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# War and Women's Work: Evidence from the Conflict in Nepal

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# ABSTRACT

## War and Women's Work: Evidence from the Conflict in Nepal*

This paper examines how Nepal's 1996-2006 civil conflict affected women's decisions to engage in employment. Using three waves of Nepal Demographic and Health Survey, we employ a difference-in-difference approach to identify the impact of war on women's employment decisions. Results indicate that as a result of the Maoist-led insurgency, women's employment probabilities were substantially higher in 2001 and 2006 relative to the outbreak of war in 1996. These employment results also hold for self-employment decisions, and they hold for smaller sub-samples that condition on husband's migration status and women's status as widows or household heads. Numerous robustness checks of the main results provide compelling evidence that women's likelihood of employment increased as a consequence of the conflict.

JEL Classification: J21, O12, D74

Keywords: conflict, women's employment, added worker effect, geography, Nepal

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## I. Introduction

Nepal's 1996-2006 civil war resulted from a movement by Maoist insurgents to take advantage of the growing dissatisfaction among people, especially those living in rural areas, with the lack of economic reforms they had expected from a new democratically-elected government. Beginning in the western region, the conflict engulfed a large part of the country in a relatively short period of time. The conflict ended when the Maoist party succeeded in brokering a peace agreement that led to a new constitution and the establishment of a people's republic. During this ten-year period, the conflict led to immense suffering in terms of thousands of deaths and injuries. It also caused economic disruption and placed tremendous hardships on the local population. These devastating consequences have led experts to rank Nepal's "People's War" as one of the most intense civil conflicts in the world in recent times (Murshed and Gates 2005).

The goal of this research is to examine how this war affected women's decisions about participating in market work. In particular, women may join the labor force in an "added worker" effect as they try to compensate for declines in household income caused by losses in their husbands' earnings due to war-related disruptions, departures, injuries, or deaths. Evidence from industrialized countries suggests that the added worker effect was strong during the World Wars and the Great Depression, but it has become less important over time as women's status in the labor market improved (e.g. Finegan and Margo 1994; Prieto-Rodriguez and Rodriguez-Gutierrez 2003). A small but growing number of studies for developing countries point to a substantial added worker effect, especially during financial crises (e.g. Parker and Skoufias 2004). In such times, households in developing countries cope with declines in income by sending household members to seek employment in paid work (Jones *et al*. 2009). Furthermore,

cross-country evidence indicates that women's labor supply, particularly in Asia and Latin America, rises when aggregate income falls (Bhalotra and Umana-Aponte 2010).

Nepal's decade-long conflict is likely to have impacted women's employment because of disruptions to family life. Not only did the conflict cause widespread mortality, it also led to an increase in family separation rates and in disability rates among husbands. Thus women may have had to work more as they took on the role of sole bread-winners. Another channel through which conflict may have induced greater labor force participation for women by making them sole providers of their households is through displacement of men. As noted in Seddon and Adhikari (2003), mainly men left home on a temporary basis seeking work and security. It was not common for entire families to move as women often remained behind to look after land.

This study employs a difference-in-difference approach to identify the impact of war on women's employment decisions using data from the Nepal Demographic and Health Survey (DHS) from 1996, 2001, and 2006. These data are used to test the hypothesis that with the displacement of male workers as a result of the Maoist insurgency, women's employment decisions exhibited an added worker effect. We find strong evidence that as compared to the beginning of conflict in 1996, women's employment probabilities are significantly higher in 2001 and 2006. These trends are evident in patterns of self-employment work as well. The analysis demonstrates that even with the use of robustness checks and alternative empirical methods, there is substantial evidence that women's employment increased as a consequence of the conflict.

## II. Conflict Background and Socioeconomic Context

Nepal's civil war erupted in 1996 when members of the Communist Nepal-Maoist party struck a police station in Rolpa, a district in the western region of Nepal. The motivation behind

the attack and the subsequent ten years of insurgency had several origins (Deraniyagala 2005; Murshed and Gates 2005; Sharma 2006). Anger by members of lower castes and lower-status ethnic groups against the elite for long periods of deprivation helped to fuel the conflict. Other sources of the insurgency included overall poverty and dissatisfaction against the government for targeting Maoist activists. From 1996 onwards, the Maoists used a variety of tactics to achieve their goals. Primary among these were attacks on army bases, police posts, government officials, and banks. At the height of the conflict, the Maoists controlled most rural areas of the country. In 2006 when the conflict ended, a new Constituent Assembly was established, and a new Interim Constitution was adopted in 2007. In 2008, Nepal became a Republic, and the Maoist leader was elected the first Prime Minister.

Nepal's geographical terrain served as an important determinant of the intensity of civil war violence. Since government forces outnumbered the insurgents, insurgent forces depended on forested terrain to help them maneuver. Moreover, Maoists found greater support for their cause among the poor and disenfranchised. This argument is consistent with Do and Iyer (2010), who find conflict-related deaths were substantially higher in districts with higher poverty and in districts characterized by higher elevation and forest coverage. Their results indicate that geographic conditions explain approximately 25 percent of the variation across districts in conflict intensity, with the pre-1996 rate of poverty at the district level also serving as a positive predictor of conflict intensity. The relationship between the intensity of violence and Nepal's geography and terrain is also supported in Bohara *et al*. (2006).

The civil war entailed enormous social costs. The death toll reached over 13,300, with about two thirds of those deaths caused by government forces and the remaining one third caused by Maoist insurgents (INSEC 2010). As shown in Panel A of Figure (1), the conflict-related

deaths increased sharply in 2002, an escalation that coincided with Prime Minister's mobilization of the Royal Nepal Army to combat the insurgents. In addition, the drawn-out conflict caused substantial destruction to the country's infrastructure as well as the postponement of new projects. This crippling of the country's infrastructure not only restricted access to education and health systems, it also stifled economic development.

Insert Figure 1 Here

Furthermore, existing migration rates increased to some extent as a consequence of the civil war (MHP/NE/MI 2007). This migration caused numerous married couples to live apart for extended periods. Our calculations based on the Nepal DHS data indicate that during the conflict period, the proportion of women whose husbands had migrated grew over time as did the proportion of women who reported themselves as their household's head. As shown in Panel B, 16 percent of all ever-married women reported that their husbands had migrated in 1996; this proportion had risen by about ten percentage points by the end of the conflict period. Another 5 percent of all ever-married women reported the loss of their husbands due to death, divorce, or separation; this proportion did not change much during the conflict period. Closely related, the proportion of women who reported themselves as the household head more than doubled during the conflict period from seven percent to 15 percent. While much of this increase occurred due to the migration of husbands, some growth also occurred due to the death, divorce, separation, and incapacitation of husbands.

