

Essays on Gender, Institutions, and Shocks:
Intra-Household Dynamics and Labour Market Adjustments

By

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A Thesis submitted to the
Faculty of Graduate and Postdoctoral Studies
of The University of Manitoba
in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

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Declaration of Co-Authorship

I declare that I am the sole author of Chapters 1 and 3 of this dissertation. Chapter 2, titled “*Effects of Conflicts on Labour Market Outcomes and Intimate Partner Violence: Evidence from Nepal*”, is co-authored with Dr. Dana Bazarkulova and Dr. Janice Compton. I outline the nature of co-authorship for this chapter below.

Contribution to Chapter 2

This chapter is based on a research idea developed as part of my PhD dissertation. I identified the topic, formulated the research questions, constructed and cleaned the dataset, developed the empirical strategy, and estimated the results. I also wrote the initial draft of the manuscript. The journal accepted my original proposal, which focuses on the effects of conflict on employment outcomes.

Following the acceptance of the initial proposal, the scope of the paper was expanded to include Intimate Partner Violence (IPV). At the time, the three of us were also working on another related proposal centred on IPV. Dr. Dana Bazarkulova led the integration of IPV-related content by preparing the IPV dataset, contributing to the literature review, and producing relevant maps. Dr. Janice Compton played a key role in restructuring the methodology and results sections in response to reviewer feedback and revised the manuscript multiple times to enhance clarity and rigor.

While all three co-authors contributed meaningfully, the research idea, data construction, and core methodology originate from my doctoral research. As such, all three agree that I am the first author of this chapter. Dr. Bazarkulova and Dr. Compton are listed as co-authors in recognition of their significant intellectual and editorial contributions during the development and revision of the final manuscript.

Abstract

This dissertation consists of three chapters examining the intersection of gender, institutions, and shocks. Standard economic models of household decision-making—specifically, cooperative bargaining and collective models—assume that the household achieves efficiency. While these models treat individual endowments as primary drivers of outcomes, this research demonstrates that women’s agency and economic well-being are embedded within broader structural constraints, ranging from social norms to large-scale exogenous shocks.

Chapter 1 develops a multidimensional framework to analyse bargaining power using the Demographic and Health Surveys (2005–2022) across seven South and Southeast Asian countries. By constructing indices for decision-making, financial independence, marital structure, and institutional norms, the study employs fractional logit models with fixed effects. The results show that while financial autonomy correlates with decision-making authority, marriage institutions often exert an equal or stronger association, particularly in South Asian contexts with restrictive kinship systems. Furthermore, the analysis reinterprets joint decision-making as a form of cooperative agency rather than dependence.

Chapter 2 investigates the legacy of the Nepalese Civil War on married women’s labour force participation and exposure to intimate partner violence. Using district-level conflict intensity and an instrumental variables strategy based on forest coverage, the chapter reveals cohort-specific heterogeneity. Older women experienced temporary employment gains consistent with an added-worker effect, while women who were adolescents during the war suffered long-term employment declines due to disrupted human capital accumulation.

Chapter 3 assesses labour supply adjustments in the United States following Hurricane Katrina. Using a novel panel from the Current Population Survey (2004–2006) and a difference-in-differences approach, the analysis finds that the likelihood of dual employment declined significantly in affected areas. This was driven by the involuntary displacement of wives rather than voluntary specialization, with the steepest declines occurring in households with young children.

Acknowledgments

I want to express my deepest gratitude to my supervisor, Dr. Janice Compton, for her invaluable guidance, encouragement, and unwavering support throughout my doctoral journey. Her mentorship has been instrumental in shaping this dissertation and my development as a researcher. She was always available for discussion, offered thoughtful feedback at every stage of my work, and continuously encouraged me to pursue new research ideas. I deeply admire her patience, insight, and belief in my work, all of which were essential in helping me complete this dissertation.

I am also sincerely grateful to the members of my dissertation committee. Dr. Ryan Compton played an important role in shaping my research interests. His course on the Economics of Conflict inspired the topic that eventually became Chapter 2 of this dissertation. Throughout the research process, he provided extensive and constructive feedback that greatly improved my work. I would also like to thank Dr. Safoura Moeeni, who joined my committee later in my PhD. Her careful reading of my dissertation and insightful feedback significantly strengthened the final version of this work. I am grateful to Dr. Elisabeth Gugl of the University of Victoria, the external examiner for my dissertation, for her thoughtful comments and constructive suggestions, which helped improve the quality and clarity of this work.

My appreciation also goes to Dr. Soodeh Saberian and Dr. Guillermo Gallacher for their encouragement, guidance, and valuable feedback in shaping my research. I am also grateful to the faculty members of the Department of Economics at the University of Manitoba for their support and guidance throughout my doctoral studies.

I owe my deepest personal gratitude to my wife, Morium Khatun, for her unwavering patience, encouragement, and constant support throughout my PhD journey. Her understanding, strength, and sacrifices allowed me to pursue and complete this demanding journey. I am equally grateful to my son, Iftikhar Hossain, whose presence has been a continuous source of joy, motivation, and inspiration. Their love and support have been the foundation that sustained me throughout this journey.

I would also like to express my heartfelt gratitude to my siblings who have supported and encouraged me throughout my educational journey. Finally, my sincere thanks go to my friends in Winnipeg and Dhaka, as well as my extended family members, for their support and encouragement throughout my academic journey.

Dedication

To my parents and my brother whose sacrifices made my education possible.

To my wife, Morium Khatun, and my son, Iftikhar Hossain, who are my greatest source of strength.

And to my teachers, who guided my path.

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Introduction

Standard economic models of household decision-making often analyze labour supply and resource allocation through the lens of efficient household outcomes, emphasizing individual endowments and preferences as the primary determinants of behaviour. Yet women's agency and economic well-being are embedded within broader institutional and structural environments that extend beyond individual resources. Social norms, marriage institutions, and large external shocks—from civil conflict to environmental disasters—can fundamentally shape both bargaining positions within households and opportunities in labour markets. Analyses that focus exclusively on individual attributes without accounting for these contextual forces risk providing an incomplete explanation of gender inequality.

This dissertation examines the intersection of gender, institutions, and shocks. It investigates how within-household dynamics—such as women's financial independence and spousal characteristics—interact with broader institutional and environmental forces, including community norms, violent conflict, and climate-related disasters, to shape women's intra-household bargaining power and labour market outcomes. By integrating institutional and contextual factors into empirical models of household behaviour, the dissertation highlights how gendered economic outcomes emerge from the interaction between household dynamics and external constraints.

Chapter 1 develops a multidimensional measurement framework to analyze women's bargaining power using repeated cross-sectional data from the Demographic and Health Surveys (2005–2022) across seven South and Southeast Asian countries. Four indices are constructed: (i) a revised bargaining power index that assigns greater weight to joint decision-making as a form of cooperative agency; (ii) a financial independence index capturing women's access to and control over economic resources; (iii) a marital structure and economic security index reflecting continuity and symmetry within marital arrangements; and (iv) a marriage institution (norms) index that summarizes both individual behaviours and community-level normative constraints. Using fractional logit models with country-by-survey-year fixed effects and DHS sampling weights, the chapter shows that while financial autonomy is strongly associated with women's decision-making authority, institutional constraints embedded in marriage systems often exert an equally strong—if not stronger—association. Particularly, in South Asian contexts characterized by restrictive kinship systems, marriage institutions significantly shape women's ability to participate in household decisions. The results also indicate that when joint decision-making is interpreted

as shared authority rather than dependence, marital stability and cooperative marital arrangements are positively associated with women's agency.

Chapter 2 examines the legacy of violent conflict by analyzing how Nepal's civil war affected married women's labour force participation and exposure to intimate partner violence (IPV). Using five waves of DHS data and exploiting district-level variation in conflict intensity, the chapter employs a difference-in-differences framework combined with an instrumental variables strategy based on forest cover to address the endogeneity of conflict exposure. The results reveal substantial cohort heterogeneity. Older women experienced temporary increases in employment during the conflict, consistent with an added-worker response to household economic shocks. In contrast, women who were children or adolescents during the war experienced persistent declines in employment later in life, consistent with disruptions to human capital accumulation and labour market entry. Although conflict exposure does not have a direct effect on IPV in the post-war period, the analysis suggests indirect effects through employment instability and household stress. These findings highlight how conflict generates long-lasting gendered economic consequences that extend beyond the period of violence.

Chapter 3 examines the labour market effects of large-scale environmental shocks and shifts the unit of analysis from individuals to couples. Using a newly constructed couple-level panel from the U.S. Current Population Survey (CPS) covering June 2004 to November 2006, the chapter applies a difference-in-differences framework to analyze how couples in Louisiana and Mississippi adjusted their employment following Hurricane Katrina relative to couples in neighbouring states. Much of the household labour supply literature emphasizes the added-worker effect, in which secondary earners increase labour supply following negative income shocks. However, disasters may simultaneously generate large labour demand shocks through firm closures, workplace destruction, and the reorganization of local economies. The results show that the probability of dual employment among couples declined by 3.1 percentage points after Katrina. This adjustment is primarily driven by employment losses among wives rather than by voluntary household specialization. Evidence from comparisons with single women and industry-level analysis indicates that these declines reflect displacement from female-dominated sectors rather than strategic intra-household labour reallocation. The effects are particularly pronounced among households with young children and among couples employed in service-sector industries, highlighting how gendered labour market structures shape household responses to environmental shocks.

Taken together, the three chapters demonstrate that women's economic outcomes cannot be understood solely in terms of individual-level characteristics. Instead, they emerge from the interaction between household power relations, institutional constraints, and exposure to external shocks. Across three empirical settings—South and Southeast Asia, Nepal, and the United States—the findings show that both household dynamics and broader societal and environmental conditions shape gendered economic outcomes. By integrating institutional variables into models of household behaviour, refining the measurement of women's agency, and examining couple-level labour market responses to shocks, the dissertation contributes to the literature on intra-household bargaining, gendered labour market adjustment, and economic resilience.

The remainder of the dissertation is organized as follows. Chapter 1 analyzes the relative influence of financial resources and institutional constraints on women's bargaining power across seven Asian countries. Chapter 2 investigates the short- and long-term effects of the Nepalese civil war on women's employment and exposure to intimate partner violence. Chapter 3 examines gendered intra-household labour market adjustments among U.S. couples following Hurricane Katrina.

Chapter 1

Rethinking Women's Intra-Household Bargaining Power: The Relative Association with Marriage Institutions, Financial Independence, and Marital Structure & Economic Security

Abstract

In this paper, I examine the relative association of financial independence, marital structure and economic security, and marriage institutions on women's intra-household bargaining power across seven South and Southeast Asian countries. Drawing on multiple waves of Demographic and Health Surveys (DHS) between 2005 and 2022, I construct four indices: (1) a women's bargaining power index capturing decision-making autonomy; (2) a financial independence index; (3) a marital structure and economic security index; and (4) a marriage institution (norms) index. A key aspect of my methodology is the use of a bargaining power index that assigns greater weight to joint decision-making, interpreting it as a marker of cooperative and balanced participation rather than diminished agency. Using fractional logit models, I find that while financial independence is a robust correlate of decision-making authority, institutional norms around marriage also play a decisive role. My analysis shows that the marriage institution index exhibits a comparable or stronger association with bargaining power relative to economic factors, particularly in South Asian sample countries where restrictive kinship systems are prevalent. Furthermore, I find that when joint decision-making is valued as shared authority, marital stability is positively associated with women's agency, challenging the assumption that stability solely reflects institutionalized dependence. I conclude that empowering women requires addressing deep-seated institutional constraints alongside economic interventions.

KEYWORDS

Intra-Household Bargaining; Financial Independence; Marriage Institutions; Gender Norms; Fractional Logit Model; Spousal Discordance

Highlights

- Joint decision-making is consistently associated with higher women's agency when viewed as shared authority.
- Institutional marriage norms show the strongest positive associations with bargaining power, especially in sampled countries in South Asia.
- Financial independence is positively linked to bargaining power, particularly among socioeconomically disadvantaged women.
- Marital stability and spousal symmetry are associated with more balanced decision-making in most country samples.

1.1 INTRODUCTION

Women's bargaining power within households plays a central role in shaping decisions about households' resource allocation, fertility, child investment, and long-term wellbeing. A large body of empirical research has demonstrated that women's access to income, assets, and education enhances their influence over household outcomes or wellbeing (Thomas 1990; Duflo 2012; Heath and Tan 2020). There is also an expanding literature documenting how factors beyond the household—such as marriage institutions, social norms, and legal frameworks—shape women's bargaining positions within households (Agarwal 1997; Jayachandran 2015; Field and Ambrus 2008). However, much of this work has examined these determinants independently, offering limited evidence on their relative importance when considered jointly within a unified empirical framework (Doepke and Tertilt 2019; Bernhardt et al. 2019).

Building on Agarwal's (1997) theoretical insights, I argue that a comprehensive understanding of women's bargaining power requires consideration of both "within-household" factors and the "beyond-household" structure of constraints. Agarwal extended cooperative bargaining models to incorporate broader constraints, including community norms, marriage practices, and state-level policies. Closely aligned with this perspective, Mabsout and van Staveren (2010) introduce institutional bargaining power as a third analytical layer, demonstrating that ethnic-level institutions mediate the effects of individual and household resources. This suggests that empowerment policies focus exclusively on individual resource accumulation may be insufficient where institutional norms remain strongly gendered. However, important gaps remain. First, most empirical applications of this framework are confined to intra-national variation, typically examining ethnic or community-level institutions within a single country. Second, the institutional features of marriage—such as age at marriage, dowry or bride price customs, and lineage systems—remain insufficiently integrated into cross-national empirical models, despite their central role in shaping women's social status, roles, and fallback positions (Anderson and Eswaran 2009; Jacobs and Kes 2014; Quisumbing and Maluccio 2003).

Building on this foundation, this paper addresses these gaps by examining two central questions: How do within-household factors (financial independence) and beyond-household factors (marital structure and institutional norms) jointly affect women's intra-household bargaining power? Moreover, does the correlation of beyond-household factors outweigh that of individual economic attributes across different social groups?

To answer these questions, I utilize multiple waves of Demographic and Health Surveys (DHS) from seven South and Southeast Asian countries—Bangladesh, India, Maldives, Nepal, Pakistan, Indonesia, and the Philippines—between 2005 and 2022. A methodological innovation of this study is the use of a revised bargaining power index that assigns greater weight to joint decision-making, interpreting it as a marker of cooperative and balanced participation rather than diminished agency.

My analysis using fractional logit models yields two key sets of findings. First, while women's financial independence is a robust and positive correlate of decision-making authority, institutional norms play a decisive, and often superior, role. The marriage institution index, which captures community-level norms, shows a stronger association with bargaining power than individual financial factors, particularly in South Asian sampled countries where restrictive kinship systems are prevalent. Second, contrary to the assumption that marital stability in traditional settings solely reflects institutionalized dependence, I find that marital structure & economic security is positively associated with women's agency. By viewing joint decision-making as a form of shared authority rather than submission, these results suggest that stable marital structures—when supported by economic security—can foster cooperative bargaining environments rather than merely constraining women's exit options.

This study makes three primary contributions. First and most importantly, it constructs four comprehensive indices capturing women's intra-household bargaining power and its determinants—financial independence, marital structure and economic security, and marriage institutions—based on widely available DHS indicators. This methodological approach allows for the rigorous operationalization of complex theoretical concepts into measurable variables using standard survey data. Second, by employing a revised bargaining power index that values joint decision-making, it challenges binary metrics of empowerment, demonstrating that marital stability can foster cooperative agency rather than merely signaling dependence. Third, it documents substantial heterogeneity across South and Southeast Asia, showing that while financial independence is crucial, deep-seated institutional constraints remain a binding force on women's power in gender-stratified settings.

The remainder of the paper is organized as follows. Section 2 proposes a bargaining framework incorporating gendered institutions. Section 3 presents the data, variable construction, and descriptive statistics. Sections 4 and 5 discuss the estimation results and key

findings. Finally, Section 6 concludes with policy implications regarding the distinction between individual and institutional levels of bargaining power.

1.2 FRAMEWORK AND LITERATURE

1.2.1 Mechanism/framework – intra-household bargaining power, determinants and outcome

I adopt a non-unitary model¹ of household behaviour, which conceptualizes decision-making as the outcome of a bargaining process among household members with distinct preferences, asymmetric power, and differential control over resources (Chiappori 1992; Lundberg and Pollak 1993). Within the non-unitary framework, women's intra-household bargaining power reflects their capacity to influence decisions across key domains of household life, including healthcare, financial expenditures, fertility choices, mobility, and investments in children. Importantly, bargaining outcomes depend not only on individual access to economic resources but also on outside options shaped by social norms, marital institutions, and legal protections that structure the relative fallback positions of spouses.

Most of the empirical literature identifies individual determinants like education, labour market participation, and asset ownership as central to enhancing women's bargaining power within the household, while institutional factors such as financial inclusion and political representation also play an enabling role (Doss, C. 2006; Dasgupta 2016; Dito 2011; Ogunleye, T.S. 2017). Agarwal (1997) challenges the limitations of individualistic frameworks by arguing that intra-household bargaining power cannot be adequately captured through personal endowments alone. She extends the determinants beyond the household, emphasizing broader institutional arenas—including the market, the community, and the state—which shape women's capacity to exercise agency.

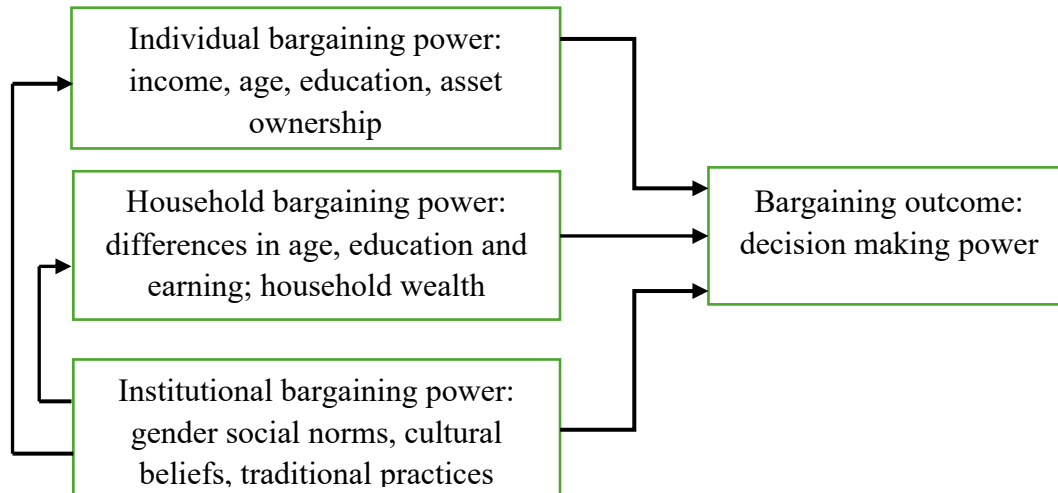
There are three interrelated pathways through which women's intra-household bargaining power is shaped (Figure 1). First, individual-level factors enhance a woman's fallback position within marriage. Human capital—particularly education—improves labour market opportunities, earnings potential, and awareness of rights (Doss 2013; Kabeer 1999). Employment and independent income strengthen leverage in both cooperative and threat-point bargaining models (Manser and Brown 1980; McElroy and Horney 1981). Asset ownership—such as land, housing, or financial savings—provides economic security and reduces dependency, reinforcing credible exit options (Agarwal 1997; Doss et al. 2014).

¹ This approach contrasts with unitary household models, which assume a single household utility function and pool preferences and resources across members.

Collectively, these factors enhance financial independence and strengthen women's negotiating capacity. Second, household-level characteristics structure the relational context of negotiation. Relative resources—age gaps, education differences, and earnings disparities—often matter more than absolute levels (Agarwal 1997). Marital structure, including monogamy versus polygamy, stability of union, and perceptions of headship, shapes authority patterns and bargaining asymmetries. Where divorce carries severe economic or social penalties, women's fallback positions weaken, reducing bargaining strength (Lundberg and Pollak 1993; Stevenson and Wolfers 2006). The household thus constitutes a strategic arena in which power is continuously negotiated. Third, institutional or beyond-household factors define the broader environment within which bargaining unfolds. Gender norms shape expectations regarding women's mobility, authority, and economic participation (Kabeer 1999). Practices such as early marriage, tolerance of wife-beating, or restrictive inheritance systems systematically weaken women's bargaining positions. Legal reforms in property rights, inheritance, and divorce laws can alter fallback options by strengthening the credibility of exit (Deininger et al. 2013; Johnson et al. 2016). Financial inclusion policies further expand independent economic agency. Institutional environments, therefore, structure both access to resources and the social legitimacy of women's claims within marriage.

These three-level bargaining power determinants are not isolated from each other but are closely interrelated. Institutions shape access to education, employment, and property, thereby influencing individual-level resources. They also structure household arrangements, such as age at marriage or marital form. At the same time, household practices may reproduce or challenge prevailing norms. Bargaining power is therefore not static but dynamic and endogenous: greater decision-making authority can facilitate resource accumulation, which in turn strengthens future bargaining capacity (Basu 2006). Intra-household bargaining should thus be understood as a multi-level process shaped by interactions among individual resources, relational structures, and institutional constraints.

Figure 1: Mechanisms Linking Determinants to Intra-Household Bargaining Outcomes



Note: Modified from Mabsout and van Staveren (2010).

1.2.2 Literature review: women bargaining power, determinants and outcome

A substantial theoretical and empirical literature suggests that joint decision-making reflects symmetric and cooperative bargaining rather than diminished agency. In cooperative household models, decisions emerge from negotiation between spouses who internalize each other's preferences, constraints, and outside options; when bargaining power is relatively balanced, efficient allocations often arise through joint agreement rather than unilateral control (Chiappori 1992; Browning and Chiappori 1998). Empirically, studies using DHS data show that higher education, spousal similarity, and more egalitarian gender norms are associated with greater joint decision-making, not necessarily a shift toward sole authority, indicating active participation rather than exclusion (Malhotra and Schuler 2005; Anderson and Eswaran 2009).

Experimental evidence further illuminates the specific mechanisms through which "jointness" facilitates cooperation. In the Philippines, research by Ashraf (2009) demonstrates that the observability of information between spouses is a primary determinant of resource allocation. When financial choices are private, individuals often act strategically to favour their own preferences; however, when choices are observable or require communication, behaviour shifts toward more cooperative outcomes that align with joint household interests. This suggests that joint decision-making acts as a vital monitoring and commitment device

that moves households toward Pareto-efficient allocations. However, the transition from individual to joint control involves complex trade-offs, as highlighted by Ashraf et al. (2014) in their study of fertility in Zambia. While providing women with individual control over resources allows them to bypass household constraints to meet their own preferences—such as reduced fertility—this autonomy can come with high psychosocial costs. Women who act independently without their husbands' knowledge reported lower subjective well-being, suggesting that unilateral agency may create marital tension that joint decision-making avoids.

Taken together, these findings support interpreting joint decision-making as an indicator of balanced bargaining power. Assigning greater weight to joint decisions aligns with modern bargaining theory by recognizing it as a marker of shared authority and cooperative governance, thereby avoiding the systematic penalization of more egalitarian households in empirical analysis.

Building on this conceptualization of bargaining power, a parallel literature examines the economic, institutional, and social factors that shape women's ability to participate in household decision-making. A growing body of research in development economics highlights the central role of women's financial autonomy in strengthening intra-household bargaining positions. Control over resources such as income, land, and housing is more likely to be directed toward child welfare and health, reflecting enhanced decision-making authority (Thomas 1990; Lundberg, Pollak, and Wales 1997). While early studies established the link between individual resource control and bargaining outcomes, Doss (2006) synthesizes cross-country evidence showing that women's access to income and assets consistently increases their role in household decision-making. More recent contributions, including Moeeni (2021), reinforce this pattern in the Iranian context, demonstrating that women's labour market participation enhances their influence over healthcare and budgetary decisions. Similar evidence from South Asia (Ambler et al. 2017; Heath 2014) and Sub-Saharan Africa (Annan et al. 2021) shows that paid employment—particularly in formal or regular sectors—is strongly associated with greater agency within the household.

The relationship between financial independence and bargaining power is not a uniform linear one. The income effects matter, depending on the type of earnings, as well as the existing practices in households and the community regarding how the earnings are spent. Studies such as Anderson and Eswaran (2009) distinguish between earned and unearned income, showing that labour earnings are more empowering than transfers or remittances. At the same time, backlash effects have been observed when women's earnings challenge

embedded gender norms (Bhattachary and Roy 2015). Ambler et al. (2017) draw attention to discrepancies between spouses' reports of decision-making roles, suggesting that spouses' decision-making autonomy may diverge from actual household dynamics. These findings underscore the importance of considering relational factors, such as relative age, education, earnings, and social dimensions, alongside economic indicators.

While economic resources got more attention in the literature, they are not the sole determinants of women's bargaining power. Marital structure—often presumed to reflect relational strength—shows an ambiguous association with agency. In patriarchal settings, longer marital duration and having children may signal reduced exit options rather than secure bargaining positions. Studies by Kabeer (1999) and Rahman and Rao (2004) argue that enduring unions may reinforce women's economic dependence and limit their leverage, particularly where social norms discourage divorce or separation. In a community where fewer women are in a divorce status, social norms may work against outside options. Adedini et al. (2019), using DHS data from West Africa, find that women in longer marriages are less likely to have a voice in reproductive health and financial matters. Fan (2020) and Musonera (2016) similarly highlight how stability may coincide with normative compliance rather than empowerment, particularly in South Asian and Middle Eastern contexts. Conversely, in more equal settings, marital stability can support agency, especially when spousal age and education gaps are narrow (Arora 2023). However, such effects tend to be the exception rather than the norm.

Marriage institutions—the social norms, customs, and community-level structures that govern marital relations—emerge as an important but underexplored factor shaping bargaining dynamics. Drawing on Agarwal's (1997) extension of the bargaining framework, recent studies have increasingly emphasized the need to situate household decision-making within institutional contexts. Field and Ambrus (2008) show that early marriage constrains long-term autonomy, while Dasgupta (2016) and Boudet et al. (2021) underscore how polygamy and dowry practices reinforce women's subordinate roles. Miotto (2019) and Yu (2023) utilize DHS-based institutional indices to demonstrate that community norms surrounding violence, education, and early marriage have predictive power over individual women's reported empowerment. Institutional constraints also mediate the extent to which individual resources translate into bargaining power. Mabsout and van Staveren (2010) introduce the concept of institutional bargaining power to capture how gendered social norms condition the effectiveness of women's economic resources. Using Ethiopian household survey data, they show that in communities characterized by highly unequal gender norms,

the expected positive association between women's resources and bargaining outcomes can weaken or even reverse. Exploiting variation across ethnic groups, their analysis underscores that the returns to women's economic resources are fundamentally context-specific and shaped by local institutional environments.

Despite growing recognition of the importance of institutional and normative constraints, the existing literature remains fragmented in its empirical treatment of these factors. While a substantial body of research documents the role of women's financial autonomy in shaping intra-household bargaining power (Doss 2006; Heath 2014; Ambler et al. 2017), far fewer studies systematically integrate beyond-household institutions—such as marriage norms, community gender attitudes, and marital exit constraints—into a unified analytical framework (Agarwal 1997; Mabsout and van Staveren 2010). Much of the existing evidence remains context-specific or confined to single-country settings, limiting comparative insight into how institutional environments condition the effectiveness of household-level resources (Quisumbing and Maluccio 2003; Anderson and Eswaran 2009). Moreover, although recent studies document systematic discrepancies in spouses' reports of decision-making authority, spousal discordance has rarely been incorporated into empirical analyses of bargaining power in large-scale, cross-national settings (Jejeebhoy 2003; Ambler et al. 2017). As a result, the interaction between institutional constraints, individual resources, and relational recognition within households remains insufficiently understood.

1.3 Empirical Strategy: Data and Econometric Model

1.3.1 Data and Variables

I draw on nationally representative microdata from the Demographic and Health Surveys (DHS), implemented by the DHS Program and funded by USAID. These surveys provide rich, comparable cross-country data on demographic outcomes, women's empowerment, household structure, and socioeconomic indicators. The analysis focuses on seven countries in South and Southeast Asia includes Bangladesh, India, Nepal, Pakistan, Maldives, Indonesia, and the Philippines, for which relatively recent rounds of DHS data are available. For each country, I include the three to four most recent standard DHS phases since 2005, except for the Maldives, which has only two such rounds during the relevant period (Table A1.1).

I restricted the unit of analysis to currently married women aged 15–49 years, excluding women who were never married, widowed, divorced, or separated. I further excluded observations with missing or incomplete responses for any of the key empowerment

variables. The analysis primarily relied on the women's questionnaire. For robustness checks, I subsequently used the men's questionnaire to examine spousal discordance in reported decision-making authority (Table A1.1). I obtained access to the DHS datasets through a formal application process, with approval granted by the DHS Program for research use.

Dependent Variable: Women's Bargaining Power

To quantify women's bargaining power within the household, I rely on self-reported responses to a standard set of decision-making questions included in the DHS. These questions ask who usually makes decisions regarding four domains: the respondent's own health care, major household purchases, visits to family or relatives, and the use of the husband's earnings.

Each question provides a categorical response indicating whether the decision is made by the respondent alone, jointly with her partner, or by someone else. Women who reported independent or joint decision-making with their husbands were classified as having higher intra-household bargaining power than women whose decisions were reported as being made solely by their husbands or other household members. A growing body of research emphasizes that joint decision-making capture cooperative bargaining, shared authority, and effective participation in household choices (Agarwal 1997; Seymour and Peterman 2018). Motivated by these considerations, I construct the basic bargaining power index using a coding that assigns greater weight to joint decision-making than to sole decision-making (joint = 2, alone = 1, others = 0). This specification captures women's inclusion in household decision-making without imposing a normative hierarchy that favors unilateral authority over shared governance (Table A1.2).

However, interpreting joint decision-making exclusively as egalitarian cooperation has limitations. The broader empowerment literature highlights that women may report a decision as "joint" even when it does not reflect true cooperative bargaining; instead, it may indicate a constraint in which a wife must secure her husband's explicit approval to act (Kabeer, 1999). In such contexts, "jointness" reflects permission-seeking behaviour rather than shared authority. I do not dismiss this alternative interpretation; instead, I acknowledge that the meaning of decision categories may vary across social contexts.

To address this ambiguity, I conduct several robustness checks using alternative constructions of the bargaining power variable. First, I estimate baseline models using a binary participation measure that distinguishes women who participate in decision-making (alone or jointly) from those whose decisions are made exclusively by others. Second, I

construct an alternative ordinal index that assigns the highest value to sole decision-making (alone = 2, joint = 1, others = 0). Across these specifications, the qualitative results remain unchanged, indicating that the findings do not depend on the particular ordinal ranking used in the baseline index.

Furthermore, a comprehensive analysis of intra-household bargaining should incorporate the husband's perspective. Recent studies show substantial spousal discordance: husbands and wives often report different decision-making dynamics within the same household (Ambler et al., 2017). Including men's responses would enable a richer analysis of recognized versus contested authority. However, the DHS administers the male questionnaire only to a sub-sample of households. Therefore, I rely primarily on women's responses to maintain consistent sample sizes and ensure comparability across countries and survey rounds.

Because these decision-making responses are ordinal in nature and do not necessarily represent equal distances between categories, treating them as cardinal may introduce measurement error. To address this concern, I employ polychoric principal component analysis (PCA), which is specifically designed for ordinal variables and derives data-driven weights based on the latent correlation structure among items. This approach avoids imposing arbitrary cardinal assumptions, allows the data to determine the relative contribution of each decision domain, and provides an internally consistent measure of women's bargaining power. I normalize the resulting index to range between 0 and 1.

Explanatory Indices

To examine the determinants of women's intra-household bargaining power, I construct three indices that capture key dimensions of women's economic autonomy, marital structure & economic security, and the marriage institution (norms) (Table A1.3). These indices are derived from standardized variables available in the DHS women's questionnaire and, where relevant, from community-level aggregates at the primary sampling unit (PSU) level.

Financial Independence Index

The Financial Independence Index captures a woman's access to and control over key economic resources relevant for intra-household bargaining. It is constructed using four indicators: (i) whether the respondent worked in the past 12 months, (ii) whether her work generated earnings received in cash or in-kind rather than unpaid labour, (iii) whether she owns a bank or financial institution account, and (iv) whether she reports owning land and/or a house, either individually or jointly. I code each component as a binary indicator and

normalize it to the [0,1] interval. The index is computed as the unweighted average across components, such that higher values indicate greater financial autonomy, with a value of 1 representing full financial independence across all measured dimensions.

