

Love on the rocks: aggressive behavior and alcohol abuse in rural Mexico

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Abstract

I use experimental data for the evaluation of Oportunidades, the Mexican flagship poverty alleviation program, to study the determinants of alcohol abuse and domestic violence. The program, a combination of cash transfers to women and human capital investments, decreases husbands' alcohol abuse by 15% and changes their aggressive behavior depending on transfer size, husbands' education, and spousal age gap. While violence decreases by 37% in households entitled to small transfers, husbands with traditional views of gender roles become more aggressive when the wife's entitlement to a large transfer threatens their identity. This evidence indirectly rejects income pooling between spouses and shows that targeting women as recipients of micro-credit or of other welfare programs may have additional beneficial effects by also reducing alcoholism and domestic violence in most households, but the risk of violence may increase for some.

1 Introduction

The World Health Organization (WHO) declared that interpersonal violence and harmful alcohol use are major challenges to global public health. These issues are especially severe in Latin American countries: in Mexico, 44% of women 15 and older and living with a partner were victim of physical, sexual, psychological, or economic violence in 2003; 70% of males aged 18 to 65 were habitual drinkers, and 40% of males in the same age range drank at least 1 to 3 times a month in 2002. There is also strong evidence of binge drinking: 34% of drinkers had between 5 and 24 drinks at once.¹

Domestic violence and alcohol abuse have strong detrimental effects on both the victims and the drinkers, as well as negative externalities for society as a whole. The victims of violence are affected psychologically, physically, and economically.² Children who witnessed violence become more likely to accept and perpetrate this behavior (Pollack, 2002). While there are no data on the cost of domestic violence in Mexico, estimates of victims' loss of productive capacity are at least 1.6% and 2% of GDP in Nicaragua and Chile (Morrison and Orlando, 1999).

Excessive drinking has been linked to a wide range of diseases, such as gastrointestinal complications, increased risks of some types of cancers, and high blood pressure. Alcohol intoxication also affects physical motor coordination; it is a major cause of automobile accidents, as well as having detrimental social and psychological consequences because of its addictive nature: the WHO estimates that alcohol is responsible for 4% of all years of health lost through disability or premature death worldwide (Krug et al., 2002); in Mexico, 24% of male drinkers aged 12 to 65 committed some alcohol-related crime in 2002.

Lastly, there is a strong link between alcohol abuse and aggressive behavior. In 2003, one in four cases of domestic violence in Mexico involved alcohol abuse (ENDIREH, 2004). Both the economic and the psychiatric literatures, the latter summarized in Leonard (2000, 2005), find that alcohol causes violence. These effects are sizeable: in 1976 a 10% increase in beer tax reduced the likelihood of severe parental violence against children by 2.3 percentage points in the United States (Markowitz and Grossman, 1998); between 1989 and 1991, the elasticity of

¹The Mexican data on violence come from the Encuesta Nacional sobre la Dinamica de las Relaciones en los Hogares, or ENDIREH, a 2003 nationally representative survey on relationship dynamics within the household. The Mexican alcohol data are from the nationally representative 2002 Encuesta Nacional de Adicciones, or National Survey of Addictions, henceforth ENA2002.

²Most of the victims from the ENDIREH sample report some form of psychological damage; moreover, 8% of the victims had bruises, 1.2% cuts and burns, or lost teeth; 1.9% had a hemorrhage or bled; 1% had a fracture; 1% had to undergo surgery; 1.2% had a premature delivery or an abortion; 1.8% had other gynecological problems; 1.8% fainted. 6% had to stop working or studying, while 1.7% had financial losses.

violence with respect to alcohol consumption for U.S. college students varied between 0.3 and 0.6 for offenses such as property damage, trouble with authorities, being involved in a fight, and sexual abuse (Grossman and Markowitz, 2001); higher alcohol prices reduce violence against wives (Markovitz, 1999).³

Understanding what causes alcohol abuse and aggressive behavior is both interesting in itself and essential to design effective policies. The existing evidence provides conflicting results, partly because of the difficulty in addressing the standard omitted variable and reverse causality problems in the absence of exogenous changes in the variables of interest, partly because individuals with different cultural background may react in different ways to similar exogenous changes.⁴

The goal of this paper is twofold: to estimate the effect of Mexico's flagship welfare program, Oportunidades, on aggressive behavior and alcohol abuse, and to understand the determinants of these phenomena. Oportunidades is a poverty alleviation program that targets poor households and makes cash transfers provided the recipients send their children to school, have periodic health care visits, and attend nutrition and health classes. The total transfer size depends largely on household demographics, since, besides a small income support received by all eligible families, the rest of the grant is in the form of scholarships awarded to 3rd to 9th graders conditional on school attendance.

