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Adjusting the Labor Supply to Mitigate Violent Shocks

Evidence from Rural Colombia

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Abstract

This paper studies the use of labor markets to mitigate the impact of violent shocks on households in rural areas in Colombia. It examines changes in the labor supply from on-farm to off-farm labor as a means of coping with the violent shock and the ensuing redistribution of time within households. It identifies the heterogeneous response by gender. Because the incidence of violent shocks is not exogenous, the analysis uses instrumental variables that capture several dimensions of the cost of exercising terror. As a response to the violent shocks, households decrease the time spent on on-farm work and increase their supply of labor to off-farm activities (non-agricultural ones). Men carry the bulk of the adjustment in the use of time inasmuch as they supply the most hours to off-farm non-agricultural work and formal labor markets. Labor markets do not fully absorb the additional labor supply. Women in particular are unable to find jobs in formal labor markets and men have increased time dedicated to leisure and household chores. Additional off-farm supply does not fully cover the decrease in consumption. The results suggest that in rural Colombia, labor markets are a limited alternative for coping with violent shocks. Thus, policies in conflict-affected countries should go beyond short-term relief and aim at preventing labor markets from collapsing and at supporting the recovery of agricultural production.

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Adjusting the Labor Supply to Mitigate Violent Shocks:

Evidence from Rural Colombia*

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1. Introduction

The dynamics of internal conflicts impose shocks on civilian populations. Armed confrontations, looting and aggression against civilians harm particular groups within the population, while other groups may benefit. The transmission channels of violent shocks are manifold—asset depletion, drops in agricultural production, human capital losses, and a weakening of insurance mechanisms, among others (Stewart and Fitzgerald 2001; Brück 2004; Justino and Verwimp 2006; Shemyakina 2006; Camacho 2008).

Households living in regions experiencing conflict are not defenseless. People devise resourceful strategies against victimization and for alleviating the impact of violent shocks. These range from traditional strategies aimed at mitigating shocks, to forced migration, participation in illegal activities and the support of armed groups (Engel and Ibáñez 2007; Justino 2009). Despite the proven resilience of households, most coping strategies are only able to compensate for present incomes, and end up reducing future income by depleting productive assets and human capital (Justino and Verwimp 2006; Ibáñez and Moya 2010).

Evidence on the use of labor markets for mitigating conflict-related shocks in rural areas is limited. Moreover, most research examining strategies adopted by households to hedge *ex ante* and *ex post* against traditional shocks assumes that the labor supply remains fixed. Notwithstanding, during long-standing conflicts of medium intensity, labor markets are not necessarily disrupted and may provide an additional source of income for confronting the economic impact of conflict-related shocks. In fact, in most cases, aggression by armed groups against the rural population deteriorates agricultural income through the seizure of land, the stealing of livestock and/or the destruction of productive assets. Thus, households may rely on non-agriculture labor to compensate for drops in agricultural income without resorting to more costly, long-run strategies, such as crop diversification, the selling of productive assets, cutting back on consumption or withdrawing children from school. Understanding how labor markets protect households against conflict-related shocks provides evidence useful for devising effective post-conflict policies so as to reduce the costs of conflict.

The purpose of this paper is to examine how labor markets contribute to mitigating shocks due to conflict. First, we establish how households redistribute on-farm and off-farm work in responding to conflict shocks, and how this prompts a redistribution in a household's use of time for the household head and the spouse. Second, we study if off-farm work is directed at formal labor markets or at subsistence activities that produce lower wages. Third, we explore whether responses are heterogeneous by gender. By examining the differentiated impact vis-à-vis gender, we establish whether the welfare losses generated by responses to shock—such as a reduction in leisure time or time dedicated to children—are borne differently by men and women. Lastly, we identify whether an increasing labor supply is an effective strategy for countervailing, or at least reducing, the impact of shocks.

We use data for Colombia, a country that has experienced a long-standing conflict for over 60 years. The data collected is the baseline of a longitudinal survey of 4,800 rural households, the first household survey applied in Colombia to households living in conflict regions, as until recently, most research has concentrated on forcefully displaced populations. Forced displacement, an extreme coping strategy utilized in times of warfare, is widespread in Colombia. Today, more than 3.3 million persons have fled their hometowns in order to save their lives. Research shows that forcefully displaced persons face large asset losses, as well as a severe disruption in risk-sharing mechanisms (Ibáñez and Moya 2010). Sharp drops in income push displaced women to increase their labor participation; consequently, their contributions to households' earnings rise significantly, yet their bargaining power remains the same and domestic violence escalates (Calderón and Ibáñez 2010). Evidence regarding coping strategies adopted by households that decide to stay in conflict zones is scarce in Colombia. This paper contributes to better understanding how households cope with conflict shocks, and how labor markets become important mechanisms for preventing further losses stemming from violent conflict.

The paper also contributes to the economic literature on the use of labor markets to hedge against the consequences of economic shocks. Empirical evidence on this issue is scarce and what data are available are restricted to small samples rich in information about the use of time, or large samples with limited labor information (Kochar 1999; Rose 2001; Cameron and Worswick 2003; Ito and Kurosaki 2009). The survey used in this paper collects detailed information about households' use of time and participation

in formal markets and covers a large sample. Furthermore, we provide evidence on the heterogeneous impact by gender, and the consequent welfare losses, both of which are not addressed in many of the literature to date.

Establishing causality between the incidence of violent shocks and changes in labor outcomes is difficult because the incidence of violent shocks is not exogenous. The presence of armed groups and attacks on the civilian population are linked with a historic tradition of conflict in a region, isolation from urban centers, and a poor quality of land, which reduces the costs of exercising terror. Since Colombia has faced a long-standing conflict for several decades, finding an instrumental variable related to the causes of conflict, yet which does not directly affect labor outcomes and consumption is difficult. Because we have a rich data-set consisting of municipal and rural district (*vereda*)[1] characteristics capturing the several dimensions that reduce the costs of exercising terror, we are able to exploit this variation in order to establish causality. The causal relation between conflict shocks on the one hand, and labor outcomes and consumption on the other, constitutes the third contribution of this paper.

Our results show non-agricultural labor markets are used as an alternative means for coping with covariate conflict shocks. Time spent on-farm decreases, while the supply of labor in off-farm (non-agricultural) labor markets expands. Men absorb the bulk of the adjustment in the use of time. Drops in agricultural production push men to provide more hours of work in off-farm employment and formal labor markets. As contractions in on-farm time are not fully absorbed by labor markets, men also spend more time on leisure activities and household chores. Women do not substitute for men in on-farm work, but rather try to find employment in off-farm work, apparently with little success. Given the large impact of conflict, additional off-farm supply is not covering fully drops in consumption.

The evidence in this paper indicates that when labor markets do not break down as a consequence of conflict, a changing labor supply can become an effective strategy for compensating for income lost due to conflict. These findings are important because most policies in conflict-ridden countries concentrate on short-term relief programs, which are designed as temporary measures to ensure the subsistence of the civilian population until productive activities can be resumed. Nonetheless, people in regions

[1] Rural districts in Colombia are smaller administrative divisions within municipalities.

experiencing conflict are resilient—productive activities continue, albeit at a slower pace, and labor markets are not completely destroyed. Protecting the population's access to labor markets may act to support households in coping with the consequences of conflict. However, short-term programs should continue, as adjusting the labor supply does not fully insure against conflict shocks.

The structure of the paper is as follows. Section two briefly discusses the impact of war-induced shocks, the coping strategies employed by households, and the long-term consequences. Section three describes the empirical strategy, the data and the empirical results. In Section four, we conclude and discuss certain policy recommendations.

2. The economic impacts of violent shocks

Conflicts impose economic losses on a population. On the one hand, direct aggression against a civilian population living in a conflict region, in addition to confronting households with traumatic events, causes economic shocks. These attacks kill and maim people, destroy productive assets and damages infrastructure. In addition, the illegal seizure of assets—for the purposes of looting or funding war activities—is widespread in many conflict regions. Destruction and the illegal seizure of productive assets restrict the ability of households to generate income and to recover from conflict shocks, pushing many households into poverty traps (André and Platteau 1998; Brück 2004; Ibáñez and Moya 2010). Death and disability due to conflict mostly target adult males during their most productive ages, which reduces the present and future income of households (de Walque 2006).

Even where not directly victimized, households living in conflict regions may face short- and long-term economic costs. Conflict limits market transactions, increases transactions cost, reduces the demand for market goods and generates uncertainty, among other things. Households face variability in addition to the traditional sort associated with income—so prevalent in rural areas—as well as a restricted capacity to generate income. In addition, relying on *ex-ante* and *ex-post* strategies in order to mitigate risk is difficult, as access to financial markets and risk-insurance mechanisms becomes more limited in conflict regions, or is severely depleted when populations are forced to migrate (Brück 2004; Ibáñez and Moya 2010). Since investments in human capital are lower and health services deteriorate, long-term income generation is also hampered. The empirical evidence shows that warfare depletes human capital, in

particular that of children (Shemyakina 2006; Camacho 2008; Bundervoet, Verwimp et al. 2009; Akresh, Verwimp et al. 2011).

Nevertheless, the impact of conflict is not restricted to negative outcomes. War may also produce positive outcomes for particular groups within the population. Empirical evidence shows that those social groups connected with armed groups may improve their economic conditions after the conflict ends, as, among other things, strong institutions may emerge and collective action may be strengthened (Tilly 1992; Verwimp 2005; Bellows and Edward 2009).

The extent of the negative impact conflict has on households depends on its magnitude and the coping mechanisms adopted by households. If conflicts are long-standing, households will experience an *ex-ante* distribution of conflict shocks and may adapt their behavior so as to insure against war-induced shocks and mitigate their impact. As with more traditional risks, households may adopt costly strategies to mitigate *ex-ante* risks. Resorting to subsistence activities, restricting transactions with markets, reducing investments in land plots, limiting contacts with other community members, and/or supporting armed groups are some the measures households may adopt (Brück 2004; Justino 2009). Since communities facing long-standing conflicts could become more isolated from markets than those residing in non-conflict regions, household incomes are presumably highly correlated, thus further restricting alternatives for risk insurance.

Unexpected outbreaks of violence cannot be anticipated and households must rely on *ex-post* coping mechanisms as well. Also, the inability to insure fully against anticipated shocks pushes households to rely on *ex-post* coping mechanisms. Informal institutional arrangements, credit markets, formal insurance markets and the depletion of savings are strategies used to insure against shocks (Deaton 1991; Paxson 1992; Townsend 1995). As access to formal markets is limited for many rural households, they often use the sale of assets, remittances, informal credits, reciprocal transfers, reductions in consumption levels and the withdrawing of children from school as risk-management strategies (Jacoby and Skoufias 1997; Fafchamps, Udry et al. 1998; Rosenzweig and Stark 1998; Jalan and Ravallion 2001; Fafchamps and Lund 2003). The deterioration of formal and informal mechanisms of *ex-ante* risk management caused by conflict implies that households are often forced to resort to *ex-post* mitigation of risk.

When the development of credit and insurance markets is scarce, labor markets are an alternative to hedging against *ex-ante* and *ex-post* risks (Kochar 1999; Rose 2001; Cameron and Worswick 2003; Ito and Kurosaki 2009). If labor markets are flexible and non-agricultural wages have a low correlation with agricultural profits, supplying labor in non-agricultural markets is an alternative to hedging *ex-ante* and *ex-post* in confronting agricultural shocks (Rose 2001; Ito and Kurosaki 2009). By increasing the number of working hours or shifting from on-farm to off-farm labor activities, households may be able to maintain consumption and avoid having to adopt costly strategies. However, most studies on risk coping assume that the labor supply remains fixed (Cameron and Worswick 2003). Although empirical evidence on this issue is limited, the results coincide—the impact of risks on the labor supply is large. Households shift from on-farm to off-farm work in order to insure *ex ante* against risks and mitigate *ex-post* the consequences of economic shocks (Kochar 1999; Rose 2001; Cameron and Worswick 2003; Ito and Kurosaki 2009). Although expanding the labor supply is an effective strategy for preventing further drops in income, welfare costs arise due to the fact that less time is dedicated to leisure or to the increase in child labor (Rose 2001; Cameron and Worswick 2003).

The empirical evidence on labor markets as a risk management mechanism in the context of conflict is small. Menon and Rodgers (2011) find that the conflict in Nepal pushed women there to participate in labor markets, yet the expansion in the labor supply has been mostly driven by the need to supplement income, and not because labor demand expanded. Other studies concentrate on the impact of forced displacement on labor markets. Calderon and Ibáñez (2009) estimate the impact of forced displacement on the wages of native populations, while Kondylis (2010) examines labor outcomes for formerly forcefully displaced population returning to Bosnia.

However, in long-standing conflicts of low or medium intensity, in which labor markets have not broken down, a changing labor supply may become an additional alternative for mitigating conflict shocks. Moreover, if the conflict occurs mostly in rural areas, rural households may supply off-farm labor in urban areas of nearby villages in order to compensate for losses generated by conflict shocks. The redistribution of labor within households may vary by gender. In order to avoid the victimization of households' female members, men may participate to a greater extent in formal labor markets, while women may substitute for them in on-farm labor.

