughout the year (Eastin, 2018).

Temperature can affect gender inequality by affecting sectors such as agriculture, where women often work, leading to lower yields, incomes, and resource access (Bryan et al., 2024). Disturbances in weather patterns also affect non-agricultural livelihoods, limiting sources of income, especially for women in informal markets (Fruttero et al., 2023). Climate-related health risks disproportionately affect women, affecting their access to education and health care (WHO, 2014). In addition, climate-induced migration can expose women to specific risks and challenges (Lama, Hamza, & Wester, 2021). Overall, climate change may contribute to

gender inequality by affecting women's economic opportunities, access to resources, and well-being.

Climate change is a complex phenomenon with multiple dimensions, including temperature changes, climate disasters, and shifts in precipitation patterns, each contributing uniquely to its overall impact. Among these, temperature is a more accurate and stable measure of long-term climate change, directly reflecting the cumulative effects of greenhouse gas emissions and global warming (Filonchyk et al., 2024). Unlike climate disasters and precipitation, which can be influenced by short-term variability and localised factors, temperature trends provide a consistent and globally comparable indicator of the progression of climate change (Strohmenger et al., 2022). For this reason, temperature is instrumented using carbon intensity (CO_2 per GDP), which captures the direct relationship between human economic activity and atmospheric emissions.

On the other hand, climate disasters and precipitation represent more localised and unpredictable events influenced by various atmospheric and oceanic conditions. While they are critical to understanding the broader effects of climate change, they are not as directly tied to emissions as temperature is. Additionally, these events can be influenced by natural climate variability, making them less suitable as primary indicators of long-term climate trends (Bolan et al., 2024). By treating them as control variables rather than endogenous regressors, the analysis can better isolate the specific impact of temperature on gender inequality. This approach also avoids introducing measurement error or aggregation bias, which could arise if all three variables were combined into a single climate change measure. Therefore, maintaining temperature as the primary climate change variable while using disasters and precipitation as control variables allows for a more precise and policy-relevant analysis of how climate change

affects gender inequality. This methodology ensures that the findings provide clearer insights into the channels through which climate change impacts social and economic outcomes.

3.3.2. Women, Business and the Law index

The WBL index is the dependent variable. It comprehensively evaluates gender inequality in women's economic status, opportunities, and autonomy (Malaquias, Matumoto, & Valadão. 2022; Hyland, Djankov, & Goldberg, 2021). A lower WBL index value indicates greater inequality, while a higher value suggests more gender equality. The WBL report assesses the legal discrepancies in economic opportunities available to men and women. It encompasses eight indicators, creating a total of thirty-five legal dimensions. Each indicator reflects different stages of a woman's professional journey (World Bank Group, 2023). The index evaluates how laws and regulations impact women's economic prospects, where 100 signifies equal legal rights for both genders. The average index is scored based on eight categories: mobility, workplace, pay, marriage, parenthood, entrepreneurship, assets, and pensions (World Bank, 2024).

The mobility indicator assesses restrictions on women's ability and freedom to travel (Htun, Jensenius, & Nelson-Nuñez, 2019). The indicator consists of four components: whether women have the same freedom to choose their residence as men, whether women have the same access to travel as men, whether there is gender-based differences in the passport application process, and whether women have the same rights for international travel as men. The workplace indicator focuses on the laws impacting women's participation in the workforce (McLaughlin, Uggen, & Blackstone, 2017; Cavalcanti & Tavares, 2016; Amin & Islam, 2015).

This indicator evaluates whether women can obtain jobs equally with men, legality of protection from sexual harassment in the workplace (World Bank, 2024).

The pay indicator evaluates the impact of laws on the wage gap between men and women and the segregation of employment (World Bank Group, 2023; Scarborough, 2020; World Bank, 2012; Costa, Silva, & Vaz, 2009; Ogloblin, 2005). This measurement assesses whether the law ensures equal pay for equal work, whether women can work at night like men, undertake hazardous jobs similar to men, and engage in industrial work like men. The marriage indicator assesses the legal restrictions on marriage and divorce (World Bank Group, 2023; Gonzales et al., 2015; Goldin & Olivetti, 2013). It includes five factors: whether the law does not require a married woman to obey her husband; whether there are specific laws against domestic violence; whether a woman has the same authority as a man within the family; whether women have equal rights to enter into new marriages; and whether a woman can initiate divorce proceedings using the same formal process as a man (World Bank Group, 2023; World Bank, 2024).

The parenting indicator evaluates the regulations affecting women's ability to work before, during, and after pregnancy (World Bank Group, 2023; Berger & Waldfogel, 2004). It consists of five components: whether mothers are entitled to at least 14 weeks of paid leave, whether the government covers all pregnancy-related expenses, and whether fathers have access to paid leave. The entrepreneurship indicator assesses women's barriers to starting and managing their businesses (World Bank Group, 2023; Field et al., 2021; Islam, Muzi, & Amin, 2019; Gonzales et al., 2015). It comprises four parts: evaluating whether laws prohibit gender-based lending, whether women can enter into contracts on a par with men, whether women can start businesses on an equal footing with men, and whether women have the same access to opening bank accounts as men (World Bank Group, 2023; World Bank, 2024).

The assets indicator assesses gender disparities in property and family law, investigating whether men and women have equal rights to own real estate, whether sons and daughters inherit assets equally, whether surviving spouses inherit assets equally, whether there is equal administrative authority over assets during marriage, and whether non-monetary contributions are evaluated (Peterman, 2011; Heath & Tan, 2018; World Bank Group, 2023; Gaddis, Lahoti, & Swaminathan, 2020). The pension indicator evaluates the rules affecting women's retirement options, considering gender-neutral retirement ages, equal ages for full and half pensions for men and women, and provisions for time off work to care for children (Chłoń-Domińczak, 2017; Burn et al., 2020; World Bank Group, 2023; World Bank, 2024).

The WBL index comprehensively evaluates 35 specific legal issues through eight indicators, providing a robust measure of gender equality and women's access to economic opportunities. Its transparent and replicable methodology ensures consistency and reliability across countries, offering a global perspective on women's rights and prospects in various legislative systems worldwide. This index is an invaluable resource for researchers, advocates, and policymakers seeking to identify and eliminate obstacles to gender equality (World Bank Group, 2023; World Bank, 2024).

3.3.3. Control variables

We have included precipitation and climate disaster observations as control variables to assess their potential impact. Precipitation tracks the total accumulated rainfall in millimetres at the country level, and it is essential to consistently and accurately evaluate the impact of rainfall (Eastin, 2016). Climate disasters represent a growing trend in the frequency of such events. These disasters have led to the loss of ten or more lives, affected one hundred or more

people, declared a state of emergency, or prompted a request for international assistance. Climate disasters are increasing in frequency and intensity due to warmer temperatures, altered precipitation patterns, rising sea levels, and melting ice (Funk, 2021). As a result, climate disasters have significant economic implications and can worsen social and economic inequalities (Ebi et al., 2021).

Economic growth can impact gender inequality by creating more opportunities for women and reducing disparities. A nation's GDP per capita indicates economic well-being, as higher incomes often lead to better living standards and gender equality (Bertay, Dordevic, & Sever, 2020; Maceira, 2017). Population growth affects resource allocation, social services, and job markets, making population control crucial to avoid skewed effects (Mondal, 2019). Inflation impacts purchasing power and living costs, influencing gender disparities (Cevik & Jalles, 2023a; Cevik & Jalles, 2023b). Economic globalisation affects trade, income, and job markets (Meyer, 2003). Gender inequality is linked to women's workforce participation and education levels, which can reduce disparities and improve human development outcomes (Ergas et al., 2021; Bertay, Dordevic, & Sever, 2020).

FDI refers to capital from foreign sources entering a country's economy (Sarkodie, Adams, & Leirvik, 2020). The proportion of agricultural land indicates the significance of agriculture in the economy and society (Raza et al., 2019). The percentage of GDP from agriculture helps differentiate the direct impacts of climate change on gender equality in agriculture from broader economic factors (Pawlak & Kołodziejczak, 2020). The electoral democracy index measures democratic governance, including electoral processes, political participation, and civil liberties (Boese & Wilson, 2023).

To accurately assess the impact of climate change on gender inequality, it is essential to consider other factors that may also contribute to gender disparities in socio-economic outcomes. By considering variables such as GDP per capita, urban population, inflation, economic globalisation, the human development index, agricultural land, FDI, agriculture's GDP contribution, and electoral democracy, we can gain a more detailed understanding of the relationship between climate change and gender equality, as demonstrated by the WBL Index. The data used for this analysis was collected from sources including the UNDP, International Monetary Fund, World Development Indicators, KOF Swiss Economic Institute, and V-Dem Project.

3.3.4. Summary statistics

Table 3.1 below presents vital descriptive statistics for the WBL index, temperature, climate disasters, and other relevant variables. The mean values of the outcome variable and the leading independent variables were 64.9 and 19.06, respectively. These variables exhibited substantial variation across countries. For example, the Middle East and North Africa region had the highest level of gender inequality, with a WBL score of 51.5 in 2021. In contrast, OECD countries demonstrated the highest level of gender equality in 2021, with a score of approximately 95.4 (World Bank Group, 2023). Burkina Faso registered the highest average air temperature in 2021, reaching a peak of 30.01°C, while Canada experienced its lowest temperature of -5.23°C in 1996 (World Bank Group, 2024). Furthermore, the United States witnessed 43 climate-related disasters in 2021, marking it as the country with the most significant global total (Emergency Events Database, 2023).

Table 3.1 Descriptive statistics of variables

Variable	Observation	Mean	Standard deviation	Min	Max

The Women, Business, and Law Index	5408	64.964	18.834	17.5	100
Temperature	5408	19.066	8.158	-5.23	30.010
Climate disasters	5408	1.681	3.320	0	43
Precipitation	5408	1137.197	787.8011	10.85	4468.6
GDP per capita growth	5203	1.836	5.840	-64.425	96.956
Urban population	5408	55.353	23.189	5.416	100
Inflation	4878	27.858	393.090	-16.859	23773.13
Economic globalisation	5290	56.261	16.271	19.677	90.929
Human development index	5020	0.671	0.166	0.216	0.962
Agricultural land	5226	38.922	21.182	0.448	85.487
Agriculture's contribution to GDP	5006	12.990	12.162	0.013	79.040
FDI	5128	4.340	14.830	-117.370	449.080
The Electoral Democracy Index	4983	0.524	0.267	0.013	0.924
fossil CO_2 emissions per GDP	**5,280**	**0.262**	**0.244**	**0.001**	3.137

Figure 3.3 demonstrates a negative correlation between the impacts of climate change and gender equality. Countries facing rising temperatures, extreme weather events, and environmental degradation typically show lower levels of gender equality. This trend indicates that the adverse effects of climate change may intensify issues such as decreased female participation in the labour market, limited access to education and healthcare, and heightened vulnerability to poverty, all of which contribute to gender inequality. Conversely, nations that experience milder climate change impacts often exhibit higher levels of gender equality, likely reflecting socioeconomic structures that promote women's empowerment, access to resources, and resilience-building initiatives. The downward-sloping trend line clearly illustrates this inverse relationship.

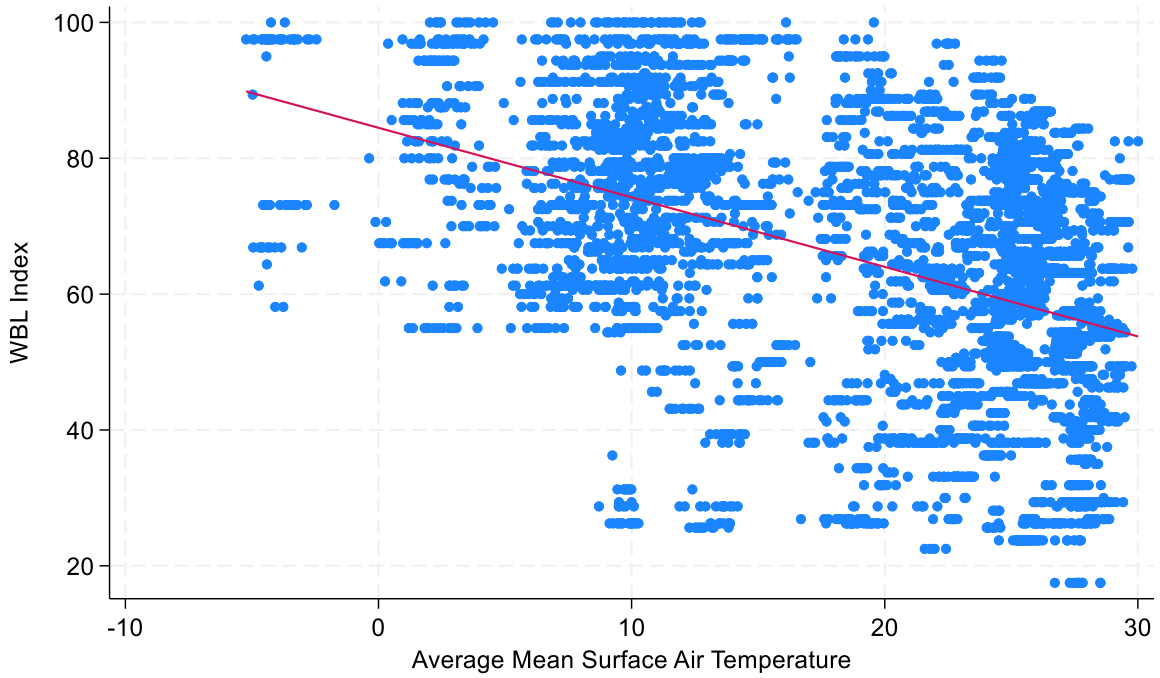


Figure 3.3 Two-way scatter between gender equality and climate change

3.4. Empirical strategy

We employ a panel fixed effects instrumental variable model to quantify the impact of climate change on gender inequality. The model is defined in the following manner:

$$\boldsymbol{GI_{it} = \beta_0 + \beta_1 CC_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it}} \quad \ldots\ldots (4)$$

where $GI_{i,t}$ takes the measure of the gender inequality, i indicates the state (i =1, …, 169) t indicates (t =1990, …, 2021). $CC_{i,t}$ is the climate change variable. X_{it} denotes the collection of control variables. μ_i displays a vector of country indicators that represent unobservable fixed effects specific to each country and time and in a panel regression model, the random error term (ε_{it}) is assumed to have a mean of zero, indicating the absence of systematic bias. Additionally, it is expected to have constant variance (homoscedasticity) and to exhibit no correlation over time or across countries, which helps prevent dependence between observations. These assumptions are crucial for obtaining unbiased and efficient estimates.

We implement the fixed effects instrumental variable (FE-IV) estimate technique to address the endogeneity between the climate change indicator and gender inequality. Endogeneity between climate change and gender inequality arises from several sources, justifying using the FE-IV technique to obtain unbiased estimates. Reverse causality is a primary concern, as while climate change can exacerbate gender inequality by increasing caregiving responsibilities, health risks, and limiting women's access to resources, existing gender inequality can also undermine a country's ability to mitigate and adapt to climate change (Duranton, Henderson, & Strange, 2015). Societies with higher gender inequality often have weaker institutional frameworks and lower female participation in decision-making, resulting in less effective climate policies. Furthermore, omitted variable bias may occur due to unobserved factors such as institutional quality, governance effectiveness, or socio-economic development, which can simultaneously affect both the severity of climate change impacts and gender inequality (Semadeni, Withers, & Trevis Certo, 2014). While including control variables can reduce this bias, it cannot eliminate it, reinforcing the need for instrumental variable estimation. Additionally, measurement errors in climate change and gender inequality data can distort the estimated relationship (Hill et al., 2021). Inaccuracies in reporting or data limitations may lead to biased results. Using the FE-IV technique, the study effectively addresses these endogeneity concerns, providing more reliable and accurate estimates of the causal effect of climate change on gender inequality. We can express Eq. (4) using the following two-stage equations:

$$\widehat{\boldsymbol{CC}}_{\boldsymbol{it}} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 X_{it}} + \boldsymbol{\alpha_2 IV_{it}} + \boldsymbol{\lambda_i} + \mathrm{x}'_{\boldsymbol{it}} \ldots\ldots\ldots (5)$$

$$\boldsymbol{GI_{it}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1}\widehat{\boldsymbol{CC}}_{\boldsymbol{it}} + \boldsymbol{\beta_2 X_{it}} + \boldsymbol{\mu_i} + \mathrm{z}'_{\boldsymbol{it}} \ldots\ldots\ldots (6)$$

The *IV* illustrates the fossil CO_2 emissions per GDP in country *j* and at time *t*. The definitions of the other variables are comparable to those in equation (4). We use the first stage

equation, equation (5), isolate the impact of the $\widehat{CC}$. We integrate the second stage's fitted values, obtained from equation (5), into equation (6) to address the endogeneity problem. We use fossil CO_2 emissions per GDP as the instrumental variable for the temperature indicator.

The variable CO_2 per GDP (carbon intensity) measures an economy's efficiency in generating output relative to its carbon emissions (Andersson & Karpestam, 2013). Economies with higher CO_2 per GDP typically depend more on fossil fuels and exhibit less efficient production processes, resulting in more significant CO_2 emissions per output. In contrast, economies with lower CO_2 per GDP are usually more energy-efficient or utilise cleaner technologies, which helps to reduce emissions relative to GDP (Mehmood et al., 2024; Raupach et al., 2007; Quadrelli & Peterson, 2007).

Increased CO_2 emissions result in higher concentrations of greenhouse gases in the atmosphere, significantly contributing to global warming (Kweku et al., 2018). Economic activities, particularly in industrialised and fossil-fuel-dependent economies, are significant sources of CO_2, exacerbating the greenhouse effect and leading to rising temperatures (Humlum, Stordahl, & Solheim, 2013). Therefore, CO_2 emissions relative to GDP can predict temperature changes, as it indicates the intensity of emissions associated with a country's economic output (Friedl & Getzner, 2003). The primary areas impacted include environmental and macroeconomic domains, particularly climate change, energy consumption, and economic efficiency (Osobajo et al., 2020; IPCC, 2023).

The concept that CO_2 emissions per GDP could decrease temperature is more concerned with slowing the rate of temperature increase rather than directly lowering global temperatures (Kabir et al., 2023). As nations grow wealthier, they invest in cleaner energy technologies such as solar, wind, or nuclear power. These advancements reduce CO_2 emissions per GDP,

lessening that economy's contribution to global greenhouse gas concentrations and ultimately leading to a deceleration in temperature rise over time (Bogdanov et al., 2021).

As economies grow and GDP increases, there is often a heightened focus on improving energy efficiency. Enhanced energy utilisation allows the same output level to be achieved with reduced energy consumption, consequently lowering CO_2 emissions. This improvement can encompass various areas, including more efficient facilities, industrial processes, transportation, and electricity generation. Additionally, as economies develop, there tends to be a transition from carbon-intensive industries, such as manufacturing, to service-oriented or technology-driven sectors (González-Álvarez & Montañés, 2023).

Nations with higher GDP typically possess more significant resources to enforce stringent environmental regulations, such as carbon pricing, emissions caps, and incentives for renewable energy. These policies motivate industries to decrease their carbon output, reducing CO_2 emissions per GDP (Krupnick & Parry, 2012). Over time, this can mitigate the effects of global warming by slowing the accumulation of greenhouse gases in the atmosphere.

Gender equality is predominantly shaped by social, cultural, legal, and institutional factors. It is influenced by policies related to women's rights, education, political representation, access to healthcare, and participation in the labour market. These elements typically operate independently of a country's carbon emissions relative to its economic output. Although environmental degradation, such as rising temperatures, may indirectly affect gender equality (for example, through impacts on agriculture, income, health, or democratic processes), CO_2 emissions per GDP do not directly influence the social institutions that drive gender inequality outcomes (McGee et al., 2020; Markkanen & Anger-Kraavi, 2019).

The carbon intensity of an economy indicates its technological and industrial structure. However, this metric has minimal impact on gender-related social outcomes such as women's participation in politics, legal rights, access to education, and experiences of gender-based violence. For instance, two countries with comparable CO_2 emissions per GDP may exhibit significantly different levels of gender equality due to variations in legal frameworks, cultural attitudes, and social policies. This underscores that CO_2 emissions per GDP do not directly affect gender inequality.