Existing literature is not conclusive that Nepalese women worked more as a result of the conflict-induced changes in household composition and income. Assessment results reported in the World Bank (2004) indicate that the absence of husbands and their income led to a dramatic increase in women's household and farm work burdens, but the findings do not specify whether

this increased work burden coincided with higher rates of employment. The income effect from remittances sent home by migrant husbands could have acted as a disincentive for women to become employed. Also, the departure of a spouse who contributed to household farm production may have put more pressure on women to increase their hours of work in subsistence farming. Both these arguments explain Lokshin and Glinskaya's (2009) finding of an inverse relationship between men's migration and women's market work participation in Nepal in 2004.

## III. Grouping of Districts into Conflict and Non-Conflict Sub-Regions

Our research design centers on the idea that regions in Nepal characterized by greater forest coverage, higher elevations, more rainfall, and fewer roads were more conducive to guerilla activity. Following the strategy developed in Angrist and Kugler (2008), we classified regions based on geography from a time period that precedes the conflict. Geographical measures from a pre-conflict time period were used as instruments to approximate conflict intensity from 1996 to 2006. In a "first stage" procedure, we tested the predictive power of these instruments in explaining conflict intensity where conflict intensity was measured by the total number of casualties due to state and Maoist action from 1996 to 2006.[1]

Note that the Nepal employment and conflict data are based on a geographical coding scheme that divides Nepal into 75 districts, which are further classified into five regions (Eastern, Central, Western, Mid-Western, and Far-Western) and three categories of physical terrain (Mountain, Hill, and Terai grasslands). We aggregated the 75 districts into 15 sub-regions (the five regions interacted with the three types of terrain). We took this step primarily in order to reduce the number of regional parameters in the estimation of the labor supply equation, which controls for region-specific effects using fixed effects. Since the districts are aggregated up to

the sub-region level, all the information contained at the district level is still reflected in the sub-regional coefficients.

Conflict measures cannot be used directly in the estimations since they are likely to be endogenous (that is, they are co-determined with other variables that might affect women's employment). For example, sub-regions with higher rates of poverty also had more intense conflict (Do and Iyer 2010). But women may work more in regions with high rates of poverty, leading to spurious correlation between employment probabilities and conflict intensity. We hypothesize that geographical measures from a pre-conflict time period provide the exogenous variation required to identify the effect of conflict on women's work. To test this hypothesis, we used the conflict and geographical indicators from Do and Iyer (2010) supplemented with additional geographical and weather data on Nepal from Sharma and Subedy (1994). In the first stage, the number of state-caused and Maoist-caused deaths from 1996 to 2006 was regressed on four indicators of geographical status and two indicators of weather status from 1994, a pre-conflict year. Indicators of geographical status include the proportion of a sub-region that is forested, altitude of the sub-region as a proxy for mountainous territory, the number of major rivers in a sub-region normalized by area, and the total length of the road network normalized by the sub-region area in 1994. Indicators of weather-related status at the sub-region level include average annual rainfall normalized by area and average temperature. The geographical and weather-related indicators, originally at the district level, were aggregated to sub-region means using sampling weights provided in the Nepal DHS.

The first stage results reported in Table 1 indicate a strong correlation between conflict-induced casualties and the proportion of a sub-region that is forested in 1994. This conclusion holds for when state-caused casualties and Maoist-caused casualties are measured separately and

when they are combined. In regressions that include all six geographical and weather indicators, the coefficient on 1994 forest coverage is statistically significant. Forest cover remains significant when it is used as the only instrument in linear or binary form. These results confirm the theoretical intuition behind the correlation between 1994 forest cover and the number of conflict-induced casualties, thus validating our choice of this variable as an instrument.[2]

Insert Table 1 Here

To implement a difference-in-difference methodology similar to that in Angrist and Kugler (2008), we converted forest coverage into a 0-1 indicator where geographical sub-regions with forest-coverage exceeding the $75^{th}$ percentile value were classified as "more-forested", and sub-regions with forest-coverage below the $75^{th}$ percentile were classified as "less-forested." Since Nepal in general is quite heavily forested, a higher than average benchmark was required to indicate regions that have relatively more cover. Note that the first stage results are robust to transforming the dependent variable (total conflict-induced casualties) from levels into growth rates over time. Furthermore, our use of a categorical functional form for the first stage (as opposed to a linear functional form) is re-affirmed by a test that plots growth rates in casualties against a linear measure of forest cover in 1994. This test indicated that the relationship between growth rates and 1994 forest cover is not particularly linear; thus, a non-linear form of the instrument was appropriate in the first stage.

In the context of our study, the "treatment" is conflict, and although women in general may work more when husbands have migrated or when they are heads of their households because husbands are disabled, the application of the difference-in-difference method allows us to measure how much of the increase in women's labor force participation is due to conflict induced changes in these variables.

## IV. Conflict and Women's Employment

*Data and Descriptive Statistics.*

This study's employment data come from the Nepal Demographic and Health Survey, a large nationally-representative sample of women aged 15-49 and the members of their households. We used the three most recently-available waves of the Standard DHS for Nepal: 1996, 2001, and 2006. These waves correspond with the beginning, middle, and end of the civil war. The DHS surveys provide detailed information on women's employment status, education, age, marital status, region and terrain of residence, religion, ethnicity, husbands' education and presence in the household, household composition, household access to electricity, and household amenities. Our sample retains all ever-married women aged 15-49 with measured values for employment status and for the other indicators in the empirical analysis leaving us with approximately 25,700 observations in the pooled sample. Note that the indicator for whether or not a woman is employed includes employment for cash earnings, in-kind payments, and non-remunerated work; however, the data do not allow us to separate these types of work. Among the employed women in the pooled data, a large proportion worked either for themselves or for their family (about 21,800 observations). We classified such women as self-employed and estimated separate regressions for the decision to be self-employed.[3]

Sample statistics in Table 2 indicate that a very high proportion of women in Nepal were employed throughout the period, and especially in 2001, when 83 percent of women were employed in some sort of job, paid or unpaid. Also, over time, a growing proportion of women lived without their husbands either due to the husband's migration or due to death, divorce, or separation. By 2006, almost one third of ever-married women lived without their husbands present in the household. The majority of women had no education in all three years, although

this proportion declined sharply over the ten-year period from 80 percent to 63 percent. Among other indicators, the vast majority of the sample lived in rural areas, with a greater tendency to live in Terai grasslands as opposed to the mountains and hills. Socioeconomic status indicators show some improvements during the 10 year period with more households having access to electricity and household amenities such as improved flooring, radio, and television. Finally, the bulk of the sample claimed Hinduism as their religion, with substantial diversity in ethnic groupings.