This paper contributes to our understanding of how households use labor markets to minimize the impact of conflict shocks. The paper examines the redistribution of the use of time between on-farm and off-farm labor, and households' participation in formal labor markets as a consequence of covariate conflict shocks. In addition, the paper estimates how the use of time is redistributed within a household. This is because the diverse effects of violence on a household are potentially borne differently by its male and female members. For example, the heavier workload burden required to increase income following a violent shock may be relatively harder on women, or women may substitute for men in on-farm work by reducing their time spent on children or leisure. Both strategies will imply welfare losses for the household. Additionally, we explore whether increasing the labor supply is an effective strategy for preventing reductions in consumption as a consequence of conflict.

Understanding the strategies households employ to cope with violent shocks is crucial to reducing the short- and long-term costs of conflict. The inability to completely insure against shocks pushes households to adopt costly mitigating strategies. Although these strategies compensate for income drops in the short-term, their long-term implications may perpetuate poverty by decreasing human capital accumulation, generating malnutrition, necessitating child labor and producing a depletion of productive assets (Behrman 1988; Jacoby and Skoufias 1997; Jensen 2000; Barret and Carter 2006). Evidence for violent shocks suggests similar impacts, but the effects are much larger (Justino and Verwimp 2006; Bundervoet, Verwimp et al. 2009; Akresh, Verwimp et al. 2011).

3. The empirical results

This paper studies the extent to which rural households in Colombia change their labor supply in order to prevent reductions in consumption brought about by conflict shocks. In order to compensate for welfare losses from conflict shocks, households may redistribute their use of time between on-farm and off-farm between members. Consequently, their participation in formal non-agricultural labor markets or in occasional work on other farms may increase. Clearly, such redistributions will likely vary by gender, and the paper studies in detail how household time-use decisions affect men and women differentially. Additionally, we examine whether relying on labor

markets is an effective strategy for preventing conflict shocks reducing the households' consumption.

3.1 The data

The Colombian Longitudinal Survey of Wealth, Income, Labor and Land (CLS-WILL) aims at furthering our understanding of social and economic changes at the individual and household levels in Colombia. The Department of Economics of the Universidad de los Andes designed the questionnaire, selected the sample, and administered the survey. The sample consists of 10,000 households: 6,000 urban ones and 4,800 rural ones. The rural sample[2] covers (mostly) small agricultural producers coming from stratum one and is representative of four micro-regions—Atlantic, Central, Coffee-Growing and South. We selected these regions based on the respective conflict dynamics, the size of land plots in the region, the land ownership arrangements (formal versus informal), per capita income growth, and whether the natural markets for their agricultural produce are located in the urban sample. For each micro-region, we selected four municipalities such that (i) two have positive economic growth and two negative; (ii) two have a high prevalence of informal land markets; and (iii) on average, land plots are small. In the final sample, there are 17 municipalities in total. Within each municipality, rural districts were chosen randomly. In the sample, there are 222 rural districts in total, divided as follows: 57 in the Atlantic, 48 in the Central, 58 in the Coffee Growing and 59 in the Southern regions. The size of the rural sample is 4.800 households and each micro-region's sample covers around 1.200 households.[3] The first wave was collected between April and July 2010.

The survey collects standard information about changes in household behavior over time – individuals and their families – including those related to employment, income, education, health and family formation. Additionally, we collect data on land tenure and property rights, consumption, expenditure, agricultural production, asset ownership, child development (nutrition and health) and social capital. Since the standard set of labor market questions used in urban areas do not capture the evolution of the rural labor market, we included a time-use module in the rural survey so as to understand role

[2] Nearly 25 percent of the Colombian population lives in rural areas.

[3] These are the survey's projected numbers. However, because of over-sampling, the actual sample sizes presented in the tables below may differ slightly from these numbers.

divisions within the household and its members' labor choices. In addition to the household questionnaire, we collected information at the rural district level on issues affecting the community as a group. This community survey was collected for each rural district, and includes information about social and public infrastructure, incidences of land conflict and the presence of illegal armed groups. It also generated the necessary information for creating a conflict time line.

3.2 Colombia: 50 years of conflict

Since the 20th century, Colombia has been confronted by two major internal conflicts. The first, known as *La Violencia*, started in the middle of the 1940s, and intensified with the assassination of the populist leader Jorge Eliécer Gaitán in 1948. The conflict emerged from the political struggles between the two major, traditional political parties in Colombia, the Liberals and Conservatives. Regional land disputes and power struggles that had been latent for decades combined with political disputes to fuel the conflict in rural areas as well (Oquist 1980). In 1958, Liberals and Conservatives negotiated a power-sharing agreement that paved the way for a peace deal and halted armed confrontations.

The power-sharing agreement effectively eliminated political violence, yet land disputes and regional power struggles remained dormant. By the end of the 1960s, guerrilla movements promoting agrarian land reform emerged in the rural areas of the country. The presence of rebel groups was confined to isolated rural regions of the countries, and actions were occasional and limited to attacking government forces.

The dynamics of the conflict changed dramatically with the appearance of the illegal drug trade at the end of the 1980s. Resources from illicit drug trading provided massive funds with which rebel groups were able to operate. These groups soon began launching attacks on large land-owners and drug barons in order to extract additional resources. Kidnapping, extortions, the taxation of cocaine production, mining and cattle ranching provided additional sources of financing. These attacks and the flow of resources from illegal drug trading contributed to the creation of right-wing paramilitary groups aimed at contesting the power of the guerrilla movement. At the same time, the conflict began to expand geographically along the Colombian territory.

From 2000 onwards, the occurrence of violent events and criminal activities started to gradually decline due to increased military spending, and an effort to strengthen military and police forces, something initiated in the 1990s. In addition, in 2003, paramilitary groups began to demobilize. Despite the strengthening of the armed forces and the demobilization of paramilitary forces, until now, guerrilla groups have continued to operate in some isolated areas of the country and some paramilitary groups mutated into drug-dealer organizations. Although attacks on the civilian population have somehow eased, aggressions have not halted completely.

Graph 1 illustrates the evolution of homicide rates per 100,000 inhabitants during the period ranging from 1946 to 2009, and clearly depicts the different stages of the Colombian conflict. In 1946, before *La Violencia* intensified, homicide rates were 9.68; after the assassination of Gaitán, homicide rates increased to 49.02, in 1958. The power-sharing agreement was relatively successful in easing violence, and in decreasing the homicide rate, to 22 in 1970, a level much higher though than prior to *La Violencia*. The emergence of the illicit drug trade intensified violence and increased the homicide rate, which reached epidemic proportions in 1991 (79.23). After 1991, homicide rates declined, reaching its lowest level in 20 years, 35.52 as of 2009. Nevertheless, the homicide rate continues to be high compared to international standards.

[Graph 1 goes about here]

Intensification of the conflict at the end of 1990 generated an escalating trend of attacks against the civilian population. Aggressions against the civilian population are a deliberate war strategy employed by armed groups in order to consolidate and expand their territorial strongholds, weaken support for their opponents, and seize assets so as to augment their war booty (Azam and Hoeffler 2002; Engel and Ibáñez 2007). In Colombia, selective homicides, massacres, sexual assaults, landmines, forced recruitment and death threats heightened as the conflict escalated. Graph 2 shows the number of victims of massacres between 1993 and 2009 in Colombia, and in the four regions of the CLS-WILL sample. Massacres[4] increased to their highest level in 2000. For the year 2009, despite a sharp decline, 147 victims of massacres were reported. Moreover, recent press articles inform of a renewed escalating trend of massacres in the

[4] Massacres are defined as the killing of four or more people (the Colombian Police Department).

second semester of 2010.[5] Trends for the four CLS-WILL regions show a wide variation between and within regions. Three of the four regions faced at least one massacre between 1993 and 2009. While the Southern and Coffee Regions suffered massacres at the end of the 1990s, the Atlantic region faced massacres in 2003.

[Graph 2 goes about here]

Escalating aggressions against the civilian population produced massive outflows of forcefully displaced persons. During the period ranging from 1999 to 2009, 3'303,979[6] persons were forcefully displaced after being the victims of an attack or in an effort to avoid being victimized. This figure, which is equivalent to 7.9 percent of the Colombian population, is the second highest magnitude worldwide after Sudan.[7]

Incidences of violence in 2009 for the four CLS-WILL regions and Colombia are presented in Table 1. The figures reveal a wide variation across regions with respect to incidences of different types of violent events in Colombia. The homicide rates are highest in the Coffee region; the figure is well above the national rate. On the other hand, the forced displacement rate is indeed large in the Southern Region (almost double the national rate), which indicates that direct aggression against the civilian population is high in this region. The Central region reports the lowest incidence of violence.

[Table 1 goes about here]

The official figures for violent events are confirmed by the responses to the rural district questionnaire of the CLS-WILL. Table 2 reports the results for the questions on the rural district questionnaire related to conflict and aggressions against the civilian population. The results show that the presence of armed groups during the last 10 years is frequent for the four regions, and ranges from 15.8 percent of rural districts in the Atlantic Region to 44.1 percent of rural districts in the Southern Region. Direct violent attacks against the population are widespread, while aggressions that cause immediate economic consequences are less frequent. For example, in the Southern Region, threats were reported in 20.3 percent of rural districts, whereas the illegal seizure of livestock,

[5] www.eltiempo.com/justicia/ARTICULO-WEB-NEW_NOTA_INTERIOR-8371361.html, retrieved on the 24th of November. During the week between the 8th and 14th of November, eight massacres were perpetrated in five regions of Colombia.
[6] www.accionsocial.gov.co, retrieved 1st of June 2010.
[7] www.internal-displacement.org, retrieved 19th of May 2010.

expropriation of land and/or illegal seizure of crops occurred respectively in 8.5, 5.1 and 3.4 percent of rural districts. Interestingly, the imposition of the rule of armed groups upon a community is reported often in rural districts, ranging from seven percent in the Atlantic Region to 23.7 percent in the Southern Region. This suggests that armed groups are not contested in those communities and that they are therefore at ease in defining their own sets of rules.

[Table 2 goes about here]

A first approximation of the economic consequences of violent conflict on rural districts is presented in Table 3. Respondents identify rural households that have had to abandon crops, stop investment in land plots, or stop producing traditional crops due to conflict during the last two years. Nonetheless, the economic consequences of conflict occur much less frequently than direct aggressions against the civilian population. In fact, direct aggressions do not seem to necessarily produce economic consequences with respect to the conflict. Thus, although the Southern Region experiences more violent attacks against the population, the Coffee Region more frequently reports economic impacts produced by the conflict.

[Table 3 goes about here]

3.3 Model and empirical strategy

We have a very simple framework in mind in order to better understand the specific ways in which a violent shock may affect the consumption of rural households, and how changes in the allocation of time may help buffer such shocks. Suppose that households choose consumption and leisure levels to maximize their utility function:

$$Max_{C,H,F}\ U(C,L)$$
$$\text{s.t. } wH + \pi(\mathrm{F};\ A, \overline{\mathrm{K}}, w, r, P, \theta) = PC$$
$$\bar{T} = H + F + L$$

where C denotes consumption and L leisure. $\bar{T}$ is the total amount of time available to a rural household which can be devoted to off-farm work (labor market), H, to on-farm work, F, or to leisure, L. We assume the existence of a labor market where agents may work for a wage, w. The household's income is comprised of the

household's profit function, which depends on the land´s productivity, A, the productive assets, $\overline{K}$, the prices of the productive inputs, w, the opportunity cost of devoting time to farm work instead of working in the labor market, and r, the rental price of capital, as well as the price of goods, P. Profits may also be affected by a violent shock, θ. The profit function fulfills the conditions of the standard neo-classical problem. For example, they increase in on-farm work, $\pi_F > 0$, in a decreasing manner, $\pi_{FF} < 0$. In addition, we assume that when a violent shock occurs, the farm's profits decrease: $\pi_\theta < 0$.

Substituting the constraints in the utility function and assuming an interior solution, the first order condition of the problem with respect to on-farm time captures the trade-off generated by the fact that an additional hour of on-farm work generates increased farm profits but it also generates disutility, $\frac{1}{P} U_C \pi_F = U_L$. The first order condition of the problem with respect to off-farm work, *H*, captures a similar trade-off: a household working an additional hour of work in the labor market receives w, which can be used to finance consumption but it also generates disutility, $\frac{w}{P} U_C = U_L$. Combining the previous expressions, we find that the allocation of off and on-farm work must be such that the additional profit of on-farm work should equal its opportunity cost, $\pi_F = w$.

The problem is well-defined, there are no non-convexities and therefore the second order conditions are satisfied. The demand functions in this model depend on all the parameters in the model. In particular, we want to emphasize that they are functions of wages, land productivity and the violent shock: $F = F(w, A, \theta), H = H(w, A, \theta)$ and $C = C(w, A, \theta)$.