Because almost all children in the sampled villages attend primary school irrespective of the program, most households in practice receive an unconditional transfer, if one neglects the health checks - which are only annual for adults and quarterly for schoolchildren aged 17 and less. This is especially important since the transfer is handed only to women, normally the mothers of the eligible children, and women from eligible households have hardly any income. Thus, not only does the transfer increase the joint spousal income by about 28% without requiring major changes in the recipients' behavior, it also constitutes a 13-fold increase in wife income, raising her share of total spousal income from 3 to 38%.

If alcoholism and domestic violence are influenced by total income and by the relative shares earned by each spouse, Oportunidades will likely affect these behaviors. Indeed, the program

³Markovitz estimates alcohol price elasticities of violence against wife smaller than -1, but she warns that her estimates may suffer from multicollinearity. Mehlum *et al.* (2006) suggest that there may be a link between the higher rye price and the decreased violence through lower consumption of beer in 19th century Bavaria. Carpenter and Dobkin (2008) show that for Californians who just turned 21 a 10% increase in the proportion of days in which they drink increases arrests for robberies, assaults, DUI, drunkenness, and disorderly conduct by almost 1%.

⁴For example, Tauchen, Witte, and Long, 1991, and Bloch and Rao, 2002, estimate the effect of income on violence simply by regressing one on the other. Aizer (2007), on the other hand, uses instrumental variables as a source of exogenous variation to estimate the same causal effect.

managers and field workers were concerned about the potential harmful effect of Oportunidades on these outcomes because many men in the sampled villages associate masculinity with the ability to provide for their families (Maldonado, Najera, and Segovia (2005)). Thus, it is feared that the large increases in wives' relative income may threaten their identity and status, causing violence. This is especially likely since many adults witnessed or experienced domestic violence as children, and exposure to violence is a predictor of future violent behavior or acceptance of violence (Pollak, 2002). On the other hand, a major cause of marital fights is lack of money, so the program poverty alleviation may reduce domestic violence.

Estimating the effect of Oportunidades on abusive behavior is straightforward, since the program is initially offered only in a random group of villages. Thus I can simply compare the observed rates of alcohol abuse and aggressive behavior in eligible households from treated and control villages. Conversely, understanding which features of the program cause the observed behavioral changes is a more challenging task because the program's various components (cash transfers, increases in school attendance, health checks and classes) do not vary randomly among eligible households. To tackle this problem I adopt the following empirical strategy. First, I sketch a model of husband demand for violence and alcohol that reflects the local cultural norms and the concerns of the Oportunidades personnel. In this model, husband utility depends positively on total household income and status, which grows with husband income share. Violence, and probably also alcohol abuse, is a mean to relieve frustration and assert one's status, therefore it is inversely related to total household income and husband income share. Given that eligible households are poor and the share of husband income high, small increases in wife income are more likely to reduce violence than larger changes, as the increase in husband utility given by a reduction in poverty probably more than offsets the disutility from his status loss. Conversely, a big program transfers to the wife may increase violence, if the husband utility loss from his large drop in status dominates the beneficial effect of higher household income. This potential increase in violence is higher the stronger the husband's traditional views of gender roles. Thus, the model predicts different treatment effects depending on the transfer size and the husband's view of gender roles. Second, I test these predictions in my data. Lastly, I check whether alternative theories can explain the observed behavior.

The program causes a 15% drop in alcohol abuse and a 37% reduction in drunken violence among households entitled to the smallest transfer, which are 40% of the sample. The corresponding decrease for the sample of drinkers is 23%. However, violence increases in households in which the wife is entitled to large transfers, if the husband has low education levels. The

average change in violence for this group, which is 17% of the sample, is zero for the entire sample, a 30% increase for the sample of drinkers, and is larger the bigger the spousal age gap. Since low education and large spousal age difference are likely correlates of traditional views of gender roles, the empirical evidence confirms the model predictions. My findings also suggest that the change in violence depends primarily on the program monetary component, as there are no differential effects for women for whom Oportunidades changed social inclusion to different extents, nor evidence of changes in tolerance to violence at the village level. Unlike violence, the program effect on alcohol abuse does not vary with transfer size, changes in female social inclusion, husband education, or spousal age gap. These differential program effects imply the aggressive behavior observed in the data is not simply a side-effect of alcohol abuse.