Many policies aimed at reducing CO_2 emissions per GDP, such as carbon pricing and investments in renewable energy, are primarily driven by environmental concerns rather than gender-related objectives. While these policies are intended to mitigate climate change, they do not directly address gender equality. The only potential link between CO_2 emissions per GDP and gender equality can be found through temperatures. Climate change manifested through increasing temperatures, can have gender-differentiated impacts in various sectors or regions. For instance, women may be more vulnerable to climate-related disasters, particularly in developing countries. However, this connection is mediated by temperature rather than being a direct consequence of CO_2 emissions per GDP. Thus, the relationship between CO_2 per GDP and gender equality is indirect, operating solely through the effects of temperature.

In order to enhance the effectiveness of our instrumental variable, we conducted empirical tests to assess the instrument's relevance. Our findings indicate that fossil CO_2 emissions per GDP demonstrate a strong and statistically significant correlation with temperature, satisfying the relevance criteria of a valid instrument. The F-statistic for the excluded instrument is 54.96. In our analysis, we employed the critical values of the Cragg-Donald Wald F-statistic, as Stock and Yogo (2005) detailed, to assess the instrument's strength. Below in the results section, Table 3.2, panel 3 shows the IV-FE estimation's Cragg-Donald

Wald F-statistic is 102.473. Our instruments pass all standard validity tests. To check for weak identification, we report the Kleibergen-Paap F-statistic, which is well above the commonly accepted threshold of 10, as detailed by Kaufman, Mehrez, and Gurgur (2019), indicates that the instrument fulfils the subsequent phase of exclusionary restrictions. Additionally, we utilised critical values of J statistics for all instruments (the overidentification test). The inclusion of the proportion of the population with access to electricity and fossil CO_2 emissions per GDP resulted in overidentification (P-value 0.0987 > 0.005), thereby enhancing the robustness of our IV identification (Hansen, Hausman, & Newey, 2008; Carrasco & Doukali, 2022). The correlation matrix also reveals a strong association between the instrumental variable and temperature (See Appendix 5). However, the correlation between the instrumental variable and the temperature could be more robust (Stock, 2001). Our findings indicate that our instrument satisfies the relevancy conditions for a valid instrument.

3.5. Results

3.5.1. Climate change and gender inequality regression-based estimates

Our analysis used the Women, Business, and Law index (WBL) as the dependent variable. Table 3.2 displays our findings, showcasing the impact of climate change on gender inequality by employing fixed effects and fixed effects instrumental variable estimation methods to address endogeneity. While panel 1 in Table 3.2 illustrates the impact using fixed effects, panels 2 and 3 demonstrate the same for FE-IV estimation. Our results indicate that the climate change indicator did not significantly affect the WBL in the fixed effects estimation. However, controlling for endogeneity approaches substantially lessened the impact of the temperature indicator on the WBL. Notably, according to the data in the FE-IV, temperatures had a more pronounced negative effect on the WBL across all countries, signifying an increase

in gender inequality between men and women. Accounting for endogeneity revealed a significant and more substantial negative relationship between the dependent and explanatory variables.

The baseline results in Table 3.2 consistently indicate that gender inequality worsens as climate change intensifies, as measured through indicators like temperature increases, climate disasters, and precipitation changes. While existing explanations often focus on the heightened caregiving responsibilities, increased health risks, and limited access to resources faced by women in vulnerable regions, this study extends the discussion by examining how legal and policy frameworks respond to these challenges. The WBL index, which captures gender inequality through eight legal parameters, comprehensively measures institutional gender responsiveness. As climate change exacerbates existing socio-economic disparities, governments may introduce legal reforms to mitigate these impacts, such as enhancing women's property rights, ensuring workplace protections, or improving access to financial resources. For example, countries have enacted legal changes in response to socio-environmental pressures, as demonstrated by recent reforms promoting paid parental leave, employment protections, and domestic violence legislation. This study contributes to the literature by offering empirical evidence on how climate change drives changes in legal and institutional frameworks affecting gender inequality. Unlike previous research, such as Eastin's study, which primarily focused on the direct socio-economic effects of climate change, this analysis highlights the dynamic relationship between environmental stress and legal reforms, providing insights into the role of institutional adaptation in shaping gender equality outcomes.

Specification 1 in Table 3.2 evaluates the link between climate change and the WBL in developed and developing countries. Our findings indicate that temperature and other climate

change metrics have an insignificant relationship with WBL when analysed using fixed effects estimation. However, in Table 3.2, panels 2 and 3 reveal that the coefficient of the critical independent variable (temperature) decreases when accounting for endogeneity, suggesting that temperature significantly negatively impacts WBL. To quantify our findings, a one-standard-deviation increase in the temperature indicator, equivalent to an 8.158°C rise (as shown in Table 3.1 above), is associated with a 67-point decrease in gender equality. This change is substantial, representing 103% of the average of the dependent variable.

The average mean surface air temperature coefficient is -8.223, representing the temperature change rate near the Earth's surface over a specific period. Upon analysing the average surface air temperature change, it becomes evident that it does not display significant fluctuations or dramatic shifts. However, it does show an increase of around 1.1°C over 32 years. This rise in temperature serves as a noteworthy indicator of climate change. It implies that for every 1°C increase in surface air temperature, gender equality decreases by 8.2 units on a scale from 0 to 100. Consequently, it can be argued that over 32 years, there has been a significant impact on gender equality due to the temperature rise.

Table 3.2 Estimating the impact of climate change Indicators on Women, Business, and the Law Index

Variables	**WBL index**	**Temperature**	**WBL index**
panel	Fixed Effects	**Fixed Effects-IV (2SLS)**	
	(1)	*(2) First stage*	***(3) second stage***
Temperature	**0.191**		**-8.223*** **
	(0.317)		**(2.008)**
CO_2 per GDP		-0.883***	
		(0.119)	
Climate disasters	**-0.048**	-0.005*	**-0.095***
	(0.052)	(0.003)	**(0.049)**
Precipitation	**0.000**	-0.000***	**-0.001***
	(0.001)	(0.000)	**(0.001)**
GDP per capita growth	-0.017	-0.001	**-0.019**
	(0.019)	(0.001)	**(0.021)**
Urban population	-0.031	-0.012***	**-0.176*** **
	(0.122)	(0.002)	**(0.057)**
Inflation	-0.001	-0.001***	**-0.002***
	(0.002)	(0.000)	**(0.001)**
Economic globalisation	0.201**	0.002	**0.251*** **
	(0.097)	(0.002)	**(0.049)**
Human development index	30.651	-0.209	**32.057*** **
	(18.59)	(0.415)	**(9.306)**
Agricultural land	-0.117	-0.006**	**-0.199*** **
	(0.116)	(0.002)	**(0.061)**
Agricultural as % of GDP	0.029	0.002	**0.055**
	(0.086)	(0.002)	**(0.044)**
FDI	0.004	-0.000	**0.001**
	(0.005)	(0.000)	**(0.004)**
Electoral democracy index	3.357	0.009	**3.029**
	(3.590)	(0.081)	**(2.172)**
Weak identification test (Cragg-Donald Wald F statistic)	-	-	**102.473**
F-statistic on the excluded instrument		54.96	
Number of countries/Obs.	154/4112	152/4086	**152/4086**
R-squared	0.65	-	**0.52**

Notes: The dependent variable is Women, Business and the Law index. Specification (1) show the fixed effect estimates and specifications (2 and 3) show FE-IV estimation. All variables are expressed in real values. The symbols ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Heteroscedasticity and autocorrelation robust standard errors are provided inside the brackets.

The coefficients of the control variables exhibit the expected trends. It is observed that climate-related disasters and precipitation have a notably adverse impact on gender equality. To provide a quantitative understanding of the findings, an increase of 3.32 standard deviations in the frequency of disasters and 787.8 mm/year in precipitation corresponds to a decrease of 0.32 and 0.78 in the WBL index, respectively. This indicates a change equivalent to 0.5% and

1.2% of the average value of the outcome variable. While GDP per capita, the percentage of GDP from agriculture, FDI, and democracy show no significant impact, urban population, inflation, and agricultural land exhibit a negative significance as seen in Table 3.2, panel 3, contributing to increased gender inequality. However, economic globalisation and the human development index significantly and positively influence WBL, suggesting that increasing these factors leads to greater gender equality.

In Table 3.2, panel 3, higher climate change indicators are associated with a lower WBL index (-8.223, -0.095, and -0.001). This is due to several factors. For instance, the negative economic impacts of climate change affect women disproportionately, mainly because they are overrepresented in sectors that are more susceptible to its adverse effects (Babacan, 2021). With less participation in the workforce and a more significant presence in the informal sector as self-employed individuals, women are more likely than men to live in the poorest households. As a result, women are more vulnerable to the consequences of climate change, which can worsen gender disparities and hinder women's economic opportunities (Asian Development Bank, 2022). Constraints on women's access to resources such as land, credit, and technology can impede their ability to adapt to climate change and mitigate its effects (Dabić et al., 2022; Salcedo, 2020). Furthermore, as water scarcity increases, women may face greater demands in terms of time and energy for water collection, which can obstruct their involvement in income-generating activities and educational pursuits (Ho et al., 2021). Given their role as primary caretakers for children, patients, and the elderly, women are particularly susceptible to health risks associated with climate change (Sorensen et al., 2018).

In less developed nations, women are often responsible for agricultural and food production. The fluctuating patterns of extreme weather events, attributed to climate change, can significantly impact agricultural output, reducing incomes and food insecurity for women

and their families. During periods of excessive heat, women are less likely than men to have their workloads reduced (Fruttero et al., 2023). Women farmers, reliant on natural resources and engaged in small-scale farming, are particularly vulnerable to the effects of climate change (Dibakoane, Siyongwana, & Shabalala, 2022). Moreover, women farmers require greater access to knowledge and resources such as technology, land ownership, and financial support to better adapt to a changing environment (Lecoutere et al., 2023).

The health impacts of climate change, such as food shortages, disproportionately affect women. Women are more vulnerable to harm or even fatality from events like hurricanes, floods, and heat waves, especially when they lack access to adequate housing and medical care (UN Women, 2022). Additionally, contaminated water and damaged infrastructure increase the risk of infectious diseases, further exacerbating the spread of illness (Okaka & Odhiambo, 2018). When women venture out in search of resources during times of scarcity, they are at a higher risk of experiencing gender-based violence and exploitation (Tallman et al., 2023; Desai & Mandal, 2021). The impact of climate change-induced disasters can amplify gender inequality, heightening women's susceptibility to gender-based violence. Lastly, research by Fatema et al. (2019) revealed that women and girls are 14 times more likely to endure harm during catastrophic events.

It is a well-documented fact that women and girls in developing countries often bear the responsibility of household chores such as fetching water and caring for family members (UN Women, 2020). Unfortunately, their increased workload due to climate change can leave them less time for schooling and skill development, potentially perpetuating cycles of poverty and inequality (Call & Sellers, 2019). Moreover, extreme weather and natural disasters can disrupt educational operations, reducing access to schooling for girls and young women (Porter, 2021). These events have already disrupted the education of approximately 37.5

million students and pose even more significant risks for around 200 million impoverished adolescent girls (Sims, 2021).

The World Bank Group (2024) suggests that rising temperatures and other signs of climate change, along with various legal, economic, and social issues, could exacerbate gender disparities in economic opportunity and empowerment. This emphasises the need to address climate change not only as an environmental concern but also as a women's rights and gender equality issue. Consequently, these factors may lead to increased gender inequality due to climate change.

3.5.2. Potential mechanisms

We explored how temperature indicators can affect the WBL index. Gender equality in a country can be influenced by various factors, including its economic development (Eastin & Prakash, 2013; Falk & Hermle, 2018). The decrease in agricultural productivity resulting from climate change could lead to reduced income for women working in agriculture, limiting their participation in the formal economy and entrepreneurship (Agarwal, 2018; Eastin, 2018). Climate change can also increase health risks, such as the spread of vector-borne diseases and respiratory illnesses caused by air pollution. Women in developing countries may bear a more significant burden of caring for ill family members, which further restricts their ability to pursue education or participate in the workforce, consequently contributing to maternal mortality (Chirowa, Atwood, & Van der Putten, 2013).

Climate change adaptation and mitigation policies have the potential to inadvertently perpetuate existing gender disparities if they do not take into account the differing needs and vulnerabilities of men and women. For instance, infrastructure projects or land use policies

disproportionately favour men or exclude women from participating in decision-making processes. A gender-sensitive approach to policymaking ensures that climate responses promote gender equality and empower women to participate in decision-making processes and resource allocation. As a result, the level of democracy in countries plays a vital role in shaping gender inequality (Beer, 2009; Andersen, 2023).

Hence, it is essential to examine the correlation between temperatures and these potential factors and to present the results in Table 3.3. We categorised the global sample of countries based on their economic development, reliance on agriculture, maternal health, and level of democracy. The findings suggest that climate change has the most significant impact on WBL (gender inequality) in countries that are relatively poorer and more reliant on agriculture, with higher rates of women's health issues, and with less democratic political institutions.

In our analysis, we combine climate change indicators with factors such as GDP per capita, percentage of GDP derived from agriculture, maternal mortality ratio, and democracy index to study their impact on gender inequality (WBL). To accomplish this, we create an indicator for each factor that indicates whether a country is in poor condition (assigned a value of one) or not (assigned a value of zero). For example, the GDP per capita indicator is assigned a value of one if a country's GDP level is above the median and zero otherwise. Similarly, the indicator for the percentage of GDP derived from agriculture is assigned a value of one if a country's agricultural sector size is above the median and zero otherwise. The indicators for maternal mortality and the democracy index are treated similarly. We then examine the relationship between these binary indicators and economic freedom variables. The full results are presented in Appendix 8.

Table 3.3 Fixed effect-instrumental variable: GDP/capita, agriculture, maternal mortality, and democracy effects

Variables	**WBL index**			
Panel 1	**Low GDP**		**High GDP**	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-15.184*** **		**4.121**
		(4.954)		**(2.533)**
CO_2 per GDP	-0.622***		1.334***	
	(0.167)		(0.220)	
Climate disasters		**-0.168** **		**0.033**
		(0.079)		**(0.055)**
Precipitation		**-0.005** **		**0.000**
		(0.001)		**(0.000)**
F-statistic on the excluded instrument	13.91		33.66	
Panel 2	**Low Agriculture**		**High Agriculture**	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-2.768**		**-9.401*** **
		(2.760)		**(3.050)**
CO_2 per GDP	-1.314***		-0.844***	
	(0.208)		(0.174)	
Climate disasters		**0.031**		**-0.106**
		(0.061)		**(0.065)**
Precipitation		**-0.000**		**-0.002***
		(0.000)		**(0.001)**
F-statistic on the excluded instrument	39.69		23.50	
Panel 3	**Low Maternal Mortality**		**High Maternal Mortality**	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**3.465**		**-13.549*** **
		(3.087)		**(2.552)**
CO_2 per GDP	-1.021***		-0.872***	
	(0.291)		(0.129)	
Climate disasters		**-0.071**		**-0.114**
		(0.068)		**(0.071)**
Precipitation		**0.000**		**-0.002*** **
		(0.000)		**(0.001)**
F-statistic on the excluded instrument	12.26		45.69	
Panel 4	**Low Democracy**		**High Democracy**	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-12.599*** **		**3.510**
		(2.976)		**(2.376)**
CO_2 per GDP	-0.679***		-1.464***	
	(0.135)		(0.200)	
Climate disasters		**-0.090**		**-0.088**
		(0.078)		**(0.064)**
Precipitation		**-0.003** **		**-0.000**
		(0.001)		**(0.000)**
F-statistic on the excluded instrument	25.05		53.64	
Mean dependent variable	64.964	64.964	64.964	64.964

Note: *, **, and *** denote significance at 10%, 5%, and 1% level, respectively. The table reports panel fixed effect IV estimations. All regressions control for GDP per capita growth, urban population, inflation, economic globalisation, human development index, agricultural land, agricultural contribution to GDP, FDI, and electoral democracy index. Heteroscedasticity and autocorrelation robust standard errors are reported in the parenthesis.

Based on the results, the effects of climate change indicators are particularly detrimental in the group of countries that are performing poorly in terms of GDP per capita, are more agriculturally dependent, have a higher women's mortality ratio, and have less democratic political institutions. Therefore, it may be possible to increase WBL (gender inequality) in these countries. For instance, in countries classified as having a lower income level, being more dependent on the agriculture sector, having a higher level of maternal mortality, and being less conducive to democracy, the temperature and climate disaster indicators have a statistically significant negative impact on WBL.

3.5.3. Robustness exercises and heterogeneity analysis

The data in Table 3.4 below illustrates the effects of climate change on WBL as shown in panels A and B, presenting results from panel fixed effects instrumental variable estimates. We categorised countries into developed and developing categories and sorted them by region (see Appendix 9). Our comparison includes Europe, Central Asia, Latin America, the Caribbean, and North America, juxtaposed with East Asia, the Pacific, the Middle East, North Africa, South Asia, and Sub-Saharan Africa. The findings reveal that climate change indicators significantly and adversely impact the WBL index across all three types of heterogeneity analyses. Notably, the influence of climate change on gender inequality is more pronounced in developing nations than in industrialised countries. Additionally, the impact of climate change on gender equality is more evident in East Asia and the Pacific, the Middle East and North Africa, South Asia, and Sub-Saharan Africa compared to regions such as Europe, Central Asia, Latin America, the Caribbean, and North America.

Table 3.4 Fixed effect-instrumental variable: heterogeneity analysis

Variables	**WBL index**			
Panel A	**Developing countries**		**Developed countries**	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-28.185*** **		**-4.650***
		(7.690)		**(2.541)**
CO_2 per GDP	-0.435***		-1.311***	
	(0.114)		(0.260)	
Climate disasters		**-0.193****		**0.099**
		(0.095)		**(0.079)**
Precipitation		**-0.004*** **		**-0.001**
		(0.001)		**(0.001)**
F-statistic on the excluded instrument	14.75		25.29	
Panel B	**Europe, Central Asia, Latin America, Caribbean and North America**		**East Asia and Pacific, Middle East and North Africa, South Asia and Sub-Saharan Africa**	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-10.056*** **		**-15.708*** **
		(3.106)		**(5.218)**
CO_2 per GDP	-0.913***		-0.557***	
	(0.211)		(0.128)	
Climate disasters		**0.010**		**-0.116***
		(0.091)		**(0.069)**
Precipitation		**-0.000**		**-0.003****
		(0.000)		**(0.001)**
F-statistic on the excluded instrument	18.58		18.86	

Note: *, **, and *** denote significance at 10%, 5%, and 1% level, respectively. The table reports panel fixed effect IV estimations. All specifications control for GDP per capita growth, urban population, inflation, economic globalisation, human development index, agricultural land, agricultural contribution to GDP, FDI, and electoral democracy index. Heteroscedasticity and autocorrelation robust standard errors are reported in the parenthesis.

We perform various robustness tests on our results to evaluate their sensitivity. At first, we consider many economic factors that directly impact gender equality, such as economic globalisation, per capita GDP, FDI, and inflation. Next, we examined agricultural metrics such as the extent of agricultural land and the agricultural sector's contribution to GDP. We then studied characteristics related to democracy, education, and employment, including the human

development index and the electoral democracy index. In addition, we used FE-IV estimate methods to address the issue of endogeneity.

Furthermore, considering different locations, we conduct heterogeneity analysis across developed and developing countries. The impact of climate change is most severe in nations with low GDP per capita, high dependence on agriculture, a high women's mortality ratio, and less democratic political structures. Our study's results are consistent across all exercises used.

3.6. Conclusions

Our research focuses on the relationship between climate change indicators and gender inequality across different geographical regions. We specifically examine key metrics of gender inequality, including the WBL Index. Our comprehensive analysis covers 169 industrialised and developing countries, revealing a clear negative correlation between climate change indicators and overall gender equality within a country. Our findings highlight that a one standard deviation increase in temperature indicators corresponds to a significant 67-point decline in the WBL Index, representing 103% of the average outcome. Notably, this correlation is more pronounced in developing countries, indicating that climate change has had a detrimental impact on gender equality, particularly in countries with lower GDP. While developed nations are better equipped to mitigate and respond to the effects of climate change, it is essential to recognise that the repercussions of escalating climate change are already being felt in high-income countries, extending beyond gender disparity outcomes.

The connection between climate change and gender equality remains strong, even considering all relevant variables. However, the link between measuring women in the workforce and other aspects of gender inequality has not been thoroughly explored. Climate

change can significantly impact gender equality by influencing laws and policy processes that enhance women's economic opportunities. We also examined the various ways in which climate change could influence gender inequalities. It has been observed that countries with higher levels of economic development, agricultural dependence, maternal mortality rates, and democratic levels experience a more significant impact from climate change.