Note that in the absence of labor markets, if $w = 0$ in this framework, the full impact of the violent shock would translate into a decrease in consumption. However, if labor markets are available, the occurrence of a violent shock would render on farm work less profitable, and thus market work more attractive. This would imply a reassignment of time between on and off-farm work, which would prevent the shock from fully transmitting into reductions in consumption. This is the insight we want to emphasize.

Our empirical framework follows the intuition presented above. The aggregate consumption of household *i* in rural district *j* located in region *k* depends on the farm´s productivity Y_{ijk}, hours worked H_{ijk}, household characteristics that capture preferences and life-cycle factors X_{ijk}, rural district controls Z_{jk}, a dummy variable, V_{jk}, that equals one if the rural district faced a covariate conflict shock and a random error ε_{ijk}

$$C_{ijk} = \beta_0 + \beta_j + \beta_Y Y_{ijk} + \beta_H H_{ijk} + \beta_X X_{ijk} + \beta_Z Z_{jk} + \beta_V V_{jk} + \varepsilon_{ijk,}$$

where β_j are regional fixed effects. To proxy for the farm's productivity, we include the standardized size of the household's land plot in hectares as well as the size of land plot at the time of the household's creation, a dummy capturing whether the household faced problems with production due to land quality and the share of livestock income in agricultural and livestock income.

The household characteristics included account for preferences and vulnerability—variables capturing the life cycle (age and age squared), the level of education of the household head. We include variables to account for the household composition, such as female headship, the number of children under five years of age, the number of children between 5 and 18 years of age, the number of household member above 65 years of age, the number of members of the extended family. We define extended family as any family member other than the head of household, spouse and the couple's offspring. In addition, we have a dummy capturing whether the household is a beneficiary of the government cash transfer Program *Familias en Acción.* To measure household wealth, we use a standardized index of durable goods ownership[8]. The rural district controls include the daily wage in the rural district (*jornal*), and a price index for agricultural produce[9].

If a violent shock occurs and households are not fully insured, the drop in consumption transmits into consumption. Most research assumes that the labor supply remains fixed;

[8] Durable goods include refrigerators, laundry machines, blenders, microwave ovens, ovens, water heaters, air conditioners, televisions, radios, internet access, computers, bicycles, cars and other properties (inclusive of housing). The index was calculated using the methodology of principal components.

[9] The price index is built taking the 15 most common products across rural districts and municipalities. We first estimate the total quantity of each good produced by a household and get the average production. We then use the variation in rural district prices to get the production value, and then build an index using the rural district with the lowest production value as a reference point.

thus, the term H_{ijk} is rarely included. However, upon experiencing a shock, households may expand their labor supply in order to prevent the shock leading to reductions in consumption. This strategy may be particularly important when credit markets and other risk mitigating alternatives are not available. If this is the case, the coefficient estimate for β_Y is overestimated, mistakenly showing that households are less able to smooth out consumption and that a larger proportion of the negative shock translates into reductions in consumption.

The equation for hours of off-farm work supplied by a person in household *i* in rural district *j* and region *k* is

$$H_{ijk} = \alpha_0 + \alpha_k + \alpha_Y Y_{ijk} + \beta_X X_{ijk} + \alpha_W Z_{jk} + \alpha_V V_{jk} + \mu_{ijk} ,$$

where α_k are the regional fixed effects. As before, Y_{ijk} captures the farm´s productivity, X_{ijk} are household characteristics, Z_{jk} includes rural district controls, V_{jk}, is a conflict shock dummy variable and μ_{ijk} is a random error. The variables included in the estimation are the same as those included in the consumption estimation. The equation for hours on on-farm work is very similar.

Besides identifying the impact of covariate violent risk on the distribution of time dedicated to on-farm and off-farm work, we explore whether off-farm work is supplied to formal labor markets or occasional agricultural activities, presumably at nearby farms. Increments in the amount of labor attached to formal labor markets would be an unexpected and positive impact of covariate conflict shocks. If off-farm hours of work are dedicated to subsistence activities, increments in the labor supply are a temporary response for coping with conflict shocks. We estimate two regressions in order to explore participation in formal labor markets: (i) whether the person worked for a salary during the past 12 months; and (ii) whether the person tried to find a job. We include the same determinants as for the hours of work estimations.

Two issues are worth discussing about our empirical strategy. First, the incidence of covariate violent shocks in rural districts is not exogenous. Armed groups may target particular individuals or communities in order to achieve their war objectives. Because Colombia has faced a low-intensity domestic conflict for several decades, it is difficult to find appropriate instruments for violent shocks. Our identification strategy is to

exploit the variation across the 222 rural districts, which are split into four regions spread out across the country.

Armed groups seek to strengthen territorial control in regions considered valuable for strategic purposes, such as those related to political motives or the likelihood of extracting valuable resources. Violent conflict and the actions of rebel groups against a population are more likely in regions with political grievances or where the extraction of rents provides funds for financing war activities or augmenting combatants' loot. However, exercising territorial control is costly. Our set of instrumental variables seeks to capture many of the dimensions that influence the costs of exercising terror. On the one hand, we exploit the historical path dependence of the Colombian conflict to find two instrumental variables highly correlated with the incidence of violent conflict in municipalities, but which do not determine labor outcomes. We use land concentration and a dummy for the presence of the native population during colonial times (between 1535 and 1540) as a proxy for the historical presence of rebel groups. Land disputes in frontier regions at the end of the 19th century erupted into violent conflicts during the 1930s and up through the 1950s. Violence in many of these regions resumed at the end of the 20th century, showing a strong path dependence of conflict. These regions exhibit two distinct features—a high land concentration that has persisted over time; and the fact that having been depopulated of the native population during colonial times, these areas became frontier regions in which land disputes erupted. On the other hand, social cleavages, such as poverty and income or asset inequality, tend to reduce the cost of terrorizing a population, as recruiting people and gaining support from the local population becomes easier. To instrument for the incidence of violent shocks on the aggregate consumption estimation, we include the distance of a rural district from the municipality's urban center and account for whether a lack of water in the district is an obstacle to agricultural production. Rebels can hide at ease in isolated communities, where the state's presence is infrequent due to high costs. Poor quality of land reduces the opportunity costs of supporting rebel groups. We expect these four variables to be highly correlated to the incidence of violent shocks, yet not to determine consumption or labor outcomes.

Second, hours worked are endogenous in the aggregate consumption estimation. Since the focus of our paper is on the impact of covariate conflict shocks, we do not instrument for hours worked.

3.4 Descriptive statistics

The survey captures the occurrence of shocks and the ways households cope with them. Given the available information, we can define two types of violence-related shocks. The first are deliberate aggressions on particular households, idiosyncratic shocks, such as the destruction or theft of household goods or direct victimization. It is important to stress that those households that are directly victimized with overt violations of human rights or who face a high risk of victimization frequently become displaced, either in seeking to avoid being victimized or because they have already been the victim of an attack. This implies that the households in our survey were likely not victimized in this fashion; thus, we are dealing with a sample of "stayers," who have a low likelihood of facing idiosyncratic shocks. In fact, two of the CLS-WILL regions report high rates of forced displacement (see Table 1), showing that the households currently residing in the rural districts are those that face a low risk of direct aggression[10].

The victimization profile of forcefully displaced persons diverges significantly with the reports of idiosyncratic shocks directed at "stayers." Ibáñez (2008) shows that rural households forced to flee report a high incidence of direct victimization—54.5 percent of households were directly threatened, 34.5 percent experienced the killing of a household member, and 17.3 percent had a household member forcefully recruited by armed groups.

Given the high probability of underreporting, we include a detailed conflict module on the rural district questionnaire that collects information on the presence of armed groups and the incidence of conflict shocks. We expect higher response rates, as responses are general for the community and do not identify particular community members. We use the responses to this module to construct the second type of violence-related shocks. These shocks are covariate risks, and include such things as cattle theft, murders, kidnapping, extortions and threats from armed groups. This information comes

[10] Therefore, the incidence of idiosyncratic shocks in our sample is low, around 1% of the sample; our sample is restricted to less serious shocks, such as the destruction or theft of household goods. These shocks are not necessarily related to the conflict, and may be due to violent crime. The low incidence of idiosyncratic shocks may also result from fear and apprehension about reporting having been the victim of a direct aggression. More specifically, this apprehension might be stronger among households residing in regions in which the presence of armed groups is strong.

from the community survey conducted in each rural district, and the time frame is one year. If there is evidence of a covariate shock in the community survey, we apply it to all households within that rural district. By defining shocks in this fashion, we avoid the reporting problems associated with the apprehension households feel at being identified as victims purposive targeted by armed groups.

Because of the low prevalence of idiosyncratic shocks, as well as the potential report problem, we focus on covariate shocks. Table 4 displays the prevalence of covariate shocks in the sample, both in terms of the percentage of rural districts, as well as the percentage of households in our sample that belong to those districts and hence are affected by the shocks. The most prevalent type of shock is cattle theft—which affects 25 percent of rural districts and 31 percent of households—followed by murder and threats by armed groups. In addition to being a consequence of the violent conflict, cattle theft constitutes a direct economic shock. Land expropriations and kidnapping are less frequent.

[Table 4 goes about here]

The correlation of shocks within the same municipality or region determines how concentrated they are, and how likely it is for nearby or neighboring rural districts to be affected by covariate shocks. The intra-class correlation of shocks within municipalities is 0.27; within regions it is 0.19. This implies that shocks are to some extent correlated, yet the geographic spreading of conflict activities may be more complex.

Idiosyncratic and covariate conflict shocks are not random. Violent shocks are presumably directed against municipalities and households with particular characteristics. Table 5 shows the differences in terms of who is targeted by violent shocks by status based on household income; also disaggregated based on the source of income: whether derived from agricultural or livestock production, or generated in the labor market. Households affected by violent shocks are significantly wealthier than unaffected households. In particular, households affected by violent shocks report having over 1.4 times the total income and income derived from livestock production than those not affected by shocks.

As discussed earlier, labor markets may constitute an alternative for hedging against *ex-ante* and *ex-post* risks if labor markets are flexible and non-agricultural wages have a

low correlation with agricultural profits. Households may use labor markets to minimize the impact of conflict shocks. Therefore, the percentage of the total income coming from labor income may be viewed as a measure of the dependence of households on agricultural and livestock income. Table 5 shows that households affected by at least one violent shock have a lower percentage of their total income coming from labor market activities. Overall, the results from this table reveal that armed groups appear to attack households with a higher income derived from agriculture and livestock activities. This purposeful targeting may be directed at households with land plots of a larger size and/or of better quality. Labor income, which is less visible, seems to be targeted less frequently by armed groups.

[Table 5 goes about here]

However, labor markets are a feasible alternative for hedging against violent shocks if the correlation between labor and agricultural income is low. In our sample, there is a very low correlation between agricultural and labor income on the one hand, and livestock production and labor income on the other. The correlation between agricultural and labor income is 0.11 for households who experienced a violent shock, and 0.04 for households that did not face a violent shock during the past year. The correlation between livestock and labor income is not statistically significant, and equals 0.02 for both households that have and have not experienced a violent shock.

The correlation of income within the same rural district determines the ability of households to insure against violent shocks. If incomes are highly correlated, relying on other community members to cope with shocks is difficult. Because regions with violent shocks are often isolated from urban centers and are more closely knight, the correlation of incomes may be high. In this case, full insurance against shocks is highly unlikely; hence, labor markets are an important alternative. Table 6 reports income correlation within each rural district for districts with and without violent covariate shocks. Even though total income is slightly more correlated for rural districts that have not experienced violent shocks, the correlation of labor income is much higher for communities with covariate shocks. The difference for rural districts with and without covariate shocks is not statistically significant.

[Table 6 goes about here]

As discussed earlier, changing the labor supply is a viable alternative for mitigating conflict shocks if labor markets are able to absorb the excess supply. Rural districts where conflict is persistent may be more isolated from regional and national markets, which may result in less dynamic markets. If this is the case, labor markets may be a limited alternative for hedging against violent shocks. The following tables present some statistics of how well markets work in rural districts affected by shocks and in those districts unaffected. As Table 7 shows, the bulk of the agricultural produce of rural districts is mostly sold to wholesale traders or intermediaries, and there are no differences between rural districts affected by violent shocks versus those that are not. This implies that producers in the rural districts in the CLS-WILL sample depend on intermediaries in order to access regional or national markets, but that the conflict is not isolating rural districts any further.

[Table 7 goes about here]

Graph 3 displays the months during which people in rural districts go out looking for a job. There is a clear seasonality that might be driven by the cycle of agricultural production. A higher percentage of people in rural districts affected by violent shocks go out looking for a job on a monthly basis compared to people in unaffected districts. Regarding the type of seasonal work performed (not shown), people in conflict afflicted areas more often work on illegal crops and in wood exploitation.