Since husband behavior depends both on household income and spousal income share, these findings indirectly reject the hypothesis of income pooling within the household, as already done by a large body of empirical research (e.g. (Thomas (1990), Schultz (1990), Bourguignon et al. (1993), Browning et al. (1994), Browning (1995), Lundberg, Shelly, and Wales (1997), Phipps and Burton (1998)), including papers using the Oportunidades data (Attanasio and Lechene (2002) and Rubalcava *et al.* (2006)). However, there are two major differences. First, violence increases with wife income share for traditional households, unlike these latter papers, which find a positive relationship between wife income share and the consumption of goods that increase her utility. Second, since aggressive behavior decreases with spousal income, the program effect on violence is negative for some households and positive for others.

These findings suggest that existing policies that target poor women in rural Mexico, such as conditional cash transfers and micro-credit programs, reduce alcohol dependence and eradicate domestic violence for most families, besides their other positive effects. However, they may also increase the incidence of violence for a specific group of households. We should fine-tune the existing policies or design alternative ones to address this issue.

2 Program and sample characteristics and comparisons with nationally representative data

The data I use are a sample of poor households who live in 506 rural villages from the Mexican states of Guerrero, Hidalgo, Michoacan, Puebla, Queretaro, San Luis Potosi, and Veracruz. The primary purpose for the data collection was the evaluation of the conditional cash transfer program Oportunidades - the flagship welfare program of the Mexican government, started in 1998 and still ongoing, aimed at fostering the accumulation of human capital and at improving

nutrition and health. For this reason, the program is implemented only in a random group of 320 villages. Oportunidades provides bimonthly grants to poor households. The grants are mainly conditional on school attendance for 3rd to 9th graders aged 18 and less, increase by grade and are higher for girls than for boys in 7th to 9th grade. In the second half of 1998 the transfers vary from 100 *pesos* per month for households with no eligible children to a maximum of 625 *pesos*. Importantly, the cash transfers are handed to women. Since wives earn on average 17 *pesos* per month in control villages, the average monthly transfer of 218 *pesos*, about 20 US dollars, causes a 13-fold increase in their income.

From my initial sample of eligible households in treatment and control villages, I exclude households in which the wife is not the survey respondent, since the husband is less likely to disclose information on his violent behavior. I further omit single-headed households, households where multiple families live in the same dwelling, and observations in which at least one of the variables used in the empirical analysis is missing, ending up with a final sample of 12,700 households.

Qualitative village-level data collected in May 1999 reveal that alcohol abuse and domestic violence are perceived as important issues: 27% and 6% of respondents consider alcoholism and domestic violence major problems in the sampled villages. The main dependent variables are the existence of habitual drinkers in the households, and the existence of drunken aggressive behavior. Household-level data on alcohol abuse and aggressive behavior are collected in November 1998, about 6 months after the beginning of the program. The questions asked are “Who is (are) the individual(s) who drinks the most in this household, irrespective of the frequency?” and “While drinking, does this person (referred to the heaviest drinker) have an aggressive behavior?”⁵ About 34% of the control households have at least one drinker, which in 96% of the cases is the male household head. Very few households report having multiple drinkers. Since drinking is much more common in rural areas than what reported in my sample (about 61% of ENA2002 rural males aged 18 to 65 drink), the respondents most likely interpret this question as inquiring about alcohol abuses, or at least frequent consumption.⁶ This is consistent with a comparison of frequency of drinking at the national evidence: in ENA2002, 25% of drinking rural males aged 18 to 65 drink at least once a week, against 36% of drinkers in control villages.⁷

About 15% of drinkers in control villages behave aggressively after drinking, primarily

⁵The questions in the original language are: “Quien(es) es(son) la(s) persona(s) que mas bebe(n) de este hogar, aunque sea de vez en cuando?”, and “Cuando bebe, esta persona tiene una actitud agresiva?”

⁶A possible reason for the vague phrasing of the sentence may be its sensitive content.

⁷The other frequencies are not directly comparable. In control villages, 32% of drinking husbands drink between 1 and several times per month, and the remaining 32 less frequently.

towards their wives but also towards other relatives. Thus, drunken violence occurs in 4.8% of all control households, and it takes places frequently in 32% of the cases in control villages and occasionally in 49% of the cases. Despite considering only households where the wife is the respondent, the sample proportion of domestic violence is substantially lower than the average from the rural sample of the ENDIREH data, in which 10% of rural Mexican women 15 or older who live with a partner were victims of alcohol-induced violence in 2003. The under-reporting is consistent with evidence from different databases that victims of violence may not provide this type of information because they are afraid of their husband's reaction. Moreover, in some cases the husband may be at home while the wife is interviewed.⁸ Because of this under-reporting, the estimated effects of Oportunidades on aggressive behavior may differ from the true effect.

