Migration, Risk and the Intra-Household Allocation of Labor in El Salvador

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Abstract

We investigate how the gender composition of migrant flows and the intra-household allocation of labor are employed as risk-coping strategies in El Salvador. We show that agricultural productivity shocks primarily increased male migration to the US and, at the same time, increased the number of hours that the household devoted to agricultural activities. In contrast, damage sustained from the 2001 earthquakes exclusively stunted female migration. We argue that the reasons for this were that the earthquakes increased the demand for home production and that the costs of retaining women at home in the disaster's wake were lower than for men.

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1 Introduction

In this study, we aim to elucidate the relationship between two common findings in the development literature. The first is that households in the developing world typically face a large degree of uninsured risk that is often dealt with *via* alternative "non-market" mechanisms.[1] The second is that within many households, but particularly within those in less developed countries, we often observe a division of labor across genders where there is a greater likelihood that men will be engaged in the more physically demanding activities and that women will be engaged in "home production." Taken together, these findings suggest that both the allocation of labor within the household and the gender composition of migrant flows may be altered as a means of coping with uninsured risk. As a consequence, exogenous shocks may not only impact the demographic composition of the household, but possibly some of its corollaries such as fertility or intra-household bargaining power.

To better understand how this might work, consider a world in which, at home, men are primarily engaged in agricultural production and women are primarily engaged in home production because of differences in comparative advantage. In addition, suppose that men face better employment opportunities abroad, in the sense that they face a higher demand for their labor, if they do choose to migrate. In such world, a household will find it optimal to respond to a productivity shock in the agricultural sector primarily by increasing its number of male migrants, provided, of course, that the shock has a relatively smaller impact on the marginal productivity

[1] Some of the mechanisms that previous studies have considered include: intra-village or intra-family transfers (Townsend 1994; Udry 1994a; Yang and Choi 2006), savings and asset accumulation/depletion (Paxson 1992; Rosenzweig and Wolpin 1993; Udry 1994b), changes in labor supply (Kochar 1999), the entry/exit of household members (Frankenberg, Smith and Thomas 2003) and migration (Rosenzweg and Stark 1989; Paulson 2000; Halliday 2006). For a more thorough review of this literature, we refer the reader to Besley (1995).

of women in agriculture. Indeed, if the household is at a corner solution in which no women are engaged in agricultural activities, then the agricultural shock will only impact male migration. In contrast, a shock which increases the demand for the home produced commodity, such as the illness of a family member, will be met by primarily reducing the number of women engaged in agricultural activities as well as the number of women residing abroad due, in part, to the fact that the opportunity cost of retaining women's labor at home is lower.

These are the types of issues that we explore in this paper. We primarily do so using a panel of households from El Salvador, a country in which there is a large degree of trans-national migration. However, we also supplement the analysis with a sub-sample of Salvadoran migrants from the 2000 US Census. Our key findings are as follows.

First, we find that shocks to agricultural productivity in El Salvador are met by increases in migration to the US which is primarily composed of male household members. This finding is consistent with data on the distribution of hours worked across various sectors by different household members which indicate that agricultural work is by-and-large the domain of men. Interestingly, at the same time that agricultural shocks increased migration to the US, we also show that they significantly increased the number of hours that the household devoted to agricultural activities. This suggests that changes to labor supply provides an additional coping mechanism for Salvadoran households.

Next, we find that households that were disproportionately impacted by the 2001 earthquakes were less likely to send members abroad. This effect operated exclusively through female migrant flows. We argue that the primary reason for this negative effect was that the earthquakes increased the household's demand for labor in El Salvador. Wage and employment data on

Salvadoran migrants from the US Census shed light on why the earthquakes only impacted female flows as they indicate that 17.73% fewer female migrants than male migrants are employed in the US. The result of this is a male-female wage gap of more than two dollars. Accordingly, the opportunity cost of retaining women at home in the disaster's wake was far less than it was for men. In addition and as a testament to our claim that the earthquakes increased the demand for labor at home, we show that households that were disproportionately affected by the disaster experienced large increases in the number of hours that they devoted to home production.

The balance of this paper is organized as follows. In the next section, we sketch out the theoretical framework. We then go on to describe our data and present our core empirical results in the next four sections. The last section concludes.

2 Some Theoretical Considerations

In this section, we outline a simple model that describes how the household will use migration and changes in labor supply to cope with exogenous shocks in the presence of skill differentials across genders. We assume that there are a total of S discrete states of nature that we index by s. Next, we assume that the household can reside in one of two locations: the north and the south. In addition, we assume that the there three goods: a consumption good which is produced in the south which we denote by C_s, a consumption good that is produced in the north which we denote by N_s and a good produced by a home production technology which we denote by H_s. The household behaves as a unitary actor and, thus, maximizes the expectation of a single utility function: $E[u(C_s, N_s, H_s)]$ which we assume to be increasing and concave in both of its arguments.

The household is endowed with a measure of female and male labor, each of which is normalized to unity. After observing the state of nature, the household allocates male and female labor either to the production of C, N or H. Male labor is denoted by the super-script M and female labor is denoted by the super-script F. Respectively, we let $\{m_s^M, l_s^M, h_s^M\}$ and $\{m_s^F, l_s^F, h_s^F\}$ denote the household's allocation of male and female labor to these three activities in state s. Finally, it is important to note that there are migration costs in this model as there is a cost and benefit to marginal utility of shifting household members across sectors. However, we do not model any other migration costs as this would further complicate the model by introducing dynamics.[2]

The household has the following production technologies. In the N-sector, it is given by $w_{j,s}m_s^j$ for $j = M$ or F where w_s^j denotes the northern wage. The production function in the southern C-sector is given by $\lambda(l_s^M, l_s^F, \psi_s)$ where ψ_s is a stochastic production shock. We assume that λ is increasing and concave in male and female labor. This technology models agricultural production in the south. Finally, the production function in the H-sector is given by $\eta(h_s^M, h_s^F, \varepsilon_s)$ where ε_s is a stochastic production shock. Once again, we assume that η is increasing and concave in male and female labor. This technology models activities such as housework, child rearing and, perhaps, home maintenance.