[Graph 3 goes about here]

Incidences of violent shocks are not random. Armed groups purposively attack municipalities and districts with the aim of reducing the cost of exercising terror. We use two variables that capture the path-dependence of conflict in the regions and reduce the costs for rebel groups by strengthening their presence in a particular region and exercising terror there—the land Gini coefficient and a dummy variable equal to one if the native population was present during colonial times. Both variables are defined at the municipal level. To capture the costs of exercising terror at the rural district level, we use whether lack of water is a major problem vis-à-vis agricultural production and the travel time to the respective municipality's urban center. Descriptive statistics for the municipality's and rural district's instrumental variables are reported in Tables 8 and 9, respectively. Land is more concentrated in the Atlantic and Southern regions, and least concentrated in the Central region. The presence of the native population during

colonial times was high in the Central and Coffee regions, and low for the Southern and Atlantic regions. In the latter regions, the presence of rebel groups, and the consequent aggression against the civilian population, has been high during the last decade. As expected, Table 9 shows that a covariate shock is more likely in more isolated rural districts consisting lands of poor quality.

[Table 8 goes about here]

[Table 9 goes about here]

To test whether the instrumental variables are valid, we directly regress the gini coefficient and the dummy for the native population for the percentage of labor income. If the instrumental variables influence the percentage of labor income, the exclusion restriction might not hold. Table 10 presents some descriptive statistics about the (conditional) correlation between the instrumental variables and labor-related income. The dependant variable is labor income as a percentage of total income. The set of controls includes the proposed instruments, the land Gini, and the dummy for the presence of the native population during colonial times (1535-1540). We control for household characteristics, inclusive of a dummy specifying whether or not the household is headed by a woman. We proxy the income generating potential of the household by the maximum number of years of education attained by a member of the household, measured in years of education. Additional control variables are the number of children under 5 years of age, the number of children between 5 and 18 years of age, the number of household members who are 65 years of age or older, and the number of members of the extended family who live in the household. Finally, we include two additional dummy variables as controls, measured at the rural district level—whether there were problems with production in the community in the past year due to land quality, and the quality of access to the municipality's urban center. We estimate the regression using clusters at the rural district level. The results show that the coefficient estimates for the land Gini and the presence of the native population during colonial times are not statistically significant. Therefore, our instruments are not significant in explaining the proportion of income derived from the labor market.

[Table 10 goes about here]

We next turn to the descriptive statistics of our labor outcomes: time use, participation in formal labor markets, and aggregate consumption. We divide the potential answers for time use into five groups of activities: (i) work on the household's farm (agricultural and non-agricultural work); (ii) work on other households' farms in agricultural activities; (iii) work on other households' farms in non-agricultural activities; (iv) leisure time and other activities (namely, leisure and recreation, personal care, helping other households, social community activities, education, and looking for a job, traveling to the workplace); and (v) domestic chores and taking care of children and other members of the household.

The traditional division of gender roles is sharp in these areas. While men are the households' main breadwinners, women's responsibilities are concentrated on domestic chores and taking care of the children. The percentage of time use for men and women is presented in Table 11. Males devote the greatest bulk of their time to working on their land plot or on another household's land plot. Although females also spend some time working in agricultural activities, the difference is large in contrast to their male counterparts. The percentage of time devoted to working in non-agricultural activities on other households' farms is small for both men and women, though men spend a higher proportion of their time employed as such. Women devote almost half of their day to domestic chores and taking care of children in the house, with little support from their husbands. Leisure time is similar for men and women.

In the presence of violent shocks, both men and women spend more time working on their respective household farm. To adjust for this increase in work on their own farm, men decrease their percentage of time engaging in agricultural activities on other households' farms, and further reduce the time they devote to domestic chores and taking care of children. The time devoted to leisure and other activities remains the same. Women, however, are less able than men to adjust their time use. They decrease their percentage of time working in non-agricultural activities outside their own farm, but this accounts for less than one-third of the increased time. The remainder is adjusted via reduced leisure time.

[Table 11 goes about here]

We complement the analysis of time-use with more traditional labor market questions, such as whether an individual worked for a wage or looked for a job in the past year.

Participation in labor markets is mostly led by male members of the household. As Table 12 reports, employment outside the farm is greater for males than females and actively seeking a job is more frequent among men than women. Men have a similar attachment to the labor market, regardless of whether the household was affected by a violent shock. However, when their household is struck by a violent shock, women increase their participation in formal labor markets. More women in households with shocks worked for a wage and tried to find jobs in the past 12 months.

[Table 12 goes about here]

Descriptive statistics for aggregate consumption, reported in Table 13, are difficult to interpret. The annual per capita consumption of households affected by a shock is 10.3 percent higher than for unaffected households. As armed groups attack wealthier households (Engel and Ibáñez 2007), an OLS regression of consumption on the violent shock and the set of controls would suggest that violent shocks actually *increase* consumption. Therefore, comparing consumption *before* controlling for household characteristics and instrumenting a particular shock leads to incorrect conclusions regarding the shock's impact.

[Table 13 goes about here]

The descriptive statistics of the other control variables used in the estimations, discriminating by shock status, are presented in Table 14. Rural districts affected by violent shocks have a higher price index and a higher wage rate than rural districts unaffected by shocks. Households affected by a violent shock are also different from unaffected households in two main respects: they have a higher and more visible income generating potential, both in the labor market and in farm production, and they are more vulnerable. Regarding income generating potential, note that households that have suffered a violent shock have on average attained a higher maximum education level. They also have a higher proportion of the agricultural income coming from livestock. This is because wealth from livestock is hard to conceal and is often targeted by armed groups. Regarding vulnerability, households affected by shocks are more often headed by females, have a higher number of elderly members (aged over 65 years of age), and have fewer extended family members living with them.

The literature suggests that wealthier households are targeted more often by armed groups. Household wealth is measured using two variables—the size of its land plot when the household was formed, and a standardized index of durable goods ownership. The first measure is unaffected, while the second is often affected by violent shocks, the subject of our study.

Affected households have slightly bigger land plots upon their formation, which suggests that they are wealthier. However, they display a negative wealth index, while unaffected households have a positive value. We do not believe that this is contradictory, but rather interpret it as evidence that wealthier households are more likely to be targeted, and that the actual violent shock negatively affects a household's possession of durable goods.

We also use other covariates that show no differences on the basis of shock status. These are: a dummy variable measured at the rural district level which captures whether or not there were any problems with production in the community during the past year due to land quality, an individual's age, or the number of children (both under 5 and between 5 and 18 years of age).

[Table 14 goes about here]

A caveat is in order. As discussed earlier, Colombia's conflict has carried on for 60 years. This implies that there are a lot of variables—not included in our dataset and hence unobservable—that may affect household behavior and the way a household insures against shocks that we are unable to control for. In addition, we only have information about shocks from the past year, yet these households may have been subjected to repeated shocks throughout their existence. Because conflict is not new to these households, the results presented in this paper constitute the lower bound of the way households use the labor market to insure against violent shocks.

3.5 The results

The empirical evidence on labor markets as a risk management mechanism in the context of conflicts is limited. This paper studies whether Colombian rural households adjust their labor supply in order to mitigate violent shocks resulting from conflict. Since violent shocks are endogenous, we use an instrumental variables approach to

determine to what extent adjustments in the labor market supply help rural households smooth consumption and avoid costly mitigation strategies.

To instrument violent shocks for labor outcomes, we use two variables that influence the cost for rebel groups of strengthening their presence in a particular region and exercising terror—the land Gini coefficient, and the presence of the native population during colonial times at the municipal level. Instruments for the consumption estimation reflect whether a lack of water causes problems vis-à-vis agricultural production, and the travel time to the municipality's urban center. This implies that even though violent shocks may be purposely directed, there is a sizeable part of the variation in the prevalence of shocks that is exogenous to the household decision problem, and may be captured by these municipal and rural district variables. That is, the likelihood that a rural district is being hit by a violent shock varies according to exogenous characteristics affecting an armed group's strategy. However, these variables are unaffected by households' characteristics, which in turn determine time use, formal labor market attachments and consumption levels. Imagine two households that are similar in every respect except the land distribution of the district they inhabit. One lives in a district with very unequal land distribution, while the other lives in a more egalitarian district. Because the likelihood of receiving a violent shock is higher for the first than for the second, the two will differ in their time use and labor market attachment. Note that this variation is exogenous to the households' characteristics. It is the variation coming from this exogenous source that we use to identify the effect of a violent shock.

Table 15 through 17 present the first stage of the regression of the effect of the violent shock on time use, formal labor market participation and consumption levels, respectively. In the first column, we present the results for both the household head and his or her spouse. The second and third columns present the results for females and males, respectively. In all three cases, the dependant variable is the covariate violent shock. In these and the following regressions, we use standard errors clustered at the rural district level.

The instruments are relevant. In all cases, the chosen instruments are individually highly significant, and we also get high values for the F test of joint significance. This is the case for the joint estimation of head of household and spouse, as well as for when we

take each gender into account separately, and for the consumption regressions. We do not face a weak instrument problem, as indicated by the results from the weak instruments test (Kleibergen-Paap). In addition, the coefficient estimates for the instrumental variables have the expected signs. The incidence of covariate violent shocks is more likely in municipalities with higher land concentrations and no presence of the native population during colonial times—that is, in what was previously frontier land. Additionally, more isolated rural districts with lands of lesser quality have a higher likelihood of experiencing a covariate violent shock.

[Table 15 goes about here]

[Table 16 goes about here]

[Table 17 goes about here]

Before describing the effects of violent shocks on time use, labor market attachment and aggregate consumption, let us discuss the evidence for the exogeneity of our chosen instruments. Because we have two variables to instrument violent shocks, the system is over-identified, allowing us to perform the relevant exogeneity tests. We report the Hansen test. For time use, displayed in Tables 18 to 20, the Hansen test suggests that the instruments are exogenous at standard confidence levels, and therefore that our instrumental variables are exogenous. For formal labor markets, displayed in Table 21, the instruments appear exogenous for both categories. Finally, for aggregate consumption, reported in Table 22, the Hansen test shows we cannot reject the hypothesis of endogenous instruments. Given the results discussed above, we are confident that our chosen instruments are both relevant and exogenous, and hence we are able to identify the local effect of violent shocks.

Table 18 presents the OLS and IV results for the effect of a violent shock on the time use of a household head and spouse. When we use OLS as an estimation strategy, it seems as if the violent shock has no effect on time use for any of the categories. However, when we instrument, we find that as a response to violent shocks, households decrease their time spent on farm work and increase their labor supply for off-farm non-agricultural activities as well as leisure, domestic chores and taking care of children. An increase of one standard deviation on the incidence probability of a conflict shock decreases the time spent on the farm by 0.12 standard deviations, while time spent in

non-agricultural activities off the farm increases by 0.091 standard deviations, and time dedicated to domestic chores and taking care of children increase by 0.04 standard deviations. This implies that households in rural Colombia use labor markets when confronted by a violent shock, supplying off-farm labor and reducing time dedicated to work on the farm. As discussed in previous paragraphs, because an incidence of conflict affects agricultural production, households may rely on non-agricultural activities to compensate for drops in agricultural income.

[Table 18 goes about here]

When looking at the heterogeneous impact of violent shocks on men and women, shown in Tables 19 and 20, a distinct pattern emerges. The bulk of the adjustment in time use is borne by men, while the distribution of time use remains the same for women. Men substantially reduce their time spent on on-farm work (0.18 standard deviations for an increase of one standard deviation in the incidence probability), and increase off-farm non-agricultural work by 0.13. Reductions in time dedicated to on-farm work is not fully absorbed by alternative labor markets. Thus, leisure time and time dedicated to household chores and taking care of children also increases for men by 0.07 and 0.11 standard deviations, respectively. The effect of covariate shocks on women is not statistically significant A worrisome pattern emerges wherein covariate conflict shocks induce households to reduce their time spent on their own land plots—presumably due to contractions in agricultural production—and pushes men to compensate for losses by supplying their labor to off-farm activities. Agricultural production is a visible sign of wealth to armed groups, and may prompt attacks by these groups against agricultural producers. Thus, the main transmission channel of covariate conflict shocks is through reductions in agricultural production and time invested on the farm.

[Table 19 goes about here]

[Table 20 goes about here]

The negative effect of the contraction in agricultural production caused by conflicts can be mitigated by supplying labor to formal labor markets. If this is the case, labor markets may play an important role in protecting households against having to face large welfare losses, as the higher wages generated by formal labor markets may

compensate for lost agricultural income. Table 21 reports the results for the OLS and IV estimates of the effects of violent shocks for having worked for a wage and for trying to find a job during the past year. In the presence of violent shocks, there is a significant increase in the percentage of households whose members worked for a wage during the past year. The magnitude of the effect is large—an increase of one standard deviation in the incidence probability of a covariate shock increases by 0.12 standard deviations the probability of a the household's head having worked during the previous year. This may be a sign of flexible labor markets. However, there is no evidence of an increase in the percentage of households who tried to find a job during the previous year.

[Table 21 goes about here]

Although women try to find a job as a consequence of covariate conflict shocks, the effect of increased participation in the formal labor market is concentrated on men. Tables 22 and 23 show the effects of a violent shock by gender. Upon being hit by a violent shock, the proportion of males who worked for a wage the previous year rises. On the other hand, women try to find a job, but with no apparent success. Labor markets are able to absorb the additional male labor supply produced by the conflict shock, while women are left unemployed and with reduced participation in on-farm work.