This chapter has demonstrated two significant contributions from our research to the existing body of literature. This study is one of the first to study the connection between climate change indicators and gender inequality, using the WBL Index as a measure. Additionally, we present evidence that climate change hurts gender equality, especially in countries with lower levels of economic development that heavily rely on the agricultural sector. International organizations such as the World Bank, the United Nations, and individual nations have taken significant steps to promote gender equality by amending legislation related to women's rights and enhancing legal frameworks to facilitate women's participation in the workforce. However, developing countries must still catch up to their more developed counterparts. To achieve the desired gender equality goals, it is crucial to boost economic growth, raise awareness about the agricultural sector, provide government and agency subsidies in case of climate disasters, improve healthcare infrastructure in developing areas, and promote and implement democracy in these regions.

Chapter 4: Household Decision-Making and Intimate Partner Violence

This chapter as a research paper, "Does Women's Participation in Household Decision-Making Decrease Emotional Intimate Partner Violence in Developing Countries? Evidence From the Demographic and Health Surveys (DHS)", under review in Journal of Family Violence at the time of submitting this thesis, works as part of my PhD thesis. I confirm that I undertook all aspects of this work, including Conceptualisation, Data Collection and Analysis, Methodology Development, Writing – Original Draft and Writing – Review and Editing. My supervisors, Ilke Onur, Rong Zhu, and Tony Cavoli, provided guidance and feedback throughout the process to ensure the successful completion of this research. Their support was instrumental in refining the work's ideas, methodologies, and presentation. I confirm that this work is my independent contribution to the field, completed under their supervision.

4.1. Introduction

This chapter examines the connection between women's participation in HDM and the level of emotional IPV in developing countries with evidence from the DHS. Over the past few decades, international efforts have significantly advanced women's rights and gender equality, improving the community well-being and living conditions of women worldwide (UNICEF, 2006). However, despite this progress, IPV remains a pervasive global issue, encompassing physical, emotional, and sexual abuse (Gibbs, Dunkle, & Jewkes, 2018; Fulu & Heise, 2015). IPV affects women across all ages, religions, cultures, and ethnicities, with approximately 30% of women worldwide experiencing some form of violence during their lifetime (Devries et al., 2013). The prevalence of IPV varies widely across regions and communities, underscoring its

deep-rooted presence in diverse societal contexts. For instance, in Sub-Saharan Africa, IPV rates range from 42.3% in Nigeria to 67.7% in Ethiopia (Beyene et al., 2019).

The consequences of IPV are severe and multifaceted, including physical injuries, reproductive health issues, mental health challenges, and even fatalities (WHO, 2013). These outcomes illustrate the gravity of IPV as both a global health crisis and a fundamental human rights issue (Campbell, 2002). Recognising this, governments and civil societies in many developing nations have prioritised combating violence against women (Kabir & Khan, 2019; Werwie et al., 2019).

Although physical and sexual IPV has been the focus of extensive research, emotional violence remains relatively underexplored. This is even though eliminating violence against women is a crucial target under Sustainable Development Goal 5.2 (Sachs, 2012; McDougal et al., 2019; Bengesai & Derera, 2021). The lack of attention to emotional abuse highlights a critical gap in the literature, underscoring the need for further investigation into this broader dimension of IPV, which can have severe consequences on women's overall well-being.

Emotional abuse encompasses behaviours aimed at causing emotional harm or threatening harm, such as belittling, humiliating, threatening, or intimidating the victim (Martín-Fernández, Gracia, & Lila, 2019). Examples include verbal abuse, bullying, insults, derogatory remarks, and manipulation. Perpetrators may also threaten to harm the victim, harm themselves, or take the victim's children away if the relationship ends (Koller & Darida, 2020). Emotional abuse behaviours can stem from various controlling behaviours such as control over finances, purchases, healthcare, and isolation from family and friends.

Addressing the power imbalances between men and women (Huis et al., 2020; Hindin & Adair, 2002) has focused on women's participation in decision-making as a critical strategy

to combat emotional IPV (UN Women, 2012). Women's decision-making is defined as their access to and control over resources, which benefits their well-being and that of their family, community, and society (Hansen, Huis, & Lensink, 2020; Kabeer, 1999). Empowerment boosts women's ability to make important life choices through agency, resources, and achievements (Kabeer, 2001). Individual, relational, and societal empowerment might protect against emotional IPV. Decision-making within households reflects control over spending and influences power dynamics, affecting overall empowerment (Rahman, Hoque, & Makinoda, 2011). However, women who make household decisions may face a higher risk of IPV if their partners see it as a challenge to their authority or traditional gender roles (Gage, 2005; Islam et al., 2017).

We fill this gap in the current literature by utilising data from the DHS to investigate the impact of women's involvement in HDM on emotional IPV across 50 developing countries, encompassing approximately one million observations. We have linked 100 individual surveys containing data on domestic violence. We first estimate the impact of women's participation in HDM on emotional IPV. The data indicates that among women who did not experience emotional IPV, 67.3% participated in HDM, while 11.4% did not. In contrast, among those who experienced emotional IPV, 17.9% had participated in HDM, and 3.4% had no participation in HDM. This reflects the importance of women's participation in household decision-making in influencing emotional IPV. Additionally, the merging of comprehensive datasets enables us to assess the impact across most Sub-Saharan African countries as well as South, Southeast, and East Asian countries.

Our analytical approaches include using a linear probability model, 2SLS, and Seemingly Unrelated Bivariate Probit methods to explore whether women's participation in HDM decreases their likelihood of experiencing emotional IPV. The findings show that

increased female participation in HDM is associated with significantly reduced emotional IPV. By empowering women to actively engage in critical household decisions, this study highlights how shifting power dynamics within households can mitigate emotional abuse, thereby contributing to gender equality. The results from the 2SLS and, after addressing endogeneity, the instrumental variable (IV) approach using women's education attainment yield significantly more significant results than those from the linear probability model.

The WHO differentiates between emotional violence, which includes insults, humiliation, and threats of harm, and controlling behaviours, such as isolation, monitoring, and restriction (WHO, 2012). However, some researchers argue that this distinction is not clear, and they view controlling behaviours as a form of emotional abuse (Dokkedahl et al., 2019; Karakurt & Silver, 2013). Controlling behaviours motivated by a desire for power often come before physical and sexual IPV (Antai, 2011), as well as emotional IPV. For example, a study by the WHO found that men who exhibit controlling behaviours are more likely to commit physical violence (García-Moreno et al., 2005).

Research on violence against women often highlights women empowerment, education, employment, and access to resources (Stöckl et al., 2021; Bulte & Lensink, 2021). While women's decision making generally reduces the likelihood of IPV, the role of women's participation in HDM, which reflects power dynamics within relationships, has received less attention among research paper.

Feminist theories propose that empowering women would decrease emotional IPV by reducing men's control in patriarchal societies. However, the evidence is inconclusive (Eswaran & Malhotra, 2011; Schuler & Nazneen, 2018; Assaf & Chaban, 2013). Some studies suggest that increased decision-making power for women may elevate the risk of IPV. For

instance, in Bangladesh, sole decision-making by women is linked to higher IPV rates (Rahman Hoque, & Makinoda, 2011). Moreover, households where one partner dominates decision-making face a greater risk of IPV compared to those with joint decision-making (Rajan, 2014; Xu, Kerley, & Sirisunyaluck, 2011; Flake & Forste, 2006; Friedemann-Sánchez & Lovatón, 2012).

In societies that uphold traditional gender roles and male dominance, women's decision-making authority within households is often linked to an increase in IPV (Flake & Foresti, 2006; Hatcher et al., 2014; Islam et al., 2017; Mann & Takyi, 2009;. Even in cases where societal norms do not perceive women's decision-making as a threat, men may still resort to violence if cultural expectations favour male authority (Flake & Foresti, 2006). Additionally, in the Philippines, Hindin and Adair (2002) discovered that gender equality at the societal level does not necessarily translate to equality within families, resulting in high rates of partner violence. When women's empowerment or deviation from traditional roles challenges men's perceived dominance, it can lead to violence (Stern, Heise, McLean, 2017; Weitzman, 2014). Men may use violence to regain control and counter feelings of powerlessness (Chin, 2012; Paul, 2016; Eswaran & Malhotra, 2011).

The link between HDM and emotional IPV requires a more profound analysis that considers gender-specific aspects of decision-making power (Mann & Takyi, 2009). Women have more influence over domestic decisions, while men dominate external ones (Choi & Harwood, 2004). Decisions in traditionally female domains show less association with emotional IPV compared to those that challenge men's roles as primary earners (Xu, Kerley, & Sirisunyaluck, 2011). Mann and Takyi (2009) found that men's perspectives on decision-making were stronger in predicting partner violence, a pattern also observed in Nepal (Yoshikawa et al., 2014). Research provides diverse findings on women's decision-making

power and partner violence across different domains (Castro, Casique, & Brindis, 2008; Conroy, 2014; Rahman, Hoque, & Makinoda, 2011).

Adams et al. (2024) provided further insight into the economic dimensions of IPV by examining how living with an abusive partner affects women's economic outcomes. Their findings reveal that women who cohabit with abusive men experience immediate declines in earnings and employment. The severity of these economic effects varies depending on women's pre-existing economic circumstances. Notably, even in the absence of physical violence, abusive men impose financial burdens on their female partners, indicating that economic suppression is a tool of abuse that transcends physical violence.

Bergvall (2024) also explored the intersection of women's economic empowerment and IPV by analysing hospital visits for assault injuries in Sweden. The study found that as women's potential relative earnings increase, the likelihood of hospital visits for assault also rises, particularly for women with initially low bargaining power. This suggests that economic empowerment may provoke a backlash in the form of IPV-related injuries. Additionally, research by Bengesai and Derera (2021) in Zimbabwe expands the understanding of women's empowerment by exploring personal, relational, and collective dimensions that reduce emotional IPV. Hansen, Huis, and Lensink (2020) similarly highlight the multifaceted nature of empowerment, including personal self-esteem, relational financial decision-making, and societal representation, while Kabir and Khan (2019) stress the significance of empowerment at both individual and household levels, focusing on decision-making authority, financial control, reproductive health, and self-confidence.

Multiple factors, including household dynamics, age, and employment, have been found to have an impact on emotional IPV (Gibbs, Dunkle, & Jewkes 2018; Tu & Lou, 2017).

Additionally, economic stress, polygamy, and adherence to traditional gender roles can exacerbate tensions, leading to emotional IPV (Djikanovic, Jansen, & Otasevic, 2010). At the community and societal levels, issues such as poverty, lack of legal repercussions for perpetrators, and cultural norms that tolerate violence further contribute to the perpetuation of emotional IPV (Dalal, 2011; Heise, 1998). Gender norms that confine women to domestic roles intensify this issue, as resistance often leads to punishment or disapproval. Husbands, in turn, are expected to maintain discipline, reinforcing these norms. This has normalised marital violence, particularly emotional abuse, through verbal attacks (Chitakure, 2016; Makahamadze, Isacco, & Chireshe, 2012).

This Chapter 4 is structured as follows: firstly, the data and variables are provided, followed by a discussion of the empirical approach, and then the empirical results will be anlaysed, followed by the conclusion.

4.2. Data and variables

This study uses an extensive repeated cross sectional data set from the Demographic and Health Survey (DHS), which includes individual surveys, to estimate the relationship between spousal emotional violence and women's empowerment, among other social and economic outcomes.

We utilise the individual dataset, which contains over 300 DHS entries. However, information on domestic violence is only available in 100 surveys within the DHS. As a result, we combine all the countries with available "standard DHS" type datasets. The DHS datasets and their respective years and waves, culminating in the total number of individuals sampled are presented in Appendix 10.

A total of 5,690,788 women aged 15–49 years were interviewed in all the selected standard DHS. Table 4.1 below provides the list of variables used and descriptive statistics. From the individual recode, we build a sample consisting of women between 15 and 49 years of age.[4] We dropped the observations for which women were not selected, women were selected but privacy was not possible, and women were selected but were not interviewed for the domestic violence section.[5] We dropped the observations for which women were never in union/living with a man.[6] The final sample used in our analysis consist of 1,702,316 observations.

Table 4.1 presents the descriptive statistics results from the total 1,701,190 observations. Emotional IPV was evaluated using a re-coded variable, where 0 signifies that the respondent has never encountered emotional violence, and 1 indicates that they have experienced it frequently, occasionally, within the past 12 months, or at some point but not within the last 12 months, resulting in a mean of 0.224. Decision-making participation was similarly re-coded, with 0 denoting no involvement and one denoting involvement, resulting in a mean of 0.868. Other variables include a control behaviour mean of 0.525, justified wife-beating mean of 0.943, access to information mean of 0.750, and partner alcohol consumption mean of 0.438. The country, wave, and year of surveys used for the regression analysis are provided in Appendix 10, while the cross-tabulation results from the total unweighted sample, comparing the characteristics of women who reported experiencing emotional IPV with those

[4] In majority of DHS, eligible individuals include women of reproductive age (15–49). Some countries provide information for older women, but we exclude these observations from our sample.

[5] A subsample of 2,534,272 women were not selected for the domestic violence section and 2,225,783 women were randomly selected and interviewed for the demotic violence, 34,863 women were selected, but privacy was not possible, and 843,298 women were selected but not interviewed. So, we kept 2,225,783 women who were randomly selected and interviewed for the demotic violence.

[6] Then we look for married status where 1,516,128 never in union, 3,759,354 current in union, and 414,153 former in union with a man. Therefore, we will exclude those who have never been in a union from our analysis.

who did not, are presented in Appendix 11. It also examines how these emotional IPV experiences are related to women's involvement in HDM and other covariates.

Table 4.1 Descriptive statistics all variables

Variables	Descriptions	Mean (standard deviation)
Emotional IPV	Re-coded variable from humiliated, threatened, and insulted by husband Never experienced emotional violence: (no=0) Experienced emotional violence (often, sometimes, or in the past): (yes=1)	0.224 (0.417)
Humiliated by husband/partner	If a woman ever been humiliated by her husband/partner: (yes=1)	0.145 (0.352
Threatened by husband/partner	If a woman ever been threatened with harm by her husband/partner: (Yes=1)	0.087 (0.281)
Insulted by husband/partner	If a woman ever been insulted or made to feel bad by her husband/partner: (yes=1)	0.182 (0.386)
Decision making	Re-coded variables based on decision-making about healthcare, large household purchases, family visits, and spending money earned by husband: No participation in decision-making: (no=0) Participation (alone, with husband, or with someone else): (yes=1)	0.868 (0.339)
Healthcare	If a woman usually participates in the decision-making of her healthcare: (yes=1)	0.726 (0.446)
Major purchases	If a woman usually participates in deciding on large household purchases: (yes=1)	0.662 (0.473)
Family visits	If a woman usually participates in deciding on visits to family or relatives: (yes=1)	0.758 (0.428)
Husband's earnings	If a woman usually participates in deciding what to do with the money her husband earns: (yes=1)	0.596 (0.491)
Control behaviour	If a woman experienced controlling behaviour: Engages in jealousy, accusations, restrictions on meeting friends, limiting family contact, insists on knowing whereabouts, or distrusts with money: (Yes=1)	0.525 (0.499)
Justified wife beating	If a woman disagrees with specific reasons for wife-beating (e.g., burning food, arguing, going out without informing him, neglecting children, refusing sexual intercourse): (yes=1)	0.943 (0.232)
Access to information	If a woman reads newspapers, listens to the radio, or watches TV and engages in these activities less than once a week, once a week, or every day: (yes=1)	0.750 (0.433)
Partner drinks alcohol	Husband/partner drink alcohol: (yes=1)	0.438 (0.496)
Electricity	Household has electricity: (yes=1)	0.677 (0.467)
Sex of household head	If female gender of household head: (yes=1)	0.219 (0.414)
Employment	Woman employed: (yes=1)	0.546 (0.498)
Woman has at least one kid	Woman has at least one or more: (yes=1)	0.927 (0.261)

Women age groups	Category: 15-19 20-24 25-29 30-34 35-39 40-44 45-49	4.138 (1.723)
Residence	Woman live in urban area:	0.459 (0.498)
Wealth	Category: Poorest Poorer Middle Richer Richest	2.823 (1.383)
Number of unions	If husband/ partner has more than one wife: (yes=1)	0.144 (0.351)
Husband's education level	Category variable No education Primary Secondary Higher	1.543 (1.292)
Woman's father ever beat her mother	If woman's father ever beat her mother: (yes=1)	0.262 (0.440)
Observations	1,701,190	

4.2.1. Emotional intimate partner violence

The module on domestic violence examines various forms of violence, including emotional, physical, sexual, and marital control (such as suspicion and controlling behaviours) (MacQuarrie, Mallick, & Kishor, 2016). Previous comparative analysis has indicated that these forms of violence are distinct factors across different sociocultural settings. Emotional and physical violence are sub factors associated with the common violence factor, while suspicion and isolation are sub factors associated with the common spousal control factor (MacQuarrie, Winter, & Kishor, 2013; MacQuarrie, Winter, & Kishor, 2014). The experience of emotional, physical, and sexual violence is assessed using a shortened version of the conflict tactics scales (Straus, 1979; Straus, 1990; Straus et al., 1996). The advantage of the conflict tactics scale is that it includes specific behavioural acts, irrespective of whether they are perceived as violent in each cultural setting (Kishor & Bradley, 2012). The questionnaire asks ever-married women whether their current or most recent (if divorced, separated, or widowed) husband has engaged

in a series of specific behaviours. [7] Women who answer affirmatively to a particular item are then asked about the frequency with which they have experienced that violent behaviour (often, sometimes, or not at all) in the 12 months before the interview.

This study focuses explicitly on emotional violence, also known as emotional IPV; the current spouse carries that out. The analysis does not include marital control behaviours such as suspicion and isolation due to their lack of time-bound relevance. Additionally, physical and sexual violence are not considered in this study, as women are asked separately about these forms of violence involving individuals other than their current or most recent husbands.

Ever-married women refers to women between the ages of 15 and 49 who are currently or previously have been in a cohabiting relationship similar to marriage. Violence by the most recent husband or intimate partner is considered only for women who have had one or more husbands or intimate partners. In terms of emotional violence, women were asked about experiences such as being "humiliated," "threatened with harm," and "insulted or made to feel awful" by their husbands or partners.[8]

4.2.2. Women's household decision-making

There are no universally accepted indicators for measuring HDM. At the same time, several studies propose broad domains and the methods for constructing decision-making variables vary, making it difficult to establish a clear link to emotional IPV. Numerous studies

[7] The term husband equally refers to a woman's legal spouse or partner who lives with her as if married. No distinction is made between the two types of unions in this study (MacQuarrie, Mallick, & Kishor, 2016).
[8] The initial values were designated as follows: "0 = never," "1 = often," "2 = sometimes," "3 = yes, but not in the last 12 months," and "4 = yes, with frequency in the last 12 months." Each factor of emotional violence—being "humiliated," "threatened with harm," or "insulted or made to feel awful" by a husband or partner—was recorded with a value of "0" for women not experiencing emotional violence and "1" for those who experienced any of the three forms of emotional violence. These three variables were then merged into a single "emotional violence" variable, where "0" indicates no emotional violence and "1" indicates the presence of any form of emotional violence.

have explored individual and joint decision-making in various contexts (Flake & Forste, 2006; Friedemann-Sánchez & Lovatón, 2012; Antai, 2011; Donta et al., 2016). Some focus on spending or healthcare decisions (Oyekale, 2014; Rahman, Hoque & Makinoda, 2011). In this study, we employ binary variables to differentiate between women's participation and non-participation in decision-making, and we also analyse variations across key decision-making domains, including healthcare, major household expenditures, visits to family or relatives, and control over the husband's earnings.

We categorised our indicators of women's decision-making and examined their correlation with outcomes related to emotional IPV, aligning with findings from previous studies (Yaya et al., 2018; Sebayang, Efendi, Astutik, 2019; Ameyaw et al., 2021). The DHS Woman's Questionnaire gathers data on the general background characteristics of female respondents (such as age, education, wealth quintile, and employment status) as well as information specifically related to women's empowerment, such as receipt of cash earnings, the extent of a woman's earnings compared to her husband's, and control over the use of her earnings and her husband's (Kishor & Subaiya, 2008).