Adopting the notation that u_X is the partial derivative of the utility function with respect to commodity X and that λ_M, λ_F, η_M and η_F are the partial derivatives of the production functions with respect to the male and female inputs, the optimal (interior) allocations of female and male

[2] While a dynamic model would certainly be more realistic, for the purposes of this paper, we do not believe that it would offer any additional insights.

labor are given by two conditions:

$$\frac{u_C(C_s, N_s, H_s)}{u_N(C_s, N_s, H_s)} = \frac{w_{j,s}}{\lambda_j(l_s^M, l_s^F, \psi_s)} \text{ for } j \in \{M, F\} \text{ and } s \in \{1, ..., S\} \tag{1}$$

and

$$\frac{u_H(C_s, N_s, H_s)}{u_N(C_s, N_s, H_s)} = \frac{w_{j,s}}{\eta_j(l_s^M, l_s^F, \varepsilon_s)} \text{ for } j \in \{M, F\} \text{ and } s \in \{1, ..., S\}. \tag{2}$$

These two conditions constitute a set of S contingency plans for all states of nature that the household will use to buffer the impact of risk. This will involve transferring labor from sectors with low demand and/or productivity to sectors with high demand and/or productivity. If we take these conditions together with the constraints that $l_s^j + m_s^j + h_s^j = 1$ for all s and j, we obtain the household's (reduced form) labor demand system $l_s^j = f^j(\varepsilon_s, \psi_s, w_{M,s}, w_{F,s})$, $m_s^j = g^j(\varepsilon_s, \psi_s, w_{M,s}, w_{F,s})$ and $h_s^j = m^j(\varepsilon_s, \psi_s, w_{M,s}, w_{F,s})$ for all s and j.

There are two points worth mentioning at this point. First, an adverse shock to the production of C can have potentially complicated effects. On one hand, it may reduce the marginal productivity of labor in the C sector and, thus, induce the household to increase its number of migrants. On the other hand, it may increase the marginal utility of C and, thus, the demand of C, which will then be met by a movement of labor into the C sector. Second, the relative wages that men and women can earn abroad as migrants will play a large role in the household's labor allocation in any given state. For example, when women earn significantly less than men abroad, the impact of a shock that reduces the household's stock of the home produced commodity and, thus, increases its demand will tend to be met by a disproportionate movement of women into the H sector. The reason, of course, is that, in this scenario, there is a lower opportunity cost to retaining women at home.

3 Data

3.1 BASIS

Our primary data source is the BASIS Panel from El Salvador which was fielded by the Ohio State University and the Fundación Salvadoreño para Desarollo Económico y Social (FUSADES). We employ three waves of the panel from 1997, 1999 and 2001. The data contain household identifiers which enable us to track households across time. Table 1 contains descriptive statistics and definitions for our variables on migration, hours worked in various household activities, land holdings and economic shocks. Table 2 provides information on the demographic composition of households in the BASIS data. For a more comprehensive description of the BASIS panel including an analysis of attrition as well as an investigation into the possibility of non-random assignment of the shocks, we refer the reader to Halliday (2006). Finally, it is important to mention that the agricultural shocks are only available for 1999 and 2001 and, thus, most of our regressions only use these years. However, the 1997 data was still used in these regressions to construct lags of some of our variables.

Some additional details need to be given on the data on hours worked. These data come from a component of the BASIS survey that listed numerous household activities and then asked, "Cuánto tiempo trabajó en esa actividad?" or "How much time did he (she) work in that activity?" We employ data for three activities. The first is what we call field labor. In the survey, this is defined as "Trabajo agrícola para venta o autoconsumo" or "Agricultural work for sale or auto-consumption." We call the second, livestock labor, which the survey defines as "Cuidado de animales para venta o autoconsumo" or "Care of animals for sale or auto-consumption." Finally, we call the third, domestic labor, which the survey defines as "Labores domésticas (preparación de alimentos, limpieza, cuido de niños y enfermos)" which, in English, is "Domestic labor (preparation of food, cleaning, care of children and the sick)."

It is important to note that the BASIS survey does not explicitly say that what we define as "field labor" constitues work such as planting, tending to and/or harvesting crops. However, the survey does list caring for livestock as a separate activity from what they call agricultural activity. Accordingly, we infer that agricultural labor as defined by the survey does not include hours spent tending to livestock and, thus, includes primarily activities which involve crops.

3.2 IPUMS

We also employ data on a sub-sample of Salvadoran migrants from the 5% micro-sample of the 2000 Census (Ruggles, *et al.* 2004). We define somebody as a Salvadoran migrant if they were residing in El Salvador five years prior to being interviewed. There are 5251 such individuals in the 2000 Census. Because we are interested in using these data to quantify wage differentials by gender, we further restrict the sample to working-aged people which we define to be 20 years or older. This further reduces the sample to 3738. We employ variables on wages, age, years in the United States, employment status, citizenship status and education. Wages were constructed by dividing the respondent's total wage income in the year by the number of hours per week that the respondent reported to typically work multiplied by 52. Summary statistics are reported in Table 3.