[Table 22 goes about here]

[Table 23 goes about here]

Our results suggest that households in the Colombian rural areas use labor markets as a strategy for compensating for income loss during conflicts. We now turn to examine whether the expansion in the labor supply is effective in preventing conflict shocks through reductions in consumption. Table 24 shows the OLS and IV coefficient estimates for aggregate consumption. Our results show that households are not able to fully insure against the covariate conflict shock. Once we instrument and control for hours of work, the coefficient estimate for the covariate violent shock becomes negative, implying that even though labor markets help to insure against covariate shocks, households are unable to fully insure against shocks and hence face welfare losses from them. On the one hand, on-farm work, which contributes positively to increase consumption, contracts due to the shock. On the other hand, the contribution of

men's off-farm work to consumption is not sufficient to cover total welfare losses from conflict shocks.

[Table 24 goes about here]

When labor markets do not break down as a consequence of conflict, changing labor supply is a feasible strategy for protecting the household and avoiding having to adopt costly strategies. Despite the flexibility of rural labor markets to absorb additional supply, labor demand does not appear to be sufficient to fully cover the additional supply. Moreover, women seek employment as a response to the shock, but are unable to find a job in formal labor markets. In fact, an increase by one standard deviation of the covariate conflict shock reduces consumption by 6.5 percent. The increased off-farm work only reduces this loss to 6.24 percents. These results contrast sharply with Kochar (1999). He finds that wage income compensates for crop shocks by as much 30 percent of the income shock experienced by small farms. Thus, adjusting labor supply is a much less effective strategy for compensating for war-induced shocks than other traditional shocks.

4. Conclusions

This paper studies the use of labor markets for mitigating covariate violent shocks, and examines whether changes in labor outcomes are heterogeneous by gender. Medium- or low-intensity conflicts do not necessarily disrupt labor markets. If labor markets are flexible and are able to absorb additional supply, credit constrained households can expand their labor supply in order to mitigate the impact of violent shocks. By using labor markets, households do not have to rely on costly strategies that can increase present income while compromising future income.

Violence is not randomly targeted, but purposively directed at relatively better-off groups within the population, likewise at certain municipalities. In order to correct for endogeneity bias, we use instrumental variables that capture the cost to armed groups of strengthening territorial control in a particular region—the concentration of land at the municipality level, the presence of the native population during colonial times, whether or not lack of water is identified as a problem vis-à-vis agricultural production, and travel time to the municipality's urban center. We find that the likelihood of an incidence of a violent shock is indeed greater in regions that have higher land

concentrations, were previously frontier lands depopulated of the native population during colonial times, are isolated from urban centers, and consist of land of poor quality.

The results of the paper show how the need for households affected by a violent shock to generate additional income appears to be pushing them to expand their labor supply. As a consequence of shocks, households seem to be substituting on-farm with off-farm work in non-agricultural markets. Given that the Colombian conflict has involved land seizure and cattle theft, agricultural production may have been affected. Non-agricultural markets, therefore, may provide support compensating for drops in agricultural income.

The redistribution of time is borne mainly by men. Men participate more in formal labor markets and supply more hours of work in off-farm non-agricultural work. Large drops in on-farm time are not fully absorbed by off-farm work. Thus, men increase the amount of time they dedicate to leisure and household chores. The apparent large drops in agricultural production imply that women do not have to substitute for men in on-farm work. Nonetheless, women do try to find work in off-farm work, though with little apparent success. Adjusting the labor supply to compensate for covariate violent shocks partially mitigates the welfare losses generated by shocks. However, additional off-farm labor supply does not fully cover drops in consumption. Apparently, labor markets are unable to fully absorb the additional labor supply. Because conflict is not new to these households, the results presented in this paper constitute the lower bound of the way in which these households use labor markets so as to insure against violent shocks.

This paper finds that changing the labor supply is an additional alternative for mitigating violent shocks. This is an important finding. Post-conflict policies have concentrated on designing short-term relief programs aimed at preventing households from falling below subsistence consumption levels. Programs aimed at boosting productive activities and creating labor markets are generally postponed until a sustainable path to peace is achieved. However, households are resilient, production continues in the midst of conflict and labor markets (albeit those entailing subsistence activities) persist. Protecting productive activities not affected by war and promoting access to labor markets may also be an important strategy for helping households cope with conflict shocks and initiating a rapid recovery once the conflict ends. This is

particularly important for conflicts of low or medium intensity, wherein markets do not necessarily break down. These policies should be complemented by short-relief programs, as adjusting the labor supply is not able by itself to fully counter the impact of conflict shocks. Additionally, providing support in order to rapidly boost agricultural production is important, as off-farm work is not a perfect substitute for on-farm work.

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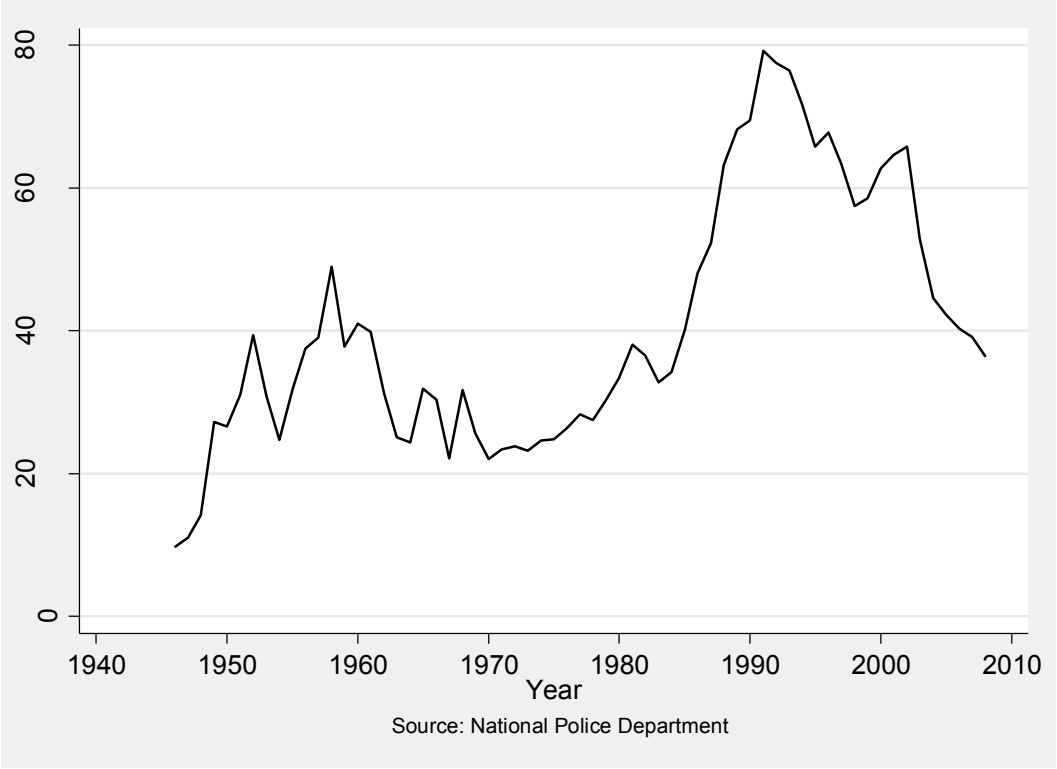
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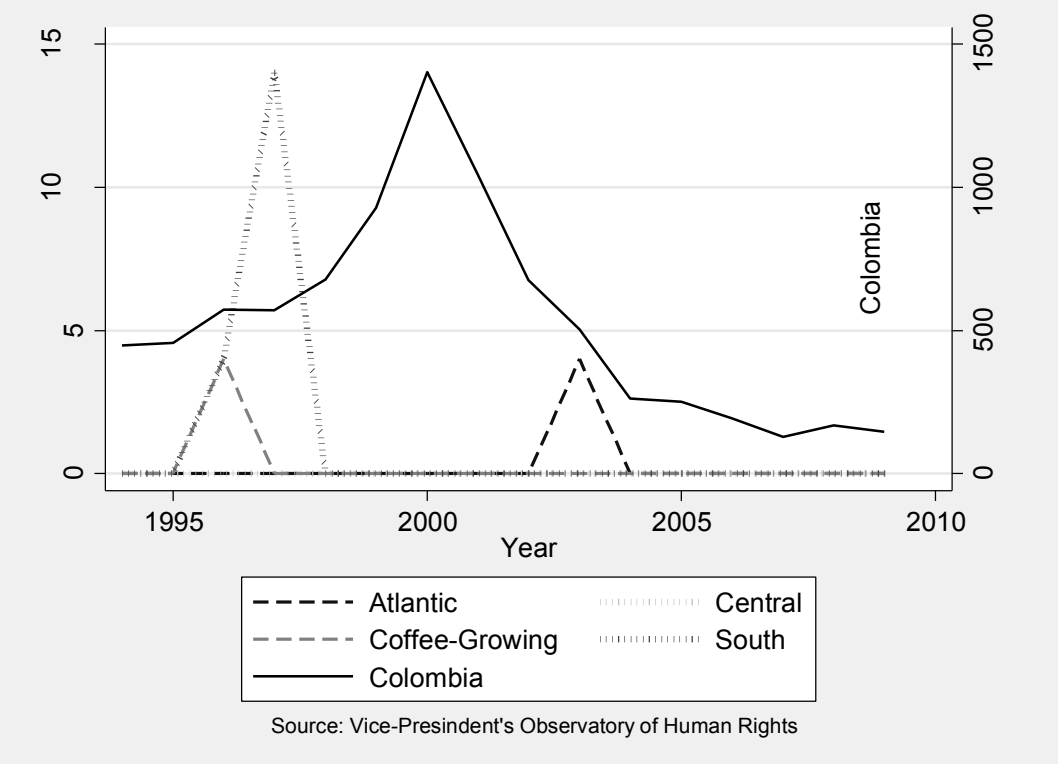
Appendix A. Graphs.

Graph 1. The Homicide Rate per 100,000 Inhabitants 1946-2009



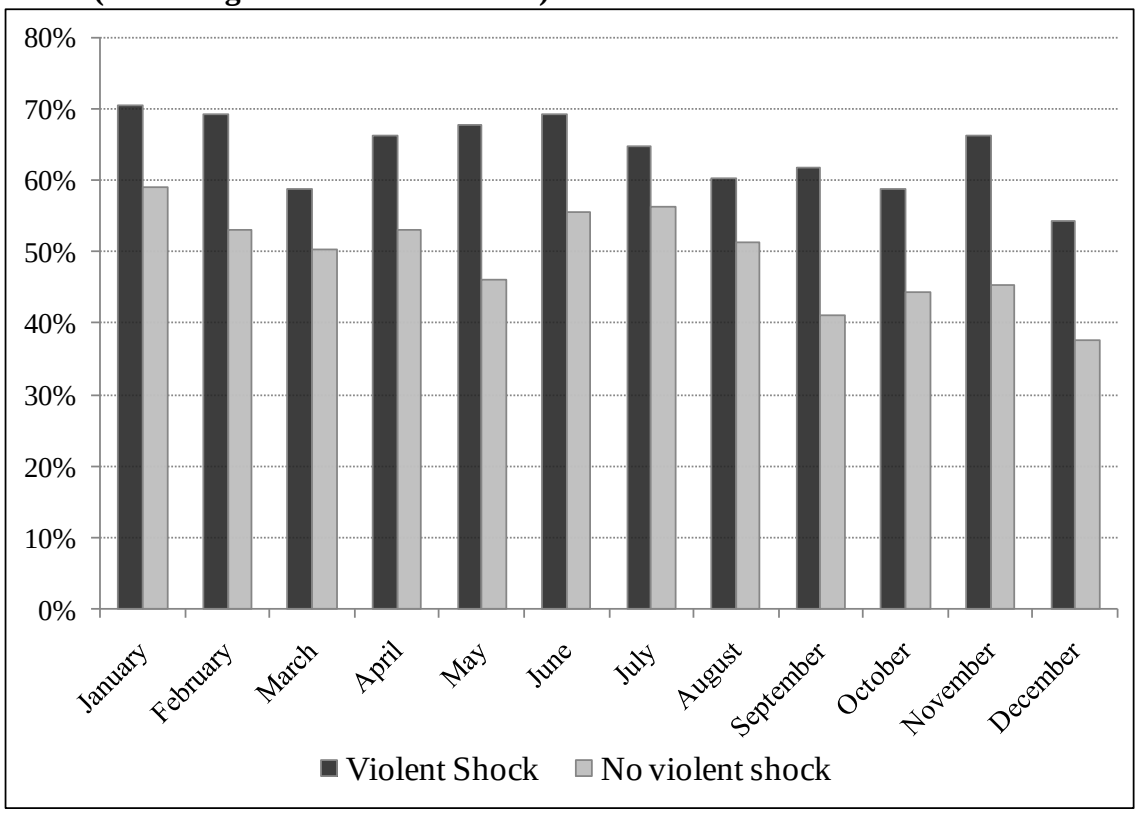
Source: National Police Department

Graph 2. Victims of Massacres: 1993-2009



Source: Vice-Presindent's Observatory of Human Rights

Graph 3. Months During which People Supplied Off-Farm Work (Percentage of the Rural District)



Appendix B. Tables.