Insert Table 2 Here

The difference-in-difference methodology is appropriate in cases where the treatment and control samples are comparable in measured characteristics in the pre-treatment time period (Meyer 1995). In order to ascertain that this comparability holds in the Nepal context, we calculated means of the individual and household indicators at the sub-region level for 1996 and then compared the sub-region means across the more-forested (conflict) and less-forested (non-conflict) classifications. Results indicate that when conflict began in 1996, the more- and less-forested sub-regions had very similar characteristics in terms of women's status, household socioeconomic status, and household composition.[4] Hence the pre-requisite for use of the difference-in-difference methodology is satisfied in our sample.

*Women's Employment Decisions: Empirical Strategy*

The next step is to examine the likelihood of a woman engaging in employment, conditional on an indicator for conflict as well as the full set of personal and household characteristics. We begin by specifying a standard labor supply equation for ever-married women of the following form:

$$y_{ijt} = a + bS_{ijt} + cX_{ijt} + \mu_j + m_t + \vartheta_{ijt} \text{ --- (1)}$$

where *i* denotes a woman, *j* denotes a sub-region, and *t* denotes time. The dependent variable $y_{ijt}$ is a dummy that takes on the value 1 if the woman is employed and 0 otherwise. The notation $X_{ijt}$ is a set of individual and household characteristics that influence women's decisions to work and includes age, education, an indicator for more than two children of pre-school age within the home, and other indicators of quality of the dwelling of the household (such as having electricity and improved flooring).[5] The vector $S_{ijt}$ is a catch-all variable that indicates the effect of conflict-related measures over and above the variables in $X_{ijt}$. The variable includes a normalized measure of the number of conflict deaths from 1996 to 2006 first in of itself. Then it measures conflict impacts using the proportion of households in which the husband has migrated and the proportion of households in which the woman is widowed, divorced, separated, or the head of her household for a reason other than the husband's migration. Finally, $\mu_j$ is a sub-region specific effect that is common to all individuals, $m_t$ is a time specific effect that is common to all individuals, and $\vartheta_{ijt}$ is a woman-specific idiosyncratic error term.

Given the binary nature of the dependent variable, we used a probit model to estimate the standard labor supply model in equation (1), treating conflict as exogenous. These estimates, referred to as "naïve probits," were used as a benchmark against which to compare estimates from the difference-in-difference method. The difference-in-difference approach conditions on the endogeneity of the conflict-related variables, thus allowing us to estimate the causal effect of conflict on the likelihood of women's employment.[6] In implementing this approach, the standard labor supply equation for ever-married women was amended as follows:

$$y_{ijt} = d + \Sigma_s \alpha_{0s} F_{js} + fX_{ijt} + \mu_j + m_t + \varepsilon_{ijt} \text{ --- (2)}$$

The dependent variable is the same binary variable as in equation (1) for whether the woman is employed. The notation $X_{ijt}$ is the same set of exogenous individual and household

characteristics, $\mu_j$ and $m_t$ are the sub-region specific effect and the time specific effect, and $\varepsilon_{ijt}$ is an idiosyncratic error term. The term of interest, $\Sigma_s \alpha_{0s} F_{js}$, represents the difference-in-difference term; it is measured as a set of interactions of the dummy variables for the conflict years and the dummy variable for relative forest cover; our instrument. In the estimations, the coefficients on the interaction terms (once they are converted into marginal probabilities) are interpreted as the marginal effects of Nepal's conflict on the likelihood of women being employed.

The difference-in-difference equation was estimated using a set of probit models for the likelihood of employment, with results shown in Table 3. We ran models for the employment decision as well as the decision to become self-employed for all women (columns 1 and 2), and we ran models for two sub-samples: women whose husbands had migrated (columns 3 and 4), and women who were either widowed, separated, divorced, or living with an incapacitated husband (columns 5 and 6). In all six columns, the conflict indicator is the binary variable for more- or less-forested interacted with year dummies. In the table, 1996 is the excluded category – thus conflict interaction terms are measured with reference to the beginning of the civil war in 1996. All standard errors were corrected for clustering at the sub-region and year level.

Insert Table 3 Here

Column (1) indicates that women living in a conflict sub-region had an increased likelihood of becoming employed in 2001 and 2006, and the same is true of the decision to become self-employed. Both key terms in the first two columns for all women are positive and statistically significant at the .05 level or higher. The magnitudes of the coefficients indicate that compared to 1996, the probability of employment was 0.098 higher for women in conflict areas in 2001 and 0.095 higher in conflict areas in 2006. Thus, there is some decline in 2006 compared

to 2001, which is consistent with the fact that conflict peaked in the 2001-2002 time period. Effects are similar for self-employment in column (2), although the magnitudes of the coefficients are smaller.

Table 3 further shows very similar results for the employment decisions of women whose husbands have migrated, and of women who manage their households due to other reasons. These results support the added worker effect; in particular, the hardship associated with civil war served as a strong incentive for women to engage in employment. The coefficients on the conflict instruments in column (4) are measured with less precision indicating that women with husbands who had migrated were not more likely to be self-employed, possibly due to the high start-up costs of self-employment activities.[7]

*Robustness Checks*

This closing section reports the results of various robustness checks for the main results. First, instead of using the forest coverage variable to directly instrument for conflict in the probit equations, we estimated marginal probabilities for the likelihood of employment using predicted values of conflict. This approach is consistent with a standard two-stage framework. This alternative set of estimations was conducted by constructing the predicted value for conflict in a first-stage regression, and then including the predicted value for conflict interacted with year dummies in a second stage regression. In the first stage, we regressed the total number of casualties on a linear version of the forest variable and then generated a predicted value. This predicted value was converted into its categorical counter-part based on the 75th percentile threshold. The categorical predicted variable was then interacted with year dummies and included in a second stage probit regression for employment likelihoods. A similar procedure

was followed in an alternative set of first stage regressions which conditioned on forest coverage and other geographical variables, all in linear form.