To address potential simultaneity concerns—particularly the possibility that asset ownership may itself be influenced by women’s bargaining power—I use a baseline specification that excludes asset ownership and focuses on labour market participation, earnings modality, and financial inclusion. An extended specification that includes asset ownership is examined as a robustness check.

Marital Structure and Economic Security Index

I construct a Marital Structure and Economic Security Index to capture structural characteristics of marriage that shape household economic arrangements and bargaining environments, rather than emotional quality or relational outcomes. The index combines five indicators: (i) marital continuity (single versus multiple unions), (ii) spousal economic security proxied by husband’s employment type, (iii) relative age between spouses, (iv) relative educational attainment, and (v) relative earnings.

Importantly, relative age, education, and earnings are coded to emphasize spousal symmetry rather than unilateral dominance. These characteristics reflect graded differences in structural balance within marriage rather than discrete states. Accordingly, components are coded on a weakly ordered scale, with the highest values assigned to symmetric arrangements and intermediate values assigned to asymmetric arrangements, irrespective of direction. I normalize all components to the [0,1] interval and aggregate them using equal weights, such that higher values reflect marital arrangements characterized by greater continuity, economic security, and balanced spousal characteristics.

The Marriage Institution (Norms) Index

The Marriage Institution Index is designed to capture the normative and institutional features of marriage that shape women’s bargaining environments beyond individual economic resources. I construct a Marriage Norms Index that aggregates normalized indicators measured at both the individual and community levels, including early marriage, polygamy, and attitudes toward wife beating. These variables capture socially embedded expectations governing marital relations, gender hierarchy, and acceptable behaviour within marriage.

To mitigate the reflection problem (Manski 1993), I compute all community-level measures using leave-one-out PSU means, excluding the respondent's own value from the calculation of local norms. This procedure reduces the mechanical correlation between individual bargaining outcomes and contextual variables. Nevertheless, the analysis cannot entirely rule out endogenous sorting, as women with greater bargaining power may be more likely to reside in progressive communities. In the absence of exogenous variation in community norms, estimated effects should therefore be interpreted as associational rather than causal peer effects.

I normalize all indicators to the [0,1] interval and directionally align them so that higher values reflect more gender-equitable marriage norms. To assess robustness, I validate the additive index using factor analysis, which confirms a dominant latent dimension and produces results consistent with the baseline specification.

Figure 1.2 presents trends in women's bargaining power, measured using the ordinal index, across selected South and Southeast Asian countries between 2005 and 2022. Bargaining power generally increases over time, though both levels and trajectories vary substantially across countries. The Philippines consistently records the highest average scores, while India and Indonesia show steady improvements, particularly after the mid-2010s. In contrast, Pakistan and Nepal exhibit lower levels and greater volatility, with periods of decline followed by partial recovery. Bangladesh shows an initial increase followed by a modest decline in later years, whereas the Maldives displays a sharp rise in the most recent survey wave. Overall, the figure underscores persistent cross-country disparities and heterogeneous patterns of change in women's intra-household bargaining power.

Figure 1.2: Trends in women bargaining power (ordinal) index by country

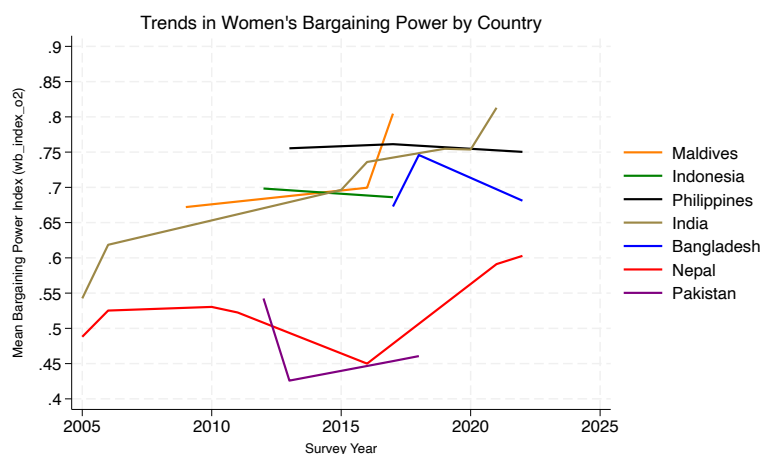


Table A1.4 reports summary statistics for the key indices and respondent characteristics across the seven South and Southeast Asian countries in the sample. Average levels of women’s bargaining power vary substantially across contexts, ranging from relatively low values in Pakistan (0.481) and Nepal (0.525) to markedly higher levels in Indonesia (0.692) and the Philippines (0.756). Similar cross-country heterogeneity is observed for the Financial Independence Index, with particularly low mean values in Pakistan (0.123) and higher levels in Nepal (0.401), Indonesia (0.495), and the Philippines (0.476). In contrast, the Marital Structure & Economic Security Index exhibits relatively high mean values with less dispersion across countries, reflecting the prevalence of stable marital arrangements and limited exit options in many contexts. The Marriage Institution (Norms) Index, however, shows greater variation across countries, capturing meaningful differences in community-level norms and institutional constraints governing marriage, gender roles, and women’s social status.

The demographic composition of the sample also differs substantially across countries. South Asian samples—particularly Bangladesh, India, Nepal, and Pakistan—are characterized by lower female educational attainment and higher concentrations of husbands in manual or informal employment. At the same time, Indonesia and the Philippines exhibit higher levels of secondary and tertiary education among both women and their spouses. Urban residence varies widely across contexts, underscoring the heterogeneity in socioeconomic environments. Together, these descriptive patterns highlight substantial variation in both within-household resources and institutional contexts, motivating a comparative framework that jointly examines individual, relational, and normative determinants of women’s intra-household bargaining power.

1.3.2 Model Specification

To examine how women’s intra-household bargaining power varies with financial independence, marital structure & economic security and marriage institutions (norms), I estimate the following model using pooled cross-sectional data from multiple waves of the Demographic and Health Surveys (DHS):

$$wb_{i,c,t} = \alpha_0 + \beta_1 F_{i,c,t} + \beta_2 S_{i,c,t} + \beta_3 I_{i,c,t} + \theta X_{i,c,t} + \delta_c + \gamma_t + \varepsilon_{i,c,t}$$

where $wb_{i,c,t}$ is the normalized index of intra-household bargaining power for women i in a country c and survey year t scaled to the $[0,1]$ interval. The basic model includes the ordinal scale of women bargaining power (alone, jointly and others. The three main

explanatory variables, and correspond to constructed indices capturing financial independence, marital structure and economic security, and marriage institutions respectively. All three indices are scaled $[0,1]$ to ensure comparability. The vector $X_{i,c,t}$ includes a set of individual and household level controls including respondents age group, education level (respondent and spouse), household wealth quintile, urban or rural residence, religion and region of residence. I included country fixed effects and survey year fixed effects to account the unobserved heterogeneity across countries and common shocks over time. The error term captures individual-level unobserved factors.

To assess heterogeneity in the relationship between women's intra-household bargaining power and the key explanatory variables, I extend the baseline specification by estimating interaction models in which the core indices—financial independence, marital structure and economic security, and marriage institutions (norms)—are interacted with selected individual and household characteristics. Specifically, I examine differential effects across women's age groups, educational attainment, household wealth quintiles, and countries. These interactions allow the estimated associations to vary systematically across social and economic contexts and help identify groups for whom institutional and economic constraints are more binding.

Across all specifications, I employ a fractional logit estimator to account for the bounded nature of the dependent variable and to avoid the limitations of linear models, such as predictions outside the unit interval. Following Papke and Wooldridge (1996), this approach accommodates both continuous and categorical covariates and yields consistent estimates when outcomes lie in the $[0,1]$ range. I weight all regressions using DHS sample weights, and robust standard errors are clustered at the primary sampling unit (PSU) level to account for intra-cluster correlation arising from the survey design.

1.4 RESULTS

1.4.1 Basic Model Estimates

I begin the analysis by estimating women's intra-household bargaining power using the full pooled sample of currently married women across all countries and survey years. To assess the potential role of selection bias, I estimate a Heckman two-step model in which the first stage models the probability of being married and the second stage estimates women's bargaining power conditional on marriage (Table A1.5). The inverse Mills ratio is positive and statistically significant, indicating non-random selection into marriage. Importantly, correcting for selection does not materially change the results: financial independence,

marital structure and economic security, and marriage institutions remain positively and significantly associated with women's bargaining power, with magnitudes comparable to the married-only estimates. This suggests that while selection into marriage is present, it does not drive the main findings.

Table 1.1 reports average marginal effects (AMEs) from fractional logit regressions using the revised ordinal measure of women's intra-household bargaining power, in which joint decision-making is assigned greater weight than sole decision-making. Model 1 shows that women's financial independence is positively and statistically significantly associated with higher bargaining power. A one-unit increase in the Financial Independence Index is associated with a 5.2-percentage-point increase in the probability that women report greater involvement in household decision-making. This association remains stable and slightly larger in the fully specified model (Model 4), increasing to 5.6 percentage points, indicating a robust relationship between women's economic autonomy and their reported agency within the household.

Model 2 examines the role of marital structure and economic security. In contrast to the baseline specification that assigns greater weight to sole decision-making, the revised coding yields a positive and statistically significant association. Higher values of the Marital Structure and Economic Security Index are associated with a 10.6-percentage-point increase in women's bargaining power, with the magnitude remaining substantial (8.5 percentage points) when all indices are included jointly in Model 4. This pattern suggests that more stable and symmetric marital arrangements are associated with greater joint participation in household decisions rather than diminished agency.

Model 3 isolates the role of marriage institutions and normative contexts, incorporating both individual- and community-level measures such as early marriage prevalence, polygamy, acceptance of wife-beating norms, and attitudes toward women's education and employment. The Marriage Institutions Index is strongly and positively associated with women's bargaining power, corresponding to a 14.3-percentage-point increase in the probability of higher reported agency. This association remains unchanged in the joint specification (Model 4), underscoring the central role of broader institutional and normative environments—beyond household-level characteristics—in shaping women's decision-making roles.

Across all specifications, the direction, magnitude, and statistical significance of the estimated associations remain consistent when the three indices are included jointly. Given the absence of substantive multicollinearity among the core indices, as documented by low

pairwise correlations and variance inflation factors, I therefore focus on the joint specification in the subsequent analysis². I prepared (not presented) the corresponding fractional logit coefficients, which mirror the patterns observed in the average marginal effects presented in Table 1.1.

Table 1.1: Average marginal effects (AMEs) from fractional logit model for women's bargaining power index

Indices	Women's Bargaining Power Index (Ordinal Scale: Joint 2, Alone 1, Other 0)			
	Model 1	Model 2	Model 3	Model 4
Financial Independence Index	0.052*** (0.005)			0.056*** (0.004)
Marital Structure & Economic Security Index		0.106*** (0.012)		0.085*** (0.011)
Marriage Institution (Norms) Index			0.143*** (0.006)	0.143*** (0.006)
Controls	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes
Country× Survey Year Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	428,301	428,301	428,301	428,301

Notes: This table reports selected average marginal effects (dy/dx) from fractional logit models; PSU-clustered standard errors are shown in parentheses. The dependent variable is the Women's Bargaining Power Index (polychoric PCA, normalized to 0–1). The Financial Independence, Marital Structure and Economic Security, and Marriage Institutions (Norms) indices are each scaled to the 0-1 range. All specifications control for respondent age group, respondent and spouse education, household wealth quintile, and urban residence, and include country-by-survey-year fixed effects. Estimates are weighted using DHS sampling weights (v005). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

I next examine heterogeneity in women's bargaining power across countries. Table 1.2 reports country-specific average marginal effects (AMEs) from fractional logit models estimating women's intra-household bargaining power, measured using an ordinal index that assigns greater weight to joint decision-making than to sole decision-making. Several important patterns emerge. First, women's financial independence is positively and statistically significantly associated with higher bargaining power in most countries, though the magnitude varies considerably. The association is particularly strong in Pakistan (0.219) and Nepal (0.125), followed by Bangladesh (0.118) and India (0.055). These results suggest that access to employment, independent income flows, and economic resources is closely linked to women's participation in household decision-making in contexts where traditional gender norms remain salient. In contrast, the association is weak or statistically insignificant in the Philippines and negative in the Maldives, indicating that economic resources alone

² Pairwise correlations among the core indices are low (≤ 0.23), and VIFs are close to unity (1.14-1.37). Higher VIFs arise only from fixed effects. Thus, multicollinearity does not drive the joint specification.

may be insufficient to enhance bargaining power in settings where decision-making is shaped more strongly by institutional or normative factors.

Second, the Marital Structure and Economic Security Index exhibit a positive and statistically significant association with women's bargaining power in most countries, including Bangladesh, India, Indonesia, Nepal, and the Philippines. Because joint decision-making receives greater weight in this specification, these results indicate that marital arrangements characterized by greater stability, spousal similarity, and economic security are associated with more cooperative and shared decision-making, rather than diminished agency. The absence of a significant association in Pakistan suggests heterogeneity in how marital structure translates into bargaining outcomes across institutional contexts.

Third, marriage institutions and normative environments play a central but highly uneven role across countries. The Marriage Institutions Index is strongly and positively associated with women's bargaining power in India (0.167), Indonesia (0.073), Nepal (0.050), and especially Pakistan (0.475), highlighting the importance of broader social norms, legal frameworks, and community-level attitudes toward women's roles. By contrast, the association is weak or statistically insignificant in the Maldives and the Philippines, suggesting that institutional constraints and norms operate differently across these settings.

These findings underscore substantial cross-country heterogeneity in the determinants of women's bargaining power.

Table 1.2: Average marginal effects (AMEs) from fractional logit model for women's bargaining power index by sample country

Indices	Women's Bargaining Power Index (Ordinal Scale: Joint 2, Alone 1, Other 0)						
	Bangladesh	India	Indonesia	Maldives	Nepal	Pakistan	Philippines
Financial Independence Index	0.118*** (0.008)	0.055*** (0.006)	0.036*** (0.006)	-0.032*** (0.012)	0.125*** (0.011)	0.219*** (0.021)	-0.008 (0.009)
Marital Structure & Economic Security Index	0.093*** (0.023)	0.076*** (0.023)	0.073*** (0.014)	0.078*** (0.025)	0.099*** (0.023)	-0.022 (0.048)	0.184*** (0.022)
Marriage Institution (Norms) Index	0.049** (0.019)	0.167*** (0.011)	0.073*** (0.013)	0.021 (0.028)	0.050** (0.025)	0.475*** (0.037)	-0.003 (0.020)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	36,454	235,069	65,176	10,351	33,056	19,118	29,077

Notes: Country-specific AMEs from fractional logit models. The dependent variable is a normalized women's bargaining power index (0–1), constructed using ordinal decision-making responses where joint decisions receive greater weight than sole decisions. All models include demographic controls, survey-year fixed effects, DHS sampling weights, and PSU-clustered standard errors. *, **, *** denote significance at the 10%, 5%, and 1% levels.

1.4.2 Heterogeneity by Individual, Household, and Contextual Characteristics

I next examine whether the associations between women's bargaining power and the three core indices—financial independence, marital structure and economic security, and marriage institutions—vary systematically across individual, household, and contextual characteristics. This heterogeneity analysis evaluates whether the estimated relationships are uniform across the population or whether they are stronger for particular social groups. Figure 1.4 presents the results by age group, while additional heterogeneity patterns by education, household wealth, residence, and spousal characteristics are reported in Figures A1.5–1.9.

Across all subgroup analyses, financial independence is positively and statistically significantly associated with women's bargaining power. However, the magnitude of this association varies along life cycle and socioeconomic dimensions. As shown in Figure 1.4, the average marginal effects are largest among women aged 25–34 and 35–44, consistent with a stage of the life cycle in which women's economic contributions are likely to be most salient for household decision-making. The association is also stronger among women with no or only primary education and among those in poorer wealth quintiles, with diminishing marginal gains observed among more educated and wealthier households. This pattern suggests that financial resources are particularly consequential for bargaining power where baseline economic constraints are tighter. Moreover, stronger effects are observed when husbands are unemployed or engaged in lower-status occupations, highlighting the importance of women's relative economic position within the household rather than absolute resources alone.

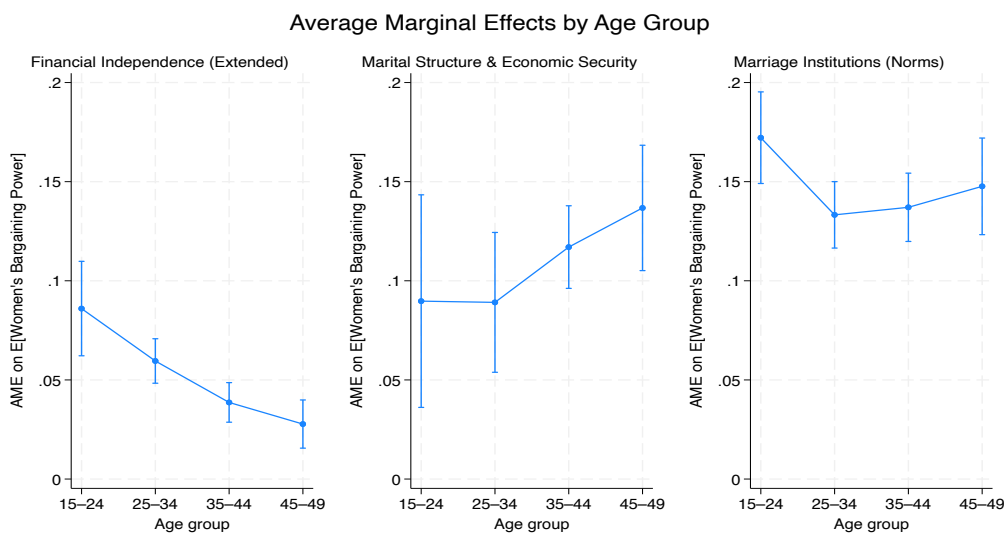
Importantly, these patterns also underscore that financial independence may partly reflect the normative and institutional environments in which women operate. In settings characterized by restrictive gender norms, women's access to paid work, independent income, or financial accounts may itself be shaped by prevailing bargaining structures, implying that financial independence both influences and reflects bargaining power. This interpretation is consistent with theoretical and empirical work emphasizing the joint evolution of economic resources, norms, and intra-household power (Agarwal 1997; Kabeer 1999; Duflo 2012).

Under the revised coding that assigns greater weight to joint decision-making, marital structure and economic security exhibit a positive and statistically significant association with women's bargaining power across most subgroups. The effects are strongest among younger

women, women with lower education, and those in poorer households. This pattern is consistent with the interpretation that stable marital arrangements—characterized by spousal similarity and economic security—are associated with greater shared authority rather than reduced female participation. When joint decision-making is treated as a marker of cooperative and balanced bargaining, marital stability is linked to more inclusive decision-making environments rather than diminished agency.

Finally, marriage institutions and normative contexts display substantial heterogeneity across social groups. The positive association between the Marriage Institutions Index and women’s bargaining power is strongest among women with lower education and those in poorer households, indicating that institutional constraints are particularly binding for disadvantaged groups. Cross-country differences are pronounced, with larger associations observed in contexts such as Pakistan and Nepal, where kinship systems and gender norms remain more restrictive. These findings highlight the central role of broader institutional and normative environments—beyond household-level characteristics—in shaping women’s bargaining positions.

Figure 1.4: Average marginal effects of financial independence, marital stability, and marriage institution indices on women’s bargaining power by age group



Notes: This figure reports average marginal effects (AMEs) from fractional logit regressions of the Women’s Bargaining Power Index on Financial Independence, Marital Structure and Economic Security, and Marriage Institutions (Norms), interacted with the respondent’s age group (15–24, 25–34, 35–44, and 45–49). Each panel displays the conditional AME evaluated at each age category, holding other covariates at their observed values. The dependent variable is a composite index of women’s intra-household bargaining power, normalized to the [0,1] interval. All models control for women’s and husbands’ education, household wealth quintile, urban residence, and include country × survey year fixed effects. Robust standard errors are clustered at the PSU level, and error bars denote 95% confidence intervals.

Taken together, the heterogeneity analysis indicates that women’s bargaining power is most responsive to economic resources and institutional conditions among socially and economically disadvantaged groups. Moreover, the joint decision-making having higher

weight reveals that marital stability is associated with more balanced bargaining arrangements rather than reduced agency, reinforcing the importance of measurement choices for interpreting intra-household power dynamics.

1.5 Robustness Check

Robustness to Binary Participation and Alternative Rankings to Measure of Bargaining Power

I re-estimate the baseline models using a binary measure of women's intra-household bargaining power that distinguishes between participation and non-participation in decision-making. Under this specification, decision outcomes in which the woman reports deciding either alone or jointly with her spouse are coded as one, while decisions made exclusively by others are coded as zero. This alternative coding relaxes the implicit ranking between sole and joint decision-making embedded in the ordinal index and instead captures whether women have any voice in household decisions. Empirically, several studies using DHS data adopt binary participation measures to avoid penalizing households characterized by shared decision-making arrangements (Anderson and Eswaran 2009; Malhotra and Schuler 2005; Heath and Tan 2020).

The results obtained under this binary specification closely mirror the baseline findings, presented in Table A1.6 and Table A1.7. Financial independence and marriage institutions remain positively and statistically significantly associated with women's bargaining power, while the qualitative pattern for marital structure and economic security is unchanged. Although effect sizes differ modestly due to the change in scale, no substantive conclusions are altered. This consistency indicates that the main results are not driven by the ordinal ranking of decision-making categories and are robust to alternative definitions of women's agency based on participation rather than sole authority.

As an additional robustness check, I estimate the models using an alternative ordinal index that assigns the highest value to sole decision-making (alone = 2, joint = 1, others = 0). This specification tests whether the baseline findings are sensitive to the traditional assumption in the empowerment literature that unilateral authority represents the highest level of female agency (Kabeer 1999; Malhotra and Schuler 2005). The results (Table A1.8 and Table A1.9) confirm the stability of the core relationships: the coefficients for financial independence and marriage institutions remain positive and statistically significant. However,

the marital structure and economic security index yield negative coefficients, reversing their signs relative to the baseline model.

This reversal is a mechanical artifact rather than a contradiction of theory. Because the alternative index rewards sole authority, the negative coefficient confirms that stable marriages foster joint decisions—a result perfectly aligned with cooperative bargaining models. This highlights how ranking unilateral authority highest unintentionally penalizes cooperative households. Consequently, modern literature increasingly prioritizes active participation (whether joint or independent) over sole authority as the most reliable measure of empowerment (Agarwal 1997; Anderson and Eswaran 2009; Seymour and Peterman 2018).

Robustness to Alternative Constructions of Financial Independence

The Financial Independence Index aggregates labour market participation, earnings form, financial account access, and asset ownership. While these components capture related dimensions of women's economic position, asset ownership may itself be shaped by intra-household bargaining, raising concerns about simultaneity and post-treatment bias. A substantial literature shows that assets and bargaining power evolve jointly, making it difficult to treat ownership as exogenous in non-experimental settings (Agarwal 1997; Duflo 2012). To address this concern, I assess robustness using alternative index constructions that exclude ownership-based components and focus on contemporaneous indicators of economic participation.

Comparing Tables 1.1–1.2 with Tables A1.10–A1.11 shows that the main results are highly robust to excluding asset ownership from the Financial Independence Index. In the pooled specifications, the estimated AME of financial independence declines modestly when ownership is excluded (from 0.052–0.056 to 0.048–0.051), but remains positive, precisely estimated, and statistically significant across all models. This indicates that the baseline association is not driven mechanically by asset ownership and instead reflects contemporaneous economic participation through employment, earnings form, and financial account access.

At the country level, the same qualitative pattern holds. The magnitude of the financial independence effect falls slightly in most countries when ownership is excluded—most notably in Pakistan and Nepal—but the sign and statistical significance remain unchanged in all cases where the baseline effect was significant. Countries where the association was weak or insignificant in the baseline specification (e.g., the Philippines and Maldives) remain so

under the alternative construction, indicating that results are not sensitive to index composition in those contexts. Taken together, these results confirm that the central findings are not driven by post-treatment bias arising from asset ownership.

Robustness to Alternative Index Construction Using Factor Analysis

In the baseline analysis, the key explanatory indices are constructed using additive aggregation of standardized components and assigns equal weight to each component. To assess whether the results are sensitive to this assumption, I re-construct the Financial Independence, Marital Structure and Economic Security, and Marriage Institution indices using factor analysis. Factor-based indices allow the data to determine the relative contribution of each component and reduce concerns that results are driven by arbitrary weighting schemes.

This approach follows a growing literature that employs latent factor methods to summarize multidimensional concepts such as empowerment, autonomy, and institutional constraints (Filmer and Pritchett 2001; Peterman et al. 2015; Anderson and Eswaran 2009). Re-estimating the baseline models using factor-based indices yields results (Table A1.12) that are qualitatively similar in sign, magnitude, and statistical significance to the main findings (Table 1.1), indicating that the observed associations are not sensitive to the choice of index construction method. Thus, the comparison of Tables 1.1 and A1.12 shows that the main findings are not driven by additive index construction or by specific components such as asset ownership. The consistency across measurement strategies strengthens confidence that the observed relationships reflect robust correlations between economic position, marital arrangements, institutional context, and women's intra-household bargaining power.

Robustness to Linear Specifications

The main results are estimated using fractional logit models to account for the bounded nature of the bargaining power index. As an additional robustness check, I re-estimate the baseline specifications using linear regression models. A comparison of the baseline fractional logit estimates (Table 1.2) and the linear OLS specification (Table A1.13) indicates that the core results are highly stable across functional forms. Across most countries, the signs, relative magnitudes, and statistical significance of the three indices remain remarkably consistent. This consistency suggests that the main conclusions are not driven by functional form assumptions and reinforces the robustness of the findings across alternative estimation strategies.

1.6 DISCUSSION

In this study, I examine the relative association of financial independence, marital structure and economic security, and marriage institutions on women's intra-household bargaining power across South and Southeast Asian sample countries using Demographic and Health Survey (DHS) data and fractional logit models. The analysis draws on pooled, nationally representative samples from seven countries, spanning the period from 2005 to 2022. It evaluates how individual- and institutional-level factors shape women's autonomy in household decision-making domains, including healthcare, major purchases, mobility, and use of earnings.

Across all specifications, women's financial independence is robustly and positively associated with higher bargaining power. Women with greater engagement in paid work, independent income flows, access to financial accounts, and—where included—assets are more likely to report active participation in household decision-making. This finding is consistent with non-unitary household models, which emphasize that access to economic resources strengthens women's fallback positions and negotiating capacity within the household (Agarwal 1997; Lundberg and Pollak 1993; Duflo 2012). Importantly, the magnitude and significance of this association remain stable across alternative index constructions, functional forms, and robustness checks, indicating that the relationship is not driven by a specific coding choice or estimation strategy.

At the same time, the heterogeneity analysis suggests that financial independence may also reflect the normative and institutional environments in which women operate. Stronger associations among younger women, those with lower education, poorer households, and women whose husbands face weaker labour market attachment indicate that economic resources matter most where baseline constraints are tighter. In such contexts, access to employment or income may both shape and signal bargaining power, reinforcing the view that economic autonomy and intra-household power evolve jointly rather than unidirectionally (Kabeer 1999; Agarwal 1997).

An important implication of the revised measurement strategy concerns the interpretation of marital structure and economic security. When joint decision-making is assigned greater weight, marital structure exhibits a positive and statistically significant association with women's bargaining power in the pooled sample and in most country-specific analyses. This stands in contrast to specifications that privileged sole decision-making authority and yielded negative coefficients. This suggests that marital arrangements characterized by spousal

similarity, economic security, and stable unions are more likely to be associated with cooperative and shared decision-making rather than diminished female agency. This pattern is consistent with cooperative bargaining models, in which joint decisions emerge as efficient outcomes when bargaining power is relatively balanced (Chiappori 1992; Browning and Chiappori 1998). More generally, the findings underscore that empirical conclusions about the role of marital stability depend critically on how joint decision-making is conceptualized and measured.

Marriage institutions and normative environments emerge as particularly powerful correlates of women's bargaining power. The Marriage Institutions Index—capturing early marriage norms, polygamy, community acceptance of wife-beating, and attitudes toward women's education and employment—exhibits the largest average marginal effects in the pooled models. This association remains strong across robustness checks and is especially pronounced in socially restrictive contexts such as Pakistan and Nepal. These results highlight the central role of broader institutional and normative constraints in shaping intra-household power relations, above and beyond individual economic characteristics. They support a growing literature emphasizing that women's agency is deeply embedded in social norms and kinship systems, which condition the effectiveness of individual resources (Mabsout and Van Staveren 2010; Field and Ambrus 2008; McKelway 2020).

The country-specific results further reveal substantial heterogeneity in how economic and institutional factors translate into bargaining power. While financial independence and marital structure are positively associated with women's bargaining power in most South Asian sampled countries, their association are weaker or absent in some Southeast Asian contexts, such as the Philippines and the Maldives. In contrast, marriage institutions display sharp cross-country variation, with particularly large association in settings where gender norms are more restrictive. These patterns suggest that similar resources may yield different bargaining outcomes depending on institutional context, reinforcing the need for comparative and context-sensitive analyses.

The heterogeneity analysis by age, education, wealth, residence, and spousal characteristics further demonstrates that women's bargaining power is not uniformly shaped across the population. Economic resources and institutional conditions are most consequential for socially and economically disadvantaged groups, indicating that empowerment gains are highly uneven. Moreover, assigning greater weight to joint decision-making reveals that marital stability is associated with more balanced bargaining

arrangements rather than reduced agency, particularly among younger and less advantaged women.

Finally, the robustness analyses confirm that the main findings are not driven by selection into marriage, index construction, asset ownership, or functional form assumptions. Correcting for marital selection using a Heckman framework yields qualitatively identical results. Excluding asset ownership from the financial independence index produces only modest reductions in magnitude without altering conclusions. Factor-analytic indices and linear specifications similarly preserve the core patterns. Taken together, these results indicate that the observed associations reflect stable and systematic relationships between women's economic position, marital arrangements, institutional context, and reported bargaining power.

Overall, this study provides strong evidence that women's intra-household bargaining power in the sample seven countries is jointly shaped by economic autonomy and institutional environments. By emphasizing joint decision-making as a marker of balanced participation rather than diminished agency, the analysis offers a more nuanced interpretation of marital dynamics and highlights the importance of measurement choices in empowerment research.

1.7 CONCLUSIONS

In this study, I examine how women's intra-household bargaining power is shaped not only by individual and household-level characteristics—such as financial independence and marital arrangements—but also by broader marriage institutions and social norms across South and Southeast Asia. Using harmonized Demographic and Health Survey (DHS) data and a multidimensional measure of women's agency, the analysis shows that both financial autonomy and institutional context are strongly associated with women's participation in household decision-making.

Across specifications, women's financial independence remains a robust and positive correlate of bargaining power. At the same time, marriage institutions—capturing norms around early marriage, polygamy, and gender attitudes—exhibit equally strong and, in some contexts, larger associations, underscoring the central role of normative environments in shaping women's agency. Importantly, the interpretation of marital structure and economic security depends on how decision-making authority is measured. When joint decision-making is treated as a marker of balanced participation rather than diminished agency, marital

structure is positively associated with women's bargaining power in the pooled sample and most country-level analyses. This contrasts with specifications that privilege sole authority and highlights how measurement choices shape conclusions about marital dynamics.

Overall, the findings suggest that improving women's bargaining power requires more than expanding access to income or employment alone. Economic resources matter most where institutional constraints are binding, and their effectiveness depends critically on the surrounding marriage norms and social context. Policies aimed at women's empowerment should therefore combine financial inclusion with efforts to reduce early marriage, challenge restrictive marital norms, and promote more egalitarian gender attitudes within communities.

I acknowledge several limitations. The cross-sectional design precludes causal inference, and self-reported indicators may be subject to social desirability or recall bias. Due to the design of the DHS data, I was unable to determine whether women's bargaining power changes over time. Future research can focus on other survey data with a longitudinal nature, examining both above to explore the causal channels linking household structure and normative shifts in the community to women's agency.