Table 1. Violent Events in 2009: Colombia and the Four CLS-WILL Regions

	Homicide Rate x 100,000 Inhabitants	Forced Displacement	Forced Displacement x 100,000 Inhabitants
Atlantic	17.15	144	45.73
Central	16.37	20	40.92
Coffee-Growing	54.87	175	252.67
South	8.80	671	656.08
Colombia	35.52	154,040	346.00

Source: Vice-President´s Observatory for Human Rights.

Table 2. Presence of Armed Groups and Aggressions against the Population

	Atlantic	Central	Coffee-Growing	South
Presence of armed groups in the community between 2001-2010	15.79%	25.00%	36.21%	44.07%
Threats	7.02%	12.50%	20.69%	20.34%
Assaults	3.51%	6.25%	12.07%	10.17%
Impose rules	7.02%	2.08%	15.52%	23.73%
Extortions	3.51%	10.42%	10.34%	8.47%
Expropriate land	1.75%	2.08%	0.00%	5.08%
Seize livestock illegally	0.00%	2.08%	0.00%	8.47%
Seize crops illegally	0.00%	2.08%	3.45%	3.39%
Total number of communities	57	48	58	59

Source: CLS-WILL: first wave – community questionnaire.

Table 3. The Economic Consequences of Conflict during the Last Two Years

Have member of the community	Atlantic	Central	Coffee-Growing	South
Abandon crops	0.00%	0.00%	6.90%	8.47%
Stopped investing in the farm	1.75%	2.08%	13.79%	6.78%
Stopped producing traditional crops	1.75%	6.25%	12.07%	5.08%
Total number of communities	57	48	58	59

Source: CLS-WILL: first wave – community questionnaire.

Table 4. Incidence of Violent Shocks

Type of shocks	Percentage of households affected	Percentage of Communities Affected
Murder	11.22%	13.19%
Cattle Theft	24.88%	31.09%
Land Expropriations	0.98%	1.04%
Threats by armed groups	4.39%	4.45%
Kidnappings	1.46%	1.31%
At least one violent shock	36.10%	43.55%
N	205	3,754
Total number of shocks	74	1,635

Source: CLS-WILL: first wave – community questionnaire.

Table 5. Household Income: Descriptive Statistics

	Violent shock	No Violent Shock	Difference between means (t-test)	All
Total Income	2,637,983	1,869,390	***	2,200,207
	(9,286,131)	(6,843,082)		(7,994,481)
Agricultural production income	982,511	1,033,592		1,011,606
	(3,493,644)	(4,979,059)		(4,401,047)
Livestock production income	1,223,497	582,002	***	858,114
	(8,077,275)	(4,052,256)		(6,125,504)
Labor Income	312,582	335,226		325,480
	(494,640)	(536,679)		(519,045)
Labor Income as a percentage of total income	0.41	0.52	***	0.47
	(0.40)	(0.40)		(0.40)

Standard errors in parenthesis.
Source: CLS-WILL: first wave – household questionnaire.

Table 6. Intra-Class Income Correlations within Rural Districts

	Total per cápita income	Agricultural production Income	Livestock production Income	Labor Income
Violent shock	0.010	0.044	0.012	0.107
	(0.011)	(0.016)	(0.011)	(0.025)
No Violent Shock	0.042	0.046	0.000	0.089
	(0.014)	(0.014)	(0.009)	(0.018)

Standard errors in parenthesis.
Source: CLS-WILL: first wave – household questionnaire.

Table 7. Markets for Agricultural Produce (Percentage of Rural Districts)

	Violent Shock	No violent shock	Difference between means (t-test)
Wholesale or intermediaries	0.649	0.565	
	(0.481)	(0.498)	
Guilds or cooperatives	0.081	0.130	
	(0.275)	(0.337)	
Markets at the municipalities	0.162	0.198	
	(0.371)	(0.400)	
General public	0.095	0.092	
	(0.295)	(0.290)	
Other	0.014	0.015	
	(0.116)	(0.123)	
Number of communities	74	131	

Standard errors in parenthesis
*** p<0.01, ** p<0.05, * p<0.1
Source: CLS-WILL: first wave – community questionnaire.

Table 8. Descriptive Statistics Instrumental Variables

	Atlantic		Central		Coffee-Growing		South		Total Sample	
	Average	Median	Average	Median	Average	Median	Average	Median	Average	Median
Land Gini	0,72	0,71	0,54	0,51	0,66	0,65	0,73	0,72	0,66	0,67
	(0,03)		(0,06)		(0,02)		(0,04)		(0,08)	
Dummy Native Populations in Colonial Times (1535-1540)	0,26		1,00		0,48		0,11		0,47	
	(0,44)		(0,00)		(0,50)		(0,32)		(0,50)	
Number of households in the community	1.696		1.609		1.999		1.197		6.501	

Standard errors in parenthesis.
Source: Instituto Geográfico Agustín Codazzi (IGAC) and Fernández (2010).

Table 9. Descriptive Statistics Instruments at Rural District Level

	No Violent Shock	Violent Shock	Difference between means (t-test)	All
Average time to rural district's urban center	0,68	0,95	***	0,80
	(0,47)	(0,94)		(0,72)
Problems in rural district due to water access	0,42	0,58	***	0,49
	(0,49)	(0,49)		(0,50)
Number of households	1.994	1.508		3.502

Standard errors in parenthesis.
Source: CLS-WILL: first wave – community questionnaire.

Table 10. OLS Regressions – Percentage of Labor Income

Variables	
Land Gini	0.4487
	(0.3120)
Dummy Native Populations in Colonial Times (1535-1540)	-0.0034
	(0.0306)
Dummy Female Household Head (1 female head of household , 0 otherwise)	-0.0074
	(0.0175)
Max educ in the household in years	-0.0021
	(0.0019)
Number of Children under 5 years of age	0.0261**
	(0.0110)
Number of Children between 5 and 18 years of age	0.0209***
	(0.0045)
Number of members 65 or older	-0.0629***
	(0.0143)
Number of Members of Extended Family	-0.0035
	(0.0056)
Dummy Production Problems due to Land Quality (1 Problems in the Rural District, 0 otherwise)	0.0602**
	(0.0251)
Dummy Quality of Access to the Municipality (1 if there is a paved road or if the road is in good condition, 0 otherwise)	0.0580**
	(0.0261)
Constant	0.1378
	(0.2087)
Observations	3,141
R-squared	0.1099

Cluster by community

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: First wave – community and household questionnaire.

Table 11. Descriptive Statistics: Use of Time

	Female			Male			All		
	No Violent Shock	Violent Shock	Difference between means (t-test)	No Violent Shock	Violent Shock	Difference between means (t-test)	No Violent Shock	Violent Shock	Difference between means (t-test)
% of time working inside the household farm	0.053	0.084	***	0.212	0.256	***	0.131	0.168	***
	(0.124)	(0.143)		(0.261)	(0.280)		(0.218)	(0.237)	
% of time working in agricultural activities in other household farm	0.013	0.016		0.254	0.215	***	0.131	0.114	***
	(0.071)	(0.081)		(0.282)	(0.276)		(0.237)	(0.225)	
% of time working in non-agricultural activities in other household farm	0.015	0.023	**	0.046	0.053		0.030	0.038	**
	(0.083)	(0.104)		(0.152)	(0.166)		(0.123)	(0.139)	
% of leisure time and other activities	0.407	0.376	***	0.413	0.410		0.410	0.392	***
	(0.163)	(0.168)		(0.158)	(0.158)		(0.160)	(0.164)	
% of time spent in domestic chores and taking care of children and other	0.512	0.501		0.075	0.066	**	0.297	0.288	
	(0.188)	(0.204)		(0.122)	(0.122)		(0.270)	(0.275)	
Number of Observations	1,878	1,433		1,812	1,378		3,690	2,811	

Standard errors in parenthesis
*** p<0.01, ** p<0.05, * p<0.1
Source: CLS-WILL: First wave – household questionnaire.

Table 12. Descriptive Statistics: Formal Labor Markets

	Female			Male			All		
	No Violent Shock	Violent Shock	Difference between means (t-test)	No Violent Shock	Violent Shock	Difference between means (t-test)	No Violent Shock	Violent Shock	Difference between means (t-test)
Worked for a salary in the past 12 months (1 if he/she worked for a salary)	0.107	0.128	*	0.363	0.345		0.233	0.234	
	(0.309)	(0.334)		(0.481)	(0.476)		(0.423)	(0.424)	
Tried to find a job in the past 12 months (1 if he/she tried to find a job)	0.057	0.090	***	0.247	0.258		0.150	0.173	**
	(0.232)	(0.286)		(0.432)	(0.438)		(0.358)	(0.378)	
Number of Observations	1,878	1,433		1,812	1,378		3,690	2,811	

Standard errors in parenthesis
*** p<0.01, ** p<0.05, * p<0.1
Source: CLS-WILL: First wave – household questionnaire.

Table 13. Descriptive Statistics: Aggregate Consumption

	No Violent Shock	Violent Shock	Difference between means (t-test)	All
Households annual consumption expenditure per capita (in $COP))	1.454.108 (886.110)	1.604.235 (1.036.302)	***	1.518.754 (956.440)
Number of households	1.994	1.508		3.502

Standard errors in parenthesis
Source: CLS-WILL: First wave – household questionnaire.

Table 14. Descriptive Statistics Control Variables

	No Violent Shock	Violent Shock	Difference between means (t-test)	All
Rural District Price Index	104.68	110.83	***	107.34
	(6.05)	(8.80)		(7.97)
Livestock Income as Share of Total Agricultural Income	0.39	0.44	***	0.41
	(0.39)	(0.38)		(0.38)
Dummy Participation in Goverment Program Familias in Acción (1 if has acces to the program; 0 otherwise)	0.42	0.41		0.41
	(0.49)	(0.49)		(0.49)
Wage per day	12,899.05	14,232.30	***	13,475.54
	(5074.67)	(4123.08)		(4732.96)
Dummy problems with production do to the quality of the land (1 if there	0.31	0.32		0.31
	(0.46)	(0.47)		(0.46)
Area owned at the moment the household was created (ha.)	0.49	0.61	*	0.54
	(2.55)	(2.70)		(2.62)
Age	43.77	43.73		43.76
	(13.06)	(13.33)		(13.17)
Education in years	4.31	4.60	***	4.44
	(3.29)	(3.46)		(3.37)
Dummy female household head (1 household head is a female, 0	0.12	0.13	*	0.12
	(0.32)	(0.34)		(0.33)
standardized wealth index (principal components)	0.04	-0.06	***	0.00
	(1.09)	(0.87)		(1.00)
Number of children under 5 years of age	0.45	0.46		0.46
	(0.71)	(0.70)		(0.71)
Number of children between 5 and 18 years of age	1.48	1.48		1.48
	(1.39)	(1.40)		(1.39)
Number of members 65 or older	0.25	0.29	***	0.27
	(0.53)	(0.58)		(0.55)
Number of members of extended family	0.77	0.71	**	0.74
	(1.33)	(1.31)		(1.32)
Observations	3,690	2,811		6,501

standard errors in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: First wave – household questionnaire.

Table 15. First Stage Regressions Time Use
Dependent Variable: Covariate Violent Shock

	Household head and spouse	Female	Male
Land Gini	2.8470***	2.9010***	2.7939***
	(0.9983)	(0.9762)	(1.0292)
Dummy Native Populations in Colonial Times (1535-1540)	-0.2574**	-0.2588**	-0.2541**
	(0.1262)	(0.1276)	(0.1257)
Rural District Price Index	0.0104	0.0135	0.0073
	(0.0316)	(0.0322)	(0.0313)
Livestock Income as Share of Total Agricultural Income	-0.1108**	-0.1210**	-0.1005*
	(0.0521)	(0.0520)	(0.0530)
Dummy Participation in Goverment Program Familias in Acción (1 if has acces to the program; 0 otherwise)	0.0300	0.0274	0.0337
	(0.0242)	(0.0244)	(0.0252)
Daily Wage	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)
Dummy Production Problems due to Land Quality (1 Problems in the Rural District, 0 otherwise)	-0.0831	-0.0797	-0.0870
	(0.0739)	(0.0737)	(0.0747)
Plot Size at Household Creation (stadandarized by region)	0.0054	0.0072	0.0043
	(0.0090)	(0.0100)	(0.0095)
Age	0.0016**	0.0017*	0.0016*
	(0.0008)	(0.0009)	(0.0009)
Education (years)	0.0007	0.0005	0.0011
	(0.0029)	(0.0035)	(0.0032)
Dummy Female Household Head (1 female head of household , 0 otherwise)	-0.0549**	-0.0619**	-0.0438
	(0.0268)	(0.0253)	(0.0480)
Dummy Wealth Index Quintile 2	0.0075	0.0161	-0.0024
	(0.0310)	(0.0316)	(0.0322)
Dummy Wealth Index Quintile 3	0.0181	0.0159	0.0192
	(0.0366)	(0.0372)	(0.0374)
Dummy Wealth Index Quintile 4	0.0117	0.0244	-0.0021
	(0.0374)	(0.0390)	(0.0375)
Dummy Wealth Index Quintile 5	0.0178	0.0123	0.0212
	(0.0403)	(0.0434)	(0.0394)
Number of children under 5 years of age	0.0124	0.0169	0.0068
	(0.0148)	(0.0153)	(0.0167)
Number of children between 5 and 18 years of age	0.0001	0.0022	-0.0024
	(0.0079)	(0.0082)	(0.0081)
Number of members 65 or older	0.0078	0.0219	-0.0058
	(0.0178)	(0.0173)	(0.0209)
Number of members of extended family	-0.0091	-0.0091	-0.0085
	(0.0071)	(0.0084)	(0.0073)
Constant	-2.4136	-2.7853	-2.0453
	(3.1609)	(3.2285)	(3.1129)
Observations	6,057	3,076	2,981
R-squared	0.1924	0.1925	0.1940
F-Test (Kleibergen-Paap)	8.934	9.239	8.457

Cluster by community

Regional Fixed Effects

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: First wave – household questionnaire, Instituto Geográfico Agustín Codazzi (IGAC) and Fernández (2010).