4 Risk and the Gender Composition of Migrant Flows

We begin our empirical analysis by investigating how exogenous shocks in El Salvador impact the gender composition of migrant flows. Our benchmark regression equation is similar to that in Halliday (2006) and, with some abuse of notation, is given by

$$\Delta M^j_{h,t} = \alpha^j + \zeta^j_t + \omega'_{h,t}\delta^j + R'_h\rho^j + X'_{h,t-1}\beta + \varepsilon^j_{h,t} \text{ for } j \in \{M, F\} \tag{3}$$

where $\Delta M^j_{h,t}$ is the change in the stock of male or female migrants across time periods, ζ^j_t is a year effect, $\omega_{h,t}$ is a vector of exogenous shocks such as the harvest and livestock loss dummies and the earthquake damage index, R_h is a comprehensive set of location dummies and $X_{h,t}$ is a set of demographic controls which were discussed in Table 2. Two sets of location dummies are employed: department dummies of which there are 14 and municipio dummies of which there are 173.[3] To address the obvious endogenity concern that migration will have a contemporaneous impact on the household's demographic structure, we use lags of $X_{h,t}$. We estimate the model using an ordered logit estimator with the 2001 and 1999 waves of the BASIS panel. To account for the possibility of correlation across observations within *municipios*, we cluster all standard errors by *municipio*. Table 4 reports our results for male migration and Table 5 reports our results for female migration.

The first column of Table 4 displays estimation results when the dependent variable is total migration (*i.e.* the sum of male and female migration) as a reference. We see that the agricultural

[3] In fact, there are 262 *municipios* in El Salvador, but only 173 of these are present in our data due to the small sample sizes in the BASIS data. In addition, for some of the regressions in this paper, some *municipio* dummies were dropped due to collinearity with the agricultural shock dummies.

shocks had a positive and significant impact on migration, whereas the earthquakes had a negative and significant impact on migration. The explanation that we give in Halliday (2006) for this result is that adverse agricultural conditions in El Salvador expanded the north-south wage gap and, thereby, increased the incentives for northward migration, whereas the earthquakes increased the demand for labor at home which was met by a reduction in migration. In that paper, we explored the possibility that the earthquakes stunted migration because they disrupted migration financing, but the preponderance of evidence that we uncovered did not support this alternative hypothesis.

Columns two through five of Table 4 use male migration as the dependent variable. In all four columns, we see that adverse agricultural shocks had a positive and significant impact on migration. All tests of joint significance had p-values less than 10%. In addition, it is important to point out that in column five we use a complete set of 166 municipio dummies and, while the agricultural shock dummies are no longer individually significant, they are still jointly significant at the 10% level. This is important as it substantially mitigates concerns of omitted variables bias.[4] Interestingly and in stark contrast to the first column, we see that there is no relationship between the earthquakes and male migration. Finally, the year dummy indicates that there was a general reduction in male migration in 2001.

Turning to the results for female migration in Table 5, we see a substantially different picture. Now the relationship between the agricultural shocks and migration is more muted as can seen by the lower point estimates and higher the p-values in the bottom panel than those in the previous

[4] For example, the areas in El Salvador with long histories of migration to the US are in the rural northern and eastern parts of the country which were hit hardest by the civil war. It might be reasonable to expect that these areas also have a higher prevalence of risky agricultural activities which could create a spurious relationship between the agricultural shocks and migration. For a more comprehensive discussion of some of these omitted variables concerns, see Halliday (2006).

table. In addition, we now see a large, negative and statistically significant relationship between the earthquakes and migration. In fact, the point estimates in this table are substantially larger than the estimate in the first column of the previous table where the dependent variable was total migration. In addition, the earthquake effects are greatest when we include the complete set of *municipio* dummies. Finally, the year dummy does not indicate that there was any significant change in female migration patterns across 1999 and 2001.

We now consider some of the possible economic underpinnings of these empirical observations using the model of section two. First, the agricultural shocks should have impacted male migration more than female migration if these shocks had larger effects the on the marginal returns to male labor than to female labor. For example, one might expect this to occur if the household is at a corner solution in which no female labor is used in agricultural activities. Second, to the extent that the earthquakes increased the demand for home produced goods, we would expect larger effects for women if the US wages for men were substantially higher than women's wages or if the marginal productivity of women in home production was substantially higher than for men. In the former case, the opportunity cost of retaining women at home in the wake of the earthquakes would be lower. In the latter case, women would be retained because they are more efficient at home production.

5 Gender Differences in Wages and Employment

In this section, we investigate gender differences in wages and employment both in El Salvador and among Salvadoran migrants in the United States with the goal of better understanding the results in the previous section. In the first sub-section, we do so using a sample of Salvadorans from the US Census. In the next sub-section, we do so using the BASIS data.

There is a large literature on gender differences in wages and employment in the both developing and developed countries. For an excellent overview of this literature, we refer the reader to Mammen and Paxson (2000). Some of this literature has focused on determining whether these observed differentials are the consequence of productivity/skill differences across genders (as we assumed in our simple model) or discrimination. Unfortunately, understanding the role that productivity differences play in determining wage and employment disparities across genders has, to a large degree, been hampered by the dearth of data on individual productivity.[5] Nevertheless, we claim that knowledge of the root causes of these differences is not important for our purposes. Rather, what is important is that these gaps do exist and their presence will have implications for what members the household chooses to send away or retain in the face of changing economic circumstances at home.