The survey evaluated women's participation in HDM related to healthcare, major purchases, family visits, and managing their husbands' earnings. Responses were categorised as follows: 1 for any level of women's participation in HDM and 0 for women without involvement in decision-making.[9]

[9] Responses were categorised as follows: "1 = wife alone," "2 = with husband," "3 = wife and another person," "4 = husband alone," "5 = someone else," and "6 = other." To simplify the data, responses were recoded to "0" for women without involvement in decision-making and "1" for any level of participation in women's decision-making. Specifically, responses "1, 2, and 3" were considered active participation (coded as "1"), while responses "4, 5, and 6" indicated no participation (coded as "0"). Each decision-making aspect was assigned a binary value of 0 or 1 based on involvement.

4.2.3. Control variables

Women's autonomy is assessed by evaluating controlling behaviours exhibited by their husbands or partners through six variables. Each variable is binary, with responses coded as "0" for "no" and "1" for "yes." Women who did not experience a particular behaviour were assigned a value of "0," while those who did were assigned a value of "1." A composite variable, “control behaviour,” was recorded as “0” for no control behaviour and “1” for any level of control behaviour.[10]

The attitudes towards wife beating are indicated by the percentage of currently married women aged 15-49 who do not support justifications for such violence. This encompasses disagreement with specific reasons for the wife beating, such as burning food, arguing with the husband, going out without informing him, neglecting the children, and refusing sexual intercourse (Ewerling et al., 2021; Upadhyay et al., 2014). In the survey, women were asked about their acceptance of wife beating, with their responses measured on a binary scale where "0" signifies acceptance and "1" signifies non-acceptance. The five recorded variables were combined into a single "wife-beating" variable, where a value of "0" indicates acceptance of wife-beating justifications (reflecting a lack of women's empowerment) and a value of "1" indicates non-acceptance of any level of wife-beating (reflecting women's empowerment).

We created a new variable called "access to information" by combining three categorical variables: "frequency of television viewing," "frequency of radio listening," and "frequency of newspaper reading." We categorised responses as "0" for women who had no

[10] "husband/partner is jealous if the respondent talks with other men," "husband/partner accuses the respondent of unfaithfulness," "husband/partner does not allow the respondent to meet female friends," "husband/partner tries to limit the respondent's contact with family," "husband/partner insists on knowing where the respondent is," and "husband/partner does not trust the respondent with money."

access to any source of information and as "1" for those who had access to at least one information source daily, weekly, or occasionally.

The DHS gather standard socio-demographic data, including information on whether the partner consumes alcohol (yes or no), household access to electricity (yes or no), sex of household head (male or female), employment status (not working, working), and a binary variable for the total number of children ever born (0 for those without children, 1 for those with at least one child). Additionally, the surveys capture data on women's age groups (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49), place of residence (urban or rural), and respondents' wealth level (categorised as Poorest, Poorer, Middle, Richer, and Richest). Other collected data includes the number of unions (once or more than once), the partner's education level (no education, primary, secondary, or higher), and whether the woman's father ever beat her mother (yes or no).

4.3. Method

The following equation describes the relationship between emotional IPV and women's empowerment decision making:

$$\boldsymbol{EIPV_{ij} = \beta_0 + \beta_1 WEDM_{ij} + \beta_2 X_{ij} + \mu_j + \delta_i + \varepsilon_{ij}} \ldots\ldots (7)$$

where $EIPV_{ij}$ a binary variable capturing the emotional IPV faced by women; $WEDM_{ij}$ representing the women's household decision making; X_{ij} are control covariates that also affect emotional IPV; $\beta_0, \beta_1 \; and \; \beta_2$ are sets of parameters to be estimated; i denotes the country, j denotes the year wave; and μ_j illustrates a vector of country variable that encapsulates an unobserved country fixed effect; δ_i year wave fixed effect; the random error term (ε_{it}) is

assumed to have a mean of zero, indicating the absence of systematic bias. Additionally, it is expected to have constant variance (homoscedasticity) and to exhibit no correlation over time or across countries, which helps prevent dependence between observations. These assumptions are crucial for obtaining unbiased and efficient estimates. Equation (7) is estimated using linear probability model.

The key parameter of interest in equation (7) is β_1, the coefficient of women empowerment decision making. This gives us the association between emotional IPV and women empowerment decision making.

The relationship likely suffers from endogeneity issues. Emotional IPV can diminish a woman's sense of autonomy and confidence, leading to reduced decision-making power. At the same time, low levels of empowerment may increase vulnerability to emotional abuse, creating a cycle of disempowerment and victimisation (Duranton, Henderson, & Strange, 2015). Omitted variable bias may arise from unobserved factors such as cultural norms or socioeconomic status that affect emotional IPV and women's empowerment (Semadeni, Withers, & Trevis Certo, 2014). Addressing these endogeneity concerns is crucial for accurately understanding their relationship and developing effective interventions. To address this endogeneity, we estimate a linear two-stage least squares (2SLS) specification. The first stage regression is given as:

$$\widehat{\boldsymbol{WEDM}}_{\boldsymbol{ij}} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 EDU_{ij}} + \boldsymbol{\alpha_2 X_{ij}} + \boldsymbol{\lambda_j} + \boldsymbol{\vartheta_i} + \mathrm{x}'_{\boldsymbol{ij}} \ldots\ldots\ldots (8)$$

where X_{ij} is the same set of covariates as in equation (1); EDU_{ij} is the set of instrumental variables; α_0, α_1, and α_2 are sets of parameters to be estimated; λ_j is a vector of unobserved fixed effect of country; ϑ_i year wave fixed effect; x'_{jt} is the error term. The second-stage regression is now given as:

$$\boldsymbol{EIPV_{ij} = \beta_0 + \beta_1 \widehat{WEDM}_{ij} + \beta_2 X_{ij} + \mu_j + \mathfrak{I}_i + z'_{ij}} \ldots\ldots\ldots (\mathbf{9})$$

where, $\widehat{WEDM}_{ij}$ is the predicted women empowerment decision making, estimated from equation (8), β_1 the main parameter of interest; β_0 and β_2 are sets of parameters to be estimated; μ_j is vector unobserved fixed effect of country; $\mathfrak{I}_i$ year wave fixed effect; and z'_{ij} is the error term. For the validity of the instrument variable, the two assumptions we require are $\alpha_1 \neq 0$ and $E(EDU_{ij}\, z'_{ij}) = 0$.

All OLS and 2SLS models are executed with clustered numbers in the survey as robust standard errors to address potential autocorrelation at the unit level. This approach provides more consistent estimates across a broader range of potential forms of correlation (Cameron & Trivedi, 2010). Furthermore, a country and year wave survey dummy variables are included in each model to control for the possibility that unobserved factors within a specific geographic region may influence the outcome independently of the primary variables of interest.

Taking into account country-fixed effects helps control for income differences across countries and unobserved characteristics like institutions (De la Croix & Gobbi, 2017). While accounting for year-fixed effects helps to address time-varying factors that impact all countries (Weidner & Zylkin, 2021). This approach aids in isolating the effects of the variables of interest and minimising bias resulting from unobserved differences between countries and temporal trends (Millimet & Bellemare, 2023). Additionally, we controlled for the following factors: controlling behaviour, experience of wife beating, access to information, age, residence, wealth, access to electricity, sex of household head, employment, partner's alcohol consumption, number of unions, husband's education level, and woman's father ever beat her mother.

4.3.1. Instrumental variable

Women's educational attainment refers to the different levels of education they have completed, including no education, incomplete or complete primary and incomplete or complete secondary education, or higher education. This framework emphasises the disparities in access to education and academic achievement, significantly impacting women's empowerment and societal roles. Education is vital in enhancing women's decision-making power, particularly within the household. Women with higher educational attainment are more likely to achieve economic independence and higher self-esteem, directly correlating with increased empowerment in family decision-making (Elsayed & Shirshikova, 2023).

Education boosts individual skills, productivity, and economic value. For women, it opens up better economic opportunities and impacts non-market outcomes, such as increased bargaining power in household matters (Arthur-Holms & Busia, 2020). Investments in education translate into greater personal autonomy and the ability to make strategic life choices (Stromquist, 2015). Empowerment, defined as the ability to make choices in contexts where women previously lacked such opportunities, is enhanced by education (Frola, Delprato, & Chudgar, 2024). It gives women the knowledge, skills, and confidence to challenge gender norms and take an active role in decision-making processes within the household and society (Colfer et al., 2015).

In relationships, power is often linked to control over valuable resources, and education is one of these resources. When women achieve higher levels of education, they are more likely to contribute to household income and gain knowledge that enhances their decision-making authority. As a result, this reduces their vulnerability to emotional abuse (Sell & Minot, 2018).

Public policies, family background, and sociocultural norms determine educational attainment early in life, external to the individual's later household dynamics (Li & Qiu, 2018). As a result, education is generally exogenous to the risk of emotional IPV later in life (Weitzman, 2018). While education directly affects empowerment, it influences emotional IPV only through its impact on empowerment. This satisfies the exclusion restriction criterion for a valid instrumental variable: education affects IPV only by enhancing women's empowerment, not through any other direct mechanism.

Empowerment in decision-making, strengthened by education, helps women resist or leave abusive relationships, reducing their exposure to emotional IPV. Empowerment takes various forms, such as finding jobs and achieving financial independence, which enhances bargaining power within the household and reduces tolerance for emotional abuse (Bulte & Lensink, 2021). Furthermore, education fosters self-confidence, critical thinking, and awareness of rights, enabling women to confront abusive behaviour and make independent decisions about their well-being (Stromquist, 2015).

Furthermore, educated women are better prepared to challenge societal norms perpetuating male dominance or condone IPV (Svenkeson, 2018). As they gain decision-making power, they can negotiate relationships more equally, often reducing the risk of emotional IPV. Education primarily influences IPV through empowerment (Erten & Keskin, 2022; Schuler et al., 2017). Without empowerment, education alone is unlikely to reduce emotional IPV, making empowerment the critical mediating factor in this relationship.

Moreover, our instrumental variable may be associated with error terms and directly impact emotional IPV due to assortative matching. This occurs when couples form relationships with individuals with similar characteristics, such as education level,

socioeconomic status, and other traits (Kalmijn, 1994; Pollak, 2004). We have partially accounted for these indirect effects by incorporating various covariates in our analysis, including the husband's education level, women's employment, family wealth, and urban living conditions, all of which may contribute to the underlying factors influencing the match (Gedikli Popli, & Yilmaz, 2023).

To enhance the effectiveness of our empirical approach, we also conduct empirical tests to determine the instrument's relevance. Education attainment has a strong and statistically significant correlation with women's empowerment decision-making, indicating that it meets the relevance criteria of a valid instrument. We utilise the critical values of the Cragg-Donald Wald F-statistic, 3680.432, as Stock and Yogo (2005) detailed, to evaluate the instrument's strength. Also, as seen in Table 4.3 below the excluded instrument's F-statistic is 1191.41 in panel 2. The consensus is that the instrument meets the subsequent phase of exclusionary restrictions if the test statistic exceeds 10 (Kaufman, Mehrez, & Gurgur, 2019). Therefore, our instrument meets the requirements for being a valid instrument.

4.4. Results

4.4.1. Linear probability model

Table 4.2 below presents the results for linear probability model for all countries. In all regressions, we include country-fixed effects to account for income differences across

countries and unobserved characteristics like institutions. Standard errors are clustered at the sample design clustering.[11]

[11] The cluster number is the variable indicating the primary sampling unit or PSU. It is used along with the variable STRATA to account for the impact of the sample design clustering on the estimates of variance and standard errors (Croft et al. 2023).

Table 4.2 Emotional IPV and women decision making- linear probability model

Variables	Emotional violence
Decision making	**-0.013*** **
	(0.002)
Control behaviour	0.191***
	(0.001)
Women don't justify husband's wife beating	-0.025***
	(0.003)
Access to information	0.013***
	(0.002)
Partner drinks alcohol	0.111***
	(0.001)
Household has electricity	-0.007***
	(0.002)
Female-headed household	-0.003*
	(0.001)
Employed woman	0.034***
	(0.001)
Woman with at least one child	0.044***
	(0.002)
Women age	
20-24	0.021***
	(0.003)
25-29	0.037***
	(0.003)
30-34	0.038***
	(0.003)
35-39	0.042***
	(0.003)
40-44	0.047***
	(0.004)
45-49	0.052***
	(0.004)
Urban residence	0.001
	(0.002)
Wealth	
Poorer	0.001
	(0.002)
Middle	-0.003
	(0.002)
Richer	-0.012***
	(0.002)
Richest	-0.025***
	(0.003)
More than once in union	0.022***
	(0.002)
Partner's education level	
primary	0.006***
	(0.002)
Secondary	-0.015***
	(0.002)
Higher	-0.036***
	(0.002)
Woman's father ever beat her mother	0.113***
	(0.002)
Number of obs.	997,783

Notes: Robust standard errors, clustered at the cluster number, in parentheses. All the regressions include year and country fixed effects, * p<0.1, ** p<0.05, *** p<0.01.

Table 4.2 presents the results regressions that analyse emotional IPV across of developing countries. The results suggest that women's participation in decision-making reduces the probability of women experiencing emotional IPV. These findings align with the 1995 Beijing Declaration, which recognised women's economic empowerment as a protective factor against emotional IPV, and other studies highlighting women's empowerment's importance (Abramsky et al., 2011; Murugan, Khoo, & Termos, 2021).

At the individual level, women's involvement in decision-making can contribute to higher gender equality by promoting social and economic rights that foster equal status. The coefficient for decision-making is negative, suggesting that greater female participation in household decisions is associated with a lower likelihood of experiencing emotional IPV.

The linear probability model indicates that a partner’s controlling behaviour is significantly associated with a higher likelihood of the female partner experiencing emotional IPV. Conversely, a woman's refusal to justify her husband's violence leads to a reduction in emotional IPV. The study also finds that women's access to information—through reading, watching, and listening—can increase the likelihood of experiencing emotional IPV. This type of violence is more common when the woman is employed, her partner consumes alcohol frequently, and she has at least one child. Additionally, factors such as the woman's age and whether her father ever abused her mother also contribute to the prevalence of emotional IPV. On the other hand, the likelihood of emotional IPV decreases when the household has access to electricity, the female is the head of the household, and the wealth level (richer or richest) and the partner’s education level (secondary or higher) are elevated.

Encouraging women's participation in financial, healthcare, household purchasing, and family visit decisions has been shown to reduce emotional IPV. This is achieved by promoting equality, enhancing communication, and, most importantly, addressing power imbalances, which fosters a more respectful and collaborative partnership (Zegenhagen, Ranganathan, & Buller, 2019; Liu & Olamijuwon, 2024). Furthermore, controlling behaviours such as jealousy, accusations, and restrictions create an environment of distrust and dominance in relationships, undermining emotional closeness and mutual respect. This power imbalance often leads to emotional abuse, as the controlling partner seeks to maintain dominance, ultimately compromising the emotional well-being and independence of the other partner (Antai, 2011; Ekhator-Mobayode, et al., 2022).

4.4.2. Two stage least square (2SLS) estimation

Table 4.3 presents the results from the first and second stages of the 2SLS estimation. Focusing on the first stage results, where women's educational attainment is used as the IV for women's HDM, several factors appear to influence decision-making power. Women who do not justify wife-beating, have access to information, live in urban areas, are employed, and have at least one child been more likely to have greater decision-making power in the household. On the other hand, women's decision-making power is not influenced by whether husbands have been married more than once or by household wealth. However, the husband's controlling behaviours appear to deter women from exercising decision-making authority in the household.

In the first-stage regression, our instrumental variable is statistically significant and, as expected, has a positive relationship with women's HDM. Specifically, if a wife has a higher

level of education, she is more likely to participate in HDM. Our instruments pass all standard validity tests. To check for weak identification, we report the Kleibergen-Paap F-statistic, which is well above the commonly accepted threshold of 10. Additionally, a recent paper by Lee et al. (2020) suggests that when using a single instrumental variable, the first-stage F-statistic should exceed 104.7. In our case, the F-statistic is far higher, at 1191.41, comfortably surpassing this benchmark. We also applied the Cragg-Donald Wald F-statistic to test for weaker instruments, yielding an effective F-statistic of 3796.759, further confirming the strength of our instruments.

The results for the second stage show a significant negative correlation between decision-making and emotional IPV. To quantify our findings, a one-standard-deviation in women's empowerment decision-making, equivalent to a 0.339 increase in women's participation in decision-making (as shown in Table 4.1 above), is associated with a -0.075 point decrease in emotional IPV. This change is substantial, representing 33% of the average of the dependent variable. The regression coefficient resulting from the IV using women's education is significantly greater than that from the linear probability model.

The results for other covariates in the 2SLS model show that a partner's controlling behaviour significantly increases the likelihood of emotional IPV. In contrast, a woman's refusal to justify her husband's violence reduces the likelihood of emotional IPV. Interestingly, the study finds that women's access to information through reading, watching TV, and listening to the radio increases the probability of experiencing emotional IPV. Also, it is more common when the woman is employed, her partner frequently consumes alcohol, and she has at least one child. Additional factors contributing to emotional IPV include the woman's age, whether her father abused her mother, her urban residence, and whether her husband married more than

once. On the other hand, emotional IPV is less likely in households with higher wealth levels (richer or richest) and when the partner has a higher level of education.

Table 4.3 Emotional IPV and women decision making- 2SLS estimates

Variables	**Emotional violence**	
panel	*First stage*	*Second stage*
Decision making		**-0.222*** **
		(0.029)
Education attainment	0.019***	
	(0.001)	
Control behaviour	-0.013***	0.188***
	(0.001)	(0.001)
Women don't justify husband's wife beating	0.070***	-0.010***
	(0.003)	(0.003)
Access to information	0.029***	0.020***
	(0.002)	(0.002)
Partner drinks alcohol	0.038***	0.118***
	(0.001)	(0.002)
Household has electricity	0.019***	0.001
	(0.002)	(0.002)
Female-headed household	0.035***	0.004**
	(0.001)	(0.002)
Employed woman	0.053***	0.045***
	(0.001)	(0.002)
Woman with at least one child	0.018***	0.046***
	(0.002)	(0.002)
Women age		
20-24	0.045***	0.032***
	(0.003)	(0.003)
25-29	0.071***	0.054***
	(0.003)	(0.004)
30-34	0.088***	0.059***
	(0.004)	(0.004)
35-39	0.099***	0.065***
	(0.004)	(0.004)
40-44	0.108***	0.072***
	(0.004)	(0.005)
45-49	0.117***	0.078***
	(0.004)	(0.005)
Urban residence	0.013***	0.010***
	(0.002)	(0.002)
Wealth		
Poorer	-0.002	0.001
	(0.002)	(0.002)
Middle	-0.007**	-0.003
	(0.002)	(0.002)
Richer	-0.005*	-0.010***
	(0.003)	(0.002)
Richest	0.002	-0.021***
	(0.003)	(0.002
More than once in union	0.003	0.021***
	(0.002)	(0.002)
Partner's education level		
primary	0.046***	0.017***
	(0.002)	(0.002)
Secondary	0.043***	-0.001
	(0.002)	(0.003)
Higher	0.033***	-0.021***
	(0.003)	(0.003)

Woman's father ever beat her mother	0.012*** (0.001)		0.115*** (0.002)
Number of obs.		997,745	
F-statistic on the excluded instrument		1191.41	
Weak identification test (Cragg-Donald Wald F statistic)		3796.759	

Notes: All estimations also include year and country dummies, and a constant, not reported to save space. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.

4.4.3. Heterogeneity analysis by regions

The findings presented in Table 4.4 offer valuable insights into the regional disparities concerning the correlation between women's decision-making and emotional IPV. In Sub-Saharan Africa, the coefficient for women's decision-making stands at -0.210, signifying a robust negative and statistically significant association. This suggests that as women's decision-making authority increases, their likelihood of experiencing emotional IPV decreases. Similar adverse associations are observed in South and Southeast Asia, East Asia, and the Pacific. This implies that women in these regions experience decreased emotional IPV with greater decision-making power. However, the strength of this relationship is comparatively weaker in these regions when contrasted with Latin America and the Caribbean.

The F-statistic on the excluded instrument and Cragg-Donald Wald statistics confirm the robustness of our instrumental variable across all panels, ensuring the validity of the 2SLS estimates. Additionally, the control variables behave as expected, with statistically significant results in most cases.