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Appendix: Additional Results for Chapter 1

Table A1.1: DHS survey phases and years

Country	Survey Years, for women questionnaire	Men's response to empowerment variables	Men's response on justification on wife beating
Bangladesh	2011	×	×
	2014	×	×
	2018	×	×
	2022	×	×
India	2005-06 (2006)	×	√
	2015-16 (2016)	√	√
	2019-21 (2021)	√	√
Nepal	2006	×	√
	2011	√	√
	2016	√	√
	2022	√	√
Pakistan	2007	×	×
	2013	√	√
	2018	√	√
Maldives	2009	×	√
	2016-17 (2017)	√	√
Indonesia	2007	√	√
	2012	√	√
	2017	√	√
Philippines	2013	×	×
	2017	×	×
	2022	×	×

Note: Bangladesh and the Philippines do not have men's responses on empowerment-related questionnaires and wife-beating justification questionnaires, while the rest of the countries have both responses, except for some survey years that did not include them.

Table A1.2: Construction of the dependent variable: Women's intra-household bargaining power index

Domain	DHS Survey Question	Ordinal Index
Own health care	Who usually makes decisions about health care for yourself?	2 = jointly with husband/partner or others 1 = respondent alone 0 = husband/others alone
Major household purchases	Who usually makes decisions about major household purchases?	2 = jointly with husband/partner or others 1 = respondent alone 0 = husband/others alone
Visits to family or relatives	Who usually makes decisions about visits to your family or relatives?	2 = jointly with husband/partner or others 1 = respondent alone 0 = husband/others alone
Use of husband's earnings	Who usually decides how your husband's earnings will be used?	2 = jointly with husband/partner or others 1 = respondent alone 0 = husband/others alone

Note: For the binary index, responses where the woman reports making decisions either alone or jointly with her husband are coded as 1; all other responses are coded as 0.

Table A1.3: Construction of explanatory variable indices

Indicator	DHS Questionnaire, and Scores
Financial Independence Index (0 - 1)	The Financial Independence Index measures a woman's access to and control over economic resources relevant for intra-household bargaining. It is based on four binary indicators: a) Whether the respondent worked in the past 12 months b) Whether she received earnings in cash or in-kind (rather than unpaid labour) c) Whether she owns a bank or financial institution account d) Whether she owns land and/or a house (individually or jointly) Each component is coded as 0 or 1 and scaled to the [0,1] range. The index is constructed by taking the unweighted average of these four components. Higher index values indicate greater financial autonomy, with a score of 1 representing full financial independence across all measured dimensions. To address potential endogeneity—particularly the concern that asset ownership may be a consequence rather than a cause of bargaining power—I construct two versions of the index. The baseline version excludes asset ownership, focusing on labour force participation, earnings modality, and financial inclusion. A robustness check includes asset ownership as a fourth component, and results are consistent across specifications.
Marital Structure & Economic Security Index (0 - 1)	The Marital Structure and Economic Security Index capture structural features of marriage that influence economic dynamics and bargaining conditions within households. It is based on five indicators: a) Marital continuity – whether the respondent has been married only once b) Husband's occupation – categorized as: not employed/unemployed (0), manual labour (0.33), informal/self-employed (0.67), professional/managerial (1) c) Relative age – coded as 1 if the age gap is within ± 5 years; 0.5 otherwise, regardless of direction d) Relative education – coded as 1 if spouses have the same level of education; 0.75 if either spouse has higher education e) Relative earnings – coded as 1 if spouses report approximately equal earnings; 0.75 if either spouse earns more Each component is scaled to the [0,1] interval before aggregation. Relative characteristics are designed to reflect spousal symmetry rather than dominance, assigning intermediate values to moderately unequal pairings. The final index is calculated as the unweighted average of the five components. Higher values represent greater marital continuity, economic security, and structural balance between spouses.
Marriage Institution Index (0 - 1)	The Marriage Institution Index captures both individual-level behaviours and community-level norms that reflect the strength and equity of marriage institutions shaping women's intra-household bargaining environments. Individual-level indicators include: a) Whether the respondent was married before age 18

	b) Whether she is in a polygamous union c) Whether she believes wife-beating is justified under certain circumstances Community-level indicators, constructed as leave-one-out means within each Primary Sampling Unit (PSU) to reduce reflection bias (Manski, 1993), include: a) Early marriage rate b) Proportion of women in polygamous unions c) Proportion of women who justify wife-beating Each component is normalized to the [0,1] interval and directionally harmonized so that higher values consistently indicate more gender-equitable marriage institutions—characterized by later marriage, monogamy, and rejection of domestic violence. To avoid conflating institutional norms with economic conditions, other contextual factors—such as local education, labour force participation, bank access, and control over earnings—are summarized separately as local economic environment measures. Robustness checks using factor analysis confirm that the additive index captures a coherent latent dimension of normative marital institutions. Estimated associations should be interpreted cautiously, as residual sorting may remain despite leave-one-out adjustment.
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Table A1.4: Descriptive statistics

Variable/index	Bangladesh	India	Maldives	Nepal	Pakistan	Indonesia	Philippines
Bargaining power index	0.694 (0.353)	0.698 (0.350)	0.723 (0.258)	0.525 (0.324)	0.481 (0.412)	0.692 (0.277)	0.756 (0.253)
Financial Independence Index	0.295 (0.311)	0.311 (0.295)	0.414 (0.372)	0.400 (0.251)	0.123 (0.212)	0.495 (0.289)	0.476 (0.301)
Marital Structure & Economic Security Index	0.762 (0.104)	0.793 (0.093)	0.774 (0.144)	0.812 (0.100)	0.794 (0.101)	0.810 (0.110)	0.820 (0.101)
Marriage Institution (Norms) Index	0.629 (0.131)	0.697 (0.155)	0.745 (0.152)	0.717 (0.119)	0.698 (0.148)	0.727 (0.143)	0.778 (0.114)
Respondent's age group (%)							
15–24	25.72	17.15	17.14	20.06	14.38	12.34	6.77
25–34	36.14	38.66	41.72	38.04	38.79	36.28	32.97
35–44	27.85	31.75	30.54	31.12	34.35	37.01	40.83
45–49	10.28	12.45	10.6	10.78	12.48	14.37	19.43
Respondent's education (%)							
No education	13.85	33.97	16.66	45.35	54.18	2.93	1.82
Primary	28.71	14.67	33.94	22.5	13.31	33.58	20.27
Secondary	42.72	41.56	40.72	26.07	18.64	50.31	43.61
Higher	14.72	9.81	8.69	6.09	13.87	13.18	34.31
Respondent's husband's education (%)							
No education	21.31	19.39	23.69	18.3	30.5	2.12	2.04
Primary	29.75	14.99	33.38	30.11	13.44	32.79	24.4
Secondary	30.67	51.42	35.89	39.83	32.06	52.41	41.98
Higher	18.26	14.19	7.03	11.77	24.01	12.67	31.57
Respondent's husband's employment (%)							
Not working	1.81	2.18	1.4	2.05	2.19	1.21	2.99
Manual labour	45.09	60.77	48.5	35.52	50.82	33.22	41.76
Informal self-employed	43.03	28.24	28.09	53.05	31.14	55.14	42.18
Professional	10.07	8.82	22.01	9.39	15.85	10.43	13.06
Wealth quintile (%)							
Q1	18.28	17.2	23.77	23.02	19.55	23.56	27.21
Q2	19.44	19.4	27.19	19.86	20.21	20.03	21.73
Q3	19.64	20.3	27.71	19.15	19.1	19.15	17.83
Q4	20.53	20.92	13.71	19.04	18.97	18.96	16.68
Q5	22.11	22.18	7.61	18.93	22.17	18.29	16.55
% of lives in urban	35.75	32.77	12.81	44.81	49.23	48.65	34.48
N	36,525	236,142	11,561	33,230	21,324	65,354	29,090

Note: The first four rows showing indices mean with standard deviation in the parenthesis.

Table A1.5: Women's Bargaining Power and Selection into Marriage: Married-Only OLS and Heckman Two-Step Estimates

Indices	(1) Married-only OLS	(2) Heckman Two-Step
Financial Independence Index	0.087*** (0.002)	0.098*** (0.002)
Marital Structure & Economic Security Index	0.023*** (0.005)	0.045*** (0.006)
Marriage Institution (Norms) Index	0.178*** (0.004)	0.183*** (0.004)
Education Level of Woman	0.022*** (0.001)	0.027*** (0.001)
Inverse Mills Ratio (λ)	—	0.157*** (0.008)
Country Fixed Effects	Yes	Yes
Demographic Controls	Yes	Yes
Selection Instruments	—	Yes
Observations	433,145	395,023

Notes: The dependent variable is women's intra-household bargaining power, constructed using polychoric PCA and normalized to the [0,1] range. Column (2) reports Heckman two-step estimates correcting for non-random selection into marriage. Demographic controls include age, education, wealth, urban residence, and number of children. Selection instruments include age at first cohabitation and community-level later-marriage norms (leave-one-out). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Figure 1.5: Average marginal effects of financial independence, marital stability, and marriage institution indices on women's bargaining power by education level

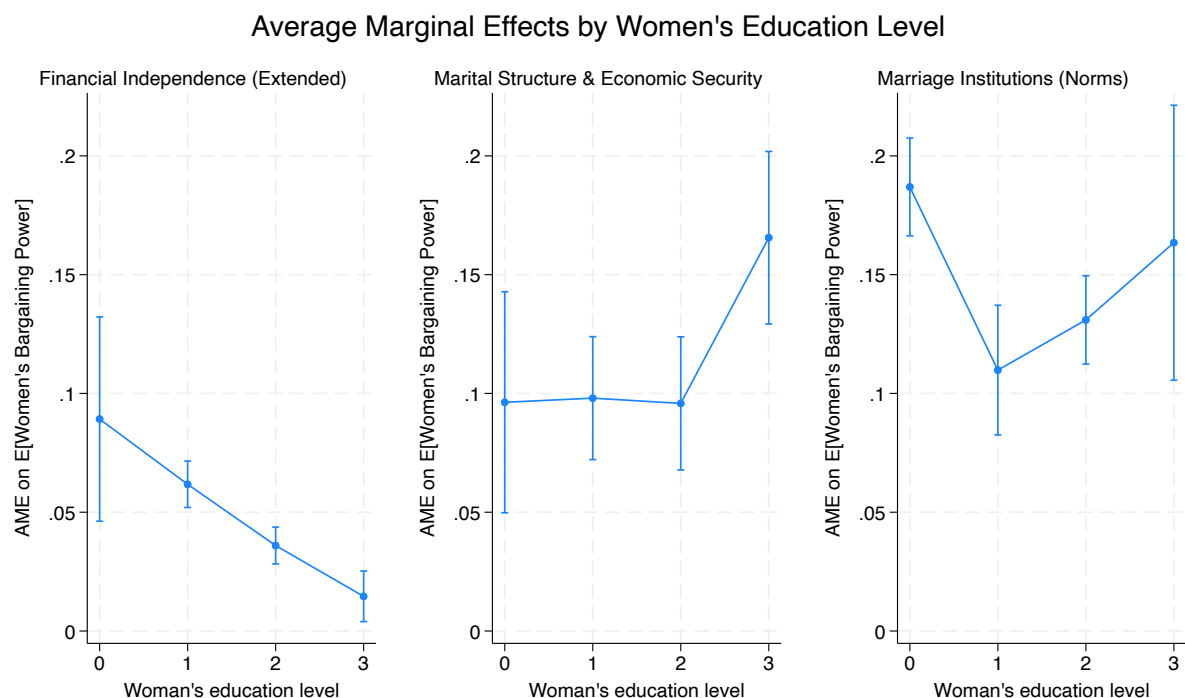


Figure 1.6: Average marginal effects of financial independence, marital stability, and marriage institution indices on women's bargaining power by household wealth

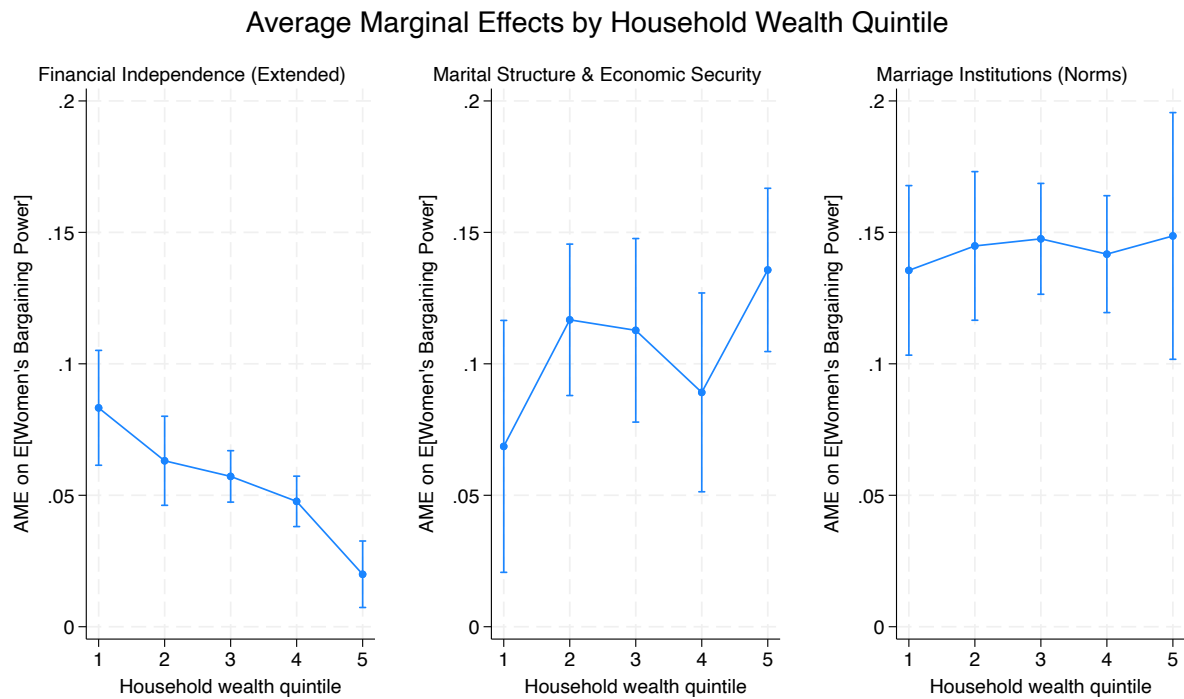


Figure 1.7: Average marginal effects of financial independence, marital stability, and marriage institution indices on women's bargaining power by residence

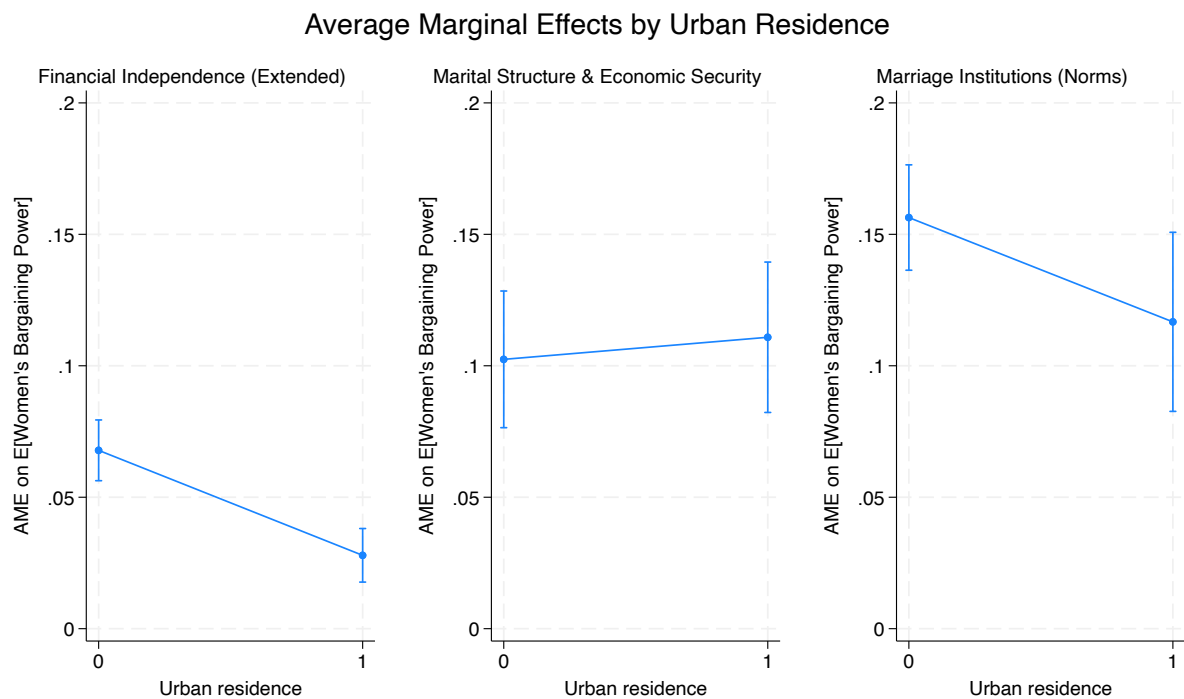


Figure 1.8: Average marginal effects of financial independence, marital stability, and marriage institution indices on women's bargaining power by husband's education

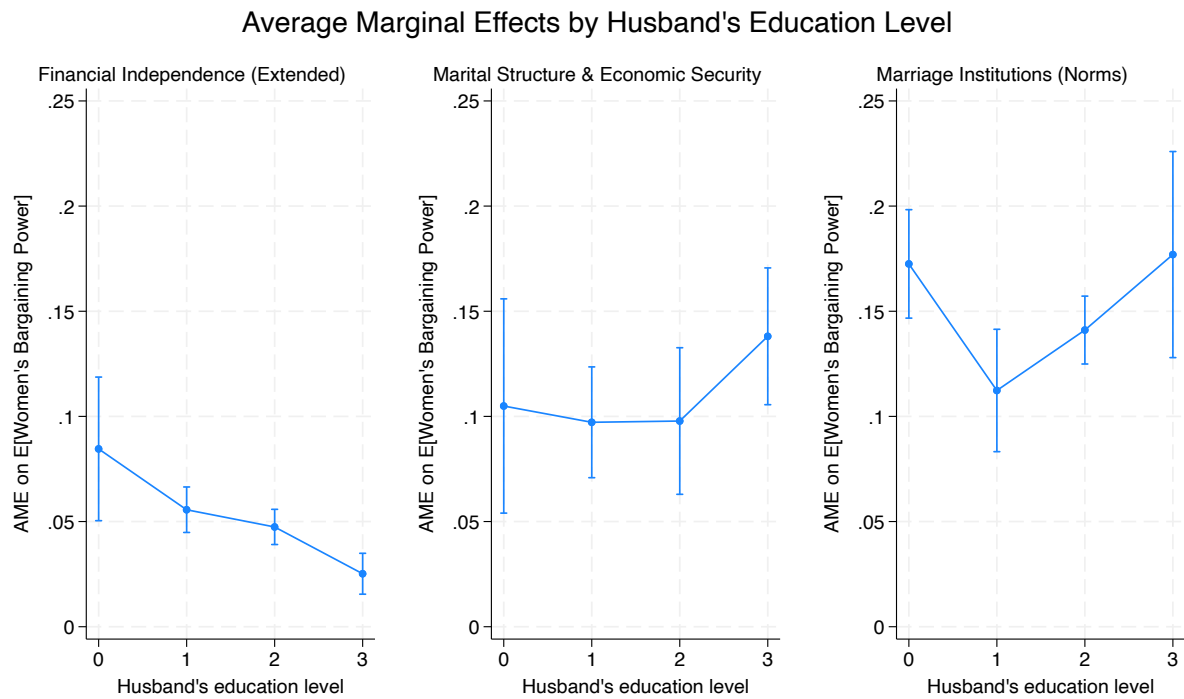


Figure 1.9: Average marginal effects of financial independence, marital stability, and marriage institution indices on women's bargaining power by husband's occupations

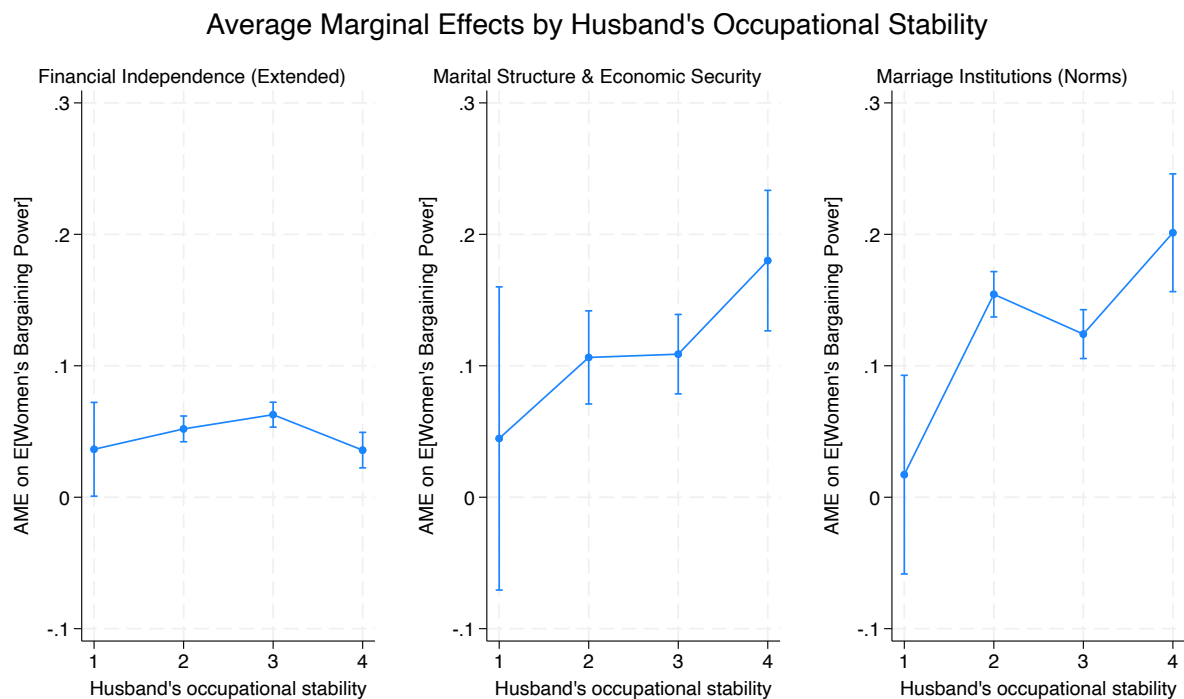


Table A1.6: Robustness check – binary participation measure: average marginal effects (AMEs)

Indices	Women's Bargaining Power Index (Dummy)			
	Model 1	Model 2	Model 3	Model 4
Financial Independence Index	0.087*** (0.009)			0.091*** (0.009)
Marital Structure & Economic Security Index		0.051*** (0.010)		0.034*** (0.009)
Marriage Institution (Norms) Index			0.118*** (0.006)	0.126*** (0.006)
Controls	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes
Country× Survey Year Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	428,301	428,301	428,301	428,301

Notes: This table reports selected average marginal effects (dy/dx) from fractional logit models using a binary version of the Women's Bargaining Power Index as the dependent variable (coded 1 if the respondent reports joint or sole decision-making authority, 0 otherwise). The Financial Independence, Marital Structure and Economic Security, and Marriage Institutions (Norms) indices are each normalized to the [0,1] range. PSU-clustered standard errors are shown in parentheses. All specifications include controls for respondent age group, respondent and spouse education, household wealth quintile, and urban residence. Models also include country-by-survey-year fixed effects and survey year fixed effects. Estimates are weighted using DHS sampling weights (v005). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A1.7: Robustness check – binary participation measure: average marginal effects (AMEs) by country

Indices	Women's Bargaining Power Index (Dummy: Joint & Alone 1, Other 0)						
	Bangladesh	India	Indonesia	Maldives	Nepal	Pakistan	Philippines
Financial Independence Index	0.083*** (0.004)	0.071*** (0.005)	0.026*** (0.005)	0.028*** (0.008)	0.176*** (0.009)	0.145*** (0.012)	0.028*** (0.006)
Marital Structure & Economic Security Index	-0.018 (0.013)	0.010 (0.012)	- (0.011)	- (0.016)	- (0.022)	- (0.028)	-0.073*** (0.020)
Marriage Institution (Norms) Index	0.009 (0.011)	0.049*** (0.006)	0.042*** (0.010)	-0.027 (0.019)	0.027 (0.018)	0.187*** (0.026)	0.008 (0.016)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	36,454	235,069	65,176	10,351	33,056	19,118	29,077

Notes: This table reports average marginal effects (dy/dx) from fractional logit regressions estimated separately by country, using a binary version of the Women's Bargaining Power Index as the dependent variable (coded 1 if the respondent reports joint or sole decision-making authority, 0 otherwise). Independent variables include the Financial Independence Index, the Marital Structure and Economic Security Index, and the Marriage Institution (Norms) Index—each normalized to the [0,1] range. PSU-clustered standard errors are shown in parentheses. All specifications control for respondent age group, respondent and spouse education, household wealth quintile, and urban residence. Year fixed effects are included to account for time-specific shocks. Estimates are weighted using DHS sampling weights (v005). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A1.8: Alternative ranking - average marginal effects (AMEs) from fractional logit model for women's bargaining power index

Indices	Women's Bargaining Power Index (Ordinal Scale: Alone 2, Joint 1, Other 0)			
	Model 1	Model 2	Model 3	Model 4
Financial Independence Index	0.065*** (0.003)			0.067*** (0.003)
Marital Structure & Economic Security Index		-0.021*** (0.005)		-0.028*** (0.005)
Marriage Institution (Norms) Index			0.039*** (0.006)	0.049*** (0.004)
Controls	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes
Country× Survey Year Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	428,301	428,301	428,301	428,301

Notes: This table reports selected average marginal effects (dy/dx) from fractional logit models; PSU-clustered standard errors are shown in parentheses. The dependent variable is the Women's Bargaining Power Index (polychoric PCA, normalized to 0–1), constructed using ordinal decision-making responses where sole decisions receive greater weight than joint decisions. All specifications control for respondent age group, respondent and spouse education, household wealth quintile, and urban residence, and include country-by-survey-year fixed effects. Estimates are weighted using DHS sampling weights (v005). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A1.9: Alternative ranking - average marginal effects (AMEs) from fractional logit model for women's bargaining power index by sample country

Indices	Women's Bargaining Power Index (Ordinal Scale: Alone 2, Joint 1, Other 0)						
	Bangladesh	India	Indonesia	Maldives	Nepal	Pakistan	Philippines
Financial Independence Index	0.083*** (0.004)	0.071*** (0.005)	0.026*** (0.005)	0.028*** (0.008)	0.176*** (0.009)	0.145*** (0.012)	0.028*** (0.006)
Marital Structure & Economic Security Index	-0.018 (0.013)	0.010 (0.012)	-0.053*** (0.011)	-0.041*** (0.016)	-0.103*** (0.022)	-0.111*** (0.048)	-0.073*** (0.020)
Marriage Institution (Norms) Index	0.009 (0.011)	0.049*** (0.006)	0.042*** (0.010)	-0.027 (0.019)	0.027 (0.018)	0.187*** (0.026)	0.0038 (0.016)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	36,454	235,069	65,176	10,351	33,056	19,118	29,077

Notes: Country-specific AMEs from fractional logit models. The dependent variable is a normalized women's bargaining power index (0–1), constructed using ordinal decision-making responses where sole decisions receive greater weight than joint decisions. All models include demographic controls, survey-year fixed effects, DHS sampling weights, and PSU-clustered standard errors. *, **, *** denote significance at the 10%, 5%, and 1% levels.

Table A1.10: Robustness check – alternative construction of financial independence index excluding asset ownership: average marginal effects (AMEs)

Indices	Women's Bargaining Power Index (Joint 2, Alone 1, Other 0)			
	Model 1	Model 2	Model 3	Model 4
Financial Independence Index	0.048*** (0.003)			0.051*** (0.003)
Marital Structure & Economic Security Index		0.106*** (0.012)		0.086*** (0.011)
Marriage Institution (Norms) Index			0.142*** (0.006)	0.143*** (0.006)
Controls	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes
Country× Survey Year Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	428,301	428,301	428,301	428,301

Notes: This table reports average marginal effects (dy/dx) from fractional logit models estimating the determinants of women's bargaining power, using an ordinal version of the index coded as 2 (joint), 1 (alone), and 0 (others). This robustness check uses an alternative Financial Independence Index that excludes asset ownership and is based solely on labour market participation, earnings modality, and financial inclusion. All indices are normalized to the [0,1] range. PSU-clustered standard errors are reported in parentheses. All specifications control for respondent age group, respondent and spouse education, household wealth quintile, and urban residence. Models include country-by-survey-year fixed effects (interaction of country and year) and separate year fixed effects. Estimates are weighted using DHS sampling weights (v005). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A1.11: Robustness check – alternative construction of financial independence index excluding asset ownership: average marginal effects (AMEs) by country

Indices	Women's Bargaining Power Index (Joint 2, Alone 1, Other 0)						
	Bangladesh	India	Indonesia	Maldives	Nepal	Pakistan	Philippines
Financial Independence Index - base	0.108*** (0.007)	0.055*** (0.005)	0.027*** (0.005)	-0.034*** (0.012)	0.089*** (0.009)	0.167*** (0.017)	-0.004 (0.008)
Marital Structure & Economic Security Index	0.092*** (0.023)	0.076*** (0.023)	0.074*** (0.014)	0.078*** (0.025)	0.101*** (0.023)	-0.023 (0.048)	0.184*** (0.022)
Marriage Institution (Norms) Index	0.050** (0.019)	0.167*** (0.011)	0.070*** (0.013)	0.021 (0.028)	0.047* (0.025)	0.467*** (0.038)	-0.003 (0.020)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	36,454	235,069	65,176	10,351	33,056	19,118	29,077

Notes: This table presents country-specific average marginal effects (dy/dx) from fractional logit models using an ordinal measure of women's bargaining power, coded as 2 (joint), 1 (alone), and 0 (others). The Financial Independence Index used here excludes asset ownership, focusing instead on labour force participation, earnings modality, and financial inclusion. All indices are normalized to the [0,1] scale. Standard errors are clustered at the PSU level and shown in parentheses. All regressions control for respondent age group, respondent and spouse education, household wealth quintile, and urban residence. Year fixed effects are included in all models. Estimates are weighted using DHS sampling weights (v005). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A1.12: Robustness check – factor analysis of explanatory indices: average marginal effects (AMEs)

Indices	Women's Bargaining Power Index (Factor Analysis)			
	Model 1	Model 2	Model 3	Model 4
Financial Independence Index	0.039*** (0.004)			0.047*** (0.004)
Marital Structure & Economic Security Index		0.027*** (0.009)		0.026*** (0.008)
Marriage Institution (Norms) Index			0.221*** (0.010)	0.222*** (0.011)
Controls	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes
Country× Survey Year Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	198,159	271,170	280,850	193,714

Notes: This table reports average marginal effects (dy/dx) from fractional logit models where the dependent variable is the Women's Bargaining Power Index constructed via factor analysis using decision-making variables. Explanatory indices—Financial Independence, Marital Structure and Economic Security, and Marriage Institution (Norms)—are also derived from factor scores rather than additive indices. All factor scores are normalized to the [0,1] scale for interpretability. Standard errors are clustered at the PSU level and reported in parentheses. Each specification controls for respondent age group, respondent and spouse education, household wealth quintile, and urban residence, and includes both year fixed effects and country-by-survey-year fixed effects. All models apply DHS sampling weights (v005). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table A1.13: Robustness check – linear specification: average marginal effects (AMEs) by country

Indices	Women's Bargaining Power Index (Joint 2, Alone 1, Other 0)						
	Bangladesh	India	Indonesia	Maldives	Nepal	Pakistan	Philippines
Financial Independence Index - base	0.111*** (0.008)	0.072*** (0.006)	0.028*** (0.006)	-0.031** (0.012)	0.126*** (0.011)	0.149*** (0.019)	0.002 (0.008)
Marital Structure & Economic Security Index	0.082*** (0.023)	0.098*** (0.016)	0.070*** (0.014)	0.083*** (0.026)	0.104*** (0.023)	0.010 (0.047)	0.169*** (0.022)
Marriage Institution (Norms) Index	0.073*** (0.019)	0.136*** (0.012)	0.068*** (0.013)	0.024 (0.030)	0.043* (0.024)	0.356*** (0.042)	0.041** (0.019)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	36,454	235,069	65,176	10,351	33,056	19,118	29,077

Notes: This table reports average marginal effects (AMEs) from ordinary least squares (OLS) regressions where the dependent variable is the Women's Bargaining Power Index, coded using ordinal weights (Joint = 2, Alone = 1, Others = 0) and scaled to the [0,1] range. Each explanatory index—Financial Independence, Marital Structure and Economic Security, and Marriage Institution (Norms)—is also normalized to [0,1]. Estimates are shown separately by country, with standard errors clustered at the PSU level and reported in parentheses. All models include controls for respondent age group, respondent and spouse education, household wealth quintile, and urban residence, as well as year fixed effects. DHS sampling weights (v005) are applied throughout. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Chapter 2

Effects of Conflicts on Labour Market Outcome and Intimate Partners Violence: Evidence from Nepal

ABSTRACT

This study investigates the impact of conflict intensity on married women's employment and intimate partner violence (IPV) in Nepal during and after the civil conflicts. Analyzing five waves of the Nepal Demographic and Health Survey, it reveals a negative short- and long-term effect of conflict on work probabilities for women facing reduced economic opportunities and delayed human capital accumulation. However, this result masks substantial heterogeneity by subgroups. The older cohort experiences a temporary negative effect, while the impact is enduring for younger cohorts. The long-run effect of conflict intensity was more sustained for married women who were children or teenagers at the onset of the war compared to older cohorts. These results hold under IV regressions. Data availability restricts our analysis of IPV to the post-war years. The study does not find a direct impact of conflict on the stated IPV experiences of married women but identifies an indirect effect.