Table 16. First Stage Regressions of Formal Labor Markets
Dependent Variable: Covariate Violent Shock

	Household head and spouse	Female	Male
Land Gini	2.8306***	2.8883***	2.7739***
	(0.9342)	(0.9179)	(0.9575)
Dummy Native Populations in Colonial Times (1535-1540)	-0.1989*	-0.2023*	-0.1943*
	(0.1132)	(0.1138)	(0.1135)
Rural District Price Index	0.0008	0.0031	-0.0014
	(0.0310)	(0.0315)	(0.0306)
Livestock Income as Share of Total Agricultural Income	-0.1087*	-0.1219**	-0.0955*
	(0.0554)	(0.0551)	(0.0568)
Dummy Participation in Goverment Program Familias in Acción (1 if has acces to the progra; 0 otherwise)	0.0250	0.0229	0.0283
	(0.0236)	(0.0237)	(0.0251)
Age	0.0011	0.0014	0.0010
	(0.0008)	(0.0009)	(0.0009)
Education (years)	0.0007	0.0012	0.0005
	(0.0030)	(0.0037)	(0.0032)
Dummy Female Household Head (1 female head of household , 0 otherwise)	-0.0461*	-0.0525**	-0.0362
	(0.0269)	(0.0254)	(0.0497)
Dummy Wealth Index Quintile 2	0.0233	0.0289	0.0168
	(0.0302)	(0.0309)	(0.0314)
Dummy Wealth Index Quintile 3	0.0229	0.0279	0.0167
	(0.0366)	(0.0368)	(0.0373)
Dummy Wealth Index Quintile 4	0.0221	0.0327	0.0104
	(0.0369)	(0.0386)	(0.0370)
Dummy Wealth Index Quintile 5	0.0316	0.0227	0.0392
	(0.0418)	(0.0445)	(0.0409)
Number of children under 5 years of age	0.0144	0.0191	0.0093
	(0.0142)	(0.0145)	(0.0163)
Number of children between 5 and 18 years of age	-0.0019	0.0001	-0.0041
	(0.0080)	(0.0081)	(0.0083)
Number of members 65 or older	0.0105	0.0225	-0.0009
	(0.0174)	(0.0181)	(0.0202)
Number of members of extended family	-0.0075	-0.0086	-0.0062
	(0.0061)	(0.0080)	(0.0058)
Constant	-1.5576	-1.8440	-1.2863
	(3.1310)	(3.1863)	(3.0895)
Observations	6,501	3,311	3,190
R-squared	0.1898	0.1898	0.1912
F-Test (Kleibergen-Paap)	7.679	8.046	7.203

Cluster by community

Regional Fixed Effects

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – household questionnaire, Instituto Geográfico Agustín Codazzi (IGAC) and Fernández (2011).

Table 17. First Stage Regressions of Aggregate Consumption
Dependent Variable: Covariate Violent Shock

	***Dummy* Violent Shock**	***Dummy* Violent Shock**	***Dummy* Violent Shock**
Dummy Problems in the community do to water access	0.164**	0.165**	0.186**
	(0.075)	(0.074)	(0.078)
Average time to community urban center	0.107**	0.106**	0.095*
	(0.053)	(0.053)	(0.055)
Rural District Price Index	0.063***	0.063***	0.066***
	(0.020)	(0.020)	(0.020)
Livestock Income as Share of Total Agricultural Income	-0.105*	-0.103*	-0.094*
	(0.056)	(0.056)	(0.053)
Dummy Participation in Goverment Program Familias in Acción (1 if has acces to the program; 0 otherwise)	0.013	0.015	0.017
	(0.023)	(0.023)	(0.023)
Dummy Wealth Index Quintile 2	0.031	0.031	0.028
	(0.027)	(0.028)	(0.028)
Dummy Wealth Index Quintile 3	0.058*	0.056	0.056
	(0.034)	(0.035)	(0.034)
Dummy Wealth Index Quintile 4	0.065*	0.065*	0.060*
	(0.033)	(0.033)	(0.032)
Dummy Wealth Index Quintile 5	0.074**	0.073**	0.071**
	(0.035)	(0.036)	(0.035)
Age	0.004	0.003	0.004
	(0.004)	(0.005)	(0.004)
Age Squared	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Education (years)	0.013	0.012	0.012
	(0.008)	(0.008)	(0.008)
Size of the Housholds Farm in Ha.	-0.002	-0.002	-0.002
	(0.001)	(0.001)	(0.001)
Dummy Female Household Head (1 female head of household , 0 otherwise)	-0.011	0.008	-0.005
	(0.022)	(0.027)	(0.028)
Number of children under 5 years of age	0.001	0.001	0.001
	(0.015)	(0.015)	(0.015)
Number of children between 5 and 18 years of age	-0.003	-0.004	-0.003
	(0.008)	(0.008)	(0.008)
Number of members 65 or older	0.018	0.018	0.013
	(0.019)	(0.019)	(0.019)
Number of members of extended family	-0.002	-0.001	-0.001
	(0.005)	(0.005)	(0.006)
% of time working inside the household farm (Female)		-0.012	-0.025
		(0.069)	(0.072)
% of time working inside the household farm (Male)		0.078	0.067
		(0.062)	(0.066)
% of time working in other farms (Female)		0.138	0.197**
		(0.084)	(0.084)
% of time working in other farms (Male)		0.043	0.043
		(0.048)	(0.053)
Daily Wage			-0.000
			(0.000)
Dummy Production Problems due to Land Quality (1 Problems in the Rural District, 0 otherwise)			-0.108
			(0.082)
Plot Size at Household Creation (stadandarized by region)			0.008
			(0.009)
Constant	-8.363***	-8.334***	-8.746***
	(2.653)	(2.654)	(2.699)
Observations	3513	3,513	3,344
R-squared	0.216	0.217	0.224
F-Test (Kleibergen-Paap)	5.045	4.984	4.929

Cluster by community

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – community and household questionnaire.

Table 18. Second Stage Regressions of Time Use: Household Heads and Spouses

	% of time working inside the household farm		% of time working in agricultural activities in other household farm		% of time working in non-agricultural activities in other household farm		% of leisure time and other activities		% of time spent in domestic chores and taking care of children and other members of the house	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Violent Shock	-0.0009	-0.0952**	-0.0032	-0.0014	0.0040	0.0418**	-0.0072	0.0127	0.0074	0.0421*
	(0.0106)	(0.0392)	(0.0057)	(0.0216)	(0.0049)	(0.0193)	(0.0081)	(0.0247)	(0.0057)	(0.0234)
Rural District Price Index	0.0045	0.0034	0.0075***	0.0076***	-0.0015	-0.0010	-0.0057**	-0.0055**	-0.0048***	-0.0044**
	(0.0029)	(0.0045)	(0.0016)	(0.0016)	(0.0012)	(0.0018)	(0.0023)	(0.0025)	(0.0015)	(0.0018)
Livestock Income as Share of Total Agricultural Income	-0.0183*	-0.0242**	0.0093	0.0094	0.0013	0.0037	-0.0117	-0.0104	0.0194***	0.0215***
	(0.0099)	(0.0118)	(0.0064)	(0.0066)	(0.0053)	(0.0055)	(0.0073)	(0.0076)	(0.0065)	(0.0068)
Dummy Participation in Goverment Program Familias in Acción (1 if has acces to the program; 0 otherwise)	-0.0054	-0.0018	0.0058	0.0057	-0.0032	-0.0047	0.0023	0.0015	0.0006	-0.0008
	(0.0080)	(0.0086)	(0.0059)	(0.0059)	(0.0045)	(0.0047)	(0.0059)	(0.0060)	(0.0061)	(0.0061)
Daily Wage	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Dummy Production Problems due to Land Quality (1 Problems in the Rural District, 0 otherwise)	-0.0169*	-0.0198	0.0094	0.0094	0.0085*	0.0097	0.0015	0.0022	-0.0025	-0.0014
	(0.0096)	(0.0129)	(0.0062)	(0.0063)	(0.0050)	(0.0061)	(0.0075)	(0.0077)	(0.0060)	(0.0064)
Plot Size at Household Creation (stadandarized by region)	0.0209***	0.0211***	-0.0089***	-0.0089***	-0.0049***	-0.0050***	-0.0049	-0.0050	-0.0022	-0.0023
	(0.0045)	(0.0043)	(0.0032)	(0.0032)	(0.0014)	(0.0014)	(0.0032)	(0.0031)	(0.0024)	(0.0024)
Age	0.0032***	0.0034***	-0.0011***	-0.0011***	-0.0002	-0.0002	0.0018***	0.0018***	-0.0038***	-0.0038***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education (years)	0.0046***	0.0049***	-0.0065***	-0.0065***	0.0038***	0.0037***	0.0011	0.0010	-0.0029***	-0.0030***
	(0.0010)	(0.0011)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0011)	(0.0011)
Dummy Female Household Head (1 female head of household , 0 otherwise)	-0.0490***	-0.0535***	-0.0528***	-0.0527***	0.0103	0.0121*	-0.0077	-0.0068	0.0992***	0.1009***
	(0.0084)	(0.0086)	(0.0057)	(0.0058)	(0.0067)	(0.0068)	(0.0081)	(0.0081)	(0.0100)	(0.0103)
Dummy Wealth Index Quintile 2	0.0054	0.0072	0.0019	0.0019	0.0002	-0.0005	0.0104	0.0101	-0.0180**	-0.0186**
	(0.0113)	(0.0119)	(0.0097)	(0.0098)	(0.0048)	(0.0048)	(0.0097)	(0.0097)	(0.0078)	(0.0080)
Dummy Wealth Index Quintile 3	0.0165	0.0190	-0.0145	-0.0145	0.0073	0.0063	0.0034	0.0029	-0.0128	-0.0137
	(0.0112)	(0.0120)	(0.0096)	(0.0096)	(0.0051)	(0.0054)	(0.0085)	(0.0086)	(0.0091)	(0.0094)
Dummy Wealth Index Quintile 4	0.0040	0.0067	-0.0096	-0.0096	0.0060	0.0049	0.0152*	0.0146	-0.0156*	-0.0166**
	(0.0114)	(0.0116)	(0.0090)	(0.0091)	(0.0049)	(0.0052)	(0.0089)	(0.0089)	(0.0081)	(0.0082)
Dummy Wealth Index Quintile 5	0.0059	0.0104	-0.0257***	-0.0258**	0.0207***	0.0189***	0.0273***	0.0264***	-0.0281***	-0.0298***
	(0.0124)	(0.0132)	(0.0098)	(0.0100)	(0.0060)	(0.0063)	(0.0090)	(0.0090)	(0.0084)	(0.0088)
Number of children under 5 years of age	-0.0047	-0.0043	0.0064	0.0064	0.0057	0.0055	-0.0138***	-0.0139***	0.0065	0.0063
	(0.0047)	(0.0048)	(0.0044)	(0.0044)	(0.0038)	(0.0038)	(0.0040)	(0.0041)	(0.0045)	(0.0045)
Number of children between 5 and 18 years of age	-0.0019	-0.0024	0.0061***	0.0061***	0.0033*	0.0035**	-0.0130***	-0.0129***	0.0055**	0.0057**
	(0.0027)	(0.0029)	(0.0021)	(0.0021)	(0.0017)	(0.0018)	(0.0020)	(0.0020)	(0.0022)	(0.0023)
Number of members 65 or older	-0.0188***	-0.0171***	-0.0133***	-0.0133***	-0.0028	-0.0035	0.0103*	0.0099*	0.0245***	0.0239***
	(0.0060)	(0.0057)	(0.0042)	(0.0042)	(0.0033)	(0.0033)	(0.0053)	(0.0053)	(0.0054)	(0.0055)
Number of members of extended family	0.0051	0.0043	-0.0002	-0.0002	-0.0019	-0.0016	0.0068***	0.0070***	-0.0097***	-0.0095***
	(0.0033)	(0.0033)	(0.0023)	(0.0023)	(0.0018)	(0.0018)	(0.0025)	(0.0025)	(0.0025)	(0.0025)
Constant	-0.4559	-0.3486	-0.6251***	-0.6149***	0.1477	0.1008	0.9462***	0.9207***	0.9870***	0.9420***
	(0.3042)	(0.4509)	(0.1666)	(0.1613)	(0.1283)	(0.1807)	(0.2415)	(0.2534)	(0.1614)	(0.1754)
Observations	6,057	6,057	6,057	6,057	6,057	6,057	6,057	6,057	6,057	6,057
R-squared	0.0885	0.0885	0.0945	0.0945	0.0307	0.0307	0.106	0.106	0.0513	0.0513
Hansen Test		0.969		0.255		0.145		0.657		0.744
Estimated effect of a standard deviation increase in probability of violent shock (in standard deviations of dependent variable)		-0,118		-0,002		0,091		0,022		0,044
Cluster by community										
Regional Fixed Effects										

Source: CLS-WILL: first wave – household questionnaire.