Table 4.4 Emotional IPV and women decision making- 2SLS estimates

Variables	**Emotional violence**			
Panel	1) Sub-Saharan Africa	(2) Central Asia	(3) Latin America & Caribbean	(4) South and Southeast Asia, East Asia, and Pacific
			Second stage	
Decision making	**-0.210*** (0.037)**	**-0.140** (0.070)**	**-1.012*** (0.170)**	**-0.222*** (0.036)**
Education attainment (*First stage)*	0.031*** (0.001)	0.025*** (0.001)	0.007*** (0.001)	0.012*** (0.001)
Number of obs.	475,238	43,917	104,411	374,179
F-statistic on the excluded instrument	3039.28	252.34	263.04	882.73
Weak identification test	2853.931	381.988	261.383	914.953

Notes: All specifications control for control behaviour, wife beating, access to information, partners drinks alcohol, electricity, female-headed household, employed woman, woman with at least one child, women age, urban residence, wealth, more than once in union, partner's education level, woman's father ever beat her mother. All the regressions include year and country dummies-fixed effects. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.

The relationship is much more robust in Latin America and the Caribbean, with a coefficient of -1.012, signifying a substantial decrease in emotional IPV when women have more decision-making power. This large magnitude highlights the potentially critical role of women's empowerment in reducing IPV in this region. Meanwhile, the relationship is adverse in Central Asia but weaker. Overall, the results demonstrate that while women's empowerment in decision-making is associated with lower levels of emotional IPV across all regions, the magnitude of this effect varies significantly by region.

The results for the other covariates show that several variables significantly increase the likelihood of emotional IPV. These include a partner's controlling behaviour, husband's alcohol consumption (except in Sub-Saharan Africa), women's employment, having a child, the woman's age, whether her father beat her mother, and whether the husband has been married to more than once. On the contrary, emotional IPV is less likely in the richest households and when the partner has a higher level of education. However, some variables, such as a woman's refusal to justify her husband's violence, access to information, household having electricity,

and being in a female-headed household, do not show consistent significance across all panels (see Appendix 12).

4.4.4. Heterogeneity analysis across three indicators of emotional IPV

In Table 4.5, we conduct an alternative heterogeneity analysis by examining the relationship between women's decision-making and three specific forms of emotional IPV: humiliation, threats, and insults from a husband or partner. The findings indicate a consistent negative impact of women's decision-making on all three indicators of emotional IPV. These results reinforce the patterns observed in earlier tables, demonstrating that as women's decision-making power increases, the likelihood of experiencing emotional IPV in these forms decreases.

The Cragg-Donald Wald statistics confirm the robustness of our instrumental variable across all panels, ensuring the validity of the 2SLS estimates. Additionally, the control variables behave as expected, with statistically significant results in most cases.

Table 4.5 Indicators of emotional IPV and women decision making-2SLS estimates

Variables	**(1) ever been humiliated by husband/partner**	**(2) ever been threatened by husband/partner**	**(3) ever been insulted or made to feel bad by husband/partner**
		Second stage	
Decision making	**-0.180*** **	**-0.087*** **	**-0.118*** **
	(0.025)	**(0.021)**	**(0.028)**
Education attainment (*First stage)*	0.019***	0.019***	0.019***
	(0.001)	(0.001)	(0.001)
Number of obs.	997,717	997,653	857,245
F-statistic on the excluded instrument	1191.30	1192.28	1146.84
Weak identification test	3797.270	3798.149	3637.425

Notes: All specifications control for control behaviour, wife beating, access to information, partners drinks alcohol, electricity, female-headed household, employed woman, woman with at least one child, women age, urban residence, wealth, more than once in union, partner's education level, woman's father ever beat her mother. All the regressions include year and country dummies-fixed effects. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.

The analysis in Table 4.5 above shows that women's decision-making has the most substantial negative impact on humiliation from a husband or partner. A one-standard deviation in women's empowerment decision-making, equivalent to a 0.339 increase in women's participation in decision-making (as shown in Table 4.1 above), is associated with a -0.061 point reduction in the likelihood of being humiliated by a husband. This change is substantial, representing 27% of the average of the dependent variable. The effect of insults is more minor but still significant, representing 17.8% of the average of the dependent variable. Finally, the impact of threats is the weakest. This indicates that a one-standard-deviation increase in women's decision-making is associated with a 13% reduction in the likelihood of being threatened by a husband or partner.

The results for the other covariates are consistent across all panels, indicating that several variables significantly increase the likelihood of emotional IPV. These include a partner's controlling behaviour, women's access to information, frequent alcohol consumption by the husband, women's employment, having at least one child, the woman's age, whether was her father abused her mother, living in an urban area, and whether the husband has been married more than once. On the other hand, a woman's refusal to justify her husband's violence, wealthier households (richer or richest), and when the partner has a higher level of education is associated with a reduced likelihood of experiencing emotional IPV (see Appendix 13).

4.4.5. **Heterogeneity analysis across socioeconomic variables**

Table 4.6 presents the effects of women's decision-making on emotional IPV across various socioeconomic variables based on 2SLS estimates. The analysis is segmented by age

groups (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49), wealth index (Poorest, Poorer, Middle, Richer, and Richest), the husband's education level (No Education, Primary, Secondary, and Higher), and the woman's employment status (unemployed or employed). The findings indicate that women's decision-making significantly negatively impacts emotional IPV across all these categories.

The influence of women's decision-making on emotional IPV varies significantly across age groups, with the most substantial effect observed among women aged 30-34, forming an inverse U-shaped relationship. Specifically, decision-making power has a more pronounced negative impact on emotional IPV in this age group. For younger age groups, such as 20-24 and 25-29, the effects are also significant but more minor, respectively. However, the impact diminishes for women in older age groups, particularly those aged 40-44 and 45-49, where the relationship becomes insignificant. This suggests that the protective effects of decision-making power against emotional IPV are strongest during a woman's early to mid-thirties.

Table 4.6 Emotional IPV and women decision making- estimates by demographic variables

Variables	**Emotional violence**						
	Age group						
	15-19	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**
Decision making	**-0.104 (0.108)**	**-0.129** (0.064)**	**-0.265*** (0.060)**	**-0.351*** (0.065)**	**-0.247*** (0.079)**	**-0.037 (0.012)**	**-0.006 (0.127)**
Education attainment (*First stage)*	0.026*** (0.003)	0.024*** (0.001)	0.022*** (0.001)	0.019*** (0.001)	0.017*** (0.001)	0.012*** (0.001)	0.014*** (0.001)
Number of obs.	48,426	157,928	212,454	198,358	165,358	119,920	95,301
F-statistic on the excluded instrument	55.16	217.51	332.97	320.61	267.70	114.52	132.61
Weak identification test	182.556	747.419	1010.770	796.929	580.288	243.098	237.169
	Wealth index						
	Poorest	**Poorer**	**Middle**	**Richer**	**Richest**		
Decision making	-0.150* (0.077)	-0.167*** (0.063)	-0.208*** (0.076)	-0.246*** (0.066)	-0.401*** (0.071)		

Education attainment (*First stage)*	0.017*** (0.001)	0.020*** (0.001)	0.017*** (0.001)	0.020*** (0.001)	0.018*** (0.001)
Number of obs.	213,517	209,953	203,006	193,016	178,253
F-statistic on the excluded instrument	193.11	296.45	227.91	276.92	218.60
Weak identification test	431.813	728.464	610.065	893.139	989.495
			Husband's education level		
	No Education	**Primary**	**Secondary**	**Higher**	
Decision making	-0.042 (0.065)	-0.075 (0.068)	-0.430*** (0.049)	-0.434*** (0.068)	
Education attainment (*First stage)*	0.026*** (0.001)	0.019*** (0.001)	0.015*** (0.001)	0.022*** (0.001)	
Number of obs.	259,786	249,362	373,447	115,150	
F-statistic on the excluded instrument	214.90	238.83	515.63	319.09	
Weak identification test	580.372	936.882	1543.025	1050.311	
			Employment level		
		Unemployed		**Employed**	
Decision making		**-0.226*** (0.031)**		**-0.429*** (0.047)**	
Education attainment (*First stage)*		0.021*** (0.001)		0.017*** (0.001)	
Number of obs.		472,110		541,785	
F-statistic on the excluded instrument		824.53		649.58	
Weak identification test		2575.001		2280.424	

Note: *, **, and *** denote significance at 10%, 5%, and 1% level, respectively. The table reports 2SLS estimates. All specifications control for control behaviour, wife beating, access to information, partners drinks alcohol, electricity, female-headed household, employed woman, woman with at least one child, women age, urban residence, wealth, more than once in union, partner's education level, woman's father ever beat her mother. All the regressions include year and country dummies-fixed effects. Robust standard errors, clustered at the at the cluster number, in parentheses.

The impact of women's decision-making on emotional IPV varies significantly across wealth groups. The most significant effect is observed in the richest households, where women's decision-making power has a pronounced negative impact on emotional IPV. The

effects are also significant for women in the middle and richer wealth groups, showing a strong protective effect of decision-making power against emotional IPV. However, the impact is slightly smaller among the poorest and poorer groups. While decision-making power still reduces emotional IPV in these lower wealth categories, its influence is less pronounced than in wealthier groups.

Moreover, the influence of women's decision-making on emotional IPV varies notably based on their husband's educational attainment. The strongest effects are evident among women whose husbands have completed at least secondary education. Conversely, these effects are not statistically significant for women whose husbands have little or no formal education. Similarly, in terms of employment, the most significant impact is observed among currently employed women, where increased decision-making power significantly reduces emotional IPV. However, an increase in decision-making authority among unemployed women also leads to decreased IPV, suggesting that half of the effect is compared to women's employment status.

4.4.6. Heterogeneity analysis across four indicators of women's household decision-making

Table 4.7 below presents the impact of women's decision-making on emotional IPV across four indicators based on estimates from 2SLS. The analysis is divided by who usually makes decisions about a woman's healthcare, large purchases for the home, visits to family or relatives, and what to do with the money the husband earns. The findings indicate that these four indicators of women's decision-making significantly and negatively affect emotional IPV.

Table 4.7 Emotional IPV and indicators of women decision making

Variables	(1) Healthcare	(2) Large purchases	(3) Visits to family	(4) Husband's earnings

	Second stage			
Decision making	**-0.169*** (0.022)**	**-0.160*** (0.020)**	**-0.192*** (0.025)**	**-0.210*** (0.027)**
Education attainment (*First stage)*	0.026*** (0.001)	0.027*** (0.001)	0.022*** (0.001)	0.021*** (0.001)
Number of obs.	1,010,817	1,013,442	1,013,484	963,372
F-statistic on the excluded instrument	1449.66	1486.05	1221.98	946.47
Weak identification test	4724.100	4883.270	3616.036	2909.150

Notes: All specifications control for control behaviour, wife beating, access to information, partners drinks alcohol, electricity, female-headed household, employed woman, woman with at least one child, women age, urban residence, wealth, more than once in union, partner's education level, woman's father ever beat her mother. All the regressions include year and country dummies-fixed effects. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.

The analysis reveals that the most notable adverse impact is on decision-making related to managing a husband's earnings. This suggests that an increase in women's involvement in decision-making about their husbands' earnings is linked to decreased emotional IPV. Decision-making regarding family or friend visits also yields a significant negative impact. The impact on major household purchases is slightly less pronounced but significantly reduces emotional IPV. Additionally, healthcare decision-making decreases in emotional IPV. These findings illustrate that enhancing women's decision-making authority in various household areas consistently diminishes emotional IPV. The results for the other covariates are consistent across all panels (refer to Appendix 14).

4.4.7. Robustness

So far, we have explored the influence of women's HDM on emotional IPV through various models and analyses. We initially utilised linear probability model regression (Table 4.2), but due to endogeneity concerns, we transitioned to a 2SLS model, employing women's education attainment as an instrumental variable (Table 4.3). Subsequently, we conducted a series of heterogeneity analyses by region, which uncovered that women's decision-making has

a negative impact on emotional IPV. This effect was most pronounced in Latin America and the Caribbean, followed by South and Southeast Asia, East Asia and the Pacific, Sub-Saharan Africa, and Central Asia (Table 4.4).

In our analysis of specific forms of emotional IPV, we observed a negative correlation between women's decision-making and experiences of humiliation, threats, and insults from their husbands or partners (refer to Table 4.5). Additionally, Table 4.6 details the impact of women's decision-making on emotional IPV across different socioeconomic variables, categorised by age group, wealth index, the husband's education level, and the woman's employment status. Across all these categories, women's decision-making consistently demonstrates a significant adverse effect on emotional IPV. Furthermore, we analysed women's decision-making in healthcare, large purchases, family visits, and control over their husbands' earnings, significantly reducing emotional IPV (see Table 4.6).

The last robustness test conducted is the Seemingly Unrelated Bivariate Probit Model. This model examines two binary dependent variables while considering correlated disturbances by introducing two correlated latent variables (Cameron, 2005; Li, Poskitt, & Zhao, 2019). This model is appropriate when simultaneously estimating two equations, where the dependent variable in one equation acts as an explanatory variable in the other (Fiebig, 2001).

The findings as detailed in Table 4.8 below indicate that education attainment, as shown in the first equation, positively and significantly impacts women's decision-making. In the second equation, women's decision-making significantly and negatively influences emotional IPV. This allows us to categorise two groups: one in which decision-making decreases emotional IPV and another in which higher education is associated with increased decision-

making authority. Ultimately, the results reveal that emotional IPV will likely decrease when women are involved in HDM. These results support the conclusions drawn from 2SLS.

Table 4.8 Emotional IPV and women decision making- estimates seemingly unrelated bivariate probit

Variables	**Decision making**	**Emotional IPV**
Panel	*First equation*	*Second equation*
Decision making		**-0.376*** (0.041)**
Education attainment	0.106*** (0.002)	
Control behaviour	-0.068*** (0.007)	0.745*** (0.006)
Women don't justify husband's wife beating	0.239*** (0.012)	-0.070*** (0.011)
Access to information	0.094*** (0.009)	0.004 (0.007)
Partner drinks alcohol	0.181*** (0.009)	0.382*** (0.006)
Household has electricity	0.056*** (0.011)	-0.095*** (0.008)
Female-headed household	0.194*** (0.010)	0.003 (0.007)
Employed woman	0.277*** (0.008)	0.173*** (0.006)
Woman with at least one child	0.085*** (0.011)	0.222*** (0.012)
Women age		
20-24	0.126*** (0.014)	0.100*** (0.015)
25-29	0.234*** (0.014)	0.160*** (0.015)
30-34	0.322*** (0.014)	0.159*** (0.016)
35-39	0.377*** (0.015)	0.179*** (0.017)
40-44	0.426*** (0.016)	0.189*** (0.017)
45-49	0.471*** (0.016)	0.206*** (0.017)
Urban residence	0.072*** (0.011)	0.050*** (0.008)
Wealth		
Poorer	0.015 (0.010)	0.020** (0.008)
Middle	0.010 (0.012)	0.026*** (0.009)
Richer	0.029** (0.013)	0.023** (0.010)
Richest	0.083*** (0.017)	0.001 (0.012)

More than once in union	0.015 **(**0.011)	0.088*** **(**0.008)
Partner's education level		
primary	0.112*** **(**0.010)	0.040*** **(**0.009)
Secondary	0.110*** **(**0.009)	-0.089*** **(**0.010)
Higher	0.102*** **(**0.014)	-0.229*** **(**0.013)
Woman's father ever beat her mother	0.048*** **(**0.008)	0.421*** **(**0.006)
Number of obs.	1,013,895	
Wald test of exogeneity	53.065 (0.000) ***	
ρ (rho)	0.175 (0.000) ***	

Notes: All estimations also include year and country dummies, and a constant, not reported to save space. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.

4.5. Conclusion

Using data from the DHS, this Chapter 4 has presented empirical evidence on the adverse impact of women's empowerment decision-making on emotional IPV. The findings of this research offer essential insights into the intricate relationship between women's empowerment and the reduction of emotional IPV. Women's decision-making power is pivotal in mitigating emotional IPV. Several factors are found to consistently increase the likelihood of emotional IPV, including controlling behaviours, partner alcohol consumption, women's employment, older age, multiple unions, witnessing parental violence, and having at least one child. However, factors such as women's rejection of wife-beating, husbands with higher education, and wealth levels in the "richer" and "richest" categories consistently reduce emotional IPV.

Furthermore, higher levels of education for women enhance their decision-making empowerment, functioning both as an endogenous variable that boosts decision-making power and as an exogenous factor that directly influences emotional IPV. This empowerment reduces the acceptance of spousal abuse and strengthens protective measures against emotional IPV.

These results emphasise the complex nature of empowerment and its significant impact on reducing emotional IPV across various social and demographic contexts.

The findings offered critical insights into the protective effects of women's decision-making on emotional IPV, highlighting significant regional and socioeconomic disparities. In Sub-Saharan Africa and South and Southeast Asia, stronger negative correlations were observed. This trend extends to specific forms of emotional abuse, such as humiliation, threats, and insults, where more participation in decision-making consistently lowers the likelihood of experiencing these abuses. Additionally, socioeconomic factors, including age, wealth, education, and employment, influence the strength of this relationship. Notably, the impact of decision-making power is most substantial among women aged 30-34, suggesting a peak protective effect against emotional IPV during this period. However, the relationship diminishes with older age groups, indicating that the protective benefits of empowerment may vary across different life stages. These results underscore women's empowerment's multifaceted and context-dependent nature in reducing emotional IPV.

This research makes a valuable contribution by linking the microeconomic assessment of women's decision-making regarding emotional IPV to the broader social progress framework in gender equality, violence against women and empowerment. The combined impact of increased decision-making autonomy, higher educational attainment, enhanced access to resources, and evolving cultural attitudes indicate a notable shift towards reducing emotional IPV. These developments indicate the potential for relatively swift progress in aligning social norms for more significant equity and diminishing IPV. This inspiring potential for change should motivate us to continue our efforts in this direction, with significant advancements observable within a few generations.

Chapter 5: Conclusion

5.1. Introduction

This thesis explores critical aspects of development economics by examining the complex relationships between economic freedom, climate change, and women's empowerment. It emphasises how these elements collectively impact essential social dynamics, including fertility rates, gender equality, and the incidence of emotional intimate partner violence (IPV) across various socioeconomic contexts. Through this investigation, the research highlights the intricate ways these factors interact and influence the lives of individuals and communities.

Chapter 1 delineated the research objectives, setting the stage for a comprehensive exploration of the three interconnected yet distinct studies that follow. Chapter 2 delves into the first of these studies, which meticulously examines the relationship between economic freedom and fertility rates across a diverse dataset of 166 countries, covering both developed and developing regions over a significant time frame from 1995 to 2021.

The analysis reveals a strikingly robust negative correlation between economic freedom and fertility rates, a trend that holds across various income levels and geographic locations. In developed countries, the influence of economic freedom manifests through multiple avenues. Increased urbanisation, improved access to education—especially for women—and enhanced healthcare services collectively contribute to declining fertility rates.

Conversely, the scenario in developing countries presents a more nuanced picture. Here, the relationship is not as straightforward; the impact of economic freedom is tempered by lower levels of economic development and prevailing cultural norms that encourage larger

families. However, these findings underscore the critical role that economic freedom plays as a policy instrument. It has the potential to not only manage population growth but also significantly advance women's health and economic prospects, if the right policy changes are implemented.

Promoting economic freedom emerges as a powerful strategy for reducing fertility rates while bolstering women's economic opportunities and health outcomes. To achieve sustainable development, it is imperative that policies prioritise improvements in education—particularly for women—and foster economic opportunities and strengthen healthcare systems. These comprehensive efforts can catalyse meaningful progress in both population management and the enhancement of women's welfare, providing a clear direction for future policymaking.

Chapter 3 delved into the intricate relationship between climate change indicators and gender inequality, utilising the Women, Business, and Law (WBL) Index as a framework for analysis across 169 countries from 1990 to 2021. This comprehensive study uncovers climate change's troubling and significant negative impact on gender equality, particularly pronounced in developing nations with lower GDP and a heavy reliance on agriculture.

In these regions, the vulnerabilities exacerbated by the effects of climate change disproportionately affect women, further entrenching existing inequalities. Even in more affluent developed countries, the ramifications of climate change are apparent, though they manifest in less severe forms. This underscores the global nature of the challenge: mitigating climate impacts on gender equality is a concern that transcends geographical borders and affects us all.

The research findings convey a compelling message: to foster gender equality in the face of pervasive climate challenges, we must adopt multifaceted policy approaches that focus

on several critical areas. The complexity of the issue is evident, and a comprehensive strategy is needed. These include initiatives aimed at stimulating economic growth, enhancing agricultural resilience against climate variability, improving healthcare access and infrastructure, and promoting democratic governance. Such strategies are essential for supporting women's rights and building a more equitable society that stands firm against the adversities brought about by climate change.