KEYWORDS

Women's employment, intimate partner violence, added worker effect, conflict, Nepal

JEL Codes : J16, J10, J22

HIGHLIGHTS

- Conflict in Nepal affects women's employment and intimate partner violence.
- Women's employment increased during the conflict but declined post-conflict.
- Conflict intensity in Nepal reduced long-term employment, particularly for younger women
- Intimate partner violence shows indirect rise due to reduced women's employment.
- The added-worker effect in Nepal was weak, with conflict disrupting labour opportunities.

2.1 Introduction

The effect of war (or armed conflict) on the employment of married women is ambiguous. Armed conflict may increase married women's employment as they try to compensate for the lost household income due to the disruptions (Menon and Rodgers 2015; Robertson, Lopez Acevedo, and Morales 2020). In contrast, armed conflict may influence the traditionalist norms or beliefs about gendered roles in the home and workplace, leading to a reduction in married women's employment following the war (Frankenberg, Smith, and Thomas 2003; Jost et al. 2003; Berrebi and Ostwald 2016). Additionally, early exposure to violence in the community or family environment can increase the likelihood of intimate partner violence (IPV) during and following conflict periods (Vinck and Pham 2013). These research findings hold significant importance when considering the consequences of civil armed conflicts on human life, employment opportunities, and men's attitudes toward women. Although armed conflicts can potentially result in long-term impacts on women's employment and IPV, there is limited empirical evidence regarding the long-term patterns. One of the challenges in studying the consequences of armed conflict is the lack of detailed longitudinal data, making it difficult to measure their precise impacts accurately.

This article investigates the impact of exposure to Nepal's 1996–2006 civil armed conflicts on women's employment and IPV using pooled cross-section samples of Nepal's Demographic and Health Survey (DHS) from 1996 to 2016 (Croft, Marshall, and Allen 2018)³. By adding the post-conflict employment and IPV information, we can identify the longer-term effects of exposure to conflict on women's employment and IPV. The literature on the consequences of Nepal civil conflicts has mainly focuses on the short-term (1996–2006) impact on women's employment at a regional level (Menon and Rodgers 2015). Moreover, this study extends the literature on the effects of conflicts on intimate partner violence, considering both direct and indirect effects through women's employment status.

The civil conflict in Nepal resulted from a movement by Maoist insurgents capturing people's dissatisfaction because of poverty and lack of economic reform. The Maoist insurgency officially started on February 13, 1996 with an attack on a police post in Rolpa, a district in Western Nepal, by the Communist Party of Nepal-Maoist (CPN-Maoist). Maoists' objective was to establish a people's republic. The ten-year-long conflict led to immense suffering, with thousands experiencing injury, disappearances, and displacements, and

³ Henceforth, we refer to the Nepalese Civil War as "the conflict."

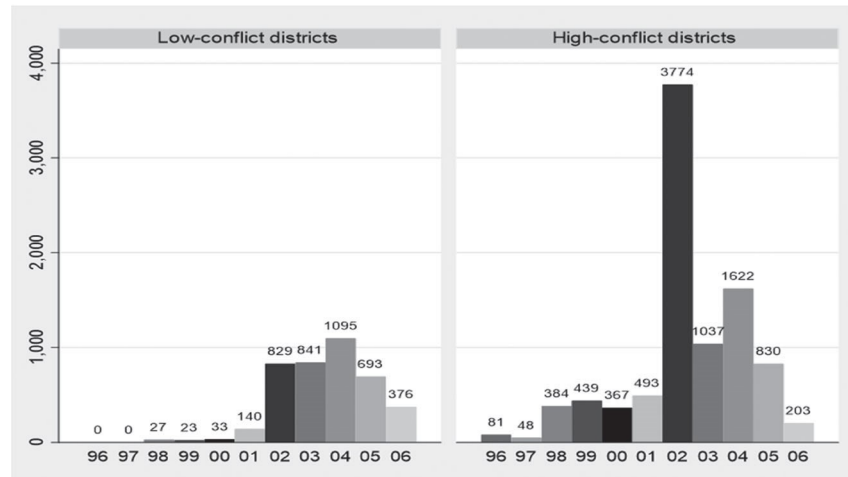
approximately 13,000 casualties. To examine the long-term effects of this conflict on employment and IPV, we utilize the casualty data from the Informal Sector Service Centre (INSEC), which provides conflict-related casualty by district. We combine this district-level data with the Nepal Demographic Health Survey (NDHS), a nationally representative survey focuses on women ages 15–49. We can determine both short-run and long-run (ten-year post-conflict) outcomes using the survey's five waves: 1996, 2001, 2006, 2011, and 2016. With the five waves, we are also able to consider the effects separately by age cohort. The intensity of war will impact women who were educated and married prior to the war much differently than women who were children during the war. To identify these different effects, we consider three age cohorts – young (ages younger than 15 at the beginning of the war), middle (ages 15–24 at the beginning of the war), and older (ages 25–39 at the beginning of the war).

Although the conflict lasted for a decade, starting from 1996, most conflict-related deaths occurred between 2002 and 2005 (see Figure 1). Within the country, there was considerable variation in the intensity of conflict across the seventy-five districts in Nepal, as shown in Figure 2. The blue gradient indicates the conflict intensity in Nepal districts, measured as the deaths per 1,000 population in 1996–2006. The number of deaths per 1,000 population varies from 0.14 to 5.84 across districts, with a country average of 0.96 deaths. The map indicates that the most violent conflict outbreak occurred in Nepal's western and northern regions. Nearly 5,000 people were killed in the Western Region, while casualties were much lower, around 1,600, in the Far Western Region. This geographic variation allows us to estimate the effect of war intensity on employment and IPV across Nepal's different regions and districts. Since conflict intensity is an endogenous variable, we follow Quy-Toan Do and Laskshmi Iyer (2010) and use district-level forest cover as an instrumental variable for casualties.

This research makes two significant contributions to the literature on the legacies of war. First, using the variation in exposure to conflict, as measured by the number of casualties, we estimate the impact of conflict intensity on married women's employment. We also add a layer of analysis to explore married women's work for different age cohorts and separately for stayers and movers. Using a two-way fixed effects model, our results indicate that residing in regions with higher than median war casualties had no measurable effect on the probability of work for the full sample, but a clear negative impact on the probability of work among particular subgroups. These results hold when casualties are estimated using

forest cover as an instrumental variable. Moreover, we show a long-run negative effect of war intensity among the young and middle cohorts in 2016.

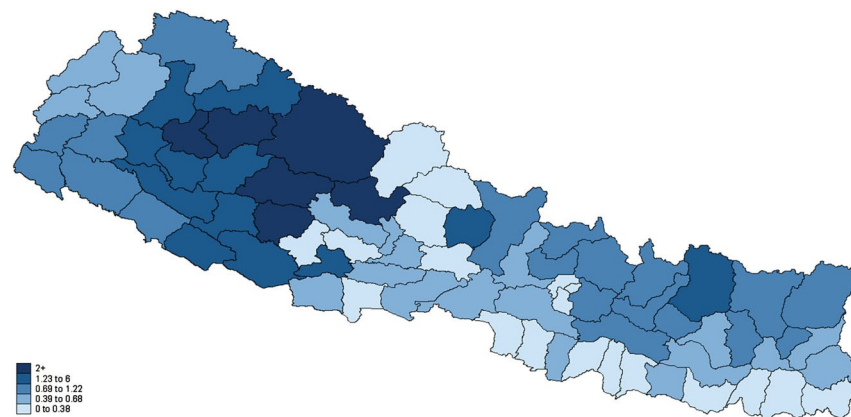
Figure 1: Annual casualties by district, 1996–2006



Notes: Districts with casualties per 1,000 population exceeding the 50th percentile value were classified as “high conflict” and districts with casualties per 1,000 population below the 50th percentile were classified as “low conflict.”

Source: Author’s calculations based on Do and Iyer (2010).

Figure 2: District-level variation in casualties per 1,000 population



Note: The blue gradient indicates the conflict intensity in Nepal districts, measured as the deaths per 1,000 population in 1996–2006. Source: Author’s calculations based on Do and Iyer (2010).

Second, we find that the conflict intensity has a small positive effect on men’s justification for IPV and on the probability of IPV. However, this pattern diminishes over time, suggesting that the high conflict does not cause the higher IPV justification patterns. In addition, we find evidence to suggest that the IPV experiences of married women depend heavily on their attachment to the labour market. However, while direct effects of conflict on IPV are not observed, women who work are more likely to experience IPV, indicating an indirect negative relationship between conflict and IPV through a reduction in employment.

2.2 Framework and Literature

2.2.1 Mechanism/framework – war, women employment, and IPV

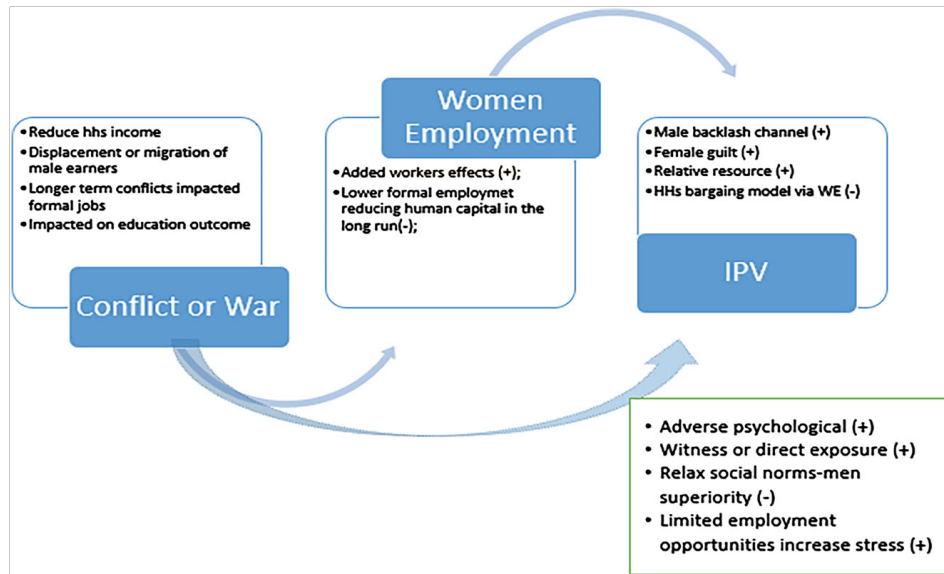
Previous studies of Nepal's civil war are mostly focuses on understanding the causes of the war: geographical terrain, economic inequality and poverty, and lack of political representation (Murshed and Gates 2005; Onesto 2005; Bohara, Mitchell, and Nepal 2006; Do and Iyer 2010; Macours 2011; Nepal, Bohara, and Gawande 2011; Menon and Rodgers 2015). Those articles focus on regional and district-level disaggregation and estimate the outcomes of the war. The results of these studies are mixed, with findings of little to zero impact on human capital, increased miscarriages, and positive impact on women's employment during the conflict period only (Valente 2014; Menon and Rodgers 2015; Pivovarova and Swee 2015). Lokendra Phadera (2021), on the other hand, analyses the long-term health impacts of Nepal's 1996–2006 civil conflict and found that childhood exposure to conflict negatively impacts attained adult height. Our study adds to this literature by estimating the short and longer run impacts of the war intensity on employment and IPV, noting the relationship between these outcomes.

Although men may be more directly involved in fighting, in 2003, the UN Under-Secretary-General for Peacekeeping Operations acknowledged that women and girls were affected disproportionately during and after conflict (United Nations Security Council 2003). The mechanisms through which war affects these outcomes are multiple and will differ depending on the intensity and length of the conflict.

There are a number of pathways through which exposure to conflict in general, and the Nepalese Civil War in particular, could potentially contribute to IPV (Figure 3). First, the conflict may have a direct effect on male attitudes towards IPV, and women's experience of IPV. Women living in areas that have higher levels of exposure to the conflict may experience larger IPV because of the adverse psychological effects of men and their economic hardship (Caesar 1988; Stith 2000; Barnett 2005; Gutierrez and Gallegos 2016). In addition, women with higher exposure to violent conflict events may be more likely to justify IPV and may be more likely to stay in a violent relationship (Gutierrez and Gallegos 2016). Second, the conflict may impact IPV indirectly by altering women's employment. Areas of heavy conflict likely experienced reduced economic activities, job opportunities, and household income. The household pressures may encourage more women to enter paid employment through the added worker effect. This short-term effect may then continue after the war's conclusion as women have gained skills and may have altered preferences for work. However, this positive effect is a priori not necessary. In contrast, a prolonged conflict may

result in a reduction in the human capital accumulation of girls relative to boys because of son preferences, and this may lead to longer-term negative consequences for women's employment possibilities.

Figure 3: Mechanisms linking conflict, employment, and IPV



The impact of employment on IPV is also unknown a priori. An increase in women's employment may increase the IPV of the employed women because of male backlash and female guilt channels (Dhanaraj and Mahambare 2022). However, these employment channels can also decrease IPV as the women are employed and increase their participation in household decisions (Lenze and Klasen 2017).

In this study then, we consider three relationships. We first test the impact of conflict intensity on married women's employment in the short and long-run. We expected a short-run increase in employment due to the added worker effect but had no priors on the long-run impact. We then estimate the direct effect of conflict intensity on IPV and finally consider the relationship between employment and IPV in Nepal.

2.2.2 Conflict and women's employment

There are multiple perspectives through which we can examine the impact of war or conflict on women's employment. According to the lifecycle model of family labour supply, a couple seeks to maximize household utility by considering their leisure time, work, and consumption over their lifetime (Stephens 2002; Bredtmann, Otten, and Rulff 2018). In cases where one spouse (typically the husband) experiences employment loss, displacement, or

death, it can reduce household permanent income and consumption. As a result, the other spouse (typically the wife) is more likely to enter the workforce or increase her working hours to maintain the same level of consumption. This phenomenon is known as the “added worker effect.” The magnitude of this effect depends on whether the shock is anticipated or unexpected. The effect is more significant if the husband’s labour force attachment is unexpectedly disrupted. However, if the shock is anticipated, the household can adjust their consumption patterns in advance (Stephens 2002).

Empirical research on the added worker effect has not reached a consensus. Some studies, such as Shelly Lundberg (1985) and Melvin Stephens Jr. (2002), have found evidence of an added worker effect. Others, such as Tim Maloney (1991), have not observed such an effect. Within the context of developing countries, a few studies find considerable added worker effects; however, the shocks considered are mostly related to economic crises, not political conflicts (McKenzie 2004; Parker and Skoufias 2004; Cho and Newhouse 2013). Overall, the effect of household shocks on women’s employment is not definitively established and is contingent on intervening factors and economic situations.

The most relevant paper to our research is Nidhiya Menon and Yana van der Muelen Rodgers (2015). They find that Nepal’s civil war between 1996 and 2006 resulted in the separation of many men from their households, increasing women’s self-employment during the conflict. However, they did not have access to more recent waves of data and so did not consider whether this increase in women’s employment continues during the post conflict period. We include post-conflict period data in this study to capture a broader perspective of women’s employment during and after the civil conflicts.

Long-run conflicts can also influence women’s employment in the post conflict period through the channel of human capital accumulation. Girls of school age during the conflict may be more negatively affected compared to girls living in regions with lower conflict intensity due to security concerns and war-related poverty, which reduces the likelihood of returning to school. Olga Shemyakina (2006) conducted a study on the 1992–98 Tajikistan war conflict and finds that girls living in high conflict regions were 12.3 percent less likely to complete their mandatory schooling compared to the pre-conflict period and 7 percent less likely compared to girls living in low conflict regions. These disparities in human capital accumulation can significantly impact later employment prospects. Although the DHS survey does not provide longitudinal data for analyzing the same individuals over time, we can rely on cohort analysis to examine women’s employment experiences in different age groups due to the conflict.

2.2.3 Conflict and domestic violence

There is empirical evidence indicating an increase in intimate partner violence (IPV) during conflict periods in Afghanistan, Lebanon, the Palestinian territories, Sri Lanka, and Côte d'Ivoire (Neuner et al. 2008; Jinan 2008). In Côte d'Ivoire, Mazedo Hossain et al. (2014) found that IPV was the most commonly reported form of violence after the armed conflict (20.9 percent among women; 9.9 percent among men). Patrick Vinck and Phuong N. Pham (2013) show higher rates of IPV among war veterans compared to civilian couples and the connection between war experiences, subsequent mental health issues, and an increased likelihood of perpetrating or experiencing IPV.

The conflict experiences can contribute to intimate partner violence (IPV) through various pathways. According to Jeannie Annan and Moriah Brier (2010), structural factors play a significant role in enabling and perpetuating IPV in conflict-affected areas. In conflict settings, displacement can disrupt kinship support systems, judicial systems and conflict-resolution mechanisms may become ineffective, and a culture of impunity may emerge (Okello and Hovil 2007). While these factors are not exclusive to conflict settings, they are intensified during prolonged periods of conflict.

Vinck and Pham (2013) use Liberian data to reveal that exposure to war-related violence was associated with an increased likelihood of intimate partner physical violence. Men who directly experienced war related traumatic events or participated in the conflict were more likely to perpetrate IPV. This finding suggests that violence in conflict can impact individuals' socioeconomic characteristics, beliefs, and value systems. Italo A. Gutierrez and Jose V. Gallegos (2016) find that early exposure to violence in the community or family environment during childhood and adolescence increases the risk of domestic violence later in life, and the magnitude of this effect varies based on the intensity of conflict exposure. Dominik Noe and Johannes Rieckmann (2013) discover that higher conflict intensity in Colombia increases the likelihood of women becoming victims of domestic violence in the short term. However, F. Grimard and S. Laszlo (2014) do not find evidence that early exposure to civil conflicts increases domestic violence in later life. The extent of exposure and the timing of marriage are likely crucial factors determining the impact of exposure on future behaviour. For instance, Gulia La Mattina (2017) demonstrates that individuals who married before the war were less likely to experience domestic violence than those who married after the conflict.

We build on this literature by considering the direct impact of conflict intensity on men's justification of IPV as well as women's stated experience of IPV. We run the analysis separately by age cohort to identify whether the timing of conflict exposure alters the results.

Employment and domestic violence

To complete the empirical analysis, we estimate the direct relationship between employment and IPV in the Nepalese context. Employment and IPV may be positively or negatively related. Increased labour force participation may enhance women's bargaining power within the household regarding collective labour supply. The economic theory of household bargaining suggests that women who engage in paid employment lower the risk of IPV because paid employment increases women's autonomy and bargaining power within the household (Koenig et al. 2003; Anderson and Eswaran 2009; Aizer 2010; Majlesi 2016)⁴. Alternatively, women's employment has been found to be positively associated with IPV (Vyas and Watts 2009; Hossain et al. 2014), depending on societal norms and beliefs regarding individual dominance status. Certain societies perceive women's employment as a threat to male identity, where men are expected to be the primary earners, and women are expected to care for the home and children (Bueno and Henderson 2021; Dhanaraj and Mahambare 2022). Consequently, male backlash and the risk of IPV are positively related in societies where cultural norms and individual beliefs accept women's abuse in certain situations (Cools and Kotsadam 2017). The predominance of the different family structures can impact IPV differently when employment conditions for women are compared to men (Tur-Prats 2021). Ana Tur-Prats (2021) finds a decrease in female unemployment compared to men increases IPV for individuals living in areas with a nuclear family tradition, while these effects are offset for individuals living in an area where the male family was socially predominant in the past.

2.3 Empirical Strategy: Data and Econometric Model

2.3.1 Data description

In our empirical analysis, we estimate the impact of war intensity on married women's employment and experience with IPV using two primary datasets. First, we use the district-level data collected by Do and Iyer (2010). These data include casualty figures for each district (normalized by population) and district information on poverty, literacy, and

⁴ It is important to stress here that we do not wish to imply that to the extent that when conflict increases women's employment this necessarily results in an increase in women's empowerment. Nor do we wish to imply that if employment and empowerment do increase, that conflict is beneficial for women.

infant mortality. Geographic information on the districts (described further below) is also incorporated in the analysis⁵. Second, information on employment and IPV comes from the Nepal Demographic and Health Survey (DHS), a large nationally representative sample of women ages 15–49 years and all members of their households.

Figure 1 reports the number of annual casualties in high-conflict and low conflict districts of Nepal. Before 2002, the number of deaths in low-conflict areas varied between zero and 140, sharply increasing to 829 in 2002. The number of deaths in high-conflict areas varied between forty-eight and 493 in 1996–2001 and spiked to 3,774 in 2002. After 2002, the dynamic of the number of deaths in high- and low-conflict areas followed similar patterns, with another increase in intensity in 2004 and an eventual decline in 2006. We exploit the variation in casualties to estimate the impact of war intensity on three related outcomes: (1) married women’s employment, (2) husbands’ justification of IPV, and (3) married women’s reporting of IPV in the previous twelve months. We use five waves of Nepal’s Demographic and Health Survey (DHS): 1996, 2001, 2006, 2011, and 2016⁶. While the war began in 1996, casualty levels in 2001 remained low. Figure 1 shows the average annual casualty rates from 1996 to 2006 separately for districts with above- and below-median casualties. While there were casualties prior to 2001, the intensity of the war increased dramatically following our 2001. We incorporate the time-consistent cumulative district-level and regional level casualty rates (total casualties in all years per 1,000 population) as our key variable.

Three important data restrictions limit our analyses. First, while we have all five waves of data for employment, the inclusion of the 1996 wave requires us to aggregate to the regional level since district is not included in the 1996 wave. We replicate the employment analyses with only the four waves (2001–16) using the district level casualty variable. Second, our employment results include the full sample of 15–49-year-old married women, regardless of whether their husband is currently in the household. However, when analyzing experiences with IPV, the relevant survey questions are only asked of married women whose

⁵ Do and Iyer (2010) data is publicly available in the supplemented materials section of the Journal of Peace Research. The primary source of the casualty data is from the Informal Sector Service Centre (INSEC), a Nepalese non-governmental organization that documents human rights abuses across all the districts of Nepal. INSEC data provides the number of casualties by the Maoists and the government in this conflict, normalized by the district population. We used the normalized number of casualties following their estimation.

⁶ In all waves except 1996, the current location is defined at the district level (seventy-five districts). To include the 1996 data, location (and casualty numbers) is aggregated to the regional level (thirteen regions).

husbands are present in the household.⁷ Third, the survey waves used in the empirical analysis differ for the three outcomes. The employment data is available for all five DHS waves. The men's IPV justification questions are available in all four waves, but the quality of the 2011 wave was low, and we therefore included only 2001, 2006, and 2016.⁸ The questions about women's IPV experience were included in the DHS questionnaire only in 2011 and 2016.

Another important data limitation is our inability to determine where the individual resided during the war and how they were impacted by the violence of the conflict at the place of their residence. However, in three of the four survey years (2001, 2006, 2016), respondents are asked the duration of residence in the current location. We use this information to split the sample into those women who were in their current location at the beginning of the war (1996) and those who migrated into their current location after the war began (stayers vs movers).

In addition to the mover/stayer subgroups, we also split the sample by age cohorts (younger, middle, and older).⁹ The impact of conflict is expected to affect women differently based on their age during the war for three reasons. First, since the mover/stayer distinction is only available for select years, the age cohort analysis may proxy women's movement during and after the conflict (younger people are more likely to move than older people).

Additionally, the timing of marriage – before, during, or after the war – is likely to impact the types of marriages and women's power within marriages. Finally, the impact of war may reflect regional influences (infrastructure, social norm changes, and so forth) and/or personal experiences. Older women would have witnessed the conflict in adulthood, may have experienced the loss of their husbands and/or children during the war, and would have to become an earner for the family. Younger women would have witnessed the conflict in childhood/adolescence and would process the trauma differently from older women.

⁷ All employment regressions control for the presence of a spouse. It is common in Nepal for men to migrate for work-related reasons, living apart from their families. The proportion of married women whose husbands were not in the household ranges from 12 to 38 percent, depending on the year and district. The wording of the IPV questions leaves the possibility that violence within the household reported by the woman in our sample could come from her brother/father/mother. We limit the responses to only those with husbands in the household to minimize this possibility. Employment regressions are replicated for the subsample of women with husbands present, and results are similar.

⁸ In the 2011 data, the questions were included, but confidence in the data is low. While in all other years, the proportion of husbands who reported justifications for wife beating lay between 20 and 30 percent, in 2011, the proportions fell to less than 2.6 percent. Due to suspicions of poor data quality for this variable this year, we omit 2011 from the analysis.

⁹ For more details on the ages of cohorts through the years, please refer to Appendix Table A2.

Employment variables

Figure A4.1 allows one to visualize differences in married women's employment rates by war intensity across all districts in 2006. Overall, during the war, the rates of working were high among married women, at 77 percent in low-conflict and 94 percent in high-conflict areas (these rates are similar in 2001 [not shown]). Figure A4.1 shows that the districts in the eastern and southern regions of Nepal, where the intensity of the conflict was relatively low, have lower rates of employment compared to the western and northern regions, where the intensity of the conflict was relatively high.

For more details, Table A4.1 in the Appendix summarizes the employment-related dependent variables separately by year and high or low-conflict districts. The top section of Table A4.1 shows employment probabilities for the full sample of married women, a pooled sample of 42,744 women. Overall, the twenty-year average likelihood of working is 90 percent in high-conflict areas compared to 73 percent in low-conflict areas. The probability of working remained high during the war years, in 2001 and 2006, and decreased by 5–6 percentage points in 2011 and by 8–9 percentage points in 2016 in both high- and low-conflict areas. While women in low-conflict regions are less likely to work overall, they are more likely to work in the market (as opposed to self/other employment). It is typical for women in Nepal to work for a family business or be self-employed rather than work in the market. Civil war, especially in high-conflict areas, can affect the availability of stable jobs in the market. As a result, women in high-conflict areas may be more likely to work in self- or family-owned employment during the conflict. Over the twenty years, women in high and low-conflict districts were increasingly likely to work part-year and less likely to work full-year.¹⁰

The bottom section of Table A4.1 shows employment probabilities for stayers and movers, and by age cohort. A common general pattern is observed among the subsamples: women are more likely to work if they are in regions that experienced high rates of casualties during the war. The most striking differences are observed in the samples for young, middle, and older cohorts of women. During the war, younger women in low-conflict areas report only a 60–63 percent probability of working, while 67–80 percent of middle cohort women and 81–86 percent of older cohort women report working in low-conflict areas during the war years. In contrast, in high-conflict areas, 91–94 percent of women in all age cohorts report

¹⁰ The wide variation in part-year/full-year over the waves is explained by other sample characteristics. In particular, the proportion of the sample residing in a rural district drops precipitously in 2016.

working during the war years. The exposure to the war conditions and the participation of men, husbands, and sons, in particular, in the army led to a necessity for women of all ages to provide their labour in the market.

IPV variables

We approach the topic from two directions to estimate the impact of war intensity on IPV. First, we estimate the probability of justification of domestic violence by husbands using the DHS questionnaire answered by the husbands of respondents for 2001, 2006, and 2016. All eligible men were asked if, in their opinion, a husband is justified in hitting or beating his wife in the following situations: (a) the wife goes out without informing the husband, (b) the wife neglects children, (c) the wife argues with him, (d) wife refuses to have sex, and (e) wife burns food. From husbands' responses, we create a summary indicator variable equal to one if the man justifies beating his wife in any of these five cases. To estimate the effect of the conflict intensity on the probability of having experienced IPV, we use the 2011 and 2016 DHS samples of 15–49-year-old married women with husbands present in the household.

Nepal DHS introduced the domestic violence module only in 2011 and 2016.¹¹ All eligible women were asked about their experience with domestic physical, sexual, and emotional violence.¹² Women were asked if they had experienced violence in the previous twelve months and, if yes, how often. The answer choices were “never,” “rarely,” and “often.” We follow Cari Jo Clark et al. (2019) and the World Health Organization (García-Moreno et al. 2005) to create an indicator for IPV experience that is equal to one if a woman responded that she experienced any type of domestic violence (physical, sexual, or emotional).¹³

Figure A4.2 shows the Nepalese districts by conflict intensity and the proportion of women who responded that they had experienced IPV in the last twelve months in 2011. The higher variation in IPV responses among women makes Figure A4.2 more visually striking than Figure A.4.1. On average, 17.9 percent of women reported having experienced IPV in the survey, with district-level rates ranging from 0 to 47 percent. Figure A4.2 shows clearly

¹¹ Of 12,674 and 12,862 women responding to the DHS in 2011 and 2016, 4,197 women (33.12 percent) and 4,444 (34.5 percent) were chosen for the domestic violence module interview, respectively. Due to sample restrictions and non-response, we end up with a sample of 4,660 women responding to the IPV questions.

¹² The extent to which responses to the IPV questions provide an accurate picture of IPV experience is impossible to determine

¹³ Detailed question information is provided in Appendix Table A3.

that the rates of IPV are higher in the high-conflict areas (indicated by the dark-blue color and large orange dots). In the western and southern regions of Nepal, where the war intensity was relatively low, we observed lower rates of IPV. In the eastern and northern regions of Nepal, where the war intensity was relatively high, we observed higher rates of IPV.

For more details, in Appendix Table A4.2, we provide summary statistics for rates of IPV justification by husband and the probability of married women experiencing IPV in the last twelve months. We again report the summary statistics for the whole sample and by age cohort.¹⁴ On average, husbands have similar rates of IPV justification when low and high-conflict areas are compared (26 and 27 percent, respectively). However, men in 2006 reported lower rates of IPV justification compared to 2011, which is consistent for all subsamples. There was an increase in IPV justification in the post-war years. The husbands of movers and the older-cohort women report the lowest rates of IPV justification.

There are notable differences in the probability of reporting IPV year, low- and high-conflict areas, and subsample. IPV data was not collected during the war, but Appendix Table A4.2 indicates a reduction of IPV from 18 percent in 2011 to 15 percent in 2016 in the low-conflict area and a reduction of IPV from 20 percent in 2011 to 12 percent in 2016 in the high-conflict area. In the low-conflict area, the younger cohort reports IPV at a higher rate compared to older and middle-age cohorts. In the high-conflict area, the older generation reports the highest violence rates, especially in 2011.

While these summary statistics provide information about the situation in districts and among subgroups, there are large compositional differences between the groups. The next section outlines the control variables.

Control variables

Table A4.3 in the Appendix reports the summary statistics of the independent variables, comparing characteristics of women and their husbands in high- and low-conflict areas over the years.

The average age of women in the sample is 30–31 years old for each survey year. The education proportions do not vary between high- and low conflict areas, but there is a sharp decline in the proportion of uneducated women sampled in 2006 and after the war. We

¹⁴ Since there is only one year of overlap between the subsample of those responding to IPV experience questions (2011, 2016) and those for whom we can identify movers and stayers (2001, 2006, 2016) we do not consider these subsamples for the IPV experience analysis.

observe an increase in the likelihood of women attaining secondary and higher education in 2011 and 2016. The level of education of women's husbands also increases post-war. The number of children under age 5 in the household is slightly higher in the high-conflict areas and drops in post-war years. The probability of the firstborn being a son is 75–77 percent.

Interestingly, fewer women reported their husbands being away from home during the war than following, possibly due to travel restrictions. On average, women in high-conflict areas are more likely to live without their husbands in the household. Recall that these areas are also likely to be higher in poverty. Access to media and electricity has improved substantially over the years, especially in 2016 and in low-conflict areas. The trends show a substantial level of urbanization, with the rural population falling from 86–89 percent in 2011 to 36–45 percent in 2016. A higher probability of women belonging to the Hindu religion and being from the rural areas in the high-conflict regions is consistent with the overall civil war history.