5.1 In the United States

We now investigate male-female differentials in wages and employment status among Salvadoran migrants in the US. Looking at Table 3, two facts emerge. First is that the average wage of Salvadoran women in the US is $2.16 less than a Salvadoran male. Second is that a far greater number of Salvadoran women (46.39%) report being out of the labor force than Salvadoran men (25.02%) suggesting that the wage gap is driven largely by differences in labor force participation. These discrepancies most likely reflect different migration motives among men, who generally

[5] One notable exception to this is Foster and Rosenzweig (1996) who do have piece-rate data. They conclude that women tend to be engaged in different activities than men because of differences in comparative advantage across genders and statistical discrimination.

migrate for economic reasons, and women, who generally migrate to be reunited with their families.[6] To give the reader a more comprehensive picture of these wage gaps, we plot the cumulative density functions (CDF) of wages for men and women in Figure 1. It can be seen that the male CDF dominates the female CDF and that the largest discrepancies exist when wages are zero. Finally, in Table 6, we estimate OLS regressions with wages as the dependent variable and gender, age, experience in the US, education and citizenship status as the independent variables.[7] It can be seen that even after we adjust for a number of potentially confounding variables, men still earn more than two dollars per hour more than women. These findings help to make sense of the observation that the earthquakes stunted female migration, but had no effect on male migration. Indeed, the fact that less than 50% of Salvadoran women work at all suggests that the opportunity cost of retaining female labor in the wake of the disaster was considerably lower than it was for men.[8]

5.2 In El Salvador

We now turn to an investigation into how the distribution of hours worked in various household activities differs across genders in El Salvador.[9] The activities that we consider are field, livestock

[6] See Donato (1994) for a discussion of these motives in the case of Mexican migration.

[7] We did not estimate a selection model for two reasons. The first is that we are interested in knowing the impact of gender on average wages which includes both the extensive margin (*i.e.* labor force participation) and the intensive margin (*i.e.* wage differentials among earners). A simple OLS regression conveniently summarizes both of these effects. The second is that selection models typically rely on *ad hoc* distributional assumptions and when these assumptions fail the performance of these models can be weak. For additional opinions of the usefulness of selection models in certain applications, we refer the reader to pages 91 - 92 of Deaton (1997).

[8] It is important to mention that prevailing social mores in Central America about the vulnerability of women may also mean that the costs of migration, as perceived by the household, may be substantially higher for women (Curran and Rivero-Fuentes 2003). This would, in turn, imply that it was "cheaper" for the household to retain women at home in the aftermath of the earthquakes.

[9] In the Salvadoran data, we focus on hours worker as opposed to wages due to the fact that in developing countries a large proportion of labor is not in the wage sector.

and domestic labor which are discussed in Section 3.1. We calculate CDF's for the total number of hours devoted to each of these activities by an individual during the survey year by gender. For the sake of clarity, it is important to emphasize that in contrast to the bulk of this paper where we work with household aggregates, these figures display hours worked per year at the level of the individual. The results of this exercise are displayed in Figures 2, 3 and 4 for field, livestock and domestic labor, respectively. These results indicate, perhaps not surprisingly, that field labor is by-and-large (but not entirely) men's work and that domestic labor is almost exclusively women's work. They also indicate that men are marginally more likely than women to be engaged in livestock labor.

These figures elucidate the previous section's results in two ways. First, given that we observe that men are more likely to be engaged in the agricultural activities of field and livestock labor, it is also reasonable to expect that a shock to marginal productivity in these sectors would have a larger impact on male migrant flows than female flows which is precisely what we observed. In addition, it is important to emphasize that, according to Figure 2, over 90% of all households were at a corner solution in which no women were engaged in field activities. Second, to the extent that Figure 4 suggests that the home is the woman's domain, it is not surprising that the earthquakes, which ostensibly increased the demand for home production, were met exclusively by a reduction in female migration.

6 Risk and the Intra-Household Allocation of Labor

The results in these figures suggest that the agricultural shocks and the earthquakes may have induced a redistribution in the number of labor hours that the household devoted to different activities. To investigate this, we define $H_{h,t}^{j,s}$ to be the number of labor hours devoted to sector s by all members of household h of gender j in year t where the sectors are field, livestock and domestic activity. We also define $h_{h,t}^{j,s}$ completely analogously to $H_{h,t}^{j,s}$ except that $h_{h,t}^{j,s}$ is the number of hours devoted to a particular labor activity per adult male or female (*i.e.* total hours worked by the household divided by the number of adult men or women).[10] We then estimate a similar model to equation (4) except that we use $\Delta H_{h,t}^{j,s}$ and $\Delta h_{h,t}^{j,s}$as the dependent variables. Tables 7 and 8 reports the OLS estimates when the dependent variables are $\Delta H_{h,t}^{j,s}$ and $\Delta h_{h,t}^{j,s}$, respectively. Each regression includes a set of department dummies and (lagged) demographic controls. A perusal of the tables reveals several interesting results.

First, we consider the coefficient estimates on the earthquake damage index. In the last column of both tables, we see that households that were hit hard by the earthquakes also experienced a dramatic increase in the number of hours devoted to domestic labor by women. The proper interpretation of the point estimate in Table 7 is that a 1% increase in earthquake damage is associated with an increase in *total* hours devoted to domestic labor by women of 1.54. This implies that a household that was hit three times harder by the earthquakes than another experienced a 462 hour increase in hours devoted to domestic work by women during the year, on average! In contrast, in column five of both tables, we see that the earthquakes had no effect on male hours devoted to domestic activities. Finally, we note that the estimate on earthquake damage in column four of both tables, where the dependent variable is the change in livestock hours worked by women, is negative and moderately significant suggesting that the earthquakes may have induced a substitution away from livestock production towards home production.