Targeted interventions are particularly crucial in developing countries, where the needs are most urgent. Efforts must strengthen agricultural resilience to withstand the impacts of climate disruptions, advance healthcare systems to ensure women's health is prioritised, and foster democratic governance that empowers women to advocate for their rights. Together, these actions can help create an environment capable of safeguarding women's rights, even amid climatic upheavals.

Chapter 4 provided valuable insights into the interplay between women's empowerment and the mitigation of emotional intimate partner violence (IPV). The findings from the research underscored that when women are empowered through avenues like decision-making, there is a significant reduction in incidents of emotional IPV. The analysis identified several critical factors that contribute to the risk of emotional abuse. These include controlling behaviours exhibited by partners, the consumption of alcohol by the partner, women's employment status, the older age of the women involved, and the presence of multiple unions or partnerships. Each of these factors was found to heighten the likelihood of experiencing abuse.

Conversely, certain protective elements were correlated with a decrease in emotional IPV. Notably, the rejection of traditional norms supporting wife-beating, the educational attainment of husbands, and more incredible wealth among couples—particularly in more

affluent socioeconomic categories—were associated with lower instances of emotional IPV. The research highlighted that women's education plays a dual role, acting as both an endogenous and exogenous protective factor. Education empowers women to make informed decisions and strengthens their social status and bargaining power within relationships.

Furthermore, the study highlighted significant regional and socioeconomic disparities that influence these dynamics, particularly in Sub-Saharan Africa and South/Southeast Asia. It revealed that the most profound negative correlations between women's empowerment and emotional IPV were observed in these regions, particularly among women aged 30 to 34. This demographic exhibited heightened vulnerability, emphasising the need for targeted interventions.

These findings illustrate the multifaceted nature of empowerment as a protective mechanism against emotional IPV, highlighting its dependence on the social and economic context. To address these issues effectively, women's empowerment initiatives should prioritise models that promote joint decision-making and ensure equity and mutual respect among partners. Additionally, efforts should focus on transforming harmful social norms and establishing comprehensive support systems that encourage household collaborative decision-making. Such strategies are essential for meaningfully reducing emotional IPV and fostering healthier relationships.

5.2. Contribution

This thesis comprehensively examines significant findings within development economics by investigating the intricate relationships among economic freedom, environmental factors, and gender dynamics. By employing an extensive cross-country data analysis alongside robust empirical methodologies, the research sheds light on the multifaceted

ways these elements collectively influence development outcomes across diverse global contexts.

The study emphasises the importance of integrating economic, environmental, and social policies, underscoring that these dimensions should not be treated in isolation. Instead, they must be viewed as interconnected components that collectively shape the development trajectory. The research identifies key patterns and correlations, demonstrating how variations in economic freedom can have ripple effects on environmental sustainability and gender equality.

By highlighting these interdependencies, the thesis advocates for a more holistic approach to policy formulation. It points out that effective development strategies should consider the interplay between these factors to achieve more sustainable and equitable development outcomes. The findings serve as a critical resource for policymakers, scholars, and practitioners, providing practical insights for fostering comprehensive development frameworks that are responsive to the complexities of real-world challenges.

5.3. Future research

The conclusions drawn from this thesis suggest several promising avenues for future research. Building on the identified relationships between economic freedom, climate change, and women's empowerment, a significant direction for further study is to explore the long-term effects of economic freedom on demographic and social outcomes. As the global economy continues to shift and evolve, it is essential to understand how economic freedom interacts with these broader transformations, as this could reveal patterns influencing population dynamics, educational attainment, and health outcomes across generations. Research that investigates the

enduring impacts of economic freedom on family structures, workforce participation, and social mobility may provide a deeper understanding of how economic policies shape social resilience over time. This line of inquiry has the potential to yield critical insights, particularly in light of changing environmental conditions and technological advancements that are reshaping the world's economic landscape.

Another crucial area for exploration is the impact of specific policy interventions that integrate economic, environmental, and social objectives. While this thesis underscores the necessity of addressing these dimensions concurrently, further studies could concentrate on designing and implementing policies that explicitly combine these goals. For instance, research could assess green economic initiatives that foster environmental protection and social equity, such as policies promoting renewable energy while generating jobs in underserved communities. Investigating the effectiveness of policies advancing gender equality within a sustainable development framework could also prove beneficial. Such studies might examine how targeted gender-based interventions in climate adaptation or economic reform programs could enhance women's empowerment and broader environmental resilience. By exploring these multi-dimensional policies, future research could identify the most effective strategies for achieving sustainable development, providing valuable insights for policymakers aiming to tackle complex social, economic, and environmental objectives cohesively.

Further research could explore regional and country-specific dynamics, examining how local contexts shape the relationships among economic freedom, environmental resilience, and gender equality. The findings of this thesis indicate that while global trends provide valuable insights, significant regional and cultural variations influence these relationships differently across various settings. For example, the effect of economic freedom on fertility rates may vary considerably between East Asia and Sub-Saharan Africa due to distinct social norms, levels of

infrastructure, and historical economic trajectories. Likewise, the impact of climate change on gender equality may fluctuate significantly depending on local agricultural dependence or the stability of the government. By focusing on the unique economic, cultural, and institutional characteristics of different regions, future studies could offer more nuanced and tailored recommendations for policymakers. This approach would allow development initiatives to be better aligned with local contexts, acknowledging that a one-size-fits-all model is rarely adequate to address the diverse challenges different countries and communities face.

This thesis offers valuable insights into the intricate relationships among economic freedom, climate change, and women's empowerment; however, further research is crucial for a deeper understanding of these dynamics. Future studies could explore the broader socioeconomic impacts of these factors, investigating how they intersect over time and influence human capital development, educational attainment, and access to healthcare. Additionally, incorporating more variables—such as cultural and institutional contexts—may uncover new dimensions within these relationships. Cultural values, for instance, can significantly affect how economic freedom or gender equality reforms are perceived and embraced within a community. Likewise, institutional factors, including the robustness of democratic governance, the rule of law, and legal protections for women's rights, could be instrumental in determining the effectiveness of empowerment policies. Such research would enhance our understanding of these complex interactions and aid in developing more comprehensive, context-sensitive policies and interventions to promote equitable and sustainable development globally.

An intriguing area for further study could involve exploring education and technology's role in shaping economic freedom and climate resilience efforts. Education has emerged as a critical factor in empowering women and fostering social resilience. However, the impact of

digital education or access to information technologies is not yet fully understood in the context of economic freedom and gender equality. Research that examines how access to digital resources influences women's empowerment and mitigates the adverse effects of climate change could provide valuable insights into modern development challenges. Additionally, examining the role of online platforms in spreading awareness about climate resilience, economic opportunities, and social rights could reveal essential avenues for promoting sustainable and inclusive development. In particular, understanding how technology can bridge gaps in resource access, especially in rural or underserved areas, would be beneficial in designing more inclusive economic policies.

Lastly, future research should explore the effects of climate change mitigation strategies on economic freedom and gender equality. As countries increasingly adopt policies aimed at environmental sustainability, it is crucial to examine how these initiatives influence economic opportunities and social equity, particularly for marginalised communities. For instance, investigating the effects of carbon pricing or emissions regulations on women's employment across various sectors could reveal necessary trade-offs between environmental policies and gender equality objectives. Additionally, analysing the broader social implications of transitioning to green energy sources may uncover potential economic benefits or risks, thereby assisting policymakers in crafting climate strategies that promote equitable development. By addressing these intersections, future research can offer actionable recommendations that optimise the advantages of climate action while preserving economic freedom and gender equality.

In conclusion, this thesis has offered valuable insights into the interconnected roles of economic freedom, environmental resilience, and women's empowerment. It also highlights the necessity of ongoing research to refine and expand these findings. The multifaceted nature

of development challenges demands a comprehensive and adaptable approach that aligns with the dynamic realities of the global economy, technological advancements, and climate change. By pursuing the recommended directions for further research, scholars and policymakers can collaborate to create innovative and inclusive policies that foster sustainable and equitable development in an increasingly complex world. This forward-looking strategy can potentially address the pressing development issues of our time and contribute to a more prosperous and resilient global community.

5.4. Policy implications

The conclusions drawn from this thesis indicate several policy implications that governments, international organisations, and development agencies should consider promoting sustainable and inclusive development. These implications focus on encouraging economic freedom, tackling environmental issues, enhancing gender equality, and advancing women's empowerment in decision-making processes.

The relationship between economic freedom and fertility rates underscores the significance of implementing policies that enhance economic autonomy, particularly for women. By promoting access to education, healthcare, and employment for women, such policies can lead to lower fertility rates, as demonstrated in both developed and developing contexts. This decline supports sustainable population growth, potentially alleviating pressure on public resources and contributing to long-term economic stability. Targeted interventions, such as supporting female entrepreneurs and improving educational opportunities, are crucial for creating an environment where women can engage fully in the economy, thereby fostering inclusive economic growth.

Moreover, the negative impact of climate change on gender equality highlights the need for environmental policies that consider social outcomes. Initiatives to reduce climate vulnerability—such as enhancing agricultural resilience, investing in renewable energy, and developing infrastructure capable of withstanding extreme weather—are vital for safeguarding gender equality. This is especially pertinent for developing countries, where climate-related risks disproportionately affect women. To address these challenges, governments can implement targeted programs that bolster agricultural productivity and climate resilience while ensuring women benefit from these efforts.

The findings regarding women's empowerment and emotional intimate partner violence (IPV) highlight the critical need for gender-sensitive policies aimed at reducing emotional IPV. By promoting initiatives empowering women—such as programs focused on financial literacy, property rights, and equitable access to healthcare—governments can significantly mitigate IPV and foster healthier relationships. This focus on empowerment aligns with broader development objectives, as reducing IPV also positively affects women's mental health, social standing, and economic productivity.

Ultimately, the findings highlight the necessity for comprehensive strategies integrating gender and climate considerations. Instead of treating economic freedom, environmental sustainability, and gender equality as separate domains, policies should recognise the interconnectedness of these aspects. This holistic approach acknowledges that pursuing one area—such as economic growth—without accounting for its environmental or social ramifications may intensify inequalities or undermine long-term development goals. Policymakers are encouraged to embrace integrated strategies that incorporate gender and climate factors, promoting development that is both inclusive and resilient.

These policy implications, grounded in the finding score, emphasise the need for holistic approaches that address multiple facets of development, promoting a balanced model that supports economic, social, and environmental well-being.

5.5. Conclusion

In conclusion, this thesis underscores the importance of adopting a holistic approach to development economics that integrates economic freedom, environmental sustainability, and gender equality. By recognising the interconnectedness of these factors, policymakers can design more effective strategies that promote inclusive and sustainable growth, reduce inequalities, and improve the well-being of all citizens. As the world continues to face complex development challenges, the insights from this research provide a valuable foundation for understanding and addressing the multifaceted nature of economic development in the 21st century.

In conclusion, this thesis highlights the importance of adopting a holistic and integrated approach to development economics, which incorporates economic freedom, environmental sustainability, and gender equality as fundamental pillars of women's well-being. These three dimensions are deeply interconnected, and acknowledging their linkages allows for a more comprehensive understanding of the complex forces shaping socioeconomic progress. Economic freedom, for instance, fosters individual autonomy, stimulates entrepreneurship, and encourages investment, yet its full potential can only be realised when accompanied by policies that address social and environmental impacts. Similarly, environmental sustainability is essential for the longevity of economic growth, as resource depletion and climate risks can severely undermine future development prospects. Gender equality further enhances economic and environmental goals, as empowering women leads to more balanced decision-making, greater workforce participation, and improved health and educational outcomes within

communities. These elements form a framework to guide development efforts toward more balanced, resilient, and equitable outcomes.

Recognising the interconnectedness of economic freedom, environmental sustainability, and gender equality is crucial for policymakers aiming to design strategies that drive growth, reduce inequalities, and improve overall well-being. Traditional approaches prioritising economic growth in isolation often overlook the broader social and environmental consequences, potentially exacerbating inequality or leading to unsustainable resource usage. This thesis suggests that an integrated policy approach combining economic, social, and environmental objectives can achieve more enduring and inclusive growth. By fostering economic environments that are open yet regulated to protect social interests, governments can encourage sustainable business practices and enhance social mobility for underserved populations. For instance, policies that promote female workforce participation, support green industries and protect property rights can generate positive outcomes across multiple dimensions of development.

As the world continues to face increasingly complex development challenges—ranging from climate change and economic inequality to population growth and shifting geopolitical landscapes—the insights from this research provide a valuable foundation for understanding and addressing the multifaceted nature of economic development in the 21st century. Climate change, in particular, poses a unique challenge, intersecting with economic and gender dynamics in ways that demand innovative, cross-cutting solutions. The findings of this thesis underscore the urgency of climate-sensitive policies that consider economic resilience and social equity. Developing adaptive strategies that protect the most vulnerable populations, especially women in low-income countries, is essential for building a sustainable future.

Furthermore, by embedding gender considerations into climate policies, nations can promote gender equality alongside environmental goals, supporting an inclusive approach to resilience.

Moreover, this thesis emphasises that sustainable development requires an adaptable, context-sensitive approach that respects and accounts for the diverse realities of different countries and regions. While some strategies, such as promoting economic freedom, may be universally beneficial, the specific applications and required policy adjustments will vary depending on local cultural, economic, and institutional contexts. Tailoring policies to these unique circumstances enhances their effectiveness and respects the diversity of development pathways that different nations pursue. As global development challenges become increasingly interconnected, this thesis calls for cooperative efforts among governments, international organisations, and the private sector to devise comprehensive strategies that transcend traditional economic, social, and environmental policy boundaries.

This research contributes to a broader development vision that values growth and well-being, immediate gains, and long-term resilience by advancing our understanding of these essential interconnections. The research findings underscore the need for development frameworks that are not solely focused on economic indicators like GDP but also prioritise factors such as health, education, equality, and environmental stewardship as core components of progress. This broader perspective encourages policymakers, practitioners, and researchers to think beyond simple metrics and consider growth's quality, distribution, and sustainability.

In the end, the insights presented in this thesis underscore the transformative potential of policies that integrate economic freedom, environmental sustainability, and gender equality. By creating environments where individuals have the freedom to pursue economic opportunities within a framework that respects social and environmental boundaries,

governments and organisations can lay the groundwork for a more inclusive, equitable, and sustainable future. As the field of development economics continues to evolve, this integrated approach offers a powerful model for addressing the challenges of our time, providing a path toward a resilient global economy that benefits all. This transformative potential should inspire hope and determination in the face of complex global challenges.

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Appendices

Appendix 1 – List of countries

Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahrain
Barbados
Belarus
Belgium
Belize
Benin
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Burkina Faso
Burundi
Cabo Verde
Cambodia
Cameroon
Canada
Central African Republic
Chad
Chile
China
Colombia
Comoros
Costa Rica
Croatia
Cuba
Cyprus
Czech Republic
Democratic Republic of Congo
Denmark
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Estonia
Ethiopia
Fiji
Finland
France
Gabon
Georgia
Germany
Ghana
Greece
Guatemala
Guinea
Guinea-Bissau
Guyana
Honduras
Hong Kong
Hungary
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kiribati
Kuwait
Kyrgyz
Latvia
Lebanon
Lesotho
Liberia
Libyan
Liechtenstein
Lithuania
Luxembourg
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Mauritania
Mauritius
Mexico
Micronesia
Moldova
Mongolia
Montenegro
Morocco
Mozambique
Namibia
Nepal
Netherlands
New Zealand
Nicaragua
Niger
Nigeria
Norway
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Portugal
Qatar
Romania
Russia
Rwanda
Samoa
Saudi Arabia
Senegal
Serbia
Seychelles
Sierra Leone
Singapore
Slovakia
Solomon Islands
South Africa
Spain
Sri Lanka
Sudan
Suriname
Sweden
Switzerland
Syria
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Tonga
Ukraine
United Kingdom
United States
Uruguay
Uzbekistan
Vanuatu
Vietnam
Yemen
Zambia

Appendix 2 – Definition and sources of data

Variable	Description	source
Fertility Rate	The total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.	WDI
Crude birth rate per 1000 population	The crude birth rate refers to the number of live births that occur during the year per 1,000 population estimated at mid-year. By subtracting the crude death rate from the crude birth rate, we obtain the rate of natural increase, which is equivalent to the rate of population change in the absence of immigration.	WDI
Economic Freedom index	Economic freedom is assessed by evaluating 12 elements, both quantitative and qualitative, which are categorised into four pillars that represent different aspects of economic freedom. The factors that are considered in evaluating a country's overall performance are the Rule of Law, Government Size, Regulatory Efficiency, and Open Markets. The Rule of Law encompasses property rights, government integrity, and judicial effectiveness. Government Size includes government expenditure, tax burden, and fiscal health. Regulatory Efficiency looks at business freedom, labour freedom, and monetary freedom. Open Markets assesses trade freedom, investment freedom, and financial freedom. Each of the twelve economic liberties in these areas is assessed on a scale ranging from 0 to 100. The total score of a nation is determined by calculating the average of these twelve economic freedoms, with each freedom being given equal weight.	Heritage Foundation
World uncertainly index	World Uncertainty Index (WUI) was constructed for an unbalanced panel of 143 individual countries on a quarterly basis from 1952. This is the first attempt to construct a panel uncertainty index for a large set of developed and developing countries. The index reflects the frequencies of the word “uncertainty” (and its variants) in the Economist Intelligence Unit (EIU) country reports. To make the WUI comparable across countries, authors scale the raw counts by the total number of words in each report — the number of “uncertainty” words per thousand words.	World uncertainly index
GDP per capita growth	Annual growth rate of GDP per capita based on constant local currency. GDP per capita is GDP divided by population at the middle of the year.	WDI
Urban population as a % of total population	Urban population refers to people living in urban areas as defined by national statistical offices	WDI
Consumer price index	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	WDI
Unemployment, female as a % of female labour force	Unemployment refers to the share of the labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ by country.	WDI
Age dependency ratio as a % of working-age population	Age dependency ratio is the ratio of dependents--people younger than 15 or older than 64--to the working-age population--those ages 15-64. Data are shown as the proportion of dependents per 100 working-age population.	WDI
Female wage and salaried workers as a % of female employment	Wage and salaried workers (employees) are those workers who hold the type of jobs defined as "paid employment jobs," where the incumbents hold explicit (written or oral) or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they work.	WDI

Infant mortality rate as a per 1,000 live births	Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births each year.	WDI
Percentage of gross female school enrolment in tertiary	The gross enrolment ratio refers to the proportion of the total number of students enrolled, irrespective of their age, to the population within the specific age group that corresponds to the educational level being considered. Typically, higher education, regardless of whether it is a specialised research programme or not, necessitates the successful completion of secondary school as a prerequisite for entrance.	WDI
Contraceptive prevalence rate	The term "any method" refers to the proportion of women who are presently using, or whose sexual partner is now using, at least one form of contraception, regardless of the specific technique being used.	United Nations Department of Economic and Social Affairs, Population Division
Indicator of Quality of Government	The average value of the International Country Risk Guide (ICRG) variables 'Corruption', 'Law and Order', and 'Bureaucracy Quality' is measured on a scale from 0 to 1. Greater values imply superior quality of governance.	The International Country Risk Guide (ICRG)
Regulatory Quality	Regulatory quality refers to the view of a government's competence in creating and enforcing effective rules and regulations that facilitate and encourage the growth of the private sector. Regulatory quality include indicators of market-unfriendly policies, such as price restrictions and insufficient financial supervision, as well as the perceived difficulties caused by excessive regulation in sectors like overseas commerce and company growth.	The Worldwide Governance Indicators

Appendix 3 – Correlation Table

	EFI	WUI	GDPpc	UP	ADR	FU	IMR	FSE	WSF	CPR	QoG	Inf
EFI	1											
WUI	0.12	1										
GDPpc	0.60	-0.02	1									
UP	0.48	-0.03	-0.04	1								
ADR	-0.43	-0.09	-0.03	-0.64	1							
FU	-0.11	-0.02	-0.01	0.15	-0.11	1						
IMR	-0.5	-0.05	0.02	-0.61	0.76	-0.12	1					
FSE	0.47	0.04	-0.05	0.67	-0.62	0.01	-0.71	1				
WSF	0.53	0.02	-0.03	0.75	-0.75	0.21	-0.80	0.73	1			
CPR	0.42	0.03	0.02	0.55	-0.66	0.02	-0.67	0.67	0.64	1		
QoG	0.66	0.06	0.01	0.53	-0.45	-0.04	-0.57	0.51	0.64	0.57	1	
Inf	-0.15	-0.01	-0.01	-0.03	0.05	-0.01	0.12	-0.07	-0.05	-0.04	-0.06	1