Table 19. Second Stage Regressions of Time Use: Females

	% of time working inside the household farm		% of time working in agricultural activities in other household farm		% of time working in non-agricultural activities in other household farm		% of leisure time and other activities		% of time spent in domestic chores and taking care of children and other members of the house	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Violent Shock	-0.0040	-0.0216	0.0006	-0.0002	0.0079*	0.0184	-0.0068	-0.0120	0.0023	0.0154
	(0.0065)	(0.0216)	(0.0025)	(0.0092)	(0.0042)	(0.0137)	(0.0088)	(0.0296)	(0.0085)	(0.0306)
Observations	3,076	3,076	3,076	3,076	3,076	3,076	3,076	3,076	3,076	3,076
R-squared	0.145	0.145	0.0264	0.0264	0.0265	0.0265	0.0991	0.0991	0.101	0.101
Hansen Test		0.582		0.156		0.780		0.244		0.281
Estimated effect of a standard deviation increase in probability of violent shock (in standard deviations of dependent variable)		-0.044		-0.001		0.054		-0.020		0.021
Cluster by community										
Regional Fixed Effects										

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – household questionnaire.

Table 20. Second Stage Regressions of Time Use: Males

	% of time working inside the household farm		% of time working in agricultural activities in other household farm		% of time working in non-agricultural activities in other household farm		% of leisure time and other activities		% of time spent in domestic chores and taking care of children and other members of the house	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Violent Shock	0.0053	-0.1628**	-0.0015	0.0081	0.0005	0.0726**	-0.0089	0.0353	0.0046	0.0469**
	(0.0175)	(0.0703)	(0.0116)	(0.0438)	(0.0081)	(0.0344)	(0.0104)	(0.0312)	(0.0063)	(0.0232)
Observations	2,981	2,981	2,981	2,981	2,981	2,981	2,981	2,981	2,981	2,981
R-squared	0.0945	0.0945	0.250	0.250	0.0634	0.0634	0.152	0.152	0.105	0.105
Hansen Test		0.928		0.632		0.128		0.662		0.0306
Estimated effect of a standard deviation increase in probability of violent shock (in standard deviations of dependent variable)		-0.176		0.008		0.134		0.065		0.113
Cluster by community										
Regional Fixed Effects										

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – household questionnaire.

Table 21. Second Stage Regressions Formal Labor Markets: Household Head and Spouse

	Worked for a salary in the past 12 months (1 if he/she worked for a salary)		Tried to find a job in the past 12 months (1 if he/she tried to find a job)	
	OLS	**2SLS**	**OLS**	**2SLS**
Violent Shock	0.0237	0.1641***	0.0044	0.0555
	(0.0156)	(0.0600)	(0.0148)	(0.0542)
Rural District Price Index	0.0073*	0.0090	-0.0026	-0.0020
	(0.0041)	(0.0064)	(0.0034)	(0.0041)
Livestock Income as Share of Total Agricultural Income	0.0481**	0.0580***	-0.0251	-0.0215
	(0.0190)	(0.0210)	(0.0157)	(0.0158)
Dummy Participation in Goverment Program Familias in Acción (1 if has acces to the program; 0 otherwise)	-0.0196	-0.0235*	0.0161	0.0146
	(0.0137)	(0.0141)	(0.0108)	(0.0109)
Age	-0.0014***	-0.0017***	-0.0021***	-0.0022***
	(0.0005)	(0.0006)	(0.0004)	(0.0004)
Education (years)	0.0096***	0.0092***	-0.0002	-0.0004
	(0.0023)	(0.0023)	(0.0015)	(0.0015)
Dummy Female Household Head (1 female head of household , 0 otherwise)	0.0543***	0.0597***	-0.0242*	-0.0223
	(0.0185)	(0.0182)	(0.0136)	(0.0136)
Dummy Wealth Index Quintile 2	-0.0173	-0.0220	-0.0351**	-0.0368**
	(0.0167)	(0.0168)	(0.0170)	(0.0172)
Dummy Wealth Index Quintile 3	0.0091	0.0045	-0.0674***	-0.0691***
	(0.0213)	(0.0220)	(0.0165)	(0.0166)
Dummy Wealth Index Quintile 4	0.0103	0.0042	-0.0634***	-0.0657***
	(0.0197)	(0.0207)	(0.0175)	(0.0178)
Dummy Wealth Index Quintile 5	-0.0253	-0.0345	-0.0907***	-0.0941***
	(0.0213)	(0.0220)	(0.0152)	(0.0156)
Number of children under 5 years of age	0.0097	0.0083	-0.0073	-0.0078
	(0.0084)	(0.0088)	(0.0072)	(0.0071)
Number of children between 5 and 18 years of age	0.0166***	0.0174***	0.0091**	0.0094**
	(0.0044)	(0.0045)	(0.0043)	(0.0044)
Number of members 65 or older	-0.0352***	-0.0380***	0.0004	-0.0006
	(0.0107)	(0.0110)	(0.0093)	(0.0094)
Number of members of extended family	-0.0004	0.0008	0.0020	0.0025
	(0.0055)	(0.0055)	(0.0044)	(0.0045)
Constant	-0.5747	-0.6949	0.5604	0.4257
	(0.4427)	(0.6481)	(0.3639)	(0.4211)
Observations	6,501	6,501	6,501	6,501
R-squared	0.0485	0.0485	0.0378	0.0378
Hansen Test		0.891		0.726
Estimated effect of a standard deviation increase in probability of violent shock (in standard deviations of dependent variable)		0,118		0,046

Cluster by community
Regional Fixed Effects
*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – household questionnaire.

Table 22. Second Stage Regressions Formal Labor Markets: Female

	Worked for a salary in the past 12 months (1 if she worked for a salary)		Tried to find a job in the past 12 months (1 if she tried to find a job)	
	OLS	**2SLS**	**OLS**	**2SLS**
Violent Shock	0.0007	0.0620	0.0109	0.0903**
	(0.0142)	(0.0492)	(0.0098)	(0.0420)
Observations	3,311	3,311	3,311	3,311
R-squared	0.0719	0.0719	0.0648	0.0648
Hansen Test		0.524		0.900
Estimated effect of a standard deviation increase in probability of violent shock (in standard deviations of dependent variable)		0,058		0,105
Cluster by community				
Regional Fixed Effects				

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – household questionnaire.

Table 23. Second Stage Regressions Formal Labor Markets: Male

	Worked for a salary in the past 12 months (1 if he worked for a salary)		Tried to find a job in the past 12 months (1 if he tried to find a job)	
	OLS	**2SLS**	**OLS**	**2SLS**
Violent Shock	0.0541**	0.2893***	0.0006	0.0153
	(0.0239)	(0.0996)	(0.0246)	(0.0872)
Observations	3,190	3,190	3,190	3,190
R-squared	0.142	0.142	0.0714	0.0714
Hansen Test		0.600		0.894
Estimated effect of a standard deviation increase in probability of violent shock (in standard deviations of dependent variable)		0,187		0,011
Cluster by community				
Regional Fixed Effects				

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – household questionnaire.

Table 24. Second Stage Regressions Aggregate Consumption

	Log Consumption Expenditure OLS	Log Consumption Expenditure 2SLS	Log Consumption Expenditure OLS	Log Consumption Expenditure 2SLS	Log Consumption Expenditure OLS	Log Consumption Expenditure 2SLS
Violent Shock	0.033	-0.316*	0.030	-0.318*	0.026	-0.264*
	(0.026)	(0.161)	(0.026)	(0.163)	(0.026)	(0.147)
Rural District Price Index	0.000	0.027*	0.000	0.027*	0.003	0.027*
	(0.007)	(0.016)	(0.007)	(0.016)	(0.008)	(0.015)
Livestock Income as Share of Total Agricultural Income	-0.020	-0.058	-0.016	-0.053	-0.007	-0.036
	(0.030)	(0.038)	(0.030)	(0.037)	(0.030)	(0.036)
Dummy Participation in Goverment Program Familias in Acción (1 if has acces to the program; 0 otherwise)	-0.102***	-0.097***	-0.100***	-0.094***	-0.099***	-0.093***
	(0.025)	(0.026)	(0.025)	(0.027)	(0.024)	(0.024)
Dummy Wealth Index Quintile 2	0.115***	0.124***	0.109***	0.118***	0.104***	0.110***
	(0.027)	(0.030)	(0.027)	(0.029)	(0.029)	(0.030)
Dummy Wealth Index Quintile 3	0.187***	0.199***	0.180***	0.191***	0.186***	0.195***
	(0.029)	(0.033)	(0.029)	(0.032)	(0.031)	(0.033)
Dummy Wealth Index Quintile 4	0.262***	0.278***	0.257***	0.273***	0.248***	0.261***
	(0.028)	(0.031)	(0.028)	(0.031)	(0.030)	(0.032)
Dummy Wealth Index Quintile 5	0.424***	0.444***	0.417***	0.436***	0.413***	0.429***
	(0.035)	(0.037)	(0.035)	(0.037)	(0.037)	(0.038)
Age	-0.002	-0.001	-0.005	-0.004	-0.007	-0.006
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Age Squared	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (years)	0.064***	0.068***	0.064***	0.068***	0.068***	0.070***
	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)
Size of the Housholds Farm in Ha.	0.004*	0.003	0.003	0.003	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Dummy Female Household Head (1 female head of household , 0 otherwise)	-0.068***	-0.079***	-0.018	-0.023	-0.029	-0.037
	(0.026)	(0.027)	(0.033)	(0.032)	(0.034)	(0.032)
Number of children under 5 years of age	-0.126***	-0.124***	-0.129***	-0.126***	-0.128***	-0.127***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
Number of children between 5 and 18 years of age	-0.131***	-0.131***	-0.133***	-0.133***	-0.130***	-0.131***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Number of members 65 or older	-0.076***	-0.072***	-0.073***	-0.070***	-0.072***	-0.070***
	(0.018)	(0.019)	(0.018)	(0.019)	(0.019)	(0.019)
Number of members of extended family	-0.038***	-0.039***	-0.036***	-0.037***	-0.039***	-0.040***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
% of time working inside the household farm (Female)			0.170**	0.164**	0.160**	0.152*
			(0.069)	(0.077)	(0.071)	(0.078)
% of time working inside the household farm (Male)			0.202***	0.231***	0.184***	0.205***
			(0.062)	(0.065)	(0.061)	(0.064)
% of time working in other farms (Female)			0.021	0.063	-0.006	0.048
			(0.084)	(0.086)	(0.086)	(0.092)
% of time working in other farms (Male)			0.145**	0.152**	0.140**	0.146**
			(0.060)	(0.062)	(0.060)	(0.062)
Daily Wage					0.000	-0.000
					(0.000)	(0.000)
Dummy Production Problems due to Land Quality (1 Problems in the Rural District, 0 otherwise)					-0.027	-0.052
					(0.027)	(0.035)
Plot Size at Household Creation (stadandarized by region)					0.016	0.018
					(0.013)	(0.013)
Constant	2.568**	-0.917	2.555**	-0.908	2.190**	-0.822
	(1.024)	(2.129)	(1.013)	(2.140)	(1.040)	(2.002)
Observations	3,513	3,513	3,513	3,513	3,344	3,344
R-squared	0.328	0.256	0.333	0.262	0.334	0.285
Hansen P -Value		0.926		0.927		0.743
Estimated effect of a standard deviation increase in probability of violent shock (in percent)		-7.78		-7.83		-6.50
Average Consumptio per capita	1,519,000	1,519,000	1,519,000	1,519,000	1,519,000	1,519,000
SD Consumptio per capita	956,400	956,400	956,400	956,400	956,400	956,400

Cluster by community

*** p<0.01, ** p<0.05, * p<0.1

Source: CLS-WILL: first wave – household questionnaire.