The second-stage marginal probability results for the likelihood of employment are found in Table 4. The standard errors are bootstrapped to adjust for use of first-stage predicted values in the second-stage. The conclusions closely mirror those described for the main difference-in-difference results. In particular, the likelihood of engaging in employment increased for women in conflict-intense areas in 2001 and 2006, as compared to 1996. Furthermore, conditional on being employed, women were also more likely to engage in self-employment if they lived in sub-regions with high levels of conflict.

Insert Table 4 Here

Another robustness check for the main results is to identify the impact of conflict on women's employment using an alternate empirical specification: instrumental variable regressions. This strategy was implemented by running a set of instrumental variable probit regressions for women's decisions to engage in employment and in self-employment. For each of these outcomes, we ran three models: the first model measured conflict as total mortality, the second model proxied for conflict as the proportion of husbands who had migrated at the year and sub-regional level, and the third model proxied for conflict as the proportion of women who managed their households due to death, divorce, separation, or incapacitation of their husbands at the year and sub-regional level. For each of these models, we instrumented for the conflict measure with the binary variable for more- or less-forest coverage interacted with a dummy variable that combined 2001 and 2006.[8]

These results reported in Table 5 indicate that when conflict is measured by total casualties or is proxied by husband's migration status, civil war strife increased the likelihood of

women engaging in employment and in self-employment. As shown in columns (1) and (2) for employment and self-employment, the coefficients on the interaction terms for conflict are large, positive and statistically significant, supporting the hypothesis of an added worker effect for women in Nepal.

Insert Table 5 Here

The third check of the main difference-in-difference results was a set of linear two stage least squares (TSLS) estimates for the likelihood of employment at the sub-region level. This robustness check first entailed transforming all the variables into sub-region averages by year and employing two alternative instruments for conflict that have been used before: the linear version of forest coverage and the binary version of forest coverage. Each instrument was interacted with conflict year dummies to capture differential effects over time, and conflict was measured in three different ways: total mortality; the proportion of women with husbands who had migrated; and the proportion of women managing without their husbands due to his death, divorce, separation, or incapacitation. Overall, these results show further support for the hypothesis of an added worker effect, especially by 2006.[9]

The fourth check of our difference-in-difference approach tests the robustness of the exclusion restriction. That is, we need to ensure that forest cover has no independent effect on the dependent variable and affects women's employment only through its effect on conflict. It is possible that forest cover may be associated with poverty and other determinants of women's shadow wages. To ensure that the instruments are randomly assigned, interactions of year and all variables from the first stage were included in the main difference-in-difference model for employment along with a measure of district-level poverty from a pre-conflict time period (1995-1996).[10] We estimated separate employment effects for women in households where the

husband had migrated, and in households where women were widows or separated or heads of households due to the husband's incapacitation. If the exclusion restriction is violated, then the main results in Table 3 should disappear when we control for these additional variables.[11] Upon re-estimating, the previous results continue to hold - indeed, become stronger for two of the three subsets of women analyzed.[12]

The final set of tests dealt with checking for bias from two sources: selection due to migration and bias arising from omitted variables and serial correlation. Note that migration was already well-entrenched, and the "remittance economy" of Nepal was well-established before the conflict began in 1996 (Seddon *et al*. 1998). Conflict, in of itself, did not cause migration to begin. It is true that civil war somewhat increased existing rates of displacement, but this increase occurred mainly in the far-western and mid-western regions of the country where the conflict tended to be more intense. Moreover, it was mainly men who migrated, leaving women, children, and the elderly behind to tend household land. Since we measure employment probabilities for women, the probability of selection from migration is likely to be small. Finally, since our instrument (forest cover) picks up effects specific to regions from which migration may have occurred (these areas tend to be relatively heavily forested), any potential bias is likely to be conservative in terms of our estimates. If our estimates are influenced by migration, then given that remittances from male migrants are likely to reduce women's employment probabilities, correcting for selection bias should strengthen our results.

We implemented two further controls for selection bias. First, selection bias would be evident if women whose husbands had migrated were systematically different in terms of their employment decisions as compared to women whose husbands had not migrated. To check for such a difference, we re-estimated the above set of specifications for the sub-sample of women

whose husbands did not migrate and found that the results are substantively the same as those in the full sample. Note that Table 3 reports results for the sub-sample of women whose husbands had migrated and again, the results are comparable to those in the full sample. In the second additional check for selection bias, we included husband's migration status directly among the control variables of equation (2).[13] Although this variable is statistically significant, the coefficients on our instruments remain positive and significant indicating that our main results hold even with a control for husband's migration status.

Next, we considered separate effects for employment decisions that excluded self-employment and found the main results described earlier to be broadly consistent with this new specification as well. With the restriction to those who are non-self-employed, the marginal effects on our instruments remain positive in sign. However, we lose some precision in estimates given the small sample size. Finally to ensure that the results are not confounded by bias due to omitted variables and serial correlation, we included separate linear trends for each sub-region and found that if anything, our earlier results become even stronger.[14]

## V. Conclusion and Implications

Consistent with the frequent observation that war is development in reverse, the civil war in Nepal entailed thousands of casualties and the economic repercussions of the war weakened the country's social fabric as households and communities struggled to survive. An important question raised by these changes is whether women engaged in more employment (the added worker effect) as a consequence of conflict. We find that this was indeed the case: women who lived in areas with high conflict intensity engaged in more work over the course of the civil war in relation to comparable women in regions of low conflict intensity. Moreover, we find that

conflict-induced impacts on women's work intensities were substantially different than those originating from an economic shock such as job loss for a male member.[15]

The results have important policy implications both for immediate changes as well as longer-term strategies. In the aftermath of civil war, viable economic policies are required to address the concerns that originally contributed to instigating conflict. In the case of Nepal, such policies should be tailored towards reducing inequities between different factions. As noted in Ghani and Iyer (2010), aid agencies working in tandem with public institutions should concentrate on the quick creation of jobs and aim first to fulfill the short-term needs of the affected populations.