[10] We define an adult to be anyone 16 years of age or older.

Next, we consider the effects of the two agricultural shocks on hours. In both tables, we see that harvest losses had large, positive and significant effects on field hours for men. We also see that livestock losses had similar effects on livestock hours for both men and women, although in Table 8, the effects on male hours are no longer significant. However, livestock losses had no effects on field hours, nor did harvest losses have any effects on livestock hours for either men or women.

These results may seem counter-intuitive at first. The reason for this is that the harvest and livestock shocks presumably lowered marginal productivity in agricultural activities in El Salvador which would also tend to reduce (shadow) wages. One would expect that such a productivity shock would, in turn, induce a substitution away from (not towards) agricultural activities. However, it is important to mention that a similar result to ours can be found in Frankenberg, Smith and Thomas (2003) who show that there was a tendency for labor supply to increase in the aftermath of the Indonesian financial crisis despite the fact that it caused a 40% reduction in real wages in the formal sector.

We propose some explanations for this seemingly paradoxical finding in Tables 7 and 8. First, while it is certainly true that agricultural shocks would have tended to reduce shadow wages in agricultural activities, they also may have reduced the consumption of agricultural commodities by the household, thereby, increasing the marginal utility of and the demand for the agricultural commodity. In such a scenario, it would be reasonable to observe an increase in agricultural hours in the presence of adverse shocks to agricultural productivity. Second, if leisure is a normal good and if its income effect dominates its substitution effect, then it would also be possible to observe an increase in hours devoted to agriculture, although we are not sure how common backwards-bending labor supply curves are in rural El Salvador. A third explanation has been proposed by Frankenberg, Smith and Thomas (2003) who suggest that a liquidity constrained household that experiences a large consumption shock today may borrow against future leisure and increase current labor supply as a means of buffering the effects of the shock. A fourth explanation is that the agricultural shocks initially induced a movement from the agricultural sector to production in the north which in turn increased the marginal productivity of labor in the agricultural sector which was then met by a movement of the remaining household members in El Salvador from either the home production, formal wage or leisure sectors into the agricultural sector.[11]

7 Conclusions

In this paper, we used Salvadoran data to demonstrate that different types of exogenous shocks will have different effects on the gender composition of migrant flows and the intra-houseold allocation of labor. We argued that this can in large part be explained by the fact that men and women face different employment opportunities both at home and abroad either because of comparative advantage or discrimination. We showed that adverse shocks in the agricultural sector, which is primarily composed of men, were met by increases in the number of male migrants living in the US. In contrast, damage sustained by households due to the 2001 earthquakes had a large negative effect on female migration, but had absolutely no effect on male migration. We argued that the primary reason for this finding was that the earthquakes increased the demand for labor at home and that this demand was met by women because, in the US, Salvadoran

[11] Note that, for the sake of simplicity, we did not model the formal wage or leisure sectors in the theoretical framework of Section 2.

women earn, on average, two dollars less than their male counterparts. Accordingly, women's labor had a lower opportunity cost. In addition, we also showed that the earthquakes were met by a dramatic increase in the number of hours that women devoted to domestic labor, but had no impact on male domestic hours. Thus, it appears that it was the women who picked up the pieces left by the disaster.

One of the possible implications of this work is that because trans-national migration appears to have large effects on the gender composition of the household, it may also have non-trivial effects on who the primary economic decision makers in the household are. Within a collective model of household decision making *a la* Chiappori (1992) or Browning, Bourguignon, Chiappori and Lechene (1994), this would potentially change the way that resources are allocated within the household. A study into this issue would be interesting as it would elucidate an additional channel through which international immigration can impact household welfare in the sending country.

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Table 1: Basis Data - Summary Statistics

	Definition	Mean (Standard Deviation)
Migrants[1]	Number of household members residing in the United States	0.55 (1.23)
- Women		0.19 (0.62)
- Men		0.36 (0.83)
Field Hours[1]	Total number of hours in the year that household members devoted to field labor	1065.33 (1584.32)
- Women		70.21 (341.17)
- Men		995.12 (1512.21)
Livestock Hours[1]	Total number of hours in the year that household members devoted to caring for livestock	474.17 (928.88)
- Women		234.33 (489.25)
- Men		239.84 (723.92)
Domestic Hours[1]	Total number of hours in the year that household members devoted to domestic labor	4533.91 (3439.47)
- Women		4311.83 (3108.16)
- Men		222.09 (1024.85)
Land Holdings[1]	Total land holdings (in manzanas) of the household that either has a title or documents indicating the power of transfer	1.69 (5.38)
Harvest Loss[2]	Dummy indicating income loss due to harvest loss	0.19 (0.39)
Livestock Loss[2]	Dummy indicating income loss due to livestock loss	0.11 (0.31)
Quakedamage[3]	Cost of all household damage due to the 2001 earthquakes (in 1992 $, in logs)	4.64 (3.80)

[1]Data is from 1997, 1999 and 2001. Sample size is 2008.
[2]Data is from 1999 and 2001. Sample size is 1365.
[3]Data is from 2001. Sample size is 689.