2.3.2 Naïve regressions

We first estimate the relationship between district conflict intensity on the probability of work with the following two-way fixed effects (TWFE) linear probability regression for women i , in region r , in year t .

$$Y_{irt} = \beta_0 + \beta_1 Region_r + \theta Year_t + \gamma(Conflict_r * Year_t) + \mu X_{idt} + \varepsilon_{idt} \quad (1)$$

where the dependent variable is an indicator of whether the woman is currently working.¹⁵ With region and year fixed effects the coefficient of interest is γ , the coefficient on the interaction between the time invariant conflict measure and year. This difference-in-difference variable captures the impact of conflict relative to the base year for both the years of conflict (2001 and 2006) and the post-conflict years (2011 and 2016). Conflict is included either as a continuous variable – the cumulative region-level casualties per 1,000 population – or as a binary indicator denoting that the region had above median casualties. X_{idt} is a vector

¹⁵ In addition to the binary employment regressions, we also estimated the effect of district casualties on the type of employment (working for self/family or others) with a multinomial probit regression. Results are provided in Appendix Table A7. However, we did not find any robust, statistically significant relationship between conflict intensity and the type or intensity of employment and so we do not discuss the results here.

of individual and household control variables that includes age and age squared, education (primary, secondary, or higher relative to no education), whether the firstborn child is a son, number of children under age 5 in the household, an indicator for Hindu religion, whether the household has electricity, whether the household has radio/television, husband's level of schooling and occupation, whether the husband is in the household, and a rural indicator.

Errors are clustered at the regional level, and the observations are weighted using individual weights.¹⁶ The regression is estimated for the full sample, by age cohort and separately for movers and stayers.¹⁷

The estimation for the IPV dependent variables is slightly different since these data are not available for the pre-war 1996 wave. Additionally, we are interested in the level differences of IPV for high and low conflict areas, which is not available in the TWFE regressions. For this reason, and given the confounding relationship between IPV and employment, the IPV justification and IPV regressions are estimated using the 2SLS model (Zellner and Theil 1992):

$$IPV_{irt} = \beta_0 + \beta_1 Conflict_d + \beta_2 Work_{idt} + \theta Year_t + \gamma(Conflict_d * Year_t) + \mu X_{idt} + \delta Z_d + \varepsilon_{idt} \quad (2a)$$

$$Work_{irt} = \beta_0 + \beta_1 Conflict_d + \beta_2 IPV_{idt} + \theta Year_t + \gamma(Conflict_d * Year_t) + \mu X_{idt} + \delta Z_d + \varepsilon_{idt} \quad (2b)$$

Equations (2a and 2b) are estimated with two IPV dependent variables: (1) an indicator for whether the woman's spouse claims that there are justifications for IPV, and (2) an indicator denoting that the woman reports having experienced IPV in the previous twelve months. In this model, the district fixed effects are replaced with time consistent casualty variables (binary or continuous as the district level) and a vector of static district level controls collected by Do and Iyer (2010) including rates of poverty, infant mortality, and literacy.

2.3.3 Instrumental variable (IV) model

The primary concern of the naïve estimations outlined in equations (1) and (2a, 2b) is the endogeneity of the variable of interest. It is probable that the region- or district-level conflict intensity is influenced by factors that also influence women's employment. For

¹⁶ There are seven provinces, each with eight to thirteen districts.

¹⁷ All regressions are estimated using a linear probability model for ease of interpretation. Probit models were also estimated, and the results are similar.

example, Menon and Rodgers (2015) note that one of the main reasons for the 1996–2006 civil war in Nepal was poverty, and there was greater support for the Maoists from the poor and marginalized people. Do and Iyer (2010) find that conflict-related casualties were significantly higher among the districts with higher poverty rates. Poverty is also correlated with women's labour market participation (Goldin 1995; Mammen and Paxson 2000; Fatima and Sultana 2009; Tam 2011; Gaddis and Klasen 2014). While we do include 1996 district-level poverty, literacy and infant mortality rates in the IPV regressions, and geographic fixed effects in the TWFE employment model to control for this relationship, these do not fully address issues of endogeneity.

To address this issue, we use a pre-conflict geographical characteristic as an instrumental variable, as suggested by Joshua D. Angrist and Adriana Kugler (2008). We consider three potential geographic instrumental variables from the district data collected by Do and Iyer (2010): the proportion of the forested district, the length of the road network within the district, and elevation. Test statistics indicate that using any two of these variables creates issues of over-identification. While test statistics indicate that any of the three variables are statistically valid instruments, we present results using district-level forestation as the instrumental variable to provide an exogenous estimate of district casualties¹⁸. Of the three instruments, (i) forestation was most correlated with district casualties (see Appendix I for more information), (ii) its use allows us to be consistent with previous literature (Menon and Rodgers, 2015) also use forestation as an instrument for conflict intensity at the regional level), and (iii) there is a historical explanation for its use – not only did Maoists recruit insurgents from poorer regions in predominantly high-elevation and heavily forested areas of Nepal, the forest terrains gave Maoists an advantage in maneuvers and so were preferable locations (Bohara, Mitchell, and Nepal 2006; Do and Iyer 2010; Menon and Rodgers 2015).

Therefore, we re-estimate equation (1) instrumenting district casualties by forestation using data collected by Do and Iyer (2010) with the following model:

$$\text{Conflict}_r * \text{Year}_t = \beta_0 + \beta_1 \text{Region}_r + \theta \text{Year}_t + \gamma (\text{Forest}_{dr} * \text{Year}_t) + \mu X_{irt} + \varepsilon_{irt}$$

$$Y_{idt} = \beta_0 + \beta_1 \text{Region}_r + \theta \text{Year}_t + \gamma (\widehat{\text{Conflict}}_r * \text{Year}_t) + \mu X_{irt} + \varepsilon_{idt} \quad (3)$$

¹⁸ The exclusion restriction assumes that historical forest cover affects labour market outcomes only through conflict exposure. In the conflict literature, forested terrain increases the feasibility and persistence of insurgency by providing geographic shelter and mobility advantages for armed groups. To mitigate concerns that forested districts follow different economic trajectories, the specification includes district and time fixed effects, which absorb time-invariant geographic characteristics and common shocks, along with additional district-level controls. Identification therefore relies on within-district variation over time rather than cross-district differences in forest endowment. See Fearon and Laitin (2003), Collier and Hoeffler (2004), Miguel, Satyanath, and Sergenti (2004), and Menon and Rodgers (2015).

where $Forest_t$ is the proportion of the region that is forested and is fixed through time. All other variables are as outlined above. Similarly, the 2SLS estimation for the joint estimation of work and IPV are estimated as a 3SLS, with the first stage estimates district casualties using forest as the instrumental variable to mitigate biases in the estimates.

2.4 Regression Results and Discussion

2.4.1 Impact of civil war intensity on married women's employment

We begin with employment regressions using the full sample of married women and five survey waves. In Table 1 we present the key coefficients for the DiD interaction terms on the probability of working from the linear probability model and the IV model. The coefficients in columns 1 and 2 are for the full sample, followed by results for the subsample of married women whose husbands are in the household (columns 3 and 4) and finally for the subsample of married women with absent husbands (columns 5 and 6). We present the results for which conflict is denoted with a binary indicator of high conflict (above median) regions compared to low conflict (below median) regions. All regressions include individual controls, region and year fixed effects. The full sample coefficients are not statistically different from zero for any year. That is, while it may be that those in higher conflict regions are more likely to work (as evidenced in the summary statistics), there is no causal impact of conflict on the probability of work for the full sample. However, this result obscures differences among the subsamples. Columns 3–6 show that while there is a positive (but not statistically significant) effect of conflict on the probability of work for women whose husband is at home, there is (perhaps surprisingly) a negative effect of conflict on the probability of work for women whose husband is away.¹⁹

We next consider the effect of casualties on employment for different population subsamples. We hypothesized that the impact of war intensity would vary by cohort: women who were already past the average age at first marriage when the war began in 1996 (older cohort) would be less likely to experience a marriage market effect of war casualties and less likely to move. Those in the middle cohort are more likely to have married during the war; those in the youngest cohort are most likely to have married after 2006 and more likely to have moved. Regression results for the age cohort subsamples are shown in Table 2. The results indicate that the impact of conflict on the older subsample is isolated to the mid-war

¹⁹ Full regression results corresponding to column (2), including first round IV results, are presented in Table A5 in the Appendix.

wave (2001). The middle and younger cohort, for whom the marriage market would have been impacted by the war, show large and enduring negative effects of residing in a high conflict region. The probability of work in 2006, 2011, and 2016 is 13–20 percent lower relative to 1996 in high-conflict areas, relative to what would be expected if they followed the same pattern as the low-conflict regions.

Table 1: Effect of regional casualties on the probability of working

REGION (1996–2016)	Full sample		Husband in house		Husband away	
	(1)	(2)	(3)	(4)	(5)	(6)
	LPM	IV	LPM	IV	LPM	IV
High casualty region × 2001	0.0135 (0.0160)	-0.0082 (0.0171)	0.0132 (0.0158)	0.0079 (0.0199)	-0.0164 (0.0350)	-0.0867** (0.0377)
High casualty region × 2006	0.0177 (0.0196)	0.0027 (0.0200)	0.0016 (0.0203)	0.0140 (0.0237)	0.0308 (0.0451)	-0.0564 (0.0412)
High casualty region × 2011	0.0267 (0.0218)	-0.0094 (0.0198)	0.0209 (0.0227)	0.0023 (0.0242)	-0.0011 (0.0463)	-0.0893** (0.0386)
High casualty region × 2016	0.0649 (0.0397)	-0.0049 (0.0199)	0.0710* (0.0354)	0.0561** (0.0242)	0.0043 (0.0747)	- 0.1575*** (0.0385)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42,744	42,744	31,979	31,979	10,754	10,754
R-squared	0.1712	0.0755	0.1702	0.0834	0.1802	0.0545
Endogeneity test (Chi-Sq)	15.526		2.134		30.898	
Endogeneity <i>p</i> -value	0.004		0.711		0.000	
Kleibergen Papp F- statistic		2601		2056		789.1
Kleibergen Papp <i>p</i> - value		0.000		0.000		0.000

Notes: Selected coefficients, robust standard errors (clustered at the regional level) are in parentheses. Full results are available on request. Sample: All married women ages 15–49, years 1996, 2001, 2006, 2011, 2016. High-intensity conflict regions are defined if the normalized number of casualties exceeds the country median. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away. Regional forest coverage is included as an instrument in the first stage (not shown) for columns (2), (4), and (6). ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

We next consider the effect of casualties on employment for different population subsamples. We hypothesized that the impact of war intensity would vary by cohort: women who were already past the average age at first marriage when the war began in 1996 (older cohort) would be less likely to experience a marriage market effect of war casualties and less likely to move. Those in the middle cohort are more likely to have married during the war; those in the youngest cohort are most likely to have married after 2006 and more likely to have moved. Regression results for the age cohort subsamples are shown in Table 2. The

results indicate that the impact of conflict on the older subsample is isolated to the mid-war wave (2001). The middle and younger cohort, for whom the marriage market would have been impacted by the war, show large and enduring negative effects of residing in a high conflict region. The probability of work in 2006, 2011, and 2016 is 13–20 percent lower relative to 1996 in high-conflict areas, relative to what would be expected if they followed the same pattern as the low-conflict regions.

As noted earlier, we can only distinguish individuals' residence duration in 2001, 2006, and 2016. For the samples in those waves, we distinguish between those in their current location since the beginning of the war (stayers) and those who had moved since the war began (movers). Table 3 presents the employment regression coefficients for these two samples separately. The negative impact of residing in a high conflict region is shown for both 2006 and 2016 for those who had moved into the current location since the war, while the impact is negative for stayers.

Overall, the employment regressions indicate much heterogeneity across subsamples. The competing forces affecting work – the positive influence of the added worker effect, and the negative influence of economic disruption and reduced human capital – affect women differently in the different subgroups. We find little evidence that the added worker effect dominates for any of the subgroups. Even for the category of women whose husband is away, we find a negative relationship between heavy conflict and employment. Women most likely to be negatively affected by the decline in human capital and economic disruption – younger women and women who have moved into a region – are more likely to be negatively impacted by the conflict. The cohort results are suggestive that power in the marriage market may be a potential factor. As noted in La Mattina (2017), women who marry following the war face an altered demographic profile of potential spouses than the women who married prior to the war. In particular, those who marry in areas of high casualties may face a lower supply of potential spouses and thus may have less power in the household. It is also likely that conflict may have a lower impact on the employment of established households, who may be able to revert to pre-war patterns more easily than households that are newly established when the conflict begins. Due to data constraints (we are unable to identify age at marriage) we leave the exploration of mechanisms channel to future research.

Table 2 Effect of regional casualties on the probability of working, by cohort

REGION (1996–2016)	Older cohort		Middle cohort		Young cohort	
	(1) LPM	(2) IV	(3) LPM	(4) IV	(5) LPM	(6) IV
High casualty region $\times$ 2001	-0.0558*** (0.0150)	-0.0648*** (0.0230)	-0.0187 (0.0185)	-0.0415 (0.0286)		
High casualty region $\times$ 2006	-0.0461** (0.0204)	-0.0280 (0.0255)	-0.0933* (0.0442)	-0.1561*** (0.0345)	-0.0920* (0.0443)	-0.0709 (0.0487)
High casualty region $\times$ 2011	-0.0219 (0.0225)	-0.0443 (0.0320)	-0.1377* (0.0659)	-0.2059*** (0.0339)	-0.1103** (0.0395)	-0.1199*** (0.0413)
High casualty region $\times$ 2016	-0.0210 (0.0563)	-0.0485 (0.0506)	-0.0554 (0.0440)	-0.1343*** (0.0347)	-0.1269* (0.0585)	-0.1828*** (0.0382)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,943	12,943	14,071	14,071	13,490	13,490
R-squared	0.1726	0.1169	0.1549	0.0687	0.1679	0.0363
Endogeneity test (Chi-Sq)	2.56		11.467		30.898	
Endogeneity p - value	0.634		0.0218		0.000	
Kleibergen Papp F- statistic		497.3		847.8		522.3
Kleibergen Papp p - value		0.000		0.000		0.000

Notes: Selected coefficients, robust standard errors (clustered at the regional level) are in parentheses. Full results are available on request. Sample: All married women ages 15–49, years 1996, 2001, 2006, 2011, 2016. Cohort age construction is described in Appendix Table A2. High-intensity conflict regions are defined if the normalized number of casualties exceeds the country median. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away, regional forest coverage is included as an instrument in the first stage (not shown) for columns (2), (4), and (6). ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table 3 Effect of regional casualties on the probability of working, by mover/stayer

REGION (1996–2016)	Movers		Stayers	
	(1) LPM	(2) IV	(3) LPM	(4) IV
High casualty region × 2006	-0.0401 (0.0339)	-0.0655* (0.0379)	-0.0067 (0.0256)	0.0238 (0.0205)
High casualty region × 2016	-0.0329 (0.0510)	-0.1204*** (0.0328)	0.0444 (0.0442)	0.0313 (0.0264)
Year fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes
Observations	12,189	12,189	13,513	13,513
R-squared	0.1599	0.0483	0.1534	0.0757
Endogeneity test (Chi-Sq)	9.633		3.548	
Endogeneity <i>p</i> -value		0.0081		0.1696
Kleibergen Papp F-statistic		1279		1470
Kleibergen Papp <i>p</i> -value		0.000		0.000

Notes: Selected coefficients, robust standard errors (clustered at the regional level) are in parentheses. Full results are available on request. Sample: All married women ages 15–49, years 1996, 2001, 2006, 2011, 2016. High-intensity conflict regions are defined if the normalized number of casualties exceeds the country median. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away. Regional forest coverage is included as an instrument in the first stage (not shown) for columns (2) and (4). ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Results are consistent when continuous measures of conflict are used, rather than the binary indicator. Equation (1) is estimated for the 2001–16 waves, using district level variation but omitting the 1996 wave. Results using the continuous IV measure of casualties are shown in Appendix Table A6.1. Again, we find that the negative impact of increasing conflict is significant for the middle and younger cohorts, and for movers into the region. When using the district analysis, we are able to consider the analysis separately for low conflict districts (Appendix Table A6.2) and for high conflict districts (Appendix Table A6.3). Results are largely consistent within the categories.

Appendix Table A7 provides the coefficients from multinomial probit regressions that estimate the probability of being in self- or market employment relative to non-work. This is estimated for all five waves (1996–2016) using the binary casualty IV indicator. For most subgroups, the decline in employment is found in both self and market categories. The notable exceptions are the subsamples of married women with absent husbands, and the subsample of young women. For these groups, the decline in employment was primarily a decline in “working for self or family.”

Our results run contrary to Menon and Rodgers (2015), who find positive effects of casualty for 2001 and 2006. One key difference in the analysis is in the definition of “high conflict region.” While we define the high conflict regions as those with casualty rates above the median (capturing six of the thirteen regions), Menon and Rodgers (2015) define high casualty regions as those with casualty rates above the 75th percentile (capturing two of the thirteen regions). Additionally, Menon and Rodgers’ (2015) main sample includes previously married women and so are capturing women who may have been induced into the labour market due to the marital disruption effects of the conflict. We abstract away from marriage structure considerations. Next, we apply similar regressions to estimate the impact of conflict intensity on a spouse’s justification for intimate partner violence and reporting of intimate partner violence.

2.4.2 Impact of civil war intensity on IPV justification and incidence

As outlined in above, in three waves of the survey (2001, 2011, 2016), the spouses of our main sample are asked whether IPV is justified under different situations related to home, husband, and childcare. We create a variable equal to one if the spouse responds that IPV is ever justified and estimate the 3SLS SUR model to study the effect of war intensity on the probability of justifying IPV.²⁰ Table 4 and Table A8.2 in the Appendix report the results of the SUR estimation: the effect of the war intensity on IPV justification, controlled for woman’s employment and the results of the probability of working, controlled for the IPV justification. The results are provided for the full sample, old, mid, and young cohorts and for movers and stayers. The model employs district-level forestation as an IV for the conflict intensity (district casualties per 1,000 population).

As with IPV justification, we estimate the impact of war intensity on the likelihood of married women indicating that IPV occurred in the previous twelve months using 3SLS SUR specification and report the probability of IPV in Table 5, and the probability of working in Table A8.4 in the Appendix. Since this dependent variable is only available for 2011 and 2016, and since movers/stayers cannot be identified for 2011, we present the results for the full sample and for age cohorts.

²⁰ We present only the IV regression results in this section. Naïve results are similar.

Table 4 Probability of IPV justification by husband, controlled for the probability of working

Variables	ALL (1)	Old cohort (2)	Mid cohort (3)	Young cohort (4)	Movers (5)	Stayers (6)
Working for self/family	-0.0684*** (0.0131)	-0.1064*** (0.0209)	-0.0929*** (0.0209)	-0.0425** (0.0165)	-0.0646*** (0.0142)	-0.0735*** (0.0161)
Market work	-0.0337** (0.0141)	-0.0789*** (0.0296)	-0.0401 (0.0259)	-0.0201 (0.0254)	-0.0302 (0.0194)	-0.0414** (0.0188)
Year 2006	-0.0639** (0.0261)	-0.0419 (0.0324)	-0.0874*** (0.0336)	-0.0773* (0.0411)	-0.0438 (0.0305)	-0.0821*** (0.0254)
Year 2016	0.0112 (0.0293)	0.0103 (0.0300)	0.0241 (0.0463)	0.0021 (0.0434)	0.0080 (0.0337)	0.0128 (0.0306)
District casualties per 1,000	-0.0001 (0.0003)	-0.0004 (0.0003)	0.0001 (0.0003)	0.0000 (0.0005)	0.0001 (0.0003)	-0.0003 (0.0003)
Casualties × 2006	0.0003 (0.0003)	0.0005 (0.0003)	0.0000 (0.0004)	0.0001 (0.0005)	-0.0003 (0.0004)	0.0007** (0.0003)
Casualties × 2016	-0.0001 (0.0003)	-0.0001 (0.0004)	-0.0006* (0.0003)	-0.0001 (0.0005)	-0.0002 (0.0003)	-0.0002 (0.0003)
Observations	25,673	7,163	8,580	9,215	12,174	13,492
R-squared	0.0212	0.0193	0.0249	0.0276	0.0251	0.0223
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Selected coefficients of the 3SLS model are reported, robust standard errors in parentheses. Full results are available on request. Sample: All husbands of married women ages 15–49, years 2001, 2006, 2016. High-intensity conflict districts are defined if the normalized number of casualties exceeds the country median. Individual controls include woman's age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, husband education, husband employment, household access to media, household has electricity, Hindu religion indicator, rural indicator. District controls include the 1996 poverty, literacy, and infant mortality rates. District forest coverage is included as an instrument in the first stage (not shown) for all columns. Errors are clustered at the district level. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Finally, Tables 4 and 5 and Appendix Tables A8.1–A8.4 present the results for the total sample and subsamples split by the intensity of the conflict. High-intensity conflict districts are defined if the normalized number of casualties exceeds the country median.

Husbands are less likely to justify IPV when their wives work for self or family, relative to when their wives do not work or work for others in the market (as suggested by Koenig et al. [2003]; Anderson and Eswaran [2009]; Aizer [2010]; Majlesi [2016]). At the same time, the probability of working wife to experience IPV in the last twelve months is higher compared to non-working counterparts (consistent with Bueno and Henderson [2021]; Dhanaraj and Mahambare [2022]). It is possible, that while men perceive a working wife as a threat to their household dominance as a breadwinner, they also recognize substitutability of domestic and market work. In the context of our investigation, IPV justification by husband includes hitting or beating their wife if she does not perform housework or childrearing or

has conflicts with the husband. Working outside home removes wife from possible violent situations and control exerted by their partners, and adds her bargaining power about household responsibilities allocation.

Table 5 Probability of IPV in previous twelve months, controlled for the probability of working

PANEL A: ALL DISTRICTS	ALL (1)	Old cohort (2)	Mid cohort (3)	Young cohort (4)
Omitted: Working for self or family	0.0274*** (0.0100)	-0.0758* (0.0426)	0.0982*** (0.0189)	0.0281** (0.0135)
Market work	0.0976*** (0.0186)	0.0425 (0.0551)	0.1464*** (0.0294)	0.0998*** (0.0262)
2016	-0.0216 (0.0205)	-0.0224 (0.0423)	-0.0314 (0.0307)	-0.0153 (0.0261)
District casualties per 1,000 population	0.0001 (0.0002)	0.0001 (0.0002)	0.0004* (0.0002)	-0.0002 (0.0002)
District casualties × 2016	-0.0003* (0.0002)	-0.0001 (0.0004)	-0.0004* (0.0002)	-0.0002 (0.0002)
Observations	6,967	925	2,148	3,894
R-squared	0.0440	0.0647	0.0413	0.0575
Individual controls	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes

Notes: Selected coefficients of the 3SLS model are reported, robust standard errors in parentheses. Full results are available on request. Sample: All husbands of married women ages 15–49, years 2011, 2016. Individual controls include woman's age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, husband education, husband employment, household access to media, household has electricity, Hindu religion indicator, rural indicator. District controls include the 1996 poverty, literacy, and infant mortality rates. District forest coverage is included as an instrument in the first stage (not shown) for all columns. Errors are clustered at the district level. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

The effect of IPV justification and IPV occurrence have an opposite effect on the probability of women working. If the husband perceives domestic chores as dominant, expressed in the increased IPV justification, the woman is less likely to work outside home. In increase in the probability of IPV has a positive effect on working. Women may work more to get out abusive relationships, temporarily or permanently, or they are trying to alleviate financial strain that causes IPV at home.

IPV justification for the most part is unaffected by the exposure to the conflict, however, it is more likely in 2006 at the end of the war, relative to 2001, but only for stayers. In 2016, only the middle-age cohort experienced a reduction in IPV justification across the country. The outcome is different in the low-intensity areas. Higher exposure to conflict in low-intensity areas have a negative impact on the probability of husbands justifying IPV and

the results hold for all groups. IPV justification is higher at the end of the conflict for older and younger cohorts, and for stayers, and the effect holds for younger cohort in 2016.

We find a positive impact of war intensity on the reported incidence of IPV in 2011 for the middle-age cohort. We find a negative (but empirically small) effect of war intensity for 2016 across country. In high-intensity areas, while the middle-age cohort experienced higher IPV with more casualties, the younger cohort shows the reduction of IPV. Also, in 2016 there is a lower probability of IPV due to the conflict in older and middle-age cohorts. We believe that the reduction of IPV over the years is likely due to public policy interventions of the Nepalese government.

In the post-war years, the Nepalese government has taken important steps to define and recognize the problem of domestic violence against women. Most notable is the Domestic Violence (Offence and Punishment) Act, 2066 (2009), which creates a legal framework for reporting, investigating, and prosecuting cases of VAW. This act was followed by The Right to Safe Motherhood and Reproductive Health Act 2075 (2018) and the Crime Victims Protection Act 2075 (2018). Moreover, Nepal established the National Women's Commission and the network of One-Stop Crisis Centres to provide legal, physical, and financial assistance to the victims of violence survivors. The positive effects of these programs, such as an increase in IPV reporting by working women and the overall decline in reporting over time, are reflected in our results.

At first glance, we capture the inconsistency based on the two measures of IPV: the IPV justification by men was positively affected by the conflict intensity in 2011, while the instances of IPV reported by women were negatively affected by the conflict intensity in 2016. This inconsistency can be explained threefold. The first two explanations are rooted in the study design. First, the nature of the variables used in the empirical investigation varies for men and women. Men answer the hypothetical question if they would justify IPV against women in certain situations. Women report specific incidences of IPV that actually happened in the last twelve months. While women are asked the question based on their recollection of their relationships with husbands, men may or may not have abused their wives to form the response to their IPV justification.

Second, the perceptions of intimate partner violence (IPV) against women tend to vary across men and women with different backgrounds (Stickley et al. 2008; Uthman, Lawoko, and Moradi 2009; Tran, Nguyen, and Fisher 2016; Caridad Bueno and Henderson

2017). While men are more likely to justify IPV and find IPV acceptable, they largely underestimate the problematic nature of IPV.

Overall, the results from estimates on the impact of war intensity on IPV are intriguing. Understanding the incongruous results of IPV justification and IPV experience lie beyond the expertise of economists but deserves further study. We do find that there are direct long-run effects of conflict on the IPV, although the indirect effect of conflict on IPV, through employment, is of higher magnitude.

2.5 Conclusion

In this article, we expand on the work of Menon and Rodgers (2015) to consider the long-run impact of civil war intensity in Nepal on married women's workforce attachment and IPV experience. We use data from Nepal's Demographic and Health Survey (DHS) that includes a pre-war year (1996), the war years (2001, 2006) and post-war years (2011, 2016). We are able to consider the effects by age cohort, separating women who were children during the war, those who were at a typical marriageable age during the war, and those who would likely have already been married at the onset of the war.

IV regressions indicate two key points. First, conflict intensity has heterogeneous impacts on the probability of employment for married women. While the results for the full sample are insignificant, we find negative effects for younger and middle cohorts, and for married women who have moved into the region since the war. These negative impacts remain even ten years following the conclusion of the war. These subgroups are the women most likely to be impacted by the disruption in human capital and in the regional economic institutions as they are experiencing war while in their development years.

Second, while we do observe a positive relationship between IPV and conflict intensity, this pattern does not hold in the long run under IV analysis. This is more consistent with unobserved differences in the men residing in high and low-conflict regions rather than a causal link between conflict intensity and IPV probability. Third, conflict does not appear to have a direct negative impact on the IPV justification of husbands. However, IPV justification is consistently lower for employed women; thus, conflict may have an indirect effect. More research is required (with longitudinal data) to identify the mechanisms.

The Nepalese experience of civil war, married women's employment, and IPV will differ from the experiences in other countries. The mechanisms through which conflict impacts employment and IPV will be influenced by the duration and intensity of the conflict

and differences in social norms surrounding gender and women's rights within the household, economic opportunities, and education availability. Our study on Nepal adds another case study example and provides a broad analysis of the long-run impacts of war on married women. These types of studies should inform policymakers in post-conflict situations to be aware of the potential long-run consequences.

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Additional Results for Chapter 2

Appendix I: Instrumental variable justification

The data collected in Do and Iyer (2010) contains a rich set of geographical variables for pre-war Nepal, including forestation, altitude, and the total length of the road network normalized by area. Menon and Rodgers (2015) show that when the districts are aggregated to the regional level, forest coverage performs best as an IV. We follow Menon and Rodgers (2015) and include 1996 in our regressions, using regional aggregated calculations for conflict and forest cover (N=13). Additionally, we exclude the 1996 data so that the geography can be identified to the district level (N=75). While we lose a pre-war year, we gain variation in the key variable and reduce the possibility of measurement error that arises from the aggregation. Since we are including regional (or district) fixed effects in regressions, our key variables are interaction terms between years and conflict deaths. Our IVs must also therefore be single, time constant variables that are interacted with year. We considered each of the three geography variables listed above as potential IVs, for all regressions, forest coverage performed best.

We aim to ensure that the presence of instrumental variable – forest coverage – does not independently influence women's employment. Instead, we hypothesized that its impact on employment is solely mediated through its effects on conflict intensity. However, forest coverage may be correlated with poverty, and other factors may influence the willingness to work for women. The regressions presented include district level fixed effects, and thus time consistent district level variables cannot be included. We have also conducted the analysis without district fixed effects, but instead controlling for district level variables such as poverty, literacy, and infant mortality rates. Results were similar. This analysis has also been conducted by Menon and Rodgers (2015) using the same poverty and forest coverage data. They estimated employment effects for different groups: women in households with husbands migrated, widowed women, or heads of households using forest coverage directly in the equation but also ran the estimation using forest coverage as an IV and found that the IV analysis has similar results.

Table A1.1 presents coefficients from simple regressions at the district level. While all three potential IVs provide valid F-tests, we focus on the proportion forested in the presented regressions for two reasons. First, to maintain consistency with Menon and Rodgers (2015). Second, of the three, proportion forested is the highest correlated with

district casualties. Finally, forestation as an instrument for conflict intensity is consistent with the conflict descriptions as noted in Menon and Rodgers (2015) and in Do and Iyer (2010). First stage regression results on the full regression are presented in Table A5.

Table A1.1: Correlation of potential IVs to District Casualties.

Dependent Variable: District Casualties per 1000 population				
	(1)	(2)	(3)	(4)
Proportion Forested	143.384*** (44.338)	155.751*** (45.171)		
Road network length	-47.258 (48.398)		-130.932*** (48.063)	
Elevation	8.796*** (3.125)			9.760*** (3.198)
Constant	-10.827 (26.109)	14.789 (19.979)	89.369*** (9.599)	38.716** (15.238)
Observations	73	73	73	73
R-squared	0.271	0.143	0.095	0.116

Source: Authors calculations based on Do and Iyer (2010).

Table A2: Cohort Age Description

	Birth Year		DHS Year			
	Min	Max	2001	2006	2011	2016
OLDER COHORT	1957	1961	40-44	45-49		
	1962	1966	35-39	40-44	45-49	
	1967	1971	30-34	35-39	40-44	
MIDDLE COHORT	1972	1976	25-29	30-34	35-39	40-44
	1977	1981	20-24	25-29	30-34	35-39
YOUNGER COHORT	1982	1986	16-20	20-24	25-29	30-34
	1987	1991		16-20	20-24	25-29
	1992	1996			16-20	20-24
	1997	2001				16-20

Source: Authors calculations based on DHS.

Table A3: Details on intimate partner violence (IPV) survey questions

Type of IPV	Did your (last) (husband/male partner) ever do any of the following things to you:
Physical	• push you, shake you, or throw something at you? • slap you? • twist your arm or pull your hair? • punch you with his fist or with something that could hurt you? • kick you, drag you, or beat you up? • try to choke you or burn you on purpose? • attack you with a knife, gun, or other weapon?
Sexual	• physically force you to have sexual intercourse with him when you did not want to? • physically force you to perform any other sexual acts you did not want to? • force you with threats or in any other way to perform sexual acts you did not want to?
Emotional	• say or do something to humiliate you in front of others? • threaten to hurt or harm you or someone you care about? • insult you or make you feel bad about yourself?