Job creation would be especially useful for women in the aftermath of the civil war. To the extent that government policies promote the industrial sector, our results indicate that women's incentives in terms of employment have changed and they would be particularly receptive to new opportunities, whether in industry or elsewhere. Such jobs would have the potential to reduce poverty as well as income inequality among the poor and among the overall population (Acharya 2008). Targeted use of microfinance to support and incentivize women would further aid in ensuring food security and economic welfare. Depending on the types of activities in which women choose to engage, public provision of vocational training and dissemination of know-how on accounting and management practices would also be of value. Furthermore, public and non-governmental institutions could play key roles by providing subsidies that facilitate the purchase of new profit-enhancing technologies, and by offering support for the marketing and sale of products created by women-run businesses.

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Table 1. First Stage Results for Conflict Intensity, Nepal DHS, 1996-2006

| | **State-Caused Casualties** | | | **Maoist-Caused Casualties** | | | **Total Casualties** | | |
|---|---|---|---|---|---|---|---|---|---|
| | *(1)* | *(2)* | *(3)* | *(1)* | *(2)* | *(3)* | *(1)* | *(2)* | *(3)* |
| Intercept | 2.505 | -0.039 | 0.474*** | 1.039 | 0.083 | 0.286*** | 3.544 | 0.045 | 0.760*** |
| | (1.553) | (0.263) | (0.124) | (0.753) | (0.117) | (0.057) | (2.267) | (0.375) | (0.179) |
| Forested | 2.247*** | 1.700** | 0.646** | 0.873** | 0.653** | 0.217 | 3.120** | 2.353** | 0.863** |
| | (0.658) | (0.637) | (0.277) | (0.319) | (0.284) | (0.127) | (0.961) | (0.909) | (0.400) |
| Roads | -0.197 | | | 0.212 | | | 0.015 | | |
| | (1.648) | | | (0.799) | | | (2.406) | | |
| Elevation | -0.126 | | | -0.047 | | | -0.173 | | |
| | (0.108) | | | (0.052) | | | (0.157) | | |
| Rivers | 0.747 | | | 20.021 | | | 20.768 | | |
| | (159.832) | | | (77.518) | | | (233.380) | | |
| Temperature | -0.102 | | | -0.035 | | | -0.137 | | |
| | (0.070) | | | (0.034) | | | (0.102) | | |
| Rain | -0.341 | | | -0.315 | | | -0.656 | | |
| | (0.627) | | | (0.304) | | | (0.915) | | |
| $R^2$ | 0.699 | 0.354 | 0.295 | 0.609 | 0.288 | 0.184 | 0.678 | 0.340 | 0.264 |
| F | 11.67*** | 7.14** | 5.44** | 7.48** | 5.27** | 2.94 | 10.55** | 6.70** | 4.67** |

Notes: DHS=Demographic and Health Survey. Weighted to national level with weights provided by the Nepal DHS in each year. Standard errors in parentheses. The notation *** is p<0.01, ** is p<0.05, * is p<0.10. Model (1) includes each regressor measured as of 1994 as linear variables; Model (2) includes only forested in 1994 as a linear variable; and Model (3) includes only forested in 1994 as a binary variable. F-statistics reported in the table are the partial F-statistic values for the "Forested" variable. All regressions have 15 observations at the sub-region level.
Source: Authors' calculations based on MHP/NE/MI (2007), MH/NE/ORC (2002), and Pradhan *et al.* (1997).