Table 2: Basis Data - Demographic Variables

Age Bracket	Men	Women
< 1	0.04 (0.21)	0.04 (0.19)
1 - 15	1.18 (1.29)	1.20 (1.26)
16 - 20	0.38 (0.65)	0.37 (0.63)
21 - 45	0.75 (0.76)	0.89 (0.71)
> 45	0.62 (0.55)	0.53 (0.55)

*Standard deviations are reported in parentheses. Data are from the 1997, 1999 and 2001 waves of the survey.

Table 3: IPUMS Data on Salvadoran Migrants in the US

	Men	Women
Wage	5.44 (6.45)	3.28 (8.79)
Age	30.70 (12.29)	34.26 (15.02)
Years in the US	3.99 (5.65)	4.21 (6.29)
Employment distribution		
- Employed	69.39%	45.66%
- Unemployed	5.58%	7.95%
- Not in labor force	25.02%	46.39%
Citizenship Status		
- Born abroad of American Citizens	0.20%	0.44%
- Naturalized Citizen	4.98%	5.00%
- Not a citizen	94.82%	94.56%
Education		
- None	13.76%	14.46%
- 1 to 4 Years	8.04%	7.95%
- 5 to 8 Years	25.70%	24.04%
- 9 Years	11.36%	9.58%
- 10 Years	2.89%	2.83%
- 11 Years	3.08%	3.19%
- 12 Years	22.95%	22.47%
- 1 to 3 Years of College	7.75%	10.06%
- 4 or more Years of College	4.48%	5.42%

*The data in this table come from a sub-sample of Salvadorans in the US who were residing in El Salvador in 1995 who were at least 20 years old. Standard deviation in parentheses.

Table 4: Migratory Responses to Adverse Shocks: Male Migration

	(1)[3]	(2)	(3)	(4)	(5)
Harvest Loss	0.31	0.40	0.40	0.36	0.34
	(1.89)	(2.23)	(2.18)	(1.97)	(1.49)
Livestock Loss	0.36	0.29	0.28	0.31	0.40
	(1.84)	(1.17)	(1.13)	(1.23)	(1.50)
Earthquake Damage	−0.05	−0.01	−0.01	−0.00	0.00
	(−2.15)	(−0.60)	(−0.61)	(−0.09)	(0.16)
2001 Dummy	−0.28	−0.40	−0.38	−0.43	−0.49
	(−1.55)	(−2.22)	(−2.09)	(−2.27)	(−2.32)
Demographic Variables[1]	No	No	Yes	Yes	Yes
Municipio Dummies	No	No	No	No	Yes
Department Dummies	No	No	No	Yes	No
Decomposition?	All	Male	Male	Male	Male
F-test on Agricultural Shocks[2]	8.32	7.59	7.29	7.09	5.60
	[0.016]	[0.023]	[0.026]	[0.029]	[0.061]
F-test on All Shocks[2]	12.18	7.83	7.54	7.09	5.73
	[0.007]	[0.050]	[0.057]	[0.069]	[0.126]
Pseudo R^2	0.0078	0.0070	0.0080	0.0237	0.0601
Households	1265	1265	1265	1265	1265

*This table contains estimates from an ordered logit model where the dependent variable is male migration.

**All standard errors allow for clustering within municipios.

***t-statistics reported in parentheses.

[1]The demographic controls that were used are indicators for the number of household members at home within certain age and gender brackets reported in Table 2.

[2]p-values are reported below each F-statistic.

[3]In this column, the dependent variable is the sum of male and female migration.

Table 5: Migratory Responses to Adverse Shocks: Female Migration

	(1)	(2)	(3)	(4)
Harvest Loss	0.29	0.29	0.26	0.22
	(1.64)	(1.63)	(1.43)	(0.99)
Livestock Loss	0.20	0.20	0.19	0.27
	(0.92)	(0.93)	(0.83)	(1.03)
Earthquake Damage	−0.07	−0.07	−0.07	−0.09
	(−2.17)	(−2.13)	(−2.02)	(−2.17)
2001 Dummy	−0.09	−0.11	−0.11	−0.02
	(−0.36)	(−0.41)	(−0.40)	(−0.08)
Demographic Variables[1]	No	Yes	Yes	Yes
Municipio Dummies	No	No	No	Yes
Department Dummies	No	No	Yes	No
F-test on Agricultural Shocks[2]	3.87	3.94	2.94	1.88
	[0.145]	[0.140]	[0.230]	[0.390]
F-test on All Shocks[2]	9.12	8.91	7.26	7.14
	[0.028]	[0.030]	[0.064]	[0.068]
Pseudo R^2	0.0082	0.0130	0.0170	0.0769
Households	1265	1265	1265	1265

*This table contains estimates from an ordered logit model where the dependent variable is female migration.

**All standard errors allow for clustering within municipios.

***t-statistics reported in parentheses.

[1]The demographic controls that were used are indicators for the number of household members at home within certain age and gender brackets. Details are in Section 2.3.

[2]p-values are reported below each F-statistic.

Table 6: US Wage Regressions

	(1)	(2)	(3)	(4)
Sex Dummy (= 1 if male)	2.09	2.07	2.11	2.09
	(8.40)	(8.35)	(8.54)	(8.45)
Age	0.28	0.22	0.20	0.20
	(6.16)	(4.83)	(4.21)	(4.21)
Age^2	−0.003	−0.003	−0.003	−0.003
	(−6.82)	(−5.69)	(−4.99)	(−5.06)
US Experience	-	0.30	0.31	0.33
		(7.22)	(7.40)	(7.60)
US $Experience^2$	-	−0.005	−0.006	−0.006
		(−4.94)	(−5.26)	(−5.67)
Education Dummies?	No	No	Yes	Yes
Citizenship Status Dummies?	No	No	No	Yes
R^2	0.0327	0.0469	0.0548	0.0571
N	3738	3738	3738	3738

*These regressions use the same data as Table 3. t-ratios are in parentheses.