Table A4.1 Summary statistics, working by high and low conflict regions

	Low conflict regions				High conflict regions			
	2001	2006	2011	2016	2001	2006	2011	2016
All Married Women								
Proportion working	0.78	0.77	0.71	0.62	0.93	0.94	0.88	0.80
Type of work								
Self or family employed	0.60	0.60	0.53	0.50	0.87	0.87	0.77	0.71
Market work	0.19	0.17	0.18	0.12	0.06	0.07	0.11	0.10
Part-year	0.22	0.20	0.32	0.30	0.12	0.22	0.36	0.42
Full-year	0.56	0.57	0.39	0.32	0.82	0.71	0.53	0.38
N	4937	4695	5326	5121	3387	3549	4133	4776
Sub-samples								
Proportion working								
Stayers	0.65	0.67		0.59	0.84	0.86		0.69
Movers	0.89	0.90		0.77	0.95	0.97		0.85
Younger Cohort	0.60	0.63	0.61	0.57	0.93	0.91	0.86	0.78
Middle Cohort	0.72	0.80	0.78	0.70	0.94	0.94	0.90	0.86
Working	0.87	0.86	0.81	0.70	0.94	0.95	0.92	0.83

Source: Author's calculations based on DHS, 1996-2016, and Do and Iyer (2010).

Note: DHS-Demographic and Health Survey. Weighted to women's individuals sample weights provided by the Nepal DHS in each year. The regions with casualties exceeding the 50th percentile value were classified as "high conflict regions" and regions with casualties below the 50th percentile were classified as "low conflict regions".

Table A4.2 Summary statistics, IPV by high and low conflict districts

	Low conflict				High conflict			
	2001	2006	2011	2016	2001	2006	2011	2016
Total sample								
Husband justifies IPV	0.28	0.23		0.28	0.29	0.25		0.28
IPV in last 12 months			0.18	0.15			0.20	0.12
N	4937	4695	5326	5121	3387	3549	4133	4776
Young Cohort								
Husband justifies IPV	0.31	0.24		0.29	0.33	0.25		0.29
IPV in last 12 months			0.20	0.16			0.20	0.11
N	527	1352	2382	3125	378	1077	1997	3001
Middle Cohort								
Husband justifies IPV	0.31	0.22		0.27	0.30	0.23		0.26
IPV in last 12 months			0.17	0.13			0.19	0.13
N	1877	1632	1768	1468	1355	1292	1319	1278
Older Cohort								
Husband justifies IPV	0.27	0.22		0.27	0.28	0.26		0.26
IPV in last 12 months			0.18	0.12			0.22	0.14
N	2069	1711	1176	528	1374	1180	817	497

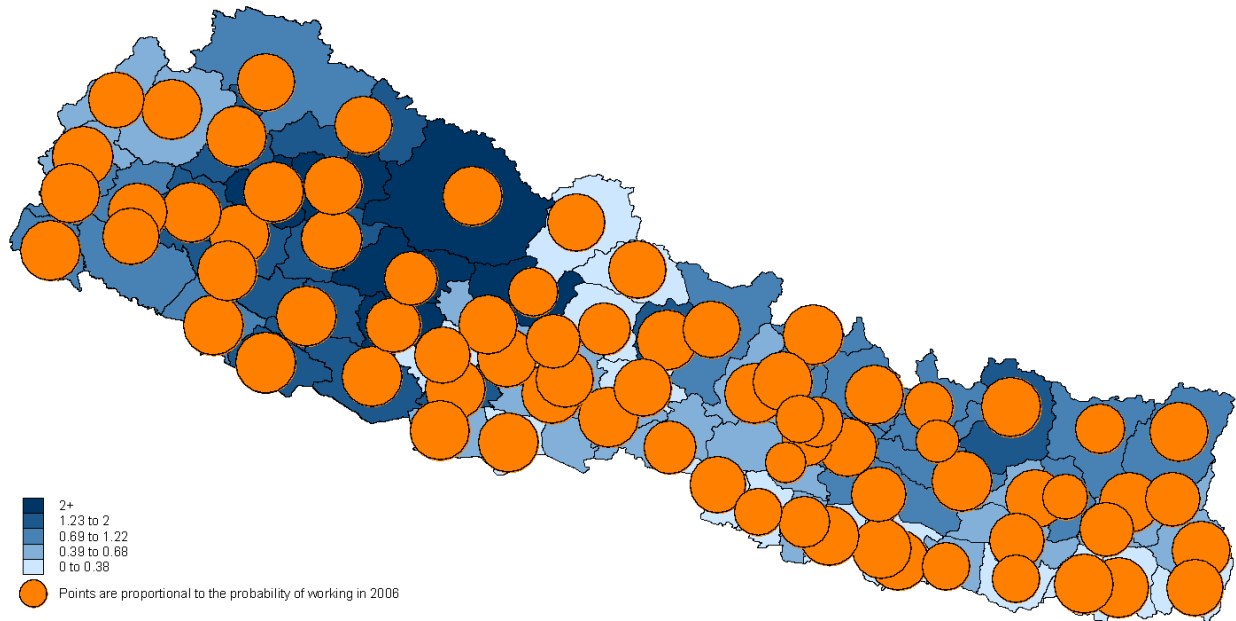
Source: Author's calculations based on DHS, 1996-2016, and Do and Iyer (2010). DHS-Demographic and Health Survey. Weighted to women's individuals sample weights provided by the Nepal DHS in each year. The districts with casualties per 1000 population exceeding the 50th percentile value were classified as "high conflict" and districts with casualties per 1000 population below the 50th percentile were classified as "low conflict".

Table A4.3 Summary statistics, control variables

	Low conflict regions				High conflict regions			
	2001	2006	2011	2016	2001	2006	2011	2016
Total sample								
Age in years	30.6	31.1	31.4	31.9	30.2	30.9	31.1	31.8
Education								
No schooling	0.71	0.61	0.46	0.41	0.72	0.63	0.51	0.39
Some or all primary school	0.15	0.17	0.19	0.18	0.15	0.17	0.19	0.19
Some secondary school	0.12	0.19	0.28	0.28	0.12	0.18	0.25	0.31
Completed secondary school	0.01	0.03	0.07	0.12	0.01	0.02	0.05	0.11
Socioeconomic Indicators and Household Characteristics								
# Of children under 5 years	1.18	0.99	0.75	0.77	1.23	1.11	0.88	0.72
Having son	0.76	0.77	0.74	0.74	0.76	0.78	0.78	0.76
House has radio/television	0.45	0.65	0.71	0.66	0.54	0.68	0.65	0.61
House has electricity	0.26	0.51	0.75	0.89	0.16	0.41	0.69	0.84
Religion is Hindu	0.79	0.81	0.80	0.83	0.97	0.94	0.94	0.93
Rural	0.89	0.83	0.86	0.36	0.94	0.89	0.89	0.45
Husband Living Away	0.18	0.24	0.30	0.32	0.28	0.31	0.35	0.38
Husband's Characteristics								
No schooling	0.38	0.28	0.22	0.17	0.28	0.20	0.18	0.13
Some or all primary school	0.23	0.26	0.22	0.21	0.28	0.30	0.25	0.24
Some secondary school	0.29	0.36	0.42	0.43	0.36	0.42	0.45	0.45
Completed secondary school	0.07	0.09	0.13	0.19	0.06	0.07	0.11	0.17
Sample size	4937	4695	5326	5121	3387	3549	4133	4776

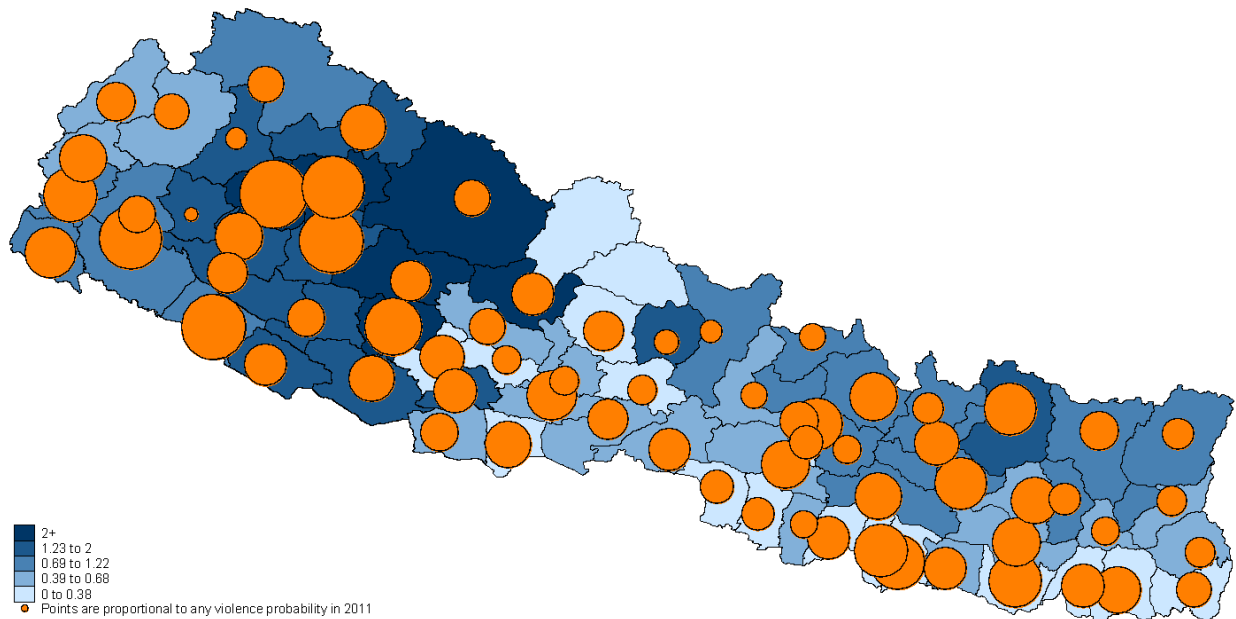
Source: Author's calculations based on DHS, 1996-2016, and Do and Iyer (2010). DHS-Demographic and Health Survey. Weighted to women's individuals sample weights provided by the Nepal DHS in each year. The districts with casualties exceeding the 50th percentile value were classified as "high conflict" and districts with casualties below the 50th percentile were classified as "low conflict".

Figure A4.1: Conflict intensity in Nepal and probability of working among married women in 2006.



Source: Author's calculations based on Do and Iyer (2010) and the Nepal DHS 2006. The blue gradient indicates the conflict intensity in Nepal districts, measured as the deaths per 1000 population in 1996-2006. Orange dots reflect women's employment rates by war intensity across all districts in 2006.

Figure A4.2: Conflict intensity in Nepal and probability of IPV among married women in 2011.



Source: Author's calculations based on Do and Iyer (2010) and the Nepal DHS 2011. The blue gradient indicates the conflict intensity in Nepal districts, measured as the deaths per 1000 population in 1996-2006. Orange dots reflect the proportion of women who responded that they had experienced IPV in the last 12 months in 2011.

Table A5 Full regression results, probability of working

	Second Stage	First Stage Results			
	Working	Above Median X 2001	Above Median X 2006	Above Median X 2011	Above Median X 2016
Above Median	-0.0082				
Mortality X 2001	(0.0171)				
Above Median	0.0027				
Mortality X 2006	(0.0200)				
Above Median	-0.0094				
Mortality X 2011	(0.0198)				
Above Median	-0.0049				
Mortality X 2016	(0.0199)				
Age	0.0326*** (0.0020)	-0.0006 (0.0007)	-0.0009 (0.0009)	-0.0005 (0.0008)	0.0011 (0.0010)
Age squared	-0.0004*** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	-0.0000 (0.0000)
Some or all primary school	-0.0142** (0.0068)	-0.0024 (0.0023)	0.0062** (0.0030)	-0.0061** (0.0028)	0.0031 (0.0032)
Some secondary school	-0.0470*** (0.0078)	0.0006 (0.0024)	-0.0027 (0.0033)	-0.0153*** (0.0031)	0.0104*** (0.0038)
Completed secondary school	-0.0356** (0.0139)	-0.0132*** (0.0035)	-0.0153*** (0.0052)	0.0006 (0.0060)	0.0320*** (0.0086)
Son	-0.0135** (0.0065)	0.0031 (0.0022)	0.0029 (0.0027)	0.0045* (0.0026)	-0.0114*** (0.0032)
Media	-0.0049 (0.0046)	0.0075*** (0.0018)	-0.0008 (0.0021)	-0.0081*** (0.0020)	-0.0045** (0.0021)
Has electricity	-0.0651*** (0.0058)	-0.0039* (0.0020)	0.0113*** (0.0029)	-0.0262*** (0.0027)	-0.0062** (0.0025)
Religion	0.0764*** (0.0071)	-0.0156*** (0.0027)	-0.0036 (0.0031)	0.0023 (0.0031)	0.0278*** (0.0033)
Spouse's education	-0.0363*** (0.0028)	-0.0009 (0.0010)	-0.0002 (0.0012)	0.0032*** (0.0011)	0.0016 (0.0013)
Spouse's occupation	0.1502***	0.0007	-0.0106	0.0030	0.0408***

	(0.0227)	(0.0038)	(0.0075)	(0.0046)	(0.0139)
Rural dummy	0.1270***	0.0007	-0.0033	-0.0137***	0.0086**
	(0.0066)	(0.0020)	(0.0029)	(0.0026)	(0.0034)
Husband in house	0.0033	-0.0009	-0.0088***	0.0110***	0.0070***
	(0.0053)	(0.0017)	(0.0022)	(0.0022)	(0.0025)
Forest coverage above		0.6922***	-0.0186***	-0.0189***	-0.0223***
75 th percentile X 2001		(0.0049)	(0.0017)	(0.0019)	(0.0021)
Forest coverage above		-0.0127***	0.6643***	-0.0100***	-0.0110***
75 th percentile X 2001		(0.0017)	(0.0059)	(0.0021)	(0.0025)
Forest coverage above		-0.0198***	-0.0216***	0.7000***	-0.0237***
75 th percentile X 2001		(0.0016)	(0.0018)	(0.0048)	(0.0022)
Forest coverage above		-0.0132***	-0.0107***	-0.0118***	0.6636***
75 th percentile X 2001		(0.0017)	(0.0019)	(0.0020)	(0.0053)
Observations	42,744	42,744	42,744	42,744	42,744
R-squared	0.0755				
F-statistic					
p-value		5739	3766.64	6094.3	4681.23
		0.000	0.000	0.000	0.000
Endogeneity Test (Chi-Sq)	15.526				
Endogeneity p-value	0.0037				
Kleibergen Papp F-statistic	2601.01				
Kleibergen Papp p-value	0.000				

Notes: Full results corresponding to Table 1a, column (2). Robust standard errors (clustered at the regional level) are in parentheses. Sample: All married women ages 15–49, years 1996, 2001, 2006, 2011, 2016. High-intensity conflict regions are defined if the normalized number of casualties exceeds the country median. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A6.1 Effect of total district casualties on probability of work, full sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full	Husband in house	Husband Away	Older Cohort	Middle Cohort	Younger Cohort	Mover	Stayer
Total District Casualties * 2006	-0.0002 (0.0002)	-0.0005* (0.0003)	0.0005 (0.0005)	-0.0001 (0.0004)	-0.0020*** (0.0004)	-0.0013** (0.0006)	-0.0013*** (0.0005)	-0.0005* (0.0003)
Total District Casualties * 2011	0.0002 (0.0002)	-0.0000 (0.0003)	0.0005 (0.0005)	-0.0001 (0.0005)	-0.0021*** (0.0004)	-0.0014** (0.0005)		
Total District Casualties * 2016	0.0003 (0.0002)	0.0002 (0.0003)	0.0003 (0.0005)	0.0002 (0.0005)	-0.0019*** (0.0004)	-0.0020*** (0.0005)	-0.0014*** (0.0004)	0.0003 (0.0003)
Year Fixed Effects	X	X	X	X	X	X	X	X
District Fixed Effects	X	X	X	X	X	X	X	X
Individual Controls	X	X	X	X	X	X	X	X
Observations	34,949	25,331	9,618	9,119	11,626	13,489	12,175	13,496
R-squared	0.0676	0.0705	0.0584	0.0872	0.0519	0.0371	0.0501	0.0607
Kleibergen Papp F- statistic	1068	728	318.1	319.7	462	187.7	614.9	560.9
Kleibergen Papp p- value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Selected coefficients, robust standard errors (clustered at the district level) are in parentheses. Full results are available on request. Sample: All married women ages 15–49, years 1996, 2001, 2006, 2011, 2016. Cohort age construction is described in Table A2. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away. District forest coverage is included as an instrument in the first stage (not shown) for all regressions shown. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A6.2 Effect of total district casualties on probability of work, high casualty districts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full	Husband in house	Husband Away	Older Cohort	Middle Cohort	Younger Cohort	Mover	Stayer
Total District Casualties * 2006	-0.0007** (0.0003)	-0.0003 (0.0004)	-0.0024*** (0.0007)	-0.0001 (0.0005)	-0.0007 (0.0005)	-0.0012** (0.0006)	-0.0019*** (0.0006)	-0.0002 (0.0004)
Total District Casualties * 2011	-0.0012*** (0.0003)	-0.0010** (0.0004)	-0.0022*** (0.0008)	-0.0009 (0.0006)	-0.0014** (0.0006)	-0.0012** (0.0006)		
Total District Casualties * 2016	-0.0002 (0.0004)	0.0002 (0.0004)	-0.0021** (0.0009)	-0.0002 (0.0009)	-0.0003 (0.0007)	-0.0001 (0.0006)	-0.0012* (0.0007)	0.0003 (0.0005)
Year Fixed Effects	X	X	X	X	X	X	X	X
District Fixed Effects	X	X	X	X	X	X	X	X
Individual Controls	X	X	X	X	X	X	X	X
Observations	14,321 4,456	10,418 5,775	3,903	3,759	4,621	5,649		
R-squared	0.0337 0.0383	0.0365 0.0290	0.0346	0.0373	0.0365	0.0296		
Kleibergen Papp F- statistic	473 286	308.4 220.8	173.5	93.37	177.1	211		
Kleibergen Papp p-value	0 0	0 0	0	0	0	0	0	

Notes: Selected coefficients, robust standard errors (clustered at the district level) are in parentheses. Full results are available on request. Sample: All married women ages 15–49, years 1996, 2001, 2006, 2011, 2016 residing in districts with above median casualties. Cohort age construction is described in Table A2. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away. District forest coverage is included as an instrument in the first stage (not shown) for all regressions shown. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A6.3 Effect of total district casualties on probability of work, low casualty districts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full	Husband in house	Husband Away	Older Cohort	Middle Cohort	Younger Cohort	Mover	Stayer
Total District Casualties * 2006	-0.0022* (0.0013)	-0.0038*** (0.0015)	0.0015 (0.0030)	-0.0020 (0.0017)	- 0.0095*** (0.0022)	-0.0054 (0.0036)	-0.0047** (0.0023)	- 0.0031** (0.0015)
Total District Casualties * 2011	0.0009 (0.0012)	-0.0003 (0.0014)	0.0041 (0.0028)	-0.0012 (0.0021)	- 0.0075*** (0.0020)	-0.0041 (0.0032)		
Total District Casualties * 2016	0.0005 (0.0013)	0.0002 (0.0016)	0.0006 (0.0028)	-0.0009 (0.0030)	- 0.0071*** (0.0024)	-0.0091*** (0.0032)	-0.0046** (0.0022)	0.0016 (0.0019)
Year Fixed Effects	X	X	X	X	X	X	X	X
District Fixed Effects	X	X	X	X	X	X	X	X
Individual Controls	X	X	X	X	X	X	X	X
Observations	20,628	14,913	5,715	5,360	7,005	7,840	7,719	7,721
R-squared	0.0885	0.0903	0.0799	0.1010	0.0588	0.0480	0.0639	0.0827
Kleibergen Papp F- statistic	2215	1430	314.3	190.6	585.7	467.4	1044	792.9
Kleibergen Papp p- value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Selected coefficients, robust standard errors (clustered at the district level) are in parentheses. Full results are available on request. Sample: All married women ages 15–49, years 1996, 2001, 2006, 2011, 2016 residing in districts with below median casualties. Cohort age construction is described in Table A2. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away. District forest coverage is included as an instrument in the first stage (not shown) for all regressions shown. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A7: Multinomial probit IV regressions

Panel A. Household Structure

Variables	All		Husband in House		Husband Away	
	Self	Market	Self	Market	Self	Market
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
High Casualty Region × 2001	-0.2152 (0.1910)	-0.6335*** (0.2437)	-0.0484 (0.2191)	-0.7055** (0.2771)	-1.0781** (0.4237)	-0.3649 (0.5629)
High Casualty Region × 2006	0.0767 (0.1796)	-0.3196 (0.2286)	0.3344 (0.2084)	-0.3912 (0.2625)	-0.9780** (0.3953)	-0.0196 (0.5281)
High Casualty Region × 2011	-0.6766*** (0.1655)	-0.7684*** (0.2114)	-0.5114*** (0.1931)	-0.8300*** (0.2439)	-1.5410*** (0.3677)	-0.5892 (0.4945)
High Casualty Region × 2016	-0.8180*** (0.1497)	-0.2046 (0.1941)	-0.4395** (0.1736)	-0.0474 (0.2219)	-2.0632*** (0.3446)	-0.3455 (0.4703)
Observations	42,744	42,744	31,979	31,979	10,754	10,754

Panel B. Cohort Analysis

Variables	Older Cohort		Middle Cohort		Young Cohort	
	Self	Market	Self	Market	Self	Market
	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
High Casualty Region × 2001	-0.5450* (0.3061)	-0.8352** (0.3734)	-0.0680 (0.3238)	-0.4379 (0.4226)		
High Casualty Region × 2006	0.3049 (0.3090)	-0.2569 (0.3773)	-0.6618** (0.3011)	-0.5224 (0.3913)	-0.3934 (0.4949)	-0.5764 (0.6784)
High Casualty Region × 2011	-0.7007** (0.2982)	-0.6987* (0.3673)	-1.2650*** (0.2851)	-1.2150*** (0.3795)	-1.2976*** (0.4713)	-0.5725 (0.6337)
High Casualty Region × 2016	-0.9232*** (0.3015)	-0.7347* (0.3927)	-1.1768*** (0.2636)	-0.2130 (0.3549)	-1.6412*** (0.4556)	-0.2197 (0.6154)
Observations	12,943	12,943	14,071	14,071	13,490	13,490

Panel C. Migration Status

Variables	Older Cohort		Middle Cohort	
	Self	Market	Self	Market
	(7a)	(7b)	(8a)	(8b)
High Casualty Region × 2001	-0.1943 (0.2632)	0.0731 (0.3457)	0.6571** (0.2650)	0.4470 (0.3209)
High Casualty Region × 2016	-1.1029*** (0.2324)	0.1234 (0.3074)	-0.4630** (0.2180)	0.4201 (0.2719)
Observations	12,189	12,189	13,513	13,513

Notes: Selected coefficients from multinomial probit regression. Robust standard errors (clustered at the regional level) are in parentheses. Full results are available on request. Sample: All married women aged 15–49, years 1996, 2001, 2006, 2011, 2016. Cohort age construction is described in Table A2. Individual controls include age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, spouse's education, spouse's employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, and husband away. Regional forest coverage is included as an instrument in the first stage (not shown) for all regressions shown. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A8.1 Probability of IPV justification by husband, controlled for the probability of working

Panel B: Low-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)	Movers (5)	Stayers (6)
District Casualties per 1,000 population	-0.0044*** (0.0013)	-0.0048*** (0.0013)	-0.0030* (0.0017)	-0.0081*** (0.0021)	-0.0055*** (0.0015)	-0.0038*** (0.0015)
District Casualties × 2006	0.0022 (0.0018)	0.0038* (0.0022)	-0.0005 (0.0021)	0.0057* (0.0031)	0.0018 (0.0020)	0.0033* (0.0019)
District Casualties × 2016	0.0014 (0.0017)	0.0005 (0.0017)	0.0005 (0.0024)	0.0050** (0.0022)	0.0026 (0.0018)	0.0006 (0.0021)
Observations	15,443	4,260	5,225	5,535	7,719	7,718
R-squared	0.0402	0.0431	0.0418	0.0534	0.0449	0.0402

Panel C: High-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)	Movers (5)	Stayers (6)
District Casualties per 1,000 population	0.0003 (0.0004)	0.0005 (0.0006)	0.0001 (0.0004)	-0.0009 (0.0009)	0.0000 (0.0004)	0.0004 (0.0005)
District Casualties × 2006	-0.0003 (0.0005)	-0.0007 (0.0006)	-0.0001 (0.0005)	0.0011 (0.0009)	-0.0004 (0.0005)	-0.0002 (0.0005)
District Casualties × 2016	-0.0007 (0.0004)	-0.0007 (0.0008)	-0.0008** (0.0004)	0.0006 (0.0009)	-0.0003 (0.0004)	-0.0009 (0.0005)
Observations	10,230	2,903	3,355	3,680	4,455	5,774
R-squared	0.0194	0.0245	0.0308	0.0315	0.0284	0.0244

Notes: Selected coefficients of the 3SLS model are reported, robust standard errors in parentheses. Full results are available on request. Sample: All husbands of married women ages 15–49, years 2001, 2006, 2016. High-intensity conflict districts are defined if the normalized number of casualties exceeds the country median. Individual controls include woman's age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, husband education, husband employment, household access to media, household has electricity, Hindu religion indicator, rural indicator. District controls include the 1996 poverty, literacy, and infant mortality rates. District forest coverage is included as an instrument in the first stage (not shown) for all columns. Errors are clustered at the district level. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A8.2 Probability of working, controlled for IPV justification by husband

Panel A: All Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)	Movers (5)	Stayers (6)
Man justifies beating 2006	-0.0471*** (0.0097)	-0.0502*** (0.0113)	-0.0589*** (0.0150)	-0.0371** (0.0163)	-0.0545*** (0.0136)	-0.0386*** (0.0090)
2016	0.0432* (0.0232)	0.0559*** (0.0170)	0.0703** (0.0284)	0.0793* (0.0457)	0.0659** (0.0318)	0.0670*** (0.0181)
District Casualties per 1,000 population	-0.0239 (0.0286)	0.0407 (0.0374)	0.0190 (0.0311)	-0.0069 (0.0410)	0.0206 (0.0342)	0.0106 (0.0289)
District Casualties × 2006	0.0012*** (0.0004)	0.0006** (0.0003)	0.0017*** (0.0005)	0.0032*** (0.0007)	0.0020*** (0.0006)	0.0010*** (0.0003)
District Casualties × 2016	-0.0006* (0.0003)	-0.0004 (0.0003)	-0.0012*** (0.0004)	-0.0018*** (0.0006)	-0.0012** (0.0005)	-0.0006** (0.0003)
Observations	25,673	7,163	8,580	9,215	12,174	13,492
R-squared	0.1533	0.1676	0.1341	0.1408	0.1338	0.1334

Panel B: Low-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)	Movers (5)	Stayers (6)
District Casualties per 1,000 population	0.0052*** (0.0013)	0.0026*** (0.0010)	0.0076*** (0.0016)	0.0122*** (0.0022)	0.0083*** (0.0018)	0.0043*** (0.0010)
District Casualties × 2006	-0.0002 (0.0013)	0.0003 (0.0008)	-0.0040** (0.0016)	-0.0031 (0.0025)	-0.0021 (0.0016)	-0.0005 (0.0011)
District Casualties × 2016	-0.0000 (0.0013)	0.0014 (0.0019)	-0.0036*** (0.0012)	-0.0069*** (0.0019)	-0.0033** (0.0015)	0.0007 (0.0014)
Observations	15,443	4,260	5,225	5,535	7,719	7,718
R-squared	0.1788	0.1857	0.1530	0.1610	0.1555	0.1624

Panel C: High-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)	Movers (5)	Stayers (6)
District Casualties per 1,000 population	0.0007*** (0.0003)	0.0004 (0.0002)	0.0006* (0.0003)	0.0015*** (0.0004)	0.0014*** (0.0004)	0.0004 (0.0002)
District Casualties × 2006	-0.0005** (0.0002)	-0.0004 (0.0003)	-0.0004 (0.0003)	-0.0012*** (0.0004)	-0.0011*** (0.0004)	-0.0002 (0.0002)
District Casualties × 2016	-0.0001 (0.0003)	-0.0001 (0.0004)	-0.0002 (0.0004)	-0.0007** (0.0003)	-0.0007* (0.0004)	0.0001 (0.0003)
Observations	10,230	2,903	3,355	3,680	4,455	5,774
R-squared	0.1034	0.1238	0.1054	0.0963	0.0940	0.0996

Notes: Selected coefficients of the 3SLS model are reported, robust standard errors in parentheses. Full results are available on request. Sample: All husbands of married women ages 15–49, years 2001, 2006, 2016. Individual controls include woman's age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, husband education, husband employment, household access to media, household has electricity, Hindu religion indicator, rural indicator. District controls include the 1996 poverty, literacy and infant mortality rates. District forest coverage is included as an instrument in the first stage (not shown) for all columns. Errors are clustered at the district level. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A8.3 Probability of IPV in previous twelve months, controlled for the probability of working

Panel B: Low-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)
District Casualties per 1,000 population	-0.0003 (0.0010)	-0.0003 (0.0020)	0.0001 (0.0014)	-0.0011 (0.0014)
District Casualties $\times$ 2016	-0.0007 (0.0009)	0.0007 (0.0022)	-0.0007 (0.0013)	-0.0004 (0.0012)
Observations	4,031	512	1,275	2,244
R-squared	0.0476	0.0859	0.0436	0.0647

Panel C: High-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)
District Casualties per 1,000 population	-0.0003 (0.0003)	0.0001 (0.0004)	0.0004* (0.0002)	-0.0008*** (0.0003)
District Casualties $\times$ 2016	-0.0003 (0.0002)	-0.0012*** (0.0004)	-0.0009*** (0.0002)	0.0002 (0.0003)
Observations	2,936	413	873	1,650
R-squared	0.0612	0.0816	0.0751	0.0856
Individual Controls	X	X	X	X
District Controls	X	X	X	X

Notes: Selected coefficients of the 3SLS model are reported, robust standard errors in parentheses. Full results are available on request. Sample: All husbands of married women ages 15–49, years 2011, 2016. Individual controls include woman's age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, husband education, husband employment, household access to media, household has electricity, Hindu religion indicator, rural indicator. District controls include the 1996 poverty, literacy and rate, infant mortality rates. District forest coverage is included as an instrument in the first stage (not shown) for all columns. Errors are clustered at the district level. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table A8.4 Probability of working, controlled for IPV in previous twelve months

Panel A: All Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)
IPV in Previous 12 Months	0.0574*** (0.0144)	-0.0529 (0.0371)	0.1318*** (0.0257)	0.0660*** (0.0208)
2016	-0.0112 (0.0278)	-0.1093** (0.0453)	-0.0089 (0.0400)	0.0065 (0.0320)
District Casualties per 1,000 population	0.0013*** (0.0005)	0.0003 (0.0003)	0.0011*** (0.0004)	0.0018*** (0.0006)
District Casualties $\times$ 2016	-0.0003 (0.0003)	0.0008** (0.0004)	-0.0006 (0.0004)	-0.0005 (0.0003)
Observations	6,967	925	2,148	3,894
R-squared	0.0956	0.1482	0.0724	0.0999

Panel B: Low-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)
District Casualties per 1,000 population	0.0081*** (0.0017)	0.0038*** (0.0015)	0.0076*** (0.0019)	0.0103*** (0.0021)
District Casualties $\times$ 2016	-0.0029 (0.0020)	0.0013 (0.0027)	-0.0034 (0.0024)	-0.0043** (0.0022)
Observations	4,031	512	1,275	2,244
R-squared	0.1281	0.1923	0.1061	0.1303

Panel C: High-Intensity Districts

Variables	ALL (1)	Old Cohort (2)	Mid Cohort (3)	Young Cohort (4)
District Casualties per 1,000 population	0.0005* (0.0003)	0.0003 (0.0003)	0.0005 (0.0004)	0.0009*** (0.0003)
District Casualties $\times$ 2016	0.0003 (0.0003)	0.0001 (0.0005)	0.0002 (0.0004)	0.0001 (0.0003)
Observations	2,936	413	873	1,650
R-squared	0.0963	0.1034	0.1369	0.0982

Notes: Selected coefficients of the 3SLS model are reported, robust standard errors in parentheses. Full results are available on request. Sample: All husbands of married women ages 16–44, years 2011, 2016. Individual controls include woman's age, age squared, education, number of children under the age of 5, whether the firstborn child is a son, husband education, husband employment, household access to media, household has electricity, Hindu religion indicator, rural indicator, district 1996 poverty rate, district 1996 literacy rate, district 1996 infant mortality rate. District forest coverage is included as an instrument in the first stage (not shown) for all columns. Errors are clustered at the district level. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Chapter 3

Natural Disasters and Employment Dynamics: Couple-Level Panel Evidence from Hurricane Katrina

Abstract:

This paper examines how couples adjusted their labour supply in response to Hurricane Katrina, focusing on intra-household dynamics rather than individual outcomes. Using a novel couple-level panel constructed from Current Population Survey (CPS) microdata (June 2004–November 2006), I apply a difference-in-differences framework to compare households in Louisiana and Mississippi with those in Texas, Georgia, and Arkansas. The analysis reveals a significant reorganisation of household labour: the likelihood of both partners remaining employed declined by 3.1 percentage points—a relative drop of over 5% from pre-disaster levels. This adjustment was strongly gendered. Husbands increased weekly hours by 1.4 hours, while wives saw an 8% decline in log weekly earnings, contributing to a shift toward single-earner households. Households with young children were especially vulnerable, with maternal earnings absorbing most of the shock. In contrast, no significant differences emerged across racial groups, suggesting that gender and family structure played a more critical role than race in shaping post-disaster employment outcomes. These findings underscore that labour market recovery after disasters is deeply uneven and shaped by intra-household dynamics, with women bearing a disproportionate share of economic displacement.