Table 2. Women's Status and Household Factors, Nepal DHS, 1996-2006

| | 1996 | | 2001 | | 2006 | |
|---|---|---|---|---|---|---|
| | *Unweighted N* | *% of Sample, Weighted* | *Unweighted N* | *% of Sample, Weighted* | *Unweighted N* | *% of Sample, Weighted* |
| Overall Sample | 8373 | 100.0 | 8719 | 100.0 | 8632 | 100.0 |
| **Basic indicators of women's status** | | | | | | |
| Employed | | | | | | |
| Yes | 6634 | 77.3 | 7341 | 82.9 | 6481 | 73.6 |
| No | 1739 | 22.7 | 1378 | 17.1 | 2151 | 26.4 |
| Husband Gone | | | | | | |
| Yes | 1747 | 20.8 | 2096 | 25.0 | 2657 | 29.7 |
| No | 6626 | 79.2 | 6623 | 75.0 | 5975 | 70.3 |
| Education | | | | | | |
| No schooling | 6689 | 80.0 | 6265 | 72.0 | 5371 | 62.6 |
| Some or all primary school | 890 | 11.0 | 1272 | 14.8 | 1461 | 16.8 |
| Some secondary school | 537 | 6.3 | 832 | 9.3 | 1211 | 14.1 |
| Completed secondary school + | 257 | 2.7 | 350 | 3.9 | 589 | 6.4 |
| Literate | | | | | | |
| Yes | 1802 | 20.9 | 3134 | 35.3 | 4072 | 46.7 |
| No | 6571 | 79.1 | 5585 | 64.7 | 4560 | 53.3 |
| Age | | | | | | |
| age<=20 | 1275 | 15.5 | 1218 | 14.4 | 1061 | 12.1 |
| 20<age<=35 | 4467 | 53.4 | 4744 | 54.2 | 4646 | 53.4 |
| age>35 | 2631 | 31.2 | 2757 | 31.4 | 2925 | 34.5 |
| **Geographical indicators** | | | | | | |
| Region | | | | | | |
| Eastern | 1666 | 22.9 | 2067 | 24.1 | 1916 | 21.4 |
| Central | 2489 | 33.4 | 2388 | 32.1 | 2213 | 33.2 |
| Western | 1584 | 19.6 | 1556 | 20.3 | 1683 | 19.4 |
| Mid-Western | 1389 | 14.3 | 1141 | 13.7 | 1403 | 11.7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Far-Western | 1245 | 9.8 | 1567 | 9.8 | 1417 | 14.2 |
| Terrain | | | | | | |
| Mountain | 1055 | 6.8 | 1188 | 6.9 | 1154 | 7.1 |
| Hill | 3577 | 42.8 | 3241 | 41.4 | 3325 | 41.3 |
| Terai grasslands | 3741 | 50.4 | 4290 | 51.6 | 4153 | 51.6 |
| Urban | | | | | | |
| Yes | 946 | 8.4 | 1153 | 9.6 | 2279 | 14.8 |
| No | 7427 | 91.6 | 7566 | 90.4 | 6353 | 85.2 |
| **Socioeconomic status indicators** | | | | | | |
| Husband's education | | | | | | |
| No schooling | 3367 | 40.7 | 3131 | 37.3 | 2182 | 26.2 |
| Some or all primary school | 1901 | 22.0 | 2184 | 24.8 | 2349 | 27.6 |
| Some secondary school | 1625 | 19.4 | 2050 | 22.8 | 2458 | 28.2 |
| Completed secondary school + | 1480 | 17.9 | 1354 | 15.1 | 1643 | 17.9 |
| House has electricity | | | | | | |
| Yes | 1552 | 17.3 | 2068 | 22.5 | 4064 | 47.4 |
| No | 6821 | 82.7 | 6651 | 77.5 | 4568 | 52.6 |
| House has improved floor | | | | | | |
| Yes | 836 | 8.7 | 1171 | 12.0 | 1920 | 22.2 |
| No | 7537 | 91.3 | 7548 | 88.0 | 6712 | 77.8 |
| House has radio | | | | | | |
| Yes | 3522 | 40.7 | 3934 | 43.9 | 5229 | 60.0 |
| No | 4851 | 59.3 | 4785 | 56.1 | 3403 | 40.0 |
| House has television | | | | | | |
| Yes | 641 | 6.9 | 1245 | 13.4 | 2396 | 29.1 |
| No | 7732 | 93.1 | 7474 | 86.6 | 6236 | 70.9 |
| **Household composition and ethnicity indicators** | | | | | | |
| Two+ children under 5 yrs | | | | | | |
| Yes | 1102 | 13.0 | 960 | 11.1 | 740 | 8.0 |
| No | 7271 | 87.0 | 7759 | 88.9 | 7892 | 92.0 |
| Religion is Hindu | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Yes | 7343 | 87.5 | 7479 | 85.5 | 7537 | 85.6 |
| No | 1030 | 12.5 | 1240 | 14.5 | 1095 | 14.4 |
| Ethnic group | | | | | | |
| Brahmin | 1159 | 13.6 | 1122 | 12.8 | 1187 | 12.1 |
| Chhetri | 1682 | 17.5 | 1829 | 17.8 | 1899 | 18.4 |
| Occupational | 1248 | 14.6 | 1720 | 21.1 | 1173 | 12.6 |
| All other | 4284 | 54.4 | 4048 | 48.3 | 4373 | 56.8 |

Notes: Weighted to national level with weights provided by the Nepal DHS in each year.
Source: Authors' calculations based on MHP/NE/MI (2007), MH/NE/ORC (2002), and Pradhan *et al.* (1997).

Table 3. Marginal Probabilities for Likelihood of Employment, Nepal DHS, 1996-2006

| | *All Women* | | *Women with Husbands Migrated* | | *Widow/Sep/Div/HH Head* | |
|---|---|---|---|---|---|---|
| | *Employed* | *Self-Employed* | *Employed* | *Self-Employed* | *Employed* | *Self-Employed* |
| Interaction Terms (reference=conflict_1996) | | | | | | |
| Conflict_2001 | 0.098** | 0.063*** | 0.134** | 0.001 | 0.099** | 0.149*** |
| | (0.032) | (0.010) | (0.032) | (0.018) | (0.023) | (0.012) |
| Conflict_2006 | 0.095*** | 0.046*** | 0.136*** | -0.013 | 0.079* | 0.090* |
| | (0.016) | (0.012) | (0.017) | (0.020) | (0.029) | (0.031) |
| Education (reference=no schooling) | | | | | | |
| Some or all primary school | -0.024*** | 0.025*** | -0.041** | 0.034*** | -0.016 | 0.079*** |
| | (0.009) | (0.008) | (0.017) | (0.009) | (0.031) | (0.020) |
| Some secondary school | -0.054*** | 0.013 | -0.063** | 0.020* | -0.031 | -0.062 |
| | (0.013) | (0.012) | (0.028) | (0.010) | (0.039) | (0.061) |
| Completed secondary school+ | -0.076*** | -0.325*** | -0.153*** | -0.365*** | -0.052 | -0.043 |
| | (0.021) | (0.043) | (0.049) | (0.054) | (0.048) | (0.078) |
| Age (reference=age<=20) | | | | | | |
| 20<age<=35 | 0.109*** | 0.004 | 0.086*** | 0.005 | 0.108** | 0.069** |
| | (0.016) | (0.011) | (0.027) | (0.012) | (0.047) | (0.032) |
| age>35 | 0.146*** | 0.038*** | 0.128*** | 0.016 | 0.110* | 0.134*** |
| | (0.019) | (0.011) | (0.026) | (0.016) | (0.072) | (0.045) |
| Socioeconomic status | YES | YES | YES | YES | YES | YES |
| Household composition | YES | YES | YES | YES | YES | YES |
| Year and sub-region dummies | YES | YES | YES | YES | YES | YES |
| Pseudo $R^2$ | 0.194 | 0.207 | 0.236 | 0.275 | 0.174 | 0.202 |
| N | 25,724 | 21,807 | 5,253 | 4,430 | 1,404 | 1,282 |

Notes: Weighted to national level with weights provided by the Nepal DHS in each year. Standard errors, in parentheses, are clustered by region-year. The notation *** is p<0.01, ** is p<0.05, * is p<0.10. In each regression the key difference-in-difference terms are the binary variable for more- or less-forested interacted with the year dummies. The Widow/Sep/Div/HH Head sub-sample excludes women whose husbands have migrated. Source: Authors' calculations based on MHP/NE/MI (2007), MH/NE/ORC (2002), and Pradhan *et al.* (1997).