Table 7: Adverse Shocks and Hours Worked

	Δ Field Hours		Δ Livestock Hours		Δ Domestic Hours	
	Men	Women	Men	Women	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Harvest Loss	336.53	53.66	29.30	−44.63	−94.78	−71.01
	(2.69)	(1.22)	(0.40)	(−0.86)	(−1.04)	(−0.25)
Livestock Loss	63.16	28.55	155.36	134.41	−59.90	612.01
	(0.41)	(0.47)	(1.96)	(2.36)	(−0.66)	(1.90)
Earthquake Damage	13.40	3.27	9.37	−11.73	8.38	153.80
	(0.90)	(0.62)	(1.11)	(−1.82)	(0.33)	(3.86)
2001 Dummy	−8.07	−5.43	−283.07	−98.54	−435.66	−179.53
	(−0.07)	(−0.16)	(−4.39)	(−2.38)	(−1.67)	(−0.48)
R^2	0.0384	0.0207	0.0381	0.0405	0.0203	0.0644
Households	1265	1265	1265	1265	1265	1265

*This table contains OLS estimates where the dependent variable is the change in hours worked in a particular sector broken down by gender. All regressions contain lagged demographic controls and department dummies.

**All standard errors allow for clustering within municipios.

***t-statistics reported in parentheses.

Table 8: Adverse Shocks and Hours Worked

	Δ Field Hours		Δ Livestock Hours		Δ Domestic Hours	
	Men	Women	Men	Women	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Harvest Loss	134.43	39.99	53.23	−47.50	−52.40	106.98
	(2.07)	(1.58)	(1.19)	(−1.15)	(−0.78)	(0.64)
Livestock Loss	61.60	10.09	69.10	80.74	−19.80	312.64
	(0.76)	(0.37)	(1.32)	(1.98)	(−0.35)	(1.64)
Earthquake Damage	1.31	1.15	5.57	−10.15	−2.88	49.42
	(0.19)	(0.41)	(1.07)	(−2.17)	(−0.25)	(2.20)
2001 Dummy	12.24	−0.37	−180.24	−65.37	−218.45	81.87
	(0.23)	(−0.02)	(−4.09)	(−2.13)	(−2.12)	(0.38)
R^2	0.0247	0.0129	0.0403	0.0370	0.0292	0.0429
Households	1265	1265	1265	1265	1265	1265

*This table contains OLS estimates where the dependent variable is the change in hours worked per adult male or female in a particular sector broken down by gender. All regressions contain lagged demographic controls and department dummies.