Keywords

Disaster, Hurricane Katrina, Couple Labour supply, Intra-household employment, Gender, Current Population Survey.

Highlights

- Hurricane Katrina led to a 3.1 percentage point decline in dual-earner couples in affected states.
- The adjustment was sharply gendered: men increased hours, while women's earnings fell by about 8%.
- Couples with young children largely maintained dual employment, but women in these households absorbed larger income losses.
- Comparisons between single and married women show that female employment declines were driven by involuntary displacement rather than voluntary intra-household labour reallocation.

3.1 Introduction

Natural disasters create sudden and large shocks to infrastructure, production, and labour markets. Hurricane Katrina, which hit the Gulf Coast in August 2005, was one of the costliest disasters in U.S. history (Knabb, Rhone and Brown 2005; Blake, Landsea and Gibney 2011), displacing more than one million residents and causing severe job dislocation across Louisiana and Mississippi (Zissimopoulos and Karoly 2010). Within two months of landfall, employment fell by roughly 35 percent in the New Orleans metropolitan area and by about 12 percent statewide in Louisiana (Kosanovich 2006). This sharp, geographically concentrated shock, which affected some regions far more than neighbouring states, provides a quasi-experimental setting for examining how households adjust their labour supply in response to large economic disruptions.

While a growing literature has examined the labour market effects of Katrina and other disasters, most studies rely on either cross-sectional designs or individual panels. Cross-sectional studies document aggregate labour market outcomes before and after Katrina but miss household dynamics (Dolfman, Wasser and Bergman 2007; Groen and Polivka 2008), while panel studies track evacuees but remain focuses on individual and overlook how couples jointly reorganize labour supply (Groen and Polivka 2010; Zissimopoulos and Karoly 2010). This gap matters because the labour supply choices are often made at the household level, where one spouse's employment is shaped by the other's opportunities, caregiving responsibilities, or migration choices.

Much of the household labour supply literature emphasizes the added-worker effect, in which secondary earners increase their labour supply following negative income shocks (Lundberg 1985; Stephens 2002). However, large disasters also generate substantial labour demand shocks through firm closures, workplace destruction, and the relocation of economic activity. Hurricane Katrina severely disrupted local labour markets and reduced employment opportunities in affected regions (Vigdor 2007; Groen and Polivka 2010). In such settings, observed employment outcomes reflect not only household labour supply decisions but also constraints imposed by employers and local labour demand conditions.

These outcomes also vary across gender-segregated occupations and industries. Women work disproportionately in service sectors such as retail, education, and hospitality, which respond strongly to local economic disruption and changes in labour demand (Altonji and Blank 1999; Blau, Kahn and Papps 2011). Prior research shows that women, particularly those with young children, experience higher labour force exit rates and greater barriers to re-

employment after Katrina (Kosanovich 2006; Elliott and Pais 2006; Fussell 2015), while men move more readily into reconstruction-intensive sectors such as construction (McIntosh 2008). Consequently, post-disaster labour market adjustments reflect both intra-household labour supply responses and employer-driven changes in labour demand.

In this paper, I address the gap in the literature on household-level labour market adjustment by constructing a novel couple-level panel from the Current Population Survey (CPS)²¹ microdata from June 2004 to November 2006, linking partners across CPS rotation groups. Using this dataset, I examine how couples reorganized their labour supply in response to Katrina, focusing on labour force participation, employment, hours worked, and industry composition. Three questions guide the analysis. First, how did Katrina affect joint employment arrangements within couples? Second, do the adjustments exhibit a gendered pattern, with women disproportionately reducing their labour force participation in the aftermath of the disaster? Third, do the effects differ by household composition—for example, the presence of young children—or by industry affiliation, particularly in sectors most directly disrupted by the hurricane?

I compare joint employment outcomes of couples in Louisiana and Mississippi before and after Hurricane Katrina with those in neighbouring, unaffected states. Couples in the affected states are significantly less likely to be jointly employed following the disaster, with the adjustment driven largely by women's withdrawal from the labour force rather than changes in men's participation. No evidence was found on the couple-level adjustment for those with single earners. When I focus on heterogeneous analysis, it showed me that couples with young children and those employed in service and construction-related sectors experienced the most pronounced declines, whereas self-employed households displayed greater resilience.

By shifting the focus from individuals to couples, I provide new evidence on how households reorganize work after a natural disaster. My findings show that household-level adaptation strategies are central to post-disaster recovery and that these adjustments are strongly gendered: women were more likely to withdraw from the labour force, while men were more absorbed into reconstruction-related employment. Methodologically, I contribute by linking CPS rotation groups to construct a novel couple-level panel and by applying

²¹ Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren, Daniel Backman, Annie Chen, Grace Cooper, Stephanie Richards, Megan Schouweiler, and Michael Westberry. IPUMS CPS: Version 12.0 [dataset]. Minneapolis, MN: IPUMS, 2024. <https://doi.org/10.18128/D030.V12.0>

difference-in-difference models to trace intra-household employment arrangements over time. In sum, these contributions extend the disaster economics literature by demonstrating how household structure and gender roles shape labour market resilience in the face of climate-related shocks.

3.2 Framework and Literature

Standard economic models of household labour supply typically frame decision-making as achieved household efficiency under constraints (Chiappori 1992; Lundberg and Pollak, 1996). However, feminist economists emphasize that responses to shocks are deeply shaped by caregiving norms, asset ownership, and intra-household bargaining power (Agarwal 1997; Enarson 1998). For example, studies of post-flood Bangladesh and post-earthquake Nepal show that women's labour withdrawal is driven not by market signals alone but by unpaid care burdens, social expectations, and restricted mobility (Sultana 2010; Luna and Hilhorst 2020).

Intra-household dynamics are particularly salient during crises. Moeeni (2021) highlights how married women's labour force participation is influenced by bargaining power, which is shaped by education and income contribution. In the context of disasters—where income sources shift and caregiving demands intensify—these bargaining mechanisms determine whether women withdraw, substitute, or expand their paid work roles.

Disasters impose sudden shocks to labour markets, often disproportionately affecting specific sectors such as retail, education, and care work where women are overrepresented (Enarson 2001; Neumayer and Plümper, 2007; Hallegatte et al. 2020). This sectoral segregation creates distinct vulnerabilities. In the US, Hurricane Katrina disrupted service and caregiving sectors, while demand rose in male-dominated construction and rebuilding industries (Weber and Messias 2012). Similar patterns appeared in the 2009 Australian bushfires (Hickson and Marshan 2022) and in rural China, where male migration into construction shifted agricultural burdens onto women (Yunmeng Li 2023). While gendered labour supply models provide a useful lens to understand post-disaster outcomes, the underlying mechanism linking disaster shocks to household labour adjustment remains underspecified. After a disaster that affects specific sectors—especially female-dominated ones—the direction of adjustment at the household level is theoretically ambiguous. Couples could respond in several ways:

The "Added Effort" Effect: Women might shift sectors, accepting lower wages due to increased competition. To compensate, both partners might increase hours. This explains cases where household earnings remain stable despite disproportionate increases in work hours (Del Boca et al. 2020).

The "Withdrawal" Effect: Conversely, infrastructure destruction increases the shadow price of childcare. Households might decide a low-wage job is not worth the cost of paid care, leading the lower earner to stay home (Parker 2020).

These competing mechanisms imply that transitions from dual- to single-earner households are context-dependent and cannot be predicted by standard models alone.

Empirical literature confirms that disaster responses are heterogeneous and non-linear. Households utilize various coping strategies, including fallback into informal employment (Takasaki 2011), adjusting child and female labour supply (Skoufias 2003), and reallocating market and non-market roles (Del Boca et al. 2020; Alon et al. 2020). However, recovery is uneven. Women, particularly single mothers and those in female-headed households, often face heightened scarring. Following Hurricane Katrina, displaced women experienced slower re-employment than men (Groen and Polivka 2008a, 2010; Jenkins and Phillips 2008). Similar gendered losses were observed after the Haiti earthquake (Llorente-Marrón et al. 2020). Yet, outcomes remain contingent on resources; for instance, women in Indonesia increased labour supply post-disaster when household support was available (Wong 2021). Recovery also diverged by geography and mobility: returnees fared better than evacuees, and Louisiana rebounded faster than Mississippi due to differences in housing stability and education (Groen et al. 2020; Davlasheridze and Fan 2017; Vigdor 2007).

While disasters exacerbate trade-offs between paid work and unpaid care (Peek and Fothergill 2008), empirical research rarely accounts for the joint nature of these decisions. Existing studies utilizing panel data—such as Groen and Polivka's (2008a; 2008b ;2010) work on Katrina or Mueller and Quisumbing's (2011) analysis of Bangladeshi households—demonstrate that family structure conditions adaptation. Self-employment, for example, often becomes a critical recovery option for households excluded from wage employment (Zissimopoulos and Karoly 2010).

Despite these advances, two important gaps remain. First, most analyses rely on individual-level or cross-sectional data, missing the joint employment and caregiving negotiations that couples undertake during recovery. Second, few studies explicitly examine how intra-household decision-making—especially bargaining power—shapes who exits or

re-enters the labour market following disaster shocks. To address this, I construct a couple-level panel from CPS microdata and build on prior work while offering a new perspective on intra-household labour reorganization. This approach reveals trade-offs and gendered patterns of adjustment that remain invisible in standard individual-level analyses.

3.3 Empirical Strategy: Data and Econometric Model

3.3.1 Data Description

I use monthly microdata from the Current Population Survey (CPS), a nationally representative household survey conducted by the U.S. Bureau of Labour Statistics. The CPS provides detailed information on individual labour force status, hours worked, demographic characteristics, and household composition. I access the data through the Integrated Public Use Microdata Series (IPUMS-CPS), which harmonizes identifiers across months and allows longitudinal linkage of households and individuals. The sample is restricted to civilians ages 16–66 years²².

I restrict the sample to the period from June 2004 through November 2006, defining the pre-Katrina period as 15 months up to August 2005 and the post-Katrina period as September 2005 onwards²³. The reasons behind this were to ensure households were present at least two times in their CPS rotation²⁴ of eight months and to cover both the pre- and post-Katrina periods. Couples -married and cohabiting partners²⁵ are identified and linked across CPS rotation using the IPUMS-CPS identifier (see Table A2.1 for details on linking procedures). The sample includes households with both spouses observed in the same month across their CPS rotation. The resulting panel allows tracking of joint employment outcomes, labour force participation, unemployment, and hours of work for both spouses. Hurricane Katrina affected four Gulf Coast states—Louisiana, Mississippi, Alabama, and Florida—but the scale of impact differed substantially across them. Louisiana and Mississippi experienced larger consequences, including extensive flooding, infrastructure destruction, and labour market

²² Instead of using 16 to 64 years, similar to other cross-sectional studies, I increased the upper limit by 2 years to include couples who were 64 years old when they were first surveyed in the CPS rotation, allowing them their entire CPS periods.

²³ As Katrina hit nearly two weeks after the August 2005 CPS survey reference week, before September 2005 constitutes the pre-Katrina period, and from September 2006 constitutes the post-Katrina period.

²⁴ The CPS uses a 4-8-4 design, in which households are interviewed for four consecutive months, rotate out for eight months, and re-enter for another four months.

²⁵ Unmarried partners are identified using RELATE = 1114, a CPS category distinct from roommates. This self-reported designation captures cohabiting couples and is commonly used in household-level labour studies to reflect partnered economic behaviour.

disruption. By contrast, the economic effects in Alabama and Florida were more limited (Sharon et al., 2006). For this reason, I define Louisiana and Mississippi as the treatment group²⁶.

The empirical analysis compares labour market outcomes in the affected states with those of neighbouring states—Texas, Georgia, and Arkansas—which serve as the control group. One concern is that large numbers of evacuees relocated to Houston following Hurricane Katrina (McIntosh 2008), potentially affecting labour market conditions in Texas. Several features of the data mitigate this concern. First, the CPS longitudinal structure follows households using the 4–8–4 rotation pattern—respondents are interviewed for four consecutive months, leave the sample for eight months, and then return for another four months. Individuals who move to another residence or state typically exit the linked panel, so the estimation primarily captures households that remain in their original state. Second, although Houston experienced substantial inflows of migrants, Texas is a large, economically diverse state, and the analysis is conducted at the state level rather than the metropolitan level. Localized labour market changes in Houston are therefore unlikely to reflect statewide labour market conditions fully. Third, neighbouring southern states provide a more appropriate counterfactual because they share similar regional economic structures and labour market trends with the treated states. Using more distant states—particularly northern states—would introduce additional differences in seasonality and labour-market structure, as is common in CPS analyses (Madrian and Lefgren 1999). For these reasons, neighbouring states provide a reasonable comparison group and remain consistent with the broader empirical literature on Hurricane Katrina’s labour market effects (Vigdor 2008; Groen and Polivka 2010; McIntosh 2008).

This structure of sample and timeframe allows me to analyse intra-household labour supply adjustments because of Katrina, capturing changes in employment arrangements, hours worked, and transitions across employment states.

Employment variables

²⁶ I also estimate couple employment models including Florida and Alabama with Louisiana and Mississippi, the estimated employment effects of Katrina are no longer robust. The significance observed in the two-state treatment (LA/MS vs. controls) diminishes, suggesting that the broader four-state comparison dilutes the measured shock.

To measure household-level labour market outcomes, I classify each couple-month observation into one of three mutually exclusive employment states: (i) both partners employed, (ii) only one partner employed, or (iii) both partners not working—defined as being either unemployed or out of the labour force in the survey month. I construct these categories using monthly labour force status indicators from the CPS for each spouse. I use the resulting binary variables as dependent outcomes in the regression analysis. Importantly, these states are contemporaneous and updated monthly; they do not reflect cumulative histories. For instance, a couple is coded as “both not working” only in months where both partners report being unemployed or out of the labour force. If either partner is employed in a given month, the couple is classified into the relevant “one employed” or “both employed” category for that observation.

The goal is to capture transitions in joint employment status around the Katrina shock. The DiD model estimates average within-couple changes by comparing affected and unaffected households before and after the disaster. Couples that remain in the same employment category across the entire panel do not contribute to the estimated treatment effect. What drives identification are couples who change status—e.g., those who were dual-earners before Katrina and moved into single-earner or non-employed states afterward. This approach allows us to differentiate between stable patterns and behavioural adjustment caused by the disaster. To further account for baseline differences in employment status, I include couple fixed effects and conduct robustness checks that stratify the sample by pre-Katrina employment state (e.g., dual-earner vs. non-earner households) to ensure results are not confounded by pre-existing heterogeneity.

Prior to Hurricane Katrina (September 2005), treatment and control states showed broadly similar distributions: roughly 55–60 percent of couples had both partners employed, 30–35 percent had only one partner employed, and fewer than 10 percent had neither partner working (Figure 3.1). Following the hurricane, the share of dual-earner couples declined in the affected states, while the proportion of couples with both partners not working increased. In contrast, the share of couples with only one employed partner remained largely unchanged. These trends suggest that in the wake of disaster-induced constraints, many households restructured their labour supply to retain at least one income earner—a form of internal risk-sharing.

Individual-level transitions further support this interpretation. In affected states, male partners were more likely to move from employment into unemployment, while female

partners disproportionately exited the labour force altogether (Figures 3.2 and 3.3). This asymmetric adjustment is consistent with prior findings that women are more likely to reduce labour supply in response to disasters (e.g., Groen and Polivka 2008a) and underscores the need to focus on the household as the relevant decision-making unit when evaluating post-disaster labour outcomes. I also examine the sectoral distribution in the CPS data. Women in the sample are disproportionately employed in service sectors such as retail and hospitality, which experience substantial disruption after Hurricane Katrina. In contrast, men are more represented in construction-related occupations, which expand during the rebuilding period (Table A3.3b). This sectoral exposure likely contributes to the gendered employment patterns observed in the results.

Figure 3.1: Couple's joint employment composition over time

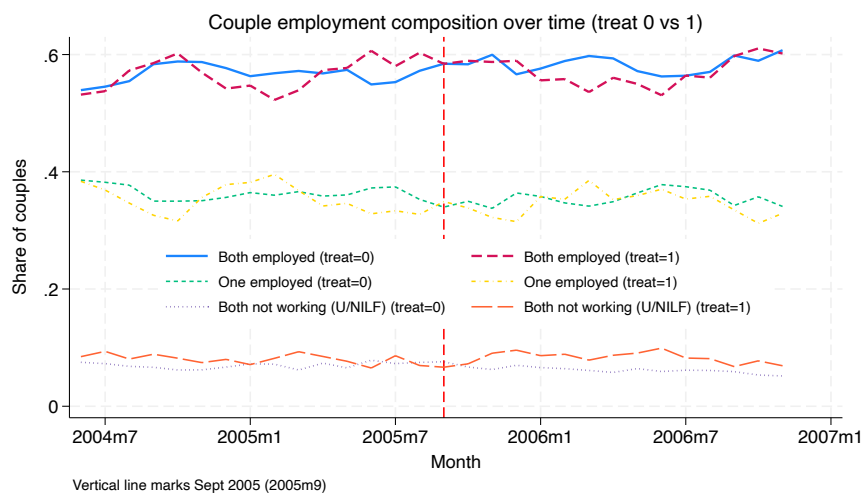


Figure 3.2: Employment to unemployment transitions by sex and treatment

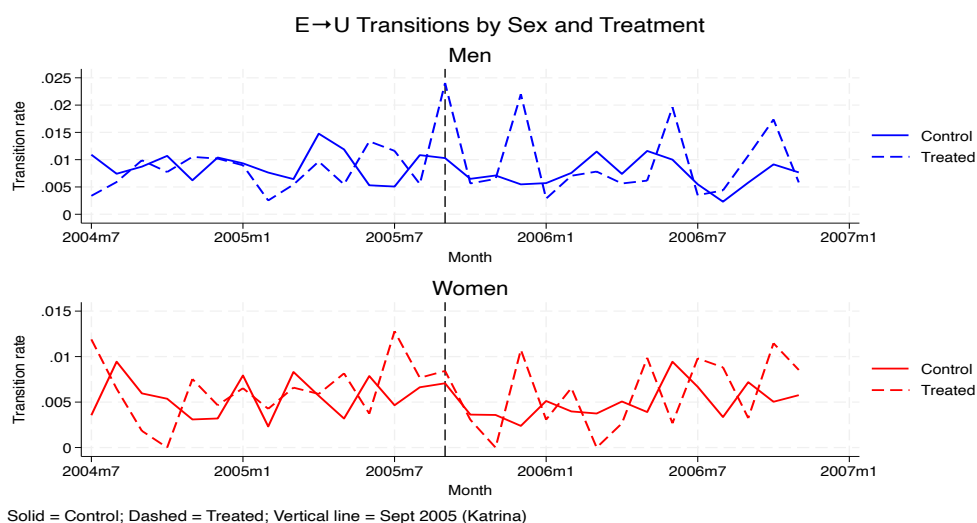
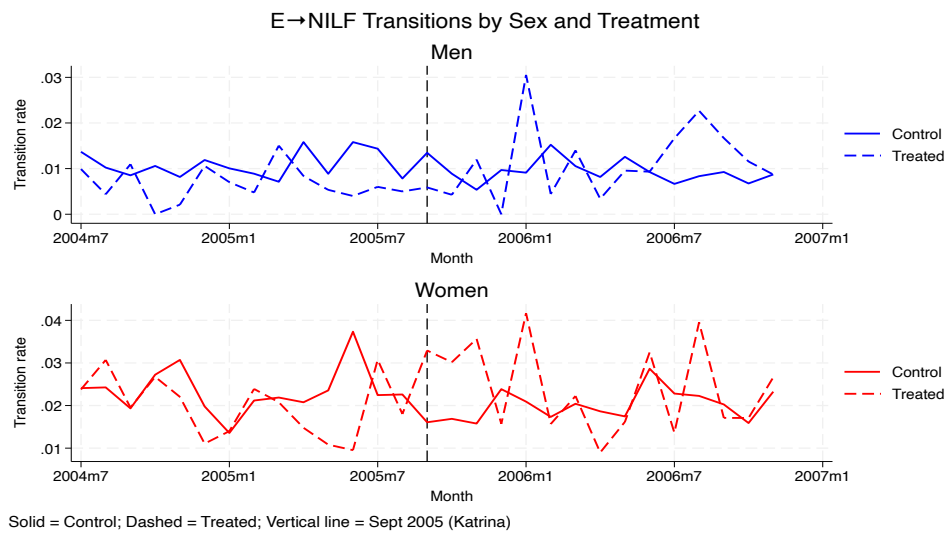


Figure 3.3: Employment to not in the labour force transitions by sex and treatment



Control variables

To address household demographic heterogeneity, I construct couple-level measures of age, race, relative education, and the presence of young children (see Table A3.2). These controls are grounded in the existing literature on household labour supply and disaster impacts, which consistently identifies these characteristics as key predictors of post-disaster employment adjustment. For instance, Groen and Polivka (2008a; 2008b; 2010) and Zissimopoulos and Karoly (2010) show that household responses to Hurricane Katrina varied significantly by family composition, especially in households with young children. Relative education levels and race are central to intra-household bargaining and labour supply decisions (Lundberg and Pollak 1996; Moeeni 2021), while age reflects life-cycle labour supply and caregiving roles.

In the baseline specification, I include these demographic controls—which vary little over the short panel—to account for persistent household traits that may confound treatment effects. In an extended specification, I incorporate pre-disaster industry of employment, following studies that emphasize sectoral vulnerability to disaster shocks (e.g., Weber & Messias 2012; Dolfman et al. 2007). Since industry may itself be endogenous to Katrina—serving as a pathway through which the disaster affects labour outcomes—it is excluded from the baseline model but included in robustness checks to assess the stability of the estimated treatment effects.

3.4 Empirical Model

I use a difference-in-differences (DiD) framework to estimate the causal impact of Hurricane Katrina on household labour market outcomes. DiD is a widely accepted empirical strategy for evaluating the effects of natural disasters and other shocks when experimental data are unavailable (Angrist and Pischke 2009). It has been effectively applied to the Katrina context by Groen and Polivka (2008a;2010) who leverage geographic variation in exposure and time to isolate disaster effects on employment, earnings, and migration. This approach enables comparison between affected and unaffected households under the standard parallel trends assumption.

I assess this assumption using event-study and placebo tests, which show no evidence of pre-trend violations or spurious effects (Appendix A). Although couple employment status is categorical, I estimate the outcomes separately as binary indicators in a linear probability framework rather than using a multinomial specification. This choice reflects the advantages of the LPM in a short panel setting: it accommodates household fixed effects, allows for straightforward inclusion of interaction terms, and yields coefficients interpretable as changes in probabilities. I also use couple's joint weekly hours of work and earnings to see the impacts on household's labour supply.

I estimate the following two-way fixed effects (TWFE) model:

$$Y_{it} = \alpha + \beta_1 \text{Treat}_{it} + \beta_2 \text{Post}_{it} + \beta_3 (\text{Treat}_{it} \times \text{Post}_{it}) + \theta X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where Y_{it} denotes the labour market outcome of couple i in month t . The explanatory variable Treat_{it} indicating a dummy variable that takes a value of 1 when a couple resides in the affected states (Louisiana or Mississippi) and 0 otherwise (Texas, Georgia and Arkansas); Post_{it} is a dummy that takes a value of 1 after September 2005 and onwards, the X_{it} 's are couple-level covariates (age, race, education, presence of young children and industry of employment); and the μ_i 's and λ_t 's are the household fixed effects and month fixed effects. The coefficient β_3 captures the average treatment effect on the treated (ATT) - measures the relative change in outcomes for couples in the affected states after Katrina compared to unaffected states.

While two-way fixed effects (TWFE) estimators are useful for identifying average treatment effects, they can obscure meaningful heterogeneity if disaster impacts vary across different types of households (de Chaisemartin and d'Haultfoeuille 2021, 2023). To address

this limitation, I extend the baseline model by interacting the treatment indicator with household characteristics such as education, age, race, presence of young children, and industry of work. This allows me to identify which types of couples are most affected by Hurricane Katrina, and whether labour market responses differ systematically across subgroups—such as parents of young children, or couples with differing sectoral exposure. By doing so, the model moves beyond average effects and provides a more nuanced picture of intra-household labour supply adjustment.

$$Y_{it} = \alpha + \beta_1 \text{Treat}_{it} + \beta_2 \text{Post}_{it} + \beta_3 (\text{Treat}_{it} \times \text{Post}_{it}) + \beta_4 (\text{Treat}_{it} \times \text{Post}_{it} \times Z_{it}) + \theta X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where Z_{it} are joint characteristics of couples', not individual traits, such as education, age, race, presence of a young child, and industry of work. The coefficient β_4 measures how the treatment effects differ across different couples, for example, whether couples with young children experience different outcomes in dual employment relative to other couples who do not have young children in their households. This triple difference interaction term allows us to move beyond the average treatment effects to highlight subgroup dynamics.

3.4 REGRESSION RESULTS

3.4.1 Baseline Estimates: Effects on Couple Employment Outcomes

Table 3.1 presents results from the difference-in-differences (DiD) estimation using a linear probability model with couple and month fixed effects. The outcomes are three mutually exclusive categories of joint employment: (1) both partners not working, (2) one partner employed, and (3) both partners employed. I model each outcome separately.

We begin by interpreting the Post coefficient, which captures time effects common to both treatment and control states after September 2005. In columns (1) and (2), the positive and marginally significant coefficient of 0.012 suggests that, across all states, the probability of both partners being non-employed rose by 1.2 percentage points post-Katrina. This likely reflects broader labour market disruptions during the post-disaster recovery period. The post coefficient is not statistically significant in the “one employed” or “both employed” regressions, implying no significant aggregate shifts in those outcomes across all states.

Turning to the Treat $\times$ Post interaction, which is the DiD estimate of interest, we see clearer patterns. Columns (1) and (2) refers “Both Not Working”, the coefficient is positive but statistically insignificant (0.009 and 0.007), suggesting no detectable increase in joint

non-employment in the affected states relative to control states after the hurricane. Columns (3) and (4) refers “One Partner Employed”, the coefficient increases to 0.023 in column (4) with demographic controls, statistically significant at the 10% level. This implies that Katrina led to a 2.3 percentage point rise in the share of couples with only one employed partner in the treatment states. This suggests partial household adjustment, where one partner remained in the labour market while the other exited, likely due to caregiving or job displacement. While Columns (5) and (6) “Both Partners Employed”, the DiD coefficients are consistently negative and statistically significant (–0.030 and –0.031). Given that 58% of couples were dual earners pre-Katrina, this corresponds to a relative decline of over 5%. This finding underscores a key result: Katrina reduced the likelihood that both partners remained employed, consistent with household reallocation of labour in response to disaster-related disruptions. The inclusion of demographic controls (age, education, race, and children) in even-numbered columns yields minimal changes in magnitude or significance, suggesting the effects are not driven by compositional differences across states.

Table 3.1: Effects of Hurricane Katrina on Couple Employment and Labour Supply, 2004-2006

Dependent variables	Both partners not working		One partner employed		Both partners Employed	
	(1)	(2)	(3)	(4)	(5)	(6)
Post (time effect)	0.012*	0.012*	-0.006	-0.009	-0.006	-0.003
	(0.007)	(0.007)	(0.014)	(0.014)	(0.013)	(0.013)
Treat × Post (DiD)	0.009	0.007	0.021	0.023*	-0.030**	-0.031**
	(0.007)	(0.007)	(0.014)	(0.014)	(0.013)	(0.013)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls		×		×		×
Observations	68507	67610	68507	67610	68507	67610
Couple Groups	14541	14471	14541	14471	14541	14471
Within R ² ²⁷	0.001	0.001	0.001	0.002	0.002	0.003

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, race composition of the couple, and the presence of young children in the household.

- ²⁷ A within R² of 0.002, like in Table 2.1, means the model explains about 0.2% of the within-couple variation in employment state over time.

These results point to a meaningful decline in dual-earner households and a compensatory rise in single-earner arrangements—especially in hurricane-affected areas. These shifts are consistent with previous literature showing intra-household adjustments during crises (e.g., Groen and Polivka 2008a; Davlasheridze and Fan 2017). The stability of the “one employed” category supports the interpretation that households sought to maintain at least one income source during the recovery period, rather than fully exiting the labour market.

3.4.2 Heterogeneous Effects by Household and Sectoral Characteristics

To better understand the mechanisms underlying the aggregate adjustment, whether showing heterogeneity across couples by characteristics and sectoral affiliation. I found little evidence that household adjustments vary across racial groups, as the interaction terms for Black, Hispanic, and other mixed-race couples are statistically insignificant except for other-race couples, for one employed partner (Table A3.5). In comparison, industry and class of work reveal some differences (Tables A3.6 and A3.7). Male partners in food, beverage, textiles, and paper industries were significantly less likely to experience joint non-employment (−4.1 percentage points), while women overall were less likely to remain in dual-earner households (−3.1 percentage points). Considering the class of worker heterogeneity, only women in government show significant adjustment, being more likely to move into single-employee partner households (+6.2 percentage points) and less likely to remain in both partners being employed (−5.4 percentage points). In contrast, I observe no significant effects for men across the class of worker categories. In additional tables not shown here, I repeat the difference-in-differences analysis separately for a couple of age groups and relative education, and no significant effects are observed.

Having young children did not significantly alter the way households adjusted their labour supply, as the estimated triple-interaction terms are small and not statistically significant (Table 3.2). However, the interaction between the post-Katrina period and the presence of children is negative and significant for the “one partner employed” outcome (−2.0 percentage points, $p < 0.05$) and positive for the “both employed” outcome (+2.8 percentage points, $p < 0.05$). This pattern indicates that couples with young children were somewhat less likely to shift into single-earner arrangements and more likely to sustain dual employment after the storm, relative to childless households.

Table A3.2: Heterogeneous Effects of Hurricane Katrina on Couple Employment and Labour Supply by Presence of Young Children

Dependent variables	Both partners not working		One partner employed		Both partners employed	
	(1)	(2)	(3)	(4)	(5)	(6)
Post (time effect)	0.015** (0.007)	0.015** (0.008)	0.001 (0.015)	-0.002 (0.015)	-0.016 (0.013)	-0.013 (0.014)
Young child (baseline gap)	0.009* (0.005)	0.009* (0.005)	-0.020 (0.015)	-0.020 (0.015)	0.011 (0.015)	0.011 (0.015)
Treat × Post (DiD effect)	0.009 (0.009)	0.007 (0.009)	0.017 (0.016)	0.021 (0.016)	-0.026* (0.015)	-0.028* (0.015)
Treat × Young child	0.014 (0.014)	0.013 (0.014)	-0.003 (0.036)	-0.001 (0.036)	-0.011 (0.036)	-0.012 (0.036)
Post × Young child	-0.008 (0.005)	-0.009* (0.005)	-0.020* (0.012)	-0.019 (0.012)	0.028** (0.011)	0.028** (0.011)
Triple interaction (DDD)	-0.003 (0.013)	-0.001 (0.013)	0.008 (0.029)	0.005 (0.029)	-0.005 (0.029)	-0.004 (0.029)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls		×		×		×
Observations	68507	67610	68507	67610	68507	67610
Couple Groups	14541	14471	14541	14471	14541	14471
Within R ²	0.001	0.001	0.001	0.002	0.003	0.003

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple and race composition of the couple in the household.