*Highest value for VIF= 5.39 < 10

Appendix 4 - Estimating the impact of economic freedom on fertility rate by Instrumental variable quantile regression

Variables	**Smoothed IV quantile regression**		
panel	(1) Q0.25	(2) Q0.50	(3) Q0.75
Economic Freedom	**-0.006** (**0.002**)	**-0.008***** **(0.003)**	**-0.011***** **(0.002)**
World uncertainty index	0.005*** (0.001)	0.004*** (0.001)	0.002*** (0.001)
GDP per capita growth	-0.017*** (0.003)	-0.020*** (0.003)	-0.012*** (0.003)
Urban population	0.003*** (0.001)	0.002*** (0.001)	0.006*** (0.001)
Female unemployment	-0.011*** (0.003)	-0.011*** (0.002)	-0.014*** (0.002)
Age dependency ratio	0.047 (0.002)	0.045*** (0.001)	0.039*** (0.001)
Female wage and salaried workers	0.002 (0.001)	0.004*** (0.001)	0.005*** (0.001)
Infant mortality rate	0.015*** (0.003)	0.020*** (0.002)	0.025*** (0.002)
female tertiary enrolment School	-0.004*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
Contraceptive prevalence	-0.018*** (0.001)	-0.019*** (0.001)	-0.021*** (0.001)
Quality of government	0.278*** (0.091)	0.482*** (0.106)	0.475 (0.127)
Inflation	-0.001 (0.001)	-0.001** (0.001)	-0.001*** (0.000)
Number of Obs	1,715	1,715	1,715

Appendix 5- Correlation matrix

	WBL	Tem	Dis	Pre	GDP	Urb	Inf	Glo	HDI	Agr	AgGDP	FDI	Ele	CI
WBL	1													
Tem	-0.44	1												
Dis	0.10	-0.06	1											
Pre	0.11	0.36	0.06	1										
GDP	0.06	-0.07	0.07	0.01	1									
Urb	0.24	-0.28	-0.01	-0.18	-0.02	1								
Inf	-0.06	0.00	-0.01	0.00	-0.08	-0.02	1							
Glo	0.57	-0.40	0.12	-0.08	0.05	0.67	-0.07	1						
HDI	0.51	-0.51	0.04	-0.08	0.03	0.71	-0.05	0.79	1					
Agr	0.13	-0.18	0.13	-0.19	0.02	-0.20	0.00	-0.02	-0.12	1				
AgGDP	-0.32	0.23	-0.03	0.05	-0.05	-0.69	0.06	-0.71	-0.71	0.15	1			
FDI	0.11	-0.04	-0.05	-0.02	0.05	0.09	-0.01	0.13	0.10	-0.04	-0.07	1		
Ele	0.58	-0.27	0.05	0.14	0.02	0.41	-0.03	0.62	0.47	0.03	-0.44	0.08	1	
CI	-0.10	-0.32	0.03	-0.29	-0.03	0.19	0.02	0.01	0.20	0.08	0.08	-0.01	-0.19	1

Appendix 6 - Definition of study variables and their sources

Variable	Description	source
Women, Business and Law Index (WBL)	offers a thorough assessment of gender disparity in terms of women's economic prospects and empowerment. A lower Women, Business and Law Index (WBL) score indicates more gender inequality and worse results for women, whereas a higher WBL value indicates greater gender equality between men and women. The Women, Business and Law research assesses the legal disparities in men's and women's ability to participate in economic activities.	The World Bank Women, Business and the Law
Average mean surface air temperature	is the average temperature in degrees Celsius for the specified time period	World Bank Group's Climate Change Knowledge Portal
Number of disasters	The overall trajectory of climate-related natural catastrophes. Only catastrophes that are directly linked to climatic conditions, such as wildfires, storms, landslides, floods, severe temperatures, drought, fog, wave action, and glacial lake outbursts, are included in the coverage. This includes catastrophes that caused the death of ten (10) or more individuals, impacted one hundred (100) or more people, led to the declaration of a state of emergency, or prompted a request for foreign aid.	The Emergency Events Database, Centre for Research on the Epidemiology of Disasters (CRED)
Precipitation	Total cumulative precipitation in millimetres	World Bank Group's Climate Change Knowledge Portal
GDP per capita growth	The annual percentage growth rate of GDP per capita is calculated using constant local currency. GDP per capita is the measure of a country's gross domestic product divided by its population at the midpoint of the year. Gross Domestic Product (GDP) at purchaser's prices is calculated by adding the total value of goods and services produced by all resident producers in the economy, including any taxes on items, and subtracting any subsidies that are not included in the value of the products.	World Development Indicators
Urban population	The yearly population growth rate for year t is the proportion by which the midyear population from year t-1 to t increases exponentially.	World Development Indicators
Inflation	The consumer price index measures the annual percentage change in the cost of a basket of products and services that the typical consumer buys, which might either remain the same or vary at predetermined intervals, such as once a year.	World Development Indicators
Economic globalisation	Economic globalisation, measured on a scale of 1 to 100, including both the movement of goods and services across borders and the movement of money and investments. De facto commerce refers to the actual trading in commodities and services. De jure commerce encompasses the legal aspects of customs charges, taxes, and trade restrictions.	KOF Swiss Economic Institute
Human development index	A composite indicator that quantifies the overall level of accomplishment in fundamental aspects of human development, including longevity, education, and economic well-being. The HDI is calculated by taking the geometric mean of the normalised indices for each of the three dimensions. A higher score, closer to 1, indicates superior performance by the nation. The assessment of the health component is based on the life expectancy at birth. The education dimension is evaluated by the average number of years of schooling for individuals aged 25 years and older, as well as the predicted number of years of schooling for children of school entry age. The	Human Development Report (UNDP)

	measure of the level of life is determined by the per capita gross national income.	
Agricultural land (% of land area)	Agricultural land encompasses the portion of land that is suitable for cultivation, devoted to permanent crops, and used for permanent pastures. Arable land encompasses land that is classified by the FAO as land used for temporary crops (areas with double-cropped crops are included only once), temporary meadows used for mowing or grazing, land used for market or kitchen gardens, and land that is temporarily left uncultivated. Land that has been left unused due to the practice of shifting agriculture is not included.	World Development Indicators
Agricultural contribution to GDP	Agriculture encompasses ISIC divisions 1-5, which include forestry, hunting, fishing, agricultural agriculture, and animal rearing. The value added of a sector is the final result obtained by summing all outputs and removing intermediate inputs. The calculation does not take into account the reduction in value of manufactured assets or the reduction and deterioration of natural resources.	World Development Indicators
Foreign direct investment (FDI)	Foreign direct investment refers to the amount of money that is invested in a company located in a different country, with the intention of acquiring a significant ownership stake (10 percent or more of voting shares) and having a long-term influence on its management. The word "balance of payments" refers to the total amount of equity capital, reinvestment of profits, other long-term capital, and short-term capital.	World Development Indicators
Electoral democracy index	The index is calculated by averaging the weighted average of the indices that measure freedom of association, clean elections, freedom of speech, elected officials, and suffrage. Additionally, it includes the five-way multiplicative interaction between these indices. This is somewhere between a simple average and a rigorous multiplication, indicating the arithmetic mean of the two values.	Varieties of Democracy (V-Dem) Project

Appendix 7 – Countries included in sample

Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Brunei Darussalam
Bulgaria
Burki Faso
Burundi
Cabo Verde
Cambodia
Cameroon
Canada
Central African Republic
Chad
Chile
China
Colombia
Congo
Congo (Democratic Republic)
Costa Rica
Croatia
Cyprus
Czechia
Denmark
Dominican Republic
Ecuador
Egypt
El Salvador
Estonia
Eswatini
Ethiopia
Fiji
Finland
France
Gabon
Gambia
Georgia
Germany
Ghana
Greece
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kiribati
Korea (Republic of)
Kuwait
Kyrgyzstan
Lao Republic
Latvia
Lebanon
Lesotho
Liberia
Libya
Lithuania
Luxembourg
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Marshall Islands
Mauritania
Mauritius
Mexico
Moldova
Mongolia
Montenegro
Morocco
Mozambique
Namibia
Nepal
Netherlands
New Zealand
Nicaragua
Niger
Nigeria
North Macedonia
Norway
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Romania
Russian Federation
Rwanda
Samoa
San Marino
Sao Tome and Principe
Saudi Arabia
Senegal
Serbia
Sierra Leone
Singapore
Slovakia
Slovenia
South Africa
South Sudan
Spain
Sri Lanka
St. Lucia
St. Vincent and Grenadines
Sudan
Suriname
Sweden
Switzerland
Syrian Arab Republic
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Uzbekistan
Venezuela
Viet Nam
Yemen
Zambia
Zimbabwe

Appendix 8 – Fixed effects-instrumental variable: Tables for GDP/capita effects, agriculture effects, maternal mortality effects, and Democracy effects.

Appendix Table 8.1 Fixed effects-instrumental variable: GDP/capita effects

Variables	Low GDP		High GDP	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-15.184*** **		**4.121**
		(4.954)		**(2.533)**
CO_2 per GDP	-0.622***		-1.334***	
	(0.167)		(0.230)	
Climate disasters	-0.004	**-0.168****	-0.005	**0.033**
	(0.003)	**(0.079)**	(0.005)	**(0.055)**
Precipitation	-0.000	**-0.005****	-0.000	**0.000**
	(0.000)	**(0.001)**	(0.000)	**(0.000)**
GDP per capita growth	-0.001	-0.016	-0.001	-0.025
	(0.001)	(0.036)	(0.001)	(0.023)
Urban population	-0.007*	-0.072	-0.012***	-0.107
	(0.003)	(0.119)	(0.004)	(0.071)
Inflation	0.000	-0.003**	0.001	-0.050*
	(0.000)	(0.001)	(0.001)	(0.028)
Economic globalisation	-0.002	0.184**	0.004	0.179***
	(0.003)	(0.086)	(0.004)	(0.059)
Human development index	0.356	-5.108	1.680**	79.326***
	(0.504)	(14.559)	(0.763)	(13.336)
Agricultural land	-0.002	0.092	-0.005	-0.205***
	(0.003)	(0.108)	(0.004)	(0.070)
Agricultural contribution to GDP	-0.001	-0.081	0.008	0.529***
	(0.001)	(0.056)	(0.009)	(0.087)
FDI	0.001	-0.027	0.000	0.002
	(0.001)	(0.034)	(0.000)	(0.004)
Electoral democracy index	-0.047	6.910***	0.056	2.174
	(0.091)	(2.374)	(0.140)	(4.176)
F-statistic on the excluded instrument	13.91		33.66	
Weak identification test (Cragg-Donald Wald F statistic)		31.316		37.830
Number of countries/Obs.		97/1917		108/2164

Appendix Table 8.2 Fixed effects-instrumental variable: agriculture effects.

Variables	Low *Agriculture*		High *Agriculture*	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-2.768**		**-9.401*** **
		(2.760)		**(3.050)**
CO_2 per GDP	-1.314***		-0.844***	
	(0.208)		(0.174)	
Climate disasters	-0.005	**0.031**	-0.004	**-0.106**
	(0.005)	**(0.061)**	(0.003)	**(0.065)**
Precipitation	-0.000*	-0.000	-0.000	-0.002*
	(0.000)	(0.000)	(0.000)	(0.001)
GDP per capita growth	-0.000	-0.016	-0.002	-0.016
	(0.001)	(0.022)	(0.001)	(0.035)
Urban population	-0.010***	-0.047	-0.008**	-0.132***
	(0.003)	(0.083)	(0.003)	(0.085)
Inflation	-0.000	-0.004***	-0.000	-0.001
	(0.000)	(0.001)	(0.000)	(0.001)
Economic globalisation	-0.006*	0.298***	-0.003	0.109
	(0.003)	(0.065)	(0.003)	(0.078)
Human development index	-0.416	41.89***	0.284	31.713**
	(0.631)	(13.72)	(0.520)	(12.247)
Agricultural land	-0.001	-0.112	-0.004	0.026
	(0.004)	(0.079)	(0.003)	(0.084)
Agricultural contribution to GDP	-0.032***	-0.249	-0.001	-0.054
	(0.012)	(0.229)	(0.002)	(0.051)
FDI	0.001	0.001	0.001	-0.026
	(0.001)	(0.004)	(0.001)	(0.033)
Electoral democracy index	-0.105	3.677	0.108	1.757
	(0.140)	(4.389)	(0.087)	(2.036)
F-statistic on the excluded instrument	39.69		23.50	
Weak identification test (Cragg-Donald Wald F statistic)		44.213		49.089
Number of countries/Obs.		95/2113		93/1970

Appendix Table 8.3 Fixed effects-instrumental variable: maternal mortality effects

Variables	Low Maternal Mortality		High Maternal Mortality	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**3.465**		**-13.549*** **
		(3.087)		**(2.552)**
CO_2 per GDP	-1.021***		-0.872***	
	(0.291)		(0.129)	
Climate disasters	-0.006	-0.071	-0.004	-0.114
	(0.005)	(0.068)	(0.003)	(0.071)
Precipitation	-0.000*	0.000	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.001)
GDP per capita growth	-0.003	0.005	-0.001	-0.030
	(0.002)	(0.041)	(0.001)	(0.027)
Urban population	-0.007	-0.140	-0.014***	-0.276***
	(0.005)	(0.101)	(0.003)	(0.082)
Inflation	0.000	-0.013	-0.000***	-0.003**
	(0.000)	(0.010)	(0.000)	(0.001)
Economic globalisation	-0.003	0.093	0.005*	0.336***
	(0.005)	(0.094)	(0.003)	(0.065)
Human development index	-1.956**	6.558	0.207	37.97***
	(0.901)	(13.94)	(0.491)	(11.97)
Agricultural land	-0.005	0.009	-0.005*	-0.339***
	(0.00)	(0.095)	(0.003)	(0.077)
Agricultural contribution to GDP	0.003	-0.093	0.002	0.129**
	(0.004)	(0.091)	(0.002)	(0.059)
FDI	0.001	-0.001	-0.001*	0.006
	(0.001)	(0.007)	(0.000)	(0.007)
Electoral democracy index	-0.178	0.444	0.017	2.529
	(0.177)	(3.120)	(0.100)	(3.148)
F-statistic on the excluded instrument	12.26		45.69	
Weak identification test (Cragg-Donald Wald F statistic)		20.315		69.735
Number of countries/Obs.		79/1441		140/2635

Appendix Table 8.4 Fixed effects-instrumental variable: Democracy effects

Variables	Low *Democracy*		High *Democracy*	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-12.599*** **		**3.510**
		(2.976)		**(2.376)**
CO_2 per GDP	-0.679***		-1.464***	
	(0.135)		(0.200)	
Climate disasters	-0.006	-0.090	-0.004	-0.088
	(0.004)	(0.078)	(0.004)	(0.064)
Precipitation	-0.000***	-0.003**	-0.000	-0.000
	(0.000)	(0.001)	(0.000)	(0.000)
GDP per capita growth	-0.002	-0.014	-0.000	-0.130***
	(0.001)	(0.029)	(0.002)	(0.034)
Urban population	-0.014***	-0.250***	-0.015***	0.002
	(0.003)	(0.093)	(0.003)	(0.081)
Inflation	0.000	-0.002	-0.000***	-0.001
	(0.000)	(0.002)	(0.000)	(0.001)
Economic globalisation	-0.001	0.109	0.005	0.284***
	(0.003)	(0.077)	(0.003)	(0.060)
Human development index	-0.311	55.13***	0.168	19.75
	(0.523)	(11.56)	(0.734)	(12.53)
Agricultural land	-0.005	-0.065	-0.002	0.036
	(0.003)	(0.100)	(0.003)	(0.066)
Agricultural contribution to GDP	0.006***	-0.001	0.002	0.008
	(0.002)	(0.063)	(0.004)	(0.066)
FDI	-0.001	0.035	-0.000	-0.002
	(0.001)	(0.034)	(0.000)	(0.004)
Electoral democracy index	-0.113	4.227	0.017	-11.21***
	(0.133)	(2.868)	(0.100)	(4.129)
F-statistic on the excluded instrument	25.05		56.64	
Weak identification test (Cragg-Donald Wald F statistic)		50.243		64.975
Number of countries/Obs.		98/1896		95/2180

Appendix 9 – Fixed effects-instrumental variable: Tables for Developing countries VS. Developed countries effects, and Europe, Central Asia, Latin America, Caribbean and North America VS. East Asia and Pacific, Middle East and North Africa, South Asia and Sub-Saharan Africa effects.

Appendix Table 9.1 Fixed effects-instrumental variable:

Developing countries VS. Developed countries effects.

Variables	Developing Countries		Developed Countries	
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-28.185*** **		**-4.650***
		(7.690)		**(2.541)**
CO_2 per GDP	-0.435***		-1.311***	
	(0.113)		(0.260)	
Climate disasters	-0.004	**-0.193****	-0.004	**0.099**
	(0.002)	**(0.095)**	(0.008)	**(0.079)**
Precipitation	-0.000***	**-0.004*****	-0.000**	**-0.001**
	(0.000)	**(0.001)**	(0.000)	**(0.001)**
GDP per capita growth	-0.002	-0.054	-0.004	-0.091**
	(0.001)	(0.040)	(0.003)	(0.045)
Urban population	-0.008***	-0.168	-0.006	-0.370***
	(0.002)	(0.112)	(0.005)	(0.078)
Inflation	-0.000*	-0.009***	-0.000***	-0.001
	(0.000)	(0.001)	(0.000)	(0.001)
Economic globalisation	-0.002	0.257***	0.001	0.087
	(0.002)	(0.095)	(0.005)	(0.068)
Human development index	0.022	18.55	2.480*	132.3***
	(0.416)	(15.94)	(1.267)	(16.78)
Agricultural land	-0.002	-0.060	-0.011**	-0.400***
	(0.002)	(0.106)	(0.004)	(0.076)
Agricultural contribution to GDP	-0.000	-0.045	-0.001	0.202*
	(0.001)	(0.066)	(0.010)	(0.110)
FDI	-0.001	-0.047	-0.000	-0.002
	(0.001)	(0.051)	(0.000)	(0.004)
Electoral democracy index	-0.008	3.180	0.309	2.839
	(0.073)	(3.121)	(0.239)	(3.745)
F-statistic on the excluded instrument	14.75		25.29	
Weak identification test (Cragg-Donald Wald F statistic)		29.243		28.345
Number of countries/Obs.		106/2810		46/1276

Appendix Table 9.2 Fixed effects-instrumental variable: Europe, Central Asia, Latin America, Caribbean and North America VS. East Asia and Pacific, Middle East and North Africa, South Asia and Sub-Saharan Africa effects.