**All standard errors allow for clustering within municipios.

***t-statistics reported in parentheses.

Figure 1

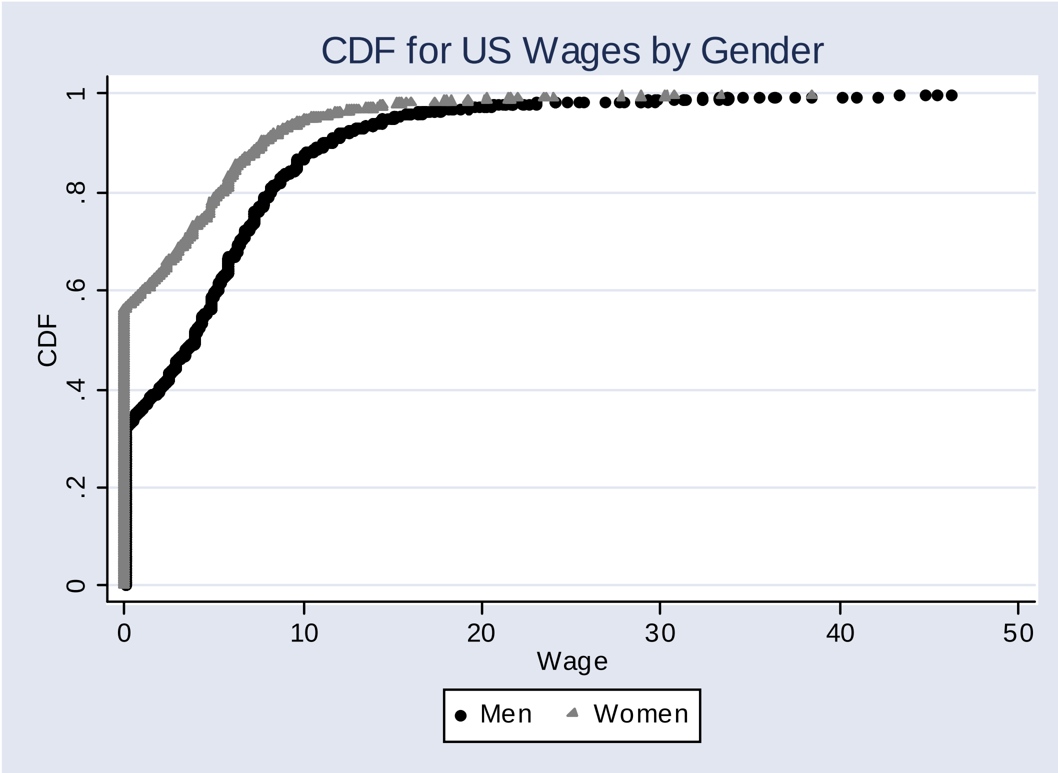

Figure 2

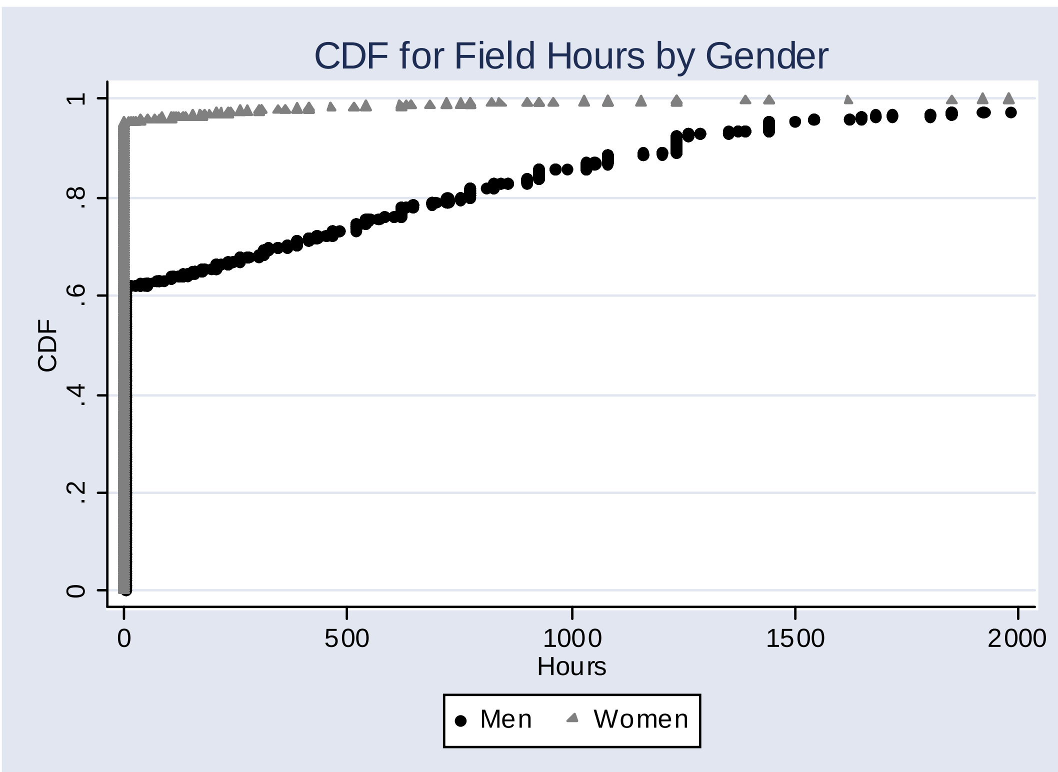

Figure 3

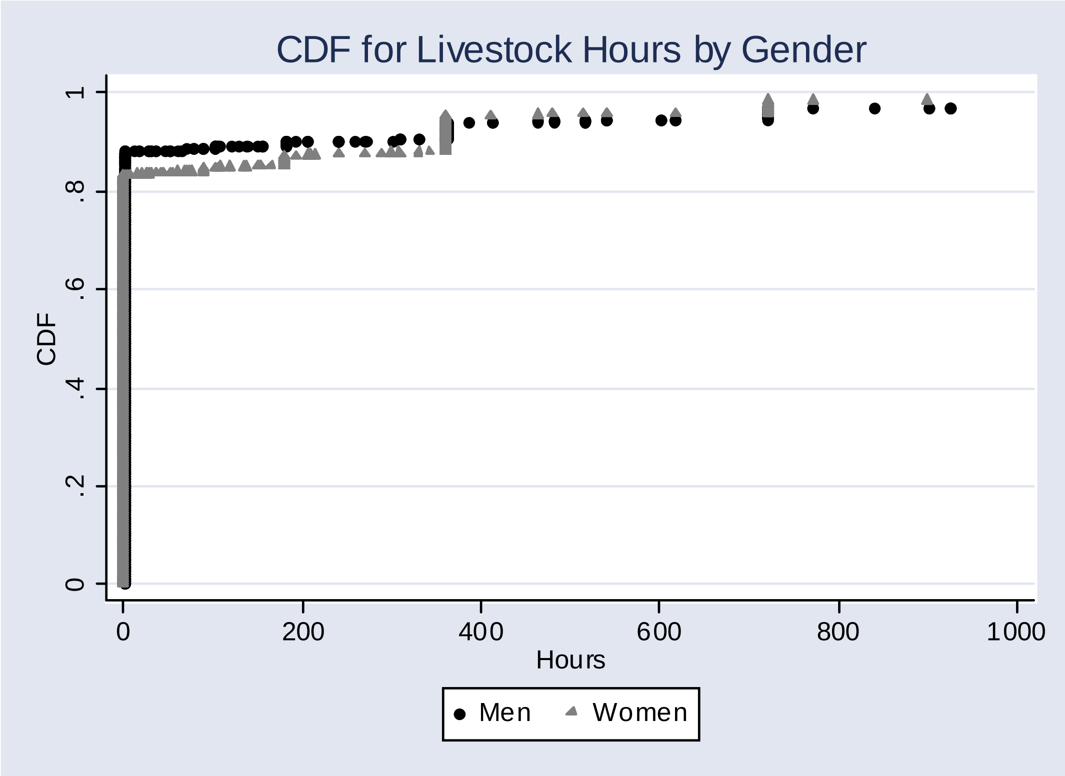

Figure 4