3.4.3 Hours and Earnings Adjustments

I also run regressions on weekly hours and household earnings to assess the labour supply margin beyond employment status. Table 3.3 shows that husbands in the affected states increased their weekly hours by about 1.4 hours ($p < 0.01$) following Katrina, while wives' hours remained stable, leaving the couple average unchanged. With respect to weekly earnings, there is no measurable change in husbands' log earnings. In contrast, wives' log weekly earnings fell by about 8 percent ($p < 0.05$), which in turn lowered average household earnings. These findings suggest that men absorbed the shock primarily through longer work hours. At the same time, women bore the adjustment on the earnings side, resulting in reduced overall household income resilience in the affected states compared to the unaffected states.

Table 3.3: Effects of Hurricane Katrina on Couple Employment and Labour Supply, Hours and Earnings

Dependent variables	Weekly Hours			Log Weekly Earning		
	Husband Hours	Wife Hours	Couple Avg Hours	Husband Earnings (log)	Wife Earnings (log)	Couple Avg Earnings (log)
Post (time effect)	-1.211** (0.503)	0.769 (0.521)	-0.334 (0.460)	0.060 (0.055)	0.240*** (0.073)	0.154*** (0.056)
Treat × Post (DiD effect)	1.358*** (0.451)	0.109 (0.381)	0.382 (0.361)	0.011 (0.034)	-0.081** (0.040)	-0.081** (0.036)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls	×	×	×	×	×	×
Observations	56036	41443	36042	12028	9646	7445
Couple Groups	12804	10087	9128	9504	7673	6005
Within R ²	0.003	0.004	0.004	0.020	0.019	0.058

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, race composition of the couple, and the presence of young children in the household.

Table 3.4 shows that wives in households with young children experienced a significant decline of 8.4 percent in log weekly earnings ($p < 0.10$), with the interaction term (Treat × Young child) reinforcing this adjustment. No corresponding effects are observed for men. Overall, the results suggest that the decline in joint employment after the disaster was absorbed mainly by households with young children through women's earnings losses rather than through reduced labour supply.

Table 3.4: Effects of Hurricane Katrina on Couple Employment and Labour Supply, Hours and Earnings by Presence of Young Children

Dependent variables	Weekly Hours			Log Weekly Earning		
	Husband Hours	Wife Hours	Couple Avg Hours	Husband Earnings (log)	Wife Earnings (log)	Couple Avg Earnings (log)
Post (time effect)	-1.232** (0.524)	0.723 (0.537)	-0.448 (0.474)	0.044 (0.057)	0.242*** (0.074)	0.159*** (0.057)
Treat × Post (DiD effect)	0.953* (0.558)	0.165 (0.451)	0.147 (0.440)	0.003 (0.044)	-0.084* (0.048)	-0.096** (0.043)
Young child (baseline gap)	-0.522 (0.392)	-0.167 (0.548)	-0.451 (0.430)	-0.033 (0.035)	0.058 (0.094)	0.065 (0.061)
Treat × Young child	-1.083 (1.192)	-0.268 (1.049)	-0.409 (0.961)	0.191 (0.126)	-0.337** (0.164)	-0.143 (0.155)
Post × Young child	0.058 (0.356)	0.133 (0.370)	0.325 (0.317)	0.033 (0.034)	0.026 (0.039)	0.009 (0.031)
Triple interaction (DDD)	1.175 (0.958)	-0.186 (0.837)	0.744 (0.768)	0.035 (0.070)	-0.015 (0.088)	0.040 (0.071)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls	×	×	×	×	×	×
Observations	56036	41443	36042	12028	9646	7445
Couple Groups	12804	10087	9128	9504	7673	6005
Within R ²	0.003	0.004	0.004	0.023	0.022	0.059

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, and race composition of the couple.

3.5 Robustness Check

I made several choices about the variable definitions and specifications in the baseline regression. For example, I use a dummy variable where all post-Katrina months are assigned a value of 1 and all other months are assigned a value of 0. I re-estimate the models using a continuous measure of post-Katrina exposure, defined as the number of months since September 2005, to assess the robustness of the base model findings. This allows us to check whether effects accumulate or change gradually.

The results in Table 3.5 are consistent with the baseline estimates. The coefficient on the interaction for dual employment is negative and statistically significant (−0.3 percentage points per month, $p < 0.05$), suggesting that couples in the affected states faced a steady decline in the likelihood of remaining dual earners in the months following Katrina. The

estimates for “both not working” and “one employed” are small and statistically insignificant, suggesting limited adjustment at the margins of joint non-employment or partial employment.

Table 3.6 extends the analysis to weekly hours and earnings. Husbands’ weekly hours show a modest but significant increase of about 0.11 hours per month after Katrina ($p < 0.05$), whereas wives’ hours do not display systematic change. Turning to earnings, wives’ log weekly earnings declined by about 0.7 percent per month relative to their counterparts in control states ($p < 0.05$), while husbands’ earnings remained stable. This differential adjustment translates into a statistically significant decline in average couple earnings, highlighting that women disproportionately bore the burden of the labour market shock.

Overall, these robustness checks reinforce the main conclusion: Katrina reduced the prevalence of dual-earner households and lowered household income through declines in women’s earnings.

Table 3.5: Effects of Hurricane Katrina on Couple Employment and Labour Supply – Robustness with Continuous Post-Treatment Months

Dependent variables	Both partners not working		One partner Employed		Both partners employed	
	(1)	(2)	(3)	(4)	(5)	(6)
Post (continuous months)	0.001*	0.001	-0.001	-0.001	-0.000	-0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Treat $\times$ Post (DiD effects, continuous)	0.001	0.001	0.002	0.002	-0.003**	-0.003**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls		×		×		×
Observations	102845	102845	102845	102845	102845	102845
Couple Groups	21995	21995	21995	21995	21995	21995
Within R ²	0.001	0.163	0.001	0.205	0.001	0.407

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, race composition of the couple, and the presence of young children in the household.

Table 3.6: Effects of Hurricane Katrina on Couple Labour Market Outcomes – Continuous Post-Treatment DiD Estimates for Hours and Earnings

Dependent variables	Weekly Hours			Log Weekly Earning		
	Husband Hours	Wife Hours	Couple Avg Hours	Husband Earnings (log)	Wife Earnings (log)	Couple Avg Earnings (log)
Post (continuous months)	-0.083** (0.034)	0.062* (0.035)	-0.013 (0.031)	0.006 (0.006)	0.024*** (0.007)	0.015*** (0.006)
Treat × Post (Continuous DID effect)	0.111** (0.047)	-0.052 (0.042)	-0.027 (0.038)	0.001 (0.004)	-0.007 (0.004)	-0.007** (0.004)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls	×	×	×	×	×	×
Observations	56036	41443	36042	12028	9646	7445
Couple Groups	12804	10087	9128	9504	7673	6005
Within R ²	0.002	0.004	0.004	0.020	0.019	0.057

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, race composition of the couple, and the presence of young children in the household.

3.5.1 Assessing Intra-Household Adjustment vs. Involuntary Displacement

To examine whether the observed post-disaster labour market adjustments reflect intra-household choices or involuntary displacement, I estimate heterogeneity by marital status using a triple-differences specification. This approach isolates whether single and married women experienced similar employment shocks in the aftermath of Hurricane Katrina.

I construct a binary variable for single status using CPS marital status codes, where women are coded as single if they are widowed, divorced, separated, or never married, and married if they report being legally married, with or without spouse present. This classification distinguishes women without a co-residing partner, who are less likely to benefit from intra-household labour reallocation. The regression sample consists of 212,564 female-month observations across treatment and control states from June 2004 to November 2006. Of these, approximately 35 percent are single women.

Table A3.8 reports the results from the triple-difference regression. The coefficient of interest is the triple interaction term $\text{post} \times \text{treat} \times \text{single}$, which captures the differential effect of the disaster on single women in the affected states relative to married women. The regression yields a triple-difference coefficient of 0.0128, which is statistically insignificant.

This indicates that single women in the affected states did not experience a significantly different employment trajectory post-Katrina compared to married women. The main effect for being single is positive and significant ($\beta = 0.148$, $p < 0.001$), confirming that single women are, on average, 14.8 percentage points more likely to be employed than married women. This aligns with standard labour supply theory, where single individuals typically have fewer alternative income sources.

If married women were voluntarily withdrawing from the labour force to manage caregiving needs or rely on a partner's income (as intra-household reallocation would suggest), we would expect a significant divergence from single women's employment trends. However, the statistically insignificant triple-difference term implies no such divergence.

The DiD estimate for married women ($\text{post} \times \text{treat}$) is negative ($\beta = -0.0096$) but statistically insignificant, reinforcing that the employment decline is not disproportionately concentrated among women with partners. Instead, the disruption appears to reflect general labour demand shocks that limited employment opportunities regardless of marital status.

These findings suggest that post-Katrina declines in female employment were not primarily driven by voluntary household labour strategies, but rather by involuntary displacement.

3.6 CONCLUSIONS

In this article, I use couple-level data from the Current Population Survey to examine how Hurricane Katrina altered household labour supply. Using the CPS rotation structure, I construct a short panel that spans the period before and after September 2005. The analysis shows that couples in Louisiana and Mississippi were less likely to maintain dual employment after Hurricane Katrina. The adjustment was felt mostly through declines in women's earnings, while men's hours remained steady, pointing to the way household roles shaped the division of economic costs. The overall fall in joint employment is not significant, but the unequal burden across spouses carries lasting implications for income security and inequality.

Nearly twenty years on, revisiting Katrina is still important. The storm remains one of the most destructive natural disasters in recent U.S. history and continues to offer a helpful reference point for thinking about resilience. Since then, the country has faced repeated shocks—Hurricanes Irene, Sandy, Harvey, Maria, and Ian, as well as major floods and wildfire seasons—that disrupted work and family life. The Katrina evidence shows that

labour market adjustment did not stop at the individual worker but extended into the household, where caregiving duties and attachment to specific sectors determined how families reorganized. There are, however, important limitations. The lack of a local-level panel means I cannot fully measure the intensity of impacts in the hardest-hit communities. In addition, CPS data exclude many households that evacuated and never returned, leaving out some of those most affected. I also do not have access to local administrative records that could be linked to the CPS for more precise estimates. At the state level, the CPS supports credible estimates of average effects, but it does a poor job of capturing the scale of disruption in places like New Orleans. The sharp drop in CPS cases there in September 2005 underlines this problem (Table A2.8). A stronger design would link CPS data with administrative sources or use the special evacuee identifiers to capture localized effects.

Overall, the findings show that disasters affect labour markets not only through the destruction of jobs but also through reallocation inside the family. For policy, this means recovery programs should be built with households—not just individual workers—in mind. In practice, measures that help women stay employed, such as childcare support, wage subsidies, or flexible work options, are likely to be critical for maintaining household resilience in the face of future disasters.

3.6.1 Limitation and future research

Several limitations should be acknowledged in interpreting the findings of this study. First, the empirical strategy relies on the assumption of stable group composition in the difference-in-differences (DiD) framework. However, Hurricane Katrina triggered widespread displacement, and the CPS data do not allow tracking of households that relocated across state lines. Selective out-migration from the treatment group (Louisiana and Mississippi) or in-migration into control states (Texas, Georgia, Arkansas) may bias estimates by altering the composition of both groups after the disaster. In the absence of individual migration histories, this paper cannot definitively assess whether the observed labour market responses reflect genuine intra-household adjustment or sample attrition. While the construction of a panel mitigates short-term measurement noise, it necessarily excludes households that moved and were not observed again, potentially understating the full scope of displacement.

Second, sample size becomes an important constraint in subgroup analyses. As the data are sliced by age, industry, class of work, and household composition, statistical power

declines, limiting the ability to detect meaningful heterogeneity. Some subgroup coefficients, particularly interaction terms, are imprecisely estimated as a result.

Finally, while the paper focuses on couples observed in multiple months to ensure a consistent panel, this design choice excludes short-duration households or those lost to follow-up, which may disproportionately include the most severely affected families. As such, the findings likely understate the magnitude of labour market disruption and may reflect more stable, resilient households.

Future research could address these issues by linking CPS data with administrative migration records, conducting formal placebo and balance tests, or incorporating evacuee identifiers to assess selection into and out of the panel sample.

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Additional Results for Chapter 3

Table A3.1 Linking Mechanics

The Current Population Survey (CPS) follows a 4-8-4 rotation design, in which households are interviewed for four consecutive months, rotate out of the sample for the next eight months, and then return for an additional four months before permanent exit. This structure allows households to be observed at multiple points in time, making it possible to construct short household panels suitable for difference-in-differences estimation.

To link individuals and households across survey months, I rely on unique identifiers provided in the IPUMS-CPS: CPSID (household identifier), CPSIDP (person identifier), and CPSIDV (a validated longitudinal identifier). CPSID and CPSIDP permit consistent tracking of households and individuals across rotation months, while CPSIDV improves linkage quality in cases where reporting inconsistencies or household roster changes occur.

The unit of analysis in this study is the household. Within each household-month, one male and one female adult are paired to form a heterosexual couple. I considered two strategies for constructing couples. The first is a sex-based approach, which identifies the first adult male and female within each household and links them over time using stable demographic characteristics. Although straightforward, this method risks misclassification when household composition changes or when unrelated adults are present.

The second strategy, which forms the basis of the analysis, is a relationship-based approach (RELATE). This method defines couples as the household head and spouse, with coverage extended to cohabiting pairs. Compared with the sex-based method, the RELATE approach provides greater precision and reliability in identifying economic partnerships, particularly in the context of panel construction. For this reason, I adopt the RELATE definition throughout the main analysis.

Table A3.2. Variables for Couple Panel Analysis

To analyse labour supply adjustments at the household level, I construct several couple-level variables from the monthly CPS data:

Variables	Description
Couple Age Group	Couples are classified as <i>young</i> (<35), <i>prime-age</i> (35–54), or <i>older</i> (55+), based on the average age of the two spouses.
Race Composition	Couples are placed into five mutually exclusive categories: Non-Hispanic White, Black, Hispanic, Other, or Mixed. The <i>Mixed</i> category includes couples in which spouses report different races.
Relative Education	Spouses' educational attainment is compared, and couples are grouped as <i>Husband more educated</i> , <i>Wife more educated</i> , or <i>both similar</i> . Roughly two-thirds of couples fall into the last category.
Young child	Presence of own young child aged below 12 years at households.
Class of Worker	Individual CPS “class of worker” codes are collapsed into four categories: (0) not in universe, (1) self-employed or unpaid family worker, (2) private sector employee (for-profit and nonprofit), and (3) government employee (federal, state, or local). Armed Forces personnel are excluded.
Industry	General industry codes are aggregated into nine broad categories: (1) agriculture, mining, utilities, construction; (2) food, textiles, paper; (3) petroleum refining and manufacturing; (4) wholesale and retail trade; (5) transport, storage, information services, banking, real estate, and leasing; (6) professional services, education, health and medical services; (7) entertainment; (8) government; and (9) not in universe.

Table A3.3a: Summary Statistics of Control Variables

Couple Variable	Category	Unaffected (%)	Affected (%)	Total (%)
Education	Less than High School	85.9	85.05	85.74
	High School	6.19	6.06	6.16
	Above High School	7.91	8.89	8.1
Age	Young (15–24)	27.53	24.04	26.88
	Prime-age (25–54)	54.33	53.63	54.2
	Older (55–66)	18.14	22.32	18.92
Race	NH White	59.15	70.36	61.24
	Black	9.24	22.8	11.77
	Hispanic	20.3	1.13	16.73
	Other	2.71	1.28	2.44
Young child	No child under 12	63.09	68.12	64.03
	Child under 12	36.91	31.88	35.97

Table A3.3b: Summary statistics of industry distribution

Industry/Class	Male			Female		
	Unaffected (%)	Affected (%)	Total (%)	Unaffected (%)	Affected (%)	Total (%)
Industry						
Ag/Construction)	18.9	20.67	19.23	3.07	3.04	3.07
Food & bev, textiles, paper	3.3	2.88	3.22	2.11	2.19	2.12
Petroleum, manufacturing	10.73	12.78	11.11	3.03	3.51	3.12
Wholesale trade, retail	13.06	10.72	12.62	9.37	9.45	9.38
Transport, courier, storage, entertainment	13.43	10.75	12.93	9.04	7.17	8.69
Professional services, education, medical services	16.67	14.96	16.35	30.24	31.35	30.45
Entertainment	8.28	7.42	8.12	8.02	8.97	8.19
Government	4.45	4.78	4.51	2.95	3.55	3.06
NIU – Not incorporated	11.19	15.05	11.91	32.17	30.77	31.91
Class of worker						
NIU – Not incorporated	11.19	15.05	11.91	32.17	30.77	31.91
Self-employed, not incorporated	8.94	8	8.77	4.67	4.72	4.68
Self-employed, incorporated	4.68	5.12	4.76	1.73	1.48	1.69
Private, for profit	62.34	58.23	61.57	42.82	41.32	42.54
Private, nonprofit	2.36	2	2.3	4.16	4.5	4.22
Federal government	2.17	2.1	2.16	1.57	1.96	1.64
State government	3.07	4.36	3.31	4.61	7.05	5.06
Local government	5.23	5.07	5.2	8.16	8.05	8.14
Unpaid family worker	0.02	0.06	0.03	0.11	0.16	0.12

Appendix A: Validity of the Difference-in-Differences Design

The key identifying assumption of the difference-in-differences (DiD) framework is the parallel trends assumption, which holds that treatment and control states exhibit similar trends before the intervention. To assess this validity criterion, I estimate an event-study specification that interacts treatment status with month dummies relative to August 2005.

Pre-Treatment Balance Table: Table A3.4a reports pre-treatment household characteristics for treatment and control states prior to Hurricane Katrina. Although several variables show statistically significant differences due to the large sample size, the magnitudes of these differences are small. For example, average age differs by approximately 1.4 years, while education differences are less than 0.1 category units. Labour market outcomes such as employment and earnings are broadly similar across groups. Overall, the results suggest that treatment and control households were comparable prior to the disaster, supporting the credibility of the difference-in-differences design.

Event-study results. Figure A3.1 plots dynamic treatment effects for three couple-level outcomes: both partners employed, one partner employed, and both not working. In each case, the pre-treatment coefficients are small and statistically indistinguishable from zero. These support the claim that treatment and control states followed a parallel trend prior to Katrina.

Placebo test. As a further falsification, I assign a placebo treatment date of September 2004. Table A3.4b shows that the placebo $\text{Treat} \times \text{Post}$ coefficients are small and statistically insignificant across all outcomes. The absence of spurious effects under the placebo design strengthens the validity of the identification strategy.

Together, the event-study estimates, and placebo test provide strong evidence that the DiD results can be interpreted causally.

Figure A3.1: Event-Study Estimates of Hurricane Katrina’s Impact on Couple Employment Outcomes

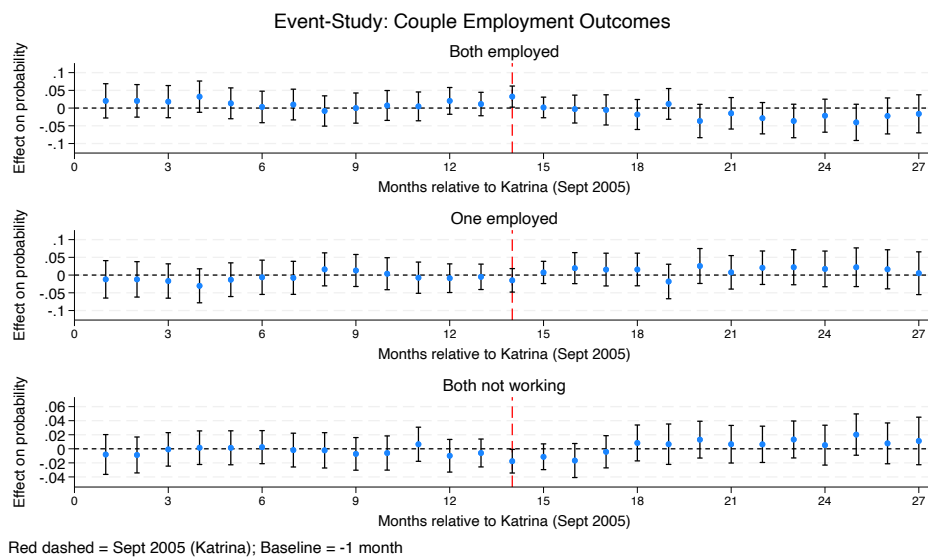


Table A3.4a: Pre-Treatment Balance Between Treatment and Control States

Variable	Control	Treatment	Difference	p-value
Husband Age	43.950	45.526	-1.575	<0.001
Wife Age	41.772	43.005	-1.232	<0.001
Average Couple Age	42.861	44.265	-1.404	<0.001
Husband Education	2.744	2.803	-0.059	<0.001
Wife Education	2.779	2.845	-0.066	<0.001
Husband Employed	0.855	0.821	0.034	<0.001
Wife Employed	0.642	0.661	-0.019	0.004
Husband Weekly Earnings	878.508	842.436	36.071	0.058
Wife Weekly Earnings	588.979	538.159	50.819	0.001
Young Child in Household	0.373	0.317	0.056	<0.001
Household Size	3.340	3.245	0.095	<0.001
Observations	34,276			

Notes: The table reports pre-treatment means of household characteristics for treatment states (Louisiana and Mississippi) and control states (Texas, Georgia, and Arkansas) prior to Hurricane Katrina. Differences are calculated using two-sample t-tests. P-values are reported to three decimal places.

Table A3.4b: Placebo Difference-in-Differences Estimates (Treatment date = Sept 2004)

	Both not working	One employed	Both employed
Post (time effect)	0.015** (0.007)	-0.007 (0.014)	-0.008 (0.013)
Treat × Post (Placebo DiD)	-0.006 (0.007)	0.021 (0.015)	-0.016 (0.014)
Observations	68507	68507	68507
Couple Groups	14541	14541	14541
Within R ²	0.001	0.001	0.002

Notes: Each column reports coefficients from a separate couple fixed-effects regression with clustered standard errors at the couple level. The placebo test assumes treatment begins in September 2004, one year before Hurricane Katrina. Standard errors in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

Table A3.5: Heterogeneous Effects of Hurricane Katrina on Couple Employment and Labour Supply by Race

Dependent variables	Both partners not working	One partner employed	Both partners employed
	(1)	(2)	(3)
Post (time effect)	0.013* (0.007)	-0.013 (0.015)	0.000 (0.014)
Treat × Post (DiD effect, ref. = NH White)	0.008 (0.008)	0.023 (0.016)	-0.031** (0.015)
DiD × Black	-0.006 (0.018)	-0.017 (0.036)	0.023 (0.036)
DiD × Hispanic	-0.006 (0.011)	-0.006 (0.217)	0.012 (0.217)
DiD × Other	-0.021 (0.016)	0.223* (0.132)	-0.202 (0.132)
DiD × Mixed race	-0.019 (0.033)	0.032 (0.077)	-0.013 (0.073)
Month fixed effects	×	×	×
Couple fixed effects	×	×	×
Demographic controls	×	×	×
Observations	67610	67610	67610
Couple Groups	14471	14471	14471
Within R ²	0.001	0.002	0.003

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, and the presence of young children in the household.

Table A3.6: Heterogeneous Effects of Hurricane Katrina on Couple Employment and Labour Supply by Industry

	Male Partners/Husbands			Female Partners/Wife		
Dependent variables	Both partners not working	One partner employed	Both partners employed	Both partners not working	One partner employed	Both partners employed
Post (time effect)	-0.007 (0.008)	0.002 (0.018)	0.005 (0.016)	0.003 (0.010)	0.028 (0.021)	-0.031* (0.017)
Treat × Post (DiD effect, ref = Ag/Construction)	0.012 (0.011)	-0.015 (0.030)	0.003 (0.029)	-0.007 (0.019)	0.060 (0.061)	-0.053 (0.060)
Food & bev, textiles, paper	-0.041** (0.020)	0.026 (0.082)	0.015 (0.082)	0.012 (0.023)	-0.036 (0.089)	0.023 (0.087)
Petroleum, manufacturing	-0.009 (0.015)	0.074 (0.051)	-0.065 (0.049)	0.004 (0.036)	-0.046 (0.093)	0.042 (0.095)
Wholesale trade, retail	0.017 (0.022)	0.031 (0.045)	-0.047 (0.046)	0.023 (0.024)	-0.036 (0.070)	0.013 (0.067)
Transport, courier, storage, entertainment	-0.027 (0.017)	0.036 (0.042)	-0.010 (0.040)	-0.000 (0.030)	0.074 (0.079)	-0.074 (0.074)
Professional services, education, medical services	-0.011 (0.018)	0.032 (0.048)	-0.021 (0.045)	0.013 (0.020)	-0.081 (0.064)	0.067 (0.063)
Entertainment	0.006 (0.024)	0.061 (0.056)	-0.067 (0.055)	0.002 (0.027)	0.015 (0.073)	-0.017 (0.072)
Government	-0.019 (0.020)	0.120* (0.063)	-0.101 (0.063)	0.000 (0.026)	0.004 (0.097)	-0.005 (0.095)
NIU – Not incorporated	-0.007 (0.029)	0.029 (0.046)	-0.022 (0.033)	0.017 (0.023)	-0.071 (0.065)	0.054 (0.062)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls	×	×	×	×	×	×
Observations	67610	67610	67610	67610	67610	67610
Couple Groups	14471	14471	14471	14471	14471	14471
Within R ²	0.134	0.006	0.070	0.035	0.348	0.201

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, race composition of the couple, and the presence of young children in the household.

Table A3.7: Heterogeneous Effects of Hurricane Katrina on Couple Employment and Labour Supply by Class of Worker

	Male Partners/Husbands			Female Partners/Wife		
Dependent variables	Both partners not working	One partner employed	Both partners employed	Both partners not working	One partner employed	Both partners employed
Post (time effect)	0.014 (0.015)	-0.025 (0.022)	0.011 (0.015)	0.015 (0.009)	-0.005 (0.014)	-0.010 (0.010)
Treat × Post (DiD effect, ref. = NIU)	0.006 (0.028)	0.012 (0.035)	-0.018 (0.017)	0.009 (0.016)	-0.014 (0.021)	0.004 (0.012)
DiD × Self-employed/Family	-0.020 (0.030)	-0.001 (0.049)	0.021 (0.034)	-0.015 (0.023)	0.048 (0.048)	-0.033 (0.038)
DiD × Private sector	0.003 (0.028)	0.014 (0.039)	-0.017 (0.023)	-0.005 (0.017)	0.028 (0.025)	-0.023 (0.019)
DiD × Government	-0.001 (0.031)	0.013 (0.050)	-0.012 (0.040)	-0.009 (0.018)	0.062* (0.034)	-0.054* (0.029)
Month fixed effects	×	×	×	×	×	×
Couple fixed effects	×	×	×	×	×	×
Demographic controls	×	×	×	×	×	×
Observations	67610	67610	67610	67610	67610	67610
Couple Groups	14471	14471	14471	14471	14471	14471
Within R ²	0.134	0.004	0.068	0.034	0.202	0.351

Notes: Treatment status does not vary within couples, so couple fixed effects absorb its main effect. The table reports estimated coefficients for the variables listed in the column headings, with robust standard errors clustered at the couple level shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively. All models include couple and month fixed effects. Coefficients are expressed in percentage points. The estimation sample consists of all couples in the treatment and control states observed during the pre- and post-Katrina periods. Demographic controls are constructed at the couple level and include the average age of spouses, relative education within the couple, race composition of the couple, and the presence of young children in the household.

Table A3.8: Difference-in-Difference Estimates by Marital Status – Female Sample

Variable	Coefficient	Std. Error	P-Value
Post ($\geq 2005m9$)	0.0066342	0.0046612	0.155
Treatment group (1.treat)	0.0004565	0.008815	0.959
Post × Treatment	-0.0096308	0.0108375	0.374
Single (1.single)	0.147807	0.0067335	0.0
Post × Single	-0.0153528	0.0080353	0.056
Treatment × Single	-0.049143	0.0142816	0.001
Post × Treatment × Single	0.012838	0.0179291	0.474
Constant (_cons)	0.3677399	0.0039588	0.0

Notes: Sample restricted to female respondents in treatment and control states. Standard errors are clustered at the individual level. The triple interaction term captures the differential post-Katrina effect for single women in affected states.

Conclusion

This dissertation examines the complex intersection of gender, institutions, and exogenous shocks, challenging the traditional assumption of standard economic models that household decision-making purely achieves efficiency through individual endowments and preferences. Across three distinct empirical settings, this research demonstrates that women's agency, bargaining power, and economic well-being are deeply embedded within broader structural constraints ranging from social norms to large-scale exogenous shocks. By integrating institutional factors and the impact of large-scale external shocks into empirical models of household behaviour, this dissertation highlights how gendered economic outcomes emerge from the interplay between intra-household power relations and beyond-household environments.

Chapter 1 investigates the relative influence of financial independence, marital structure, economic security, and marriage institutions on women's intra-household bargaining power. Utilizing multiple waves of the Demographic and Health Surveys (DHS) from 2005 to 2022 across seven South and Southeast Asian countries, the chapter develops a multidimensional framework to measure bargaining power. A key methodological innovation of this analysis is the reinterpretation of joint decision-making as a form of cooperative agency and shared authority, rather than a signal of diminished agency or dependence. Employing fractional logit models with fixed effects, the results reveal that while financial autonomy is a robust and positive correlate of decision-making authority, institutional norms surrounding marriage play a decisive role. The marriage institution index shows an association with bargaining power that is equal to or stronger than that with economic factors, particularly in South Asian countries characterized by restrictive kinship systems. Furthermore, the findings indicate that stable and symmetric marital structures, when supported by economic security, foster cooperative bargaining environments rather than merely constraining women's exit options. These results suggest that empowering women requires addressing deep-seated institutional and normative constraints alongside economic interventions.

Chapter 2 extends the analysis by examining the long-term consequences of violent conflict on women's labour market outcomes and exposure to intimate partner violence. Exploiting district-level variations in conflict intensity and employing an instrumental variables strategy based on forest coverage, the chapter uncovers substantial cohort-specific heterogeneity. Older women experienced temporary employment gains during the conflict, a

response consistent with the added-worker effect as households attempted to compensate for negative economic shocks. However, women who were children or adolescents during the conflict suffered persistent, long-term employment declines, reflecting the severe disruption of human capital accumulation and delayed labour market entry. Regarding IPV, the analysis does not find a direct long-term impact of conflict intensity on the reported experiences of violence among married women in the post-war period. Though it identifies an indirect negative relationship, suggesting that IPV experiences are heavily dependent on women's attachment to the labour market. The findings highlight how the gendered economic consequences of civil conflict extend far beyond the period of violence, permanently altering the trajectories of younger cohorts.

Chapter 3 explores gendered intra-household labour market adjustments in the wake of severe environmental shocks, focusing on the aftermath of Hurricane Katrina in the United States. Utilizing a newly constructed couple-level panel from the Current Population Survey (CPS) covering 2004 to 2006, the chapter employs a difference-in-differences approach to evaluate changes in joint employment arrangements. The analysis finds a significant decline in the likelihood of dual employment among couples in the affected areas. This adjustment was driven primarily by the involuntary displacement and labour force withdrawal of wives, rather than by voluntary household specialization or strategic intra-household labour reallocation. The larger declines in female employment occurred in households with young children and among couples employed in service-sector industries. By shifting the analytical lens from individuals to couples, this chapter demonstrates that post-disaster labour market adjustments are strongly gendered, with women bearing a disproportionate share of the employment disruption.

These findings carry important policy implications. First, interventions aimed at enhancing women's economic empowerment should extend beyond income generation and asset ownership to address institutional barriers embedded in marriage systems and social norms. Policies targeting early marriage, gender-based violence, and discriminatory practices may be as critical as those promoting financial inclusion. Second, post-conflict and post-disaster recovery programs should incorporate gender-sensitive strategies that account for differential impacts across cohorts and household roles. In particular, supporting women's re-entry into the labour market and mitigating disruptions to human capital formation are essential for long-term recovery. Third, the results underscore the importance of treating

households as units of analysis in policy design, especially in the context of shocks that simultaneously affect both labour demand and supply.

In conclusion, this dissertation contributes to the literature by integrating institutional context, household dynamics, and external shocks into a unified framework for understanding gendered economic outcomes. It demonstrates that empowering women requires not only improving access to economic resources but also addressing the structural and institutional constraints that shape how those resources translate into agency.