Variables		Europe, Central Asia, Latin America, Caribbean and North America		East Asia and Pacific, Middle East and North Africa, South Asia and Sub-Saharan Africa
	First stage	*Second stage*	*First stage*	*Second stage*
Temperature		**-10.056*** (3.106)**		**-15.708*** (5.218)**
CO_2 per GDP	-0.913*** (0.211)		-0.557*** (0.128)	
Climate disasters	-0.008 (0.006)	0.010 (0.091)	-0.001 (0.002)	-0.116* (0.069)
Precipitation	-0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.003** (0.001)
GDP per capita growth	-0.000 (0.002)	-0.067 (0.044)	-0.002 (0.001)	-0.013 (0.029)
Urban population	-0.010*** (0.003)	-0.232** (0.092)	-0.010*** (0.002)	-0.137 (0.093)
Inflation	-0.000*** (0.000)	-0.003** (0.001)	-0.000 (0.000)	-0.008 (0.008)
Economic globalisation	0.003 (0.003)	0.214*** (0.072)	0.001 (0.003)	0.318*** (0.082)
Human development index	1.807** (0.850)	102.1*** (15.91)	-1.304*** (0.433)	-9.220 (13.91)
Agricultural land	-0.013 (0.004)	-0.366*** (0.100)	-0.000 (0.002)	0.008 (0.080)
Agricultural contribution to GDP	0.004 (0.004)	0.190** (0.084)	0.002 (0.001)	-0.005 (0.059)
FDI	-0.001 (0.001)	-0.012 (0.007)	-0.001 (0.000)	0.008 (0.010)
Electoral democracy index	-0.018 (0.156)	0.041 (2.617)	0.029 (0.076)	5.551* (3.188)
F-statistic on the excluded instrument	18.58		18.86	
Weak identification test (Cragg-Donald Wald F statistic)		37.385		31.798
Number of countries/Obs.		74/2016		78/2070

Appendix 10 – Country, phase and year of survey

country	year	country code and phase	Freq.	Per cent	Cum.
		Sub-Saharan Africa			
Angola	2015-16	AO7	71895	1.26	3.05
Burkina Faso	2010	BF6	85435	1.5	4.55
Burkina Faso	2021	BF8	88295	1.55	6.1
Benin	2017-18	BJ7	127424	2.24	8.34
Burundi	2016-17	BU7	86345	1.52	9.86
Congo Democratic Republic	2007	CD5	29985	0.53	10.39
Congo Democratic Republic	2013-14	CD6	56481	0.99	11.38
Cote d'Ivoire	2011-12	CI6	20120	0.35	11.73
Cote d'Ivoire	2021	CI8	29754	0.52	12.26
Cameroon	2004	CM4	85248	1.5	13.75
Cameroon	2011	CM6	154260	2.71	16.46
Cameroon	2018	CM7	58708	1.03	17.5
Ethiopia	2016	ET7	31366	0.55	31.51
Gabon	2012	GA6	16844	0.3	31.81
Gabon	2019-21	GA7	22086	0.39	32.2
Ghana	2008	GH5	9832	0.17	32.37
Ghana	2022	GH8	30028	0.53	32.9
Gambia	2013	GM6	20466	0.36	33.26
Gambia	2019-20	GM7	11865	0.21	33.47
Kenya	2008-2009	KE5	8444	0.15	76.31
Kenya	2014	KE6	31079	0.55	76.86
Kenya	2022	KE8	32156	0.57	77.42
Comoros	2012	KM6	15987	0.28	82.29
Liberia	2007	LB5	7092	0.12	82.56
Liberia	2019-20	LB7	8065	0.14	82.7
Madagascar	2021	MD7	18869	0.33	83.03
Mali	2006	ML5	14583	0.26	83.29
Mali	2012-13	ML6	10424	0.18	83.47
Mali	2018	ML7	10519	0.18	83.66
Mauritania	2019-20	MR7	15714	0.28	84.16
Malawi	2010	MW5	23020	0.4	84.7
Malawi	2015-16	MW7	24562	0.43	85.13
Mozambique	2011	MZ6	21494	0.38	85.51
Mozambique	2022-23	MZ8	13183	0.23	85.74
Nigeria	2008	NG5	33385	0.59	86.33
Nigeria	2013	NG6	38948	0.68	87.01
Nigeria	2018	NG7	41821	0.73	87.75
Namibia	2013	NM6	10018	0.18	87.92
Rwanda	2010	RW6	27168	0.48	93.96
Rwanda	2014-15	RW7	14634	0.26	94.22
Sierra Leone	2013	SL6	16658	0.29	94.51
Sierra Leone	2019	SL7	15574	0.27	94.78
Senegal	2015-16	SN7	27477	0.48	95.26
Sao Tome and Principe	2008-09	ST5	2615	0.05	95.31
Chad	2014-15	TD6	53157	0.93	96.24
Togo	2013-14	TG6	9480	0.17	96.41
Tanzania	2015-16	TZ7	26532	0.47	97.69
Tanzania	2022	TZ8	15254	0.27	97.96
Uganda	2006	UG5	8531	0.15	98.23
Uganda	2011	UG6	8674	0.15	98.38
Uganda	2016	UG7	18506	0.33	98.7
South Africa	2016	ZA7	8514	0.15	98.85

Zambia	2007	ZM5	7146	0.13	98.98
Zambia	2013-14	ZM6	16411	0.29	99.27
Zambia	2018	ZM7	13683	0.24	99.51
Zimbabwe	2005-06	ZW5	8907	0.16	99.66
Zimbabwe	2010-11	ZW6	9171	0.16	99.83
Zimbabwe	2015	ZW7	9955	0.17	100
Middle East and North Africa (MENA) & Europe and Central Asia					
Jordan	2007	JO5	10876	0.19	75.5
Jordan	2012	JO6	22704	0.4	75.9
Jordan	2017-18	JO7	14689	0.26	76.16
Egypt	2014	EG6	43524	0.76	30.96
Armenia	2015-16	AM7	42812	0.75	1.79
Kyrgyz Republic	*2012*	*KY6*	*8208*	*0.14*	*82.44*
Tajikistan	*2012*	*TJ6*	*9656*	*0.17*	*96.58*
Tajikistan	*2017*	*TJ7*	*10718*	*0.19*	*96.77*
Ukraine	2007	UA5	6841	0.12	98.08
Latin America & Caribbean					
Colombia	2000	CO4	165376	2.91	20.4
Colombia	2005	CO5	321126	5.64	26.05
Colombia	2015	CO7	154872	2.72	28.77
Peru	2009	PE5	41648	0.73	89.36
Peru	2012	PE6	93564	1.64	91.01
Dominican Republic	2007	DR5	57540	1.01	29.78
Dominican Republic	2013	DR6	23865	0.42	30.2
Guatemala	2014-15	GU6	25914	0.46	33.92
Honduras	2005-06	HN5	19948	0.35	34.27
Honduras	2011-12	HN6	22757	0.4	34.67
Haiti	2005-06	HT5	10757	0.19	34.86
Haiti	2012	HT6	14287	0.25	35.11
Haiti	2016-17	HT7	15513	0.27	35.38
South and Southeast Asia, East Asia, and the Pacific regions					
Philippines	2013	PH6	16155	0.28	91.56
Philippines	2017	PH7	25074	0.44	92
Philippines	2022	PH8	55642	0.98	92.98
Pakistan	2012-13	PK6	13558	0.24	93.22
Pakistan	2017-18	PK7	15068	0.26	93.48
Cambodia	2005	KH5	185053	3.25	80.67
Cambodia	2010	KH6	17578	0.31	80.98
Cambodia	2015	KH8	58488	1.03	82.01
Afghanistan	2015	AF7	58922	1.04	1.04
Nepal	2011	NP6	12674	0.22	88.15
Nepal	2016	NP7	12862	0.23	88.37
Nepal	2022	NP8	14845	0.26	88.63
India	2005-06	IA5	124385	2.19	37.57
India	2015-16	IA6	699686	12.3	49.87
India	2019-21	IA7	1448230	25.45	75.31
Myanmar	2015-16	MM7	12885	0.23	83.88
Papua New Guinea	2016-18	PG7	15198	0.27	91.28
Timor-Leste	2009-10	TL5	13137	0.23	97
Timor-Leste	2016	TL7	12607	0.22	97.22
Maldives	2016-17	MV7	7699	0.14	84.3
Total number of Observations			5690788	100	

Appendix 11 – Cross-tabulation descriptive statistics

Variables	Descriptions	No Emotional IPV	Emotional IPV
Decision making			
	No	156,924 (11.4%)	46,340 (3.4%)
	Yes	922,123 (67.3%)	246,369 (17.9%)
Control behaviour			
	No	619,436 (42.5%)	72,518 (5.0%)
	Yes	513,780 (35.2%)	252,253 (17.3%)
Justified wife beating			
	Yes	64,533 (4.7%)	24,802 (1.8%)
	No	992,538 (72.8%)	281,806 (20.7%)
Access to information			
	No	619,436 (42.5%)	72,518 (5.0%)
	Yes	513,780 (35.2%)	252,253 (17.3%)
Partner drinks alcohol			
	No	620,640 (50.1%)	126,407 (10.2%)
	Yes	338,584 (27.3%)	153,657 (12.4%)
Electricity			
	No	381,968 (26.6%)	134,278 (9.4%)
	Yes	730,487 (50.9%	186,052 (12.9%)
Sex of household head			
	Male	919,875 (62.4%)	248,985 (16.9%)
	Female	223,387 (15.2%)	81,702 (5.5%
Employment			
	No	542,815 (37.3%)	121,809 (8.4%)
	Yes	586,567 (40.3%)	205,053 (14.1%)
Woman has at least one kid			
	No	91,062 (6.2%)	16,109 (1.1%)
	Yes	1,052,208 (71.4%)	314,578 (21.3%)
Women age groups			
	15-19	58,589 (3.9%)	12,988 (0.9%)
	20-24	176,916 (12.0%	47,183 (3.2%)
	25-29	228,816 (15.5%)	66,727 (4.5%)
	30-34	218,694 (14.8%)	64,185 (4.3%)
	35-39	188,529 (12.8%)	56,949 (3.8%)
	40-44	146,914 (10.0%)	44,535 (3.0)
	45-49	124,812 (8.4%	38,120 (2.6%)
Residence			
	Urban	657,717 (44.6%)	189,628 (12.9%)
	Rural	485,553 (32.9%)	141,059 (9.6%)
Wealth			
	Poorest	246,453 (16.7%)	77,297 (5.2%)
	Poorer	248,347 (16.8%)	77,657 (5.3%)
	Middle	233.997 (15.9%)	70,682 (4.8%)
	Richer	217,026 (14.7%)	59,794 (4.1%)
	Richest	197,447 (13.4%)	45,257 (3.1%)
Number of unions			
	Once	1,004,732 (68.4%)	274,717 (18.7%)
	More than once	134,724 (9.2%)	54,725 (3.7%)
Husband's education level			
	No education	240,735 (18.5%)	69,952 (5.4%)
	Primary	249,356 (19.1%)	87,949 (6.7%)
	Secondary	397,556 (30.5%)	103,891 (8.0%)
	Higher	130,920 (10.0%)	22,988 (1.7%)
Woman's father ever beat her mother	No	843,584 (61.5%)	187,839 (13.7%)
	Yes	225,655 (16.5%)	114,203 (8.3%)

Appendix 12 – Emotional IPV and women decision making- 2SLS estimates

Variables	Emotional violence			
Panel	1) Sub-Saharan Africa	(2) Central Asia	(3) Latin America & Caribbean	(4) South and Southeast Asia, East Asia, and Pacific
			Second stage	
Decision making	**-0.210*** (0.037)**	**-0.140** (0.070)**	**-1.012*** (0.170)**	**-0.222*** (0.036)**
Education attainment (*First stage)*	0.031*** (0.001)	0.025*** (0.001)	0.007*** (0.001)	0.012*** (0.001)
Control behaviour	0.201*** (0.002)	0.109*** (0.003)	0.195*** (0.002)	0.176*** (0.001)
Women don't justify husband's wife beating	-0.001 (0.002)	-0.024* (0.014)	0.024 (0.023)	-0.027*** (0.003)
Access to information	0.026*** (0.001)	0.012 (0.014)	0.040*** (0.010)	0.012*** (0.002)
Partner drinks alcohol	0.153 (0.001)	0.059*** (0.003)	0.099*** (0.003)	0.081*** (0.001)
Household has electricity	-0.012*** (0.001)	-0.075** (0.033)	0.047*** (0.006)	0.006*** (0.002)
Female-headed household	-0.003 (0.002)	0.008** (0.004)	0.020*** (0.003)	0.008*** (0.001)
Employed woman	0.059*** (0.002)	0.003 (0.004)	0.051*** (0.003)	0.029*** (0.001)
Woman with at least one child	0.056*** (0.002)	0.054*** (0.005)	0.064*** (0.005)	0.031*** (0.021)
Women age				
20-24	0.028*** (0.002)	0.026** (0.010)	0.033*** (0.008)	0.028*** (0.004)
25-29	0.054*** (0.002)	0.035*** (0.011)	0.050*** (0.008)	0.047*** (0.004)
30-34	0.057*** (0.003)	0.050*** (0.012)	0.072*** (0.009)	0.050*** (0.005)
35-39	0.059*** (0.003)	0.055*** (0.012)	0.081*** (0.008)	0.059*** (0.005)
40-44	0.065*** (0.003)	0.062*** (0.013)	0.098*** (0.009)	0.063*** (0.005)
45-49	0.068*** (0.003)	0.054*** (0.013)	0.127*** (0.009)	0.067*** (0.005)
Urban residence	0.006*** (0.001)	-0.002 (0.004)	0.036*** (0.003)	0.007*** (0.001)
Wealth				
Poorer	0.006*** (0.001)	-0.018*** (0.005)	0.018*** (0.005)	-0.008*** (0.002)
Middle	0.003* (0.002)	-0.009* (0.005)	0.011* (0.006)	-0.012*** (0.002)
Richer	0.001 (0.002)	-0.015*** (0.005)	-0.012* (0.006)	-0.021** (0.002)
Richest	-0.002 (0.003)	-0.024*** (0.006)	-0.039*** (0.007)	-0.031*** (0.002)
More than once in union	0.011*** (0.001)	0.050*** (0.010)	0.027*** (0.003)	0.038*** (0.003)
Partner's education level				
primary	0.023*** (0.002)	0.005 (0.012)	0.002 (0.006)	-0.006*** (0.002)
Secondary	0.005**	-0.026**	0.001	-0.024***

	(0.002)	(0.011)	(0.007)	(0.001)
Higher	-0.029***	-0.038***	-0.020**	-0.031***
	(0.003)	(0.011)	(0.008	(0.002)
Woman's father ever beat her mother	0.119***	0.146***	0.087***	0.114***
	(0.001)	(0.006)	(0.003	(0.001)
Number of obs.	475,238	43,917	104,411	374,179
F-statistic on the excluded instrument	3039.28	252.34	263.04	882.73
Weak identification test	2853.931	381.988	261.383	914.953

Notes: All estimations also include year and country dummies, and a constant, not reported to save space. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.

Appendix 13 – Indicators of emotional IPV and women decision making-2SLS estimates

Variables	(1) ever been humiliated by husband/partner	(2) ever been threatened by husband/partner	(3) ever been insulted or made to feel bad by husband/partner
		Second stage	
Decision making	**-0.180*** **	**-0.087*** **	**-0.118*** **
	(0.025)	**(0.021)**	**(0.028)**
Education attainment (*First stage)*	0.019***	0.019***	0.019***
	(0.001)	(0.001)	(0.001)
Control behaviour	0.131***	0.084***	0.148***
	(0.001)	(0.001)	(0.001)
Women don't justify husband's wife beating	-0.012	-0.013***	-0.010***
	(0.003)	(0.002)	(0.003)
Access to information	0.009***	0.010	0.014***
	(0.002)	(0.001)	(0.002)
Partner drinks alcohol	0.083***	0.055***	0.097***
	(0.001)	(0.001)	(0.002)
Household has electricity	0.001	0.003	-0.005**
	(0.002)	(0.001)	(0.002)
Female-headed household	0.005***	0.006***	-0.005***
	(0.001)	(0.001)	(0.002)
Employed woman	0.030***	0.018***	0.030***
	(0.001)	(0.001)	(0.002)
Woman with at least one child	0.033***	0.015***	0.032***
	(0.002)	(0.001)	(0.002)
Women age			
20-24	0.021***	0.016***	0.028***
	(0.003)	(0.002)	(0.003)
25-29	0.042***	0.025***	0.045***
	(0.003)	(0.002)	(0.004)
30-34	0.048***	0.028***	0.048***
	(0.003)	(0.003)	(0.004)
35-39	0.058***	0.032***	0.053***
	(0.003)	(0.003)	(0.004)
40-44	0.063***	0.037***	0.056***
	(0.004)	(0.003)	(0.004)
45-49	0.069***	0.040***	0.057***
	(0.004)	(0.003)	(0.005)
Urban residence	0.009***	0.006***	0.005***
	(0.001)	(0.001)	(0.002)
Wealth			
Poorer	0.002	-0.002*	-0.001
	(0.001)	(0.001)	(0.002)
Middle	-0.001	-0.007***	0.001
	(0.002)	(0.001)	(0.002)
Richer	-0.004*	-0.012***	-0.008***
	(0.002)	(0.001)	(0.002)
Richest	-0.011***	-0.017***	-0.016***
	(0.003)	(0.002)	(0.003)
More than once in union	0.021***	0.015***	0.017***
	(0.002)	(0.002)	(0.002)
Partner's education level			
primary	0.008***	0.010***	0.014***
	(0.002)	(0.002)	(0.002)
Secondary	-0.006**	0.001	-0.004

	(0.002)	(0.002)	(0.002)
Higher	-0.021***	-0.009***	-0.014***
	(0.003)	(0.002)	(0.003)
Woman's father ever beat her mother	0.079***	0.047***	0.092***
	(0.001)	(0.001)	(0.002)
Number of obs.	997,717	997,653	857,245
F-statistic on the excluded instrument	1191.30	1192.28	1146.84
Weak identification test	3797.270	3798.149	3637.425

Notes: All estimations also include year and country dummies, and a constant, not reported to save space. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.

Appendix 14 – Emotional IPV and indicators of women decision making

Variables	(1) Healthcare	(2) Large purchases	(3) Visits to family	(4) Husband's earnings
		Second stage		
Decision making	**-0.169*** (0.022)**	**-0.160*** (0.020)**	**-0.192*** (0.025)**	**-0.210*** (0.027)**
Education attainment (*First stage)*	0.026*** (0.001)	0.027*** (0.001)	0.022*** (0.001)	0.021*** (0.001)
Control behaviour	0.184*** (0.001)	0.183*** (0.001)	0.182*** (0.002)	0.182*** (0.002)
Women don't justify husband's wife beating	-0.014*** (0.003)	-0.015*** (0.003)	-0.011*** (0.003)	-0.019*** (0.003)
Access to information	0.016*** (0.002)	0.016*** (0.002)	0.018*** (0.002)	0.018*** (0.002)
Partner drinks alcohol	0.116*** (0.002)	0.115*** (0.002)	0.117*** (0.002)	0.111*** (0.002)
Household has electricity	-0.000 (0.002)	0.001 (0.002)	0.001 (0.002)	-0.001 (0.002)
Female-headed household	0.005** (0.002)	0.003* (0.002)	0.004* (0.002)	-0.008*** (0.002)
Employed woman	0.042*** (0.002)	0.043*** (0.002)	0.042*** (0.002)	0.039*** (0.002)
Woman with at least one child	0.047*** (0.002)	0.048*** (0.002)	0.048*** (0.002)	0.045*** (0.002)
Women age				
20-24	0.031*** (0.003)	0.031*** (0.003)	0.031*** (0.003)	0.028*** (0.003)
25-29	0.053*** (0.004)	0.053*** (0.004)	0.053*** (0.004)	0.047*** (0.004)
30-34	0.057*** (0.004)	0.058*** (0.004)	0.058*** (0.004)	0.050*** (0.004)
35-39	0.063*** (0.004)	0.064*** (0.004)	0.065*** (0.004)	0.055*** (0.004)
40-44	0.071*** (0.004)	0.072*** (0.005)	0.072*** (0.005)	0.061*** (0.005)
45-49	0.077*** (0.005)	0.079*** (0.005)	0.070*** (0.005)	0.066*** (0.005)
Urban residence	0.010*** (0.002)	0.011*** (0.002)	0.006*** (0.001)	0.008*** (0.001)
Wealth				
Poorer	0.001 (0.001)	0.001 (0.002)	-0.002* (0.001)	0.007 (0.002)
Middle	-0.002 (0.002)	-0.002 (0.002)	-0.007*** (0.001)	-0.002 (0.002)
Richer	-0.009*** (0.002)	-0.010*** (0.002)	-0.012*** (0.001)	-0.010*** (0.002)
Richest	-0.020*** (0.003)	-0.021*** (0.003)	-0.017*** (0.002)	-0.022*** (0.003)
More than once in union	0.018*** (0.002)	0.019*** (0.002)	0.010*** (0.002)	0.014*** (0.002)
Partner's education level				
primary	0.012*** (0.002)	0.013*** (0.002)	0.013*** (0.002)	0.013*** (0.002)
Secondary	-0.005** (0.002)	-0.004* (0.002)	-0.005* (0.002)	-0.005** (0.002)
Higher	-0.023***	-0.022***	-0.021***	-0.023***

	(0.003)	(0.003)	(0.002)	(0.002)
Woman's father ever beat her mother	0.112*** (0.001)	0.112*** (0.002)	0.112*** (0.002)	0.109*** (0.002)
Number of obs.	1,010,817	1,013,442	1,013,484	963,372
F-statistic on the excluded instrument	1449.66	1486.05	1221.98	946.47
Weak identification test	4724.100	4883.270	3616.036	2909.150

Notes: All estimations also include year and country dummies, and a constant, not reported to save space. Significance levels are indicated as $*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Robust standard errors in parentheses.