Table 4. Marginal Probabilities for Likelihood of Employment using Predicted Values, Nepal DHS, 1996-2006

| | *Linear Forest Instrument* | | *Linear Forest and Other Instruments* | |
|---|---|---|---|---|
| | *Employed* | *Self-Employed* | *Employed* | *Self-Employed* |
| Interaction Terms (reference=conflict_1996) | | | | |
| Conflict_2001 | 0.098*** | 0.063*** | 0.130*** | 0.065*** |
| | (0.011) | (0.008) | (0.011) | (0.010) |
| Conflict_2006 | 0.095*** | 0.046*** | 0.056*** | 0.034** |
| | (0.013) | (0.009) | (0.014) | (0.014) |
| Education (reference=no schooling) | | | | |
| Some or all primary school | -0.024*** | 0.025*** | -0.023** | 0.025*** |
| | (0.008) | (0.006) | (0.009) | (0.007) |
| Some secondary school | -0.054*** | 0.013 | -0.053*** | 0.013 |
| | (0.013) | (0.011) | (0.014) | (0.010) |
| Completed secondary school+ | -0.076*** | -0.325*** | -0.075*** | -0.324*** |
| | (0.020) | (0.028) | (0.018) | (0.027) |
| Age (reference=age<=20) | | | | |
| 20<age<=35 | 0.109*** | 0.004 | 0.109*** | 0.005 |
| | (0.007) | (0.007) | (0.009) | (0.007) |
| age>35 | 0.146*** | 0.038*** | 0.144*** | 0.038*** |
| | (0.007) | (0.007) | (0.008) | (0.007) |
| Socioeconomic status | YES | YES | YES | YES |
| Household composition | YES | YES | YES | YES |
| Year and sub-region dummies | YES | YES | YES | YES |
| Pseudo $R^2$ | 0.194 | 0.207 | 0.194 | 0.206 |
| N | 25,724 | 21,807 | 25,724 | 21,807 |

Notes: Weighted to national level with weights provided by the Nepal DHS in each year. Standard errors, in parentheses, are clustered by region-year and bootstrapped to adjust for use of first-stage predicted values in the second-stage. The notation *** is p<0.01, ** is p<0.05, * is p<0.10. In each regression the conflict-year interactions are constructed as predicted values based on the linear forest instrument only (columns 1 and 2) and based on all the geographical variables in linear form (columns 3 and 4).
Source: Authors' calculations based on MHP/NE/MI (2007), MH/NE/ORC (2002), and Pradhan *et al.* (1997).

Table 5. Instrumental Variable Probits for Likelihood of Employment, Nepal DHS, 1996-2006

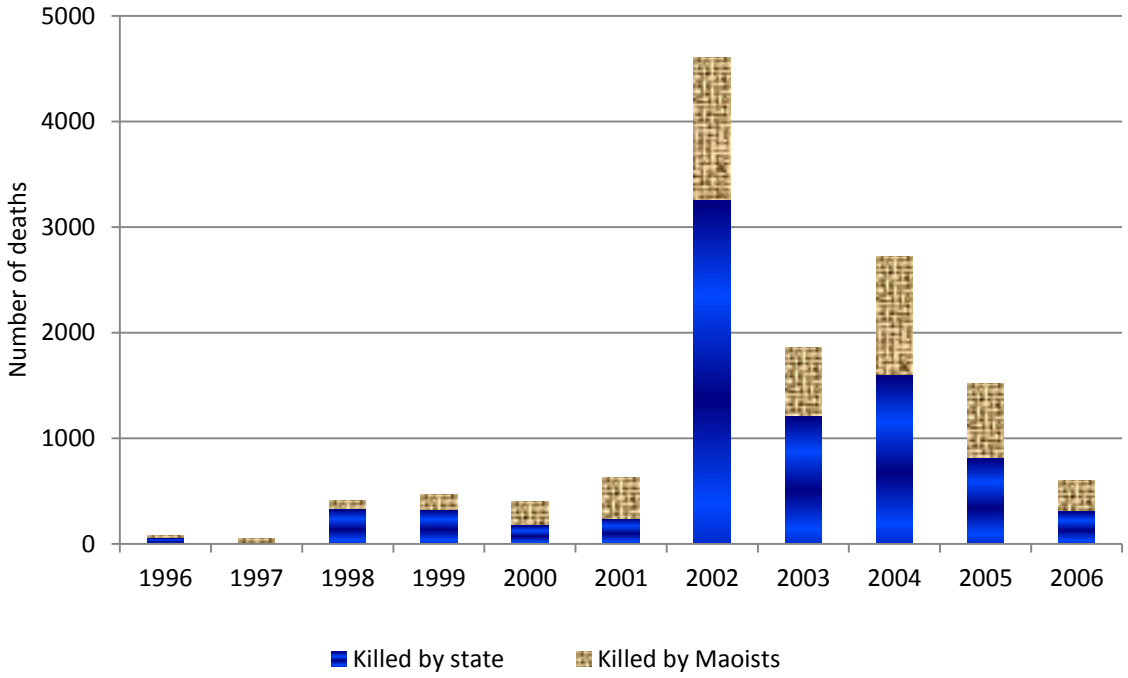
| | *Likelihood of Employment* | | | *Likelihood of Self-Employment* | | |
|---|---|---|---|---|---|---|
| | *(1)* | *(2)* | *(3)* | *(1)* | *(2)* | *(3)* |
| Interaction Terms (reference=conflict_1996) | | | | | | |
| Conflict_2001_2006 | 0.799** | 10.692* | -61.243 | 0.744* | 10.061* | -55.379 |
| | (0.392) | (5.822) | (42.690) | (0.401) | (5.171) | (39.992) |
| Education (reference=no schooling) | | | | | | |
| Some or all primary school | -0.102*** | -0.105*** | -0.064 | 0.154*** | 0.137** | 0.183*** |
| | (0.032) | (0.034) | (0.048) | (0.056) | (0.058) | (0.053) |
| Some secondary school | -0.206*** | -0.235*** | -0.166*** | 0.067 | 0.012 | 0.097 |
| | (0.045) | (0.053) | (0.061) | (0.077) | (0.100) | (0.077) |
| Completed secondary school+ | -0.280*** | -0.300*** | -0.236*** | -1.130*** | -1.152*** | -1.049*** |
| | (0.070) | (0.068) | (0.084) | (0.110) | (0.106) | (0.166) |
| Age (reference=age<=20) | | | | | | |
| 20<age<=35 | 0.421*** | 0.386*** | 0.394*** | 0.024 | 0.011 | 0.022 |
| | (0.063) | (0.075) | (0.065) | (0.065) | (0.062) | (0.062) |
| age>35 | 0.633*** | 0.594*** | 0.599*** | 0.234*** | 0.223*** | 0.229*** |
| | (0.102) | (0.120) | (0.103) | (0.074) | (0.079) | (0.075) |
| Socioeconomic status | YES | YES | YES | YES | YES | YES |
| Household composition | YES | YES | YES | YES | YES | YES |
| Year and sub-region dummies | YES | YES | YES | YES | YES | YES |
| Wald test of exogeneity $\chi^2$ | 3.90** | 2.23 | 1.38 | 5.72** | 1.82 | 1.26 |
| N | 25,724 | 25,724 | 25,724 | 21,807 | 21,807 | 21,807 |

Notes: Weighted to national level with weights provided by the Nepal DHS in each year. Standard errors, in parentheses, are clustered by region-year. The notation *** is p<0.01, ** is p<0.05, * is p<0.10. In each regression we instrument for conflict with a binary variable for more- or less-forested interacted with a dummy that combines 2001 and 2006. Model (1) measures conflict as total mortality; Model (2) proxies for conflict as number of husbands migrated; and Model (3) proxies for conflict as number of women divorced, separated, widowed, or living with incapacitated husbands.

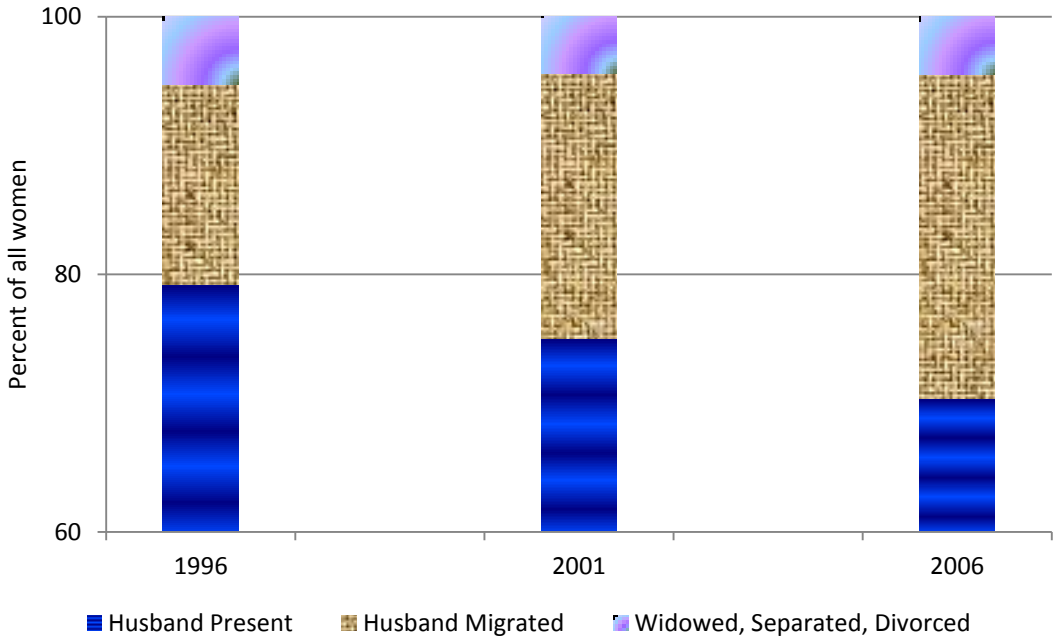
Source: Authors' calculations based on MHP/NE/MI (2007), MH/NE/ORC (2002), and Pradhan *et al.* (1997).

Figure 1. Conflict-related indicators in Nepal, 1996-2006

Panel A: Total Number of Deaths, per Year




Panel B. Status of Husband's Presence




Source: Authors' calculations based on INSEC (2010) in Panel A, and based on MHP/NE/MI (2007), MH/NE/ORC (2002), and Pradhan *et al.* (1997) in Panel B.

## Endnotes

[1] In a separate set of regressions, we tested the predictive power of our instruments from 1994 in explaining the growth in conflict intensity over the 1996 – 2006 time period. Results indicate that the 1994 instruments are good predictors of the subsequent growth in conflict intensity. These regressions are not reported in the paper but are available upon request.

[2] The form of the "Forested" variable that is used as the instrument is as in the third column of the final panel of Table 1. We implement various robustness checks for this choice.

[3] We coded as self-employed those individuals who reported that they worked for themselves or for their family. The reference group is individuals who worked for someone else.

[4] The sample means across control and treatment groups are available upon request.

[5] This specification excludes the woman's potential wage, a variable that could also determine women's participation in the labor market (as in Dex *et al.* 1995 and Prieto-Rodriguez and Rodriguez-Gutierrez 2003 in their studies of the added worker effect). Because the Nepal DHS does not include information on cash earnings in the three years of our analysis, we cannot follow this approach.

[6] The naïve probit results are available on request.

[7] Because the two sub-samples of women with husbands not present are not representative of all women, the estimates in columns 3-6 may be subject to selectivity bias. We address this issue by noting that male migration was already well-entrenched in Nepal before the conflict began. Furthermore, a specification check of the average proportion of husbands who had migrated regressed on the forest/year interaction terms and the full set of regressors at the year/sub-regional level finds no evidence of confounding effects from the pre-conflict instruments in 2001

or 2006. A similar test for women who are widowed, separated, or household heads for a reason other than husband's migration also indicates that selection does not affect the results.

[8] We needed to combine the 2001 and 2006 dummies in order to achieve model convergence.

[9] These results are available on request.

[10] Another check involved using district-level means of a wealth index in the 1996 DHS data constructed from factor scores as an indicator of poverty. These results were similar to those from the district-level measure of poverty for a pre-conflict time period.

[11] Since more forested regions could be poorer, we included the forest variable directly in the difference-in-difference model as a final control for poverty effects. The forest variable is negative and significant in these runs, indicating that in more-forested areas, women are less likely to be employed. However, our main results as measured by the coefficients on the forest/year interaction terms remain positive and significant. Thus our previous results continue to hold.

[12] These results are available upon request.

[13] This approach is similar to the strategy followed to address selection bias from migration in Angrist and Kugler (2008).

[14] These regressions as well as those using TSLS and those testing for selection bias are not reported in the paper. They are available on request.

[15] These results are available on request.