Alcohol abuse and aggressive behavior increase with the household poverty level. In control villages alcohol abuse and related aggressive behavior for the least poor quartile are respectively 10% and 30% lower than for the remaining 75% of the sample. However, the evidence from the national surveys is more complex. For example, in the ENA2002 data alcohol abuses are more frequent in (wealthier) urban than (poorer) rural areas. Further, violence and female education follow an inverse u-shaped relationship: 38% of uneducated women sampled in ENDIREH are victims of violence; the proportion peaks at 52% for women with secondary education and declines beyond that point. Economically active women and women from rural areas are respectively 3 percentage point more likely and 5 percentage points less likely to be victims of violence than a randomly drawn woman. This evidence suggests that violence and alcohol abuse may be caused by multiple factors and confirms that understanding how conditional cash transfers affect them may help unveil some determinants of these phenomena.

Table 1 shows the means and standard deviations for alcohol abuse and aggressive behavior, as well as for the other variables I use in the empirical analysis: at the household level number of eligible children and size of potential transfer (together with actual transfer for comparative purposes), wife and husband age, household size, husband education, and dummies for households i) with no eligible children or with no relatives in the village and ii) with at least one child aged 2 or less; at the village level frequency of natural disasters in the previous six months, poverty level, alcohol price and whether the interviewed village official knows this price. In case of unavailable price information, I use average municipal or state price.

To have a pre-determined measure of potentially eligible children, I use pre-program data

⁸The document summarizing the evidence from ENDIREH 2003 provides interesting, though saddening anecdotal evidence of problems with disclosing sensitive information and husbands monitoring the wives' answers.

collected in September 1997. Since in November 1998 the scholarships are offered to children aged 18 and less who attend 3rd to 9th grade, I count the number of children who were 17 year old or younger in September 1997 and who completed grades 1 to 8 in the 1996-1997 academic year. These children are potentially enrolled in grades 3 to 9 in the school year 1998-1999.⁹ I use a similar procedure to compute the potential transfer. I look at the completed grade in the 1996-1997 school year and assume that no child fails a grade for the next two years. For example, I assume a child who finished first grade in June 1997 is entitled to the scholarship for 3rd grade in November 1998.¹⁰

I use some of these variables in different ways. First, as controls to improve the precision of the estimates. This is especially important with variables like husband education, which have a slightly different distribution in control and treatment villages, and which may determine alcohol abuse and aggressive behavior.¹¹ However, the variables have generally the same means for control and treatment villages, confirming that the randomization was successful.^{12,13} Second, to estimate treatment effects for different subgroups of households. Lastly, I use the price variables as exclusion restrictions in a selection model that I will discuss in the next section.

Besides describing the main variables, Table 1 presents a few important program effects. First, Oportunidades increases monthly spousal income by 40% or about 220 *pesos*, equivalent to the average transfer. Second, since the transfer is handed to women, the share of spousal income earned by the husband decreases by 35 percentage points, from 97 to 62%. Third, alcohol abuse is 13% lower in treatment than control villages, while there is no difference in aggressive behavior. This is the starting point of the econometric analysis.

3 A theory of domestic violence and alcohol abuse

Before starting the empirical analysis, it is useful to have a theory of aggressive behavior and alcohol abuse to understand how the various program components may affect these outcomes,

⁹Given the high retention rates in rural Mexico and the incentives to fail a grade to remain eligible, I expect a non-trivial fraction of 8 graders in the school year 1996-1997 to be still in 9th grade to years later.

¹⁰To create this variable I assume, unlike I did to compute the number of potentially eligible children, that 1996-1997 8th graders are no longer in a subsidized grade two years later. Since the eligible children and potential transfer variables are basically measuring the same thing, in this way I can check whether the estimated treatment effects are robust to making these different assumptions on grade retention.

¹¹While the Mann-Whitney test rejects the hypothesis that husband schooling has the same distribution in control and treatment villages, the actual differences are minimal: 50 and 16% of husbands have at most incomplete and complete primary education in control villages, compared with 48 and 18% in treatment villages.

¹²See Behrman and Todd 1999 for further details on the randomization.

¹³Since I use the average municipal price when the village price is missing, and in a few cases average state prices, I also test for a price difference considering only villages for which price data are available. The average prices for this smaller sample are 10.56 and 9.71 in treatment and control villages, and again their difference is not significant.

which treatment effects to estimate in case the program effects are heterogeneous, and to derive general conclusions on the effects of similar policies in rural Mexico.

One of the program architects' concerns related to handing the transfer to women is that the increase in female income might lead to a surge in domestic abuses. Interviews to groups of husbands conducted by Maldonado, *et al.* (2005) in eligible villages provide a series of reasons to justify these concerns. First, there is a widespread belief that the man should provide for his family. Many men identify masculinity with the ability to provide for their family. Second, domestic violence is associated with power and with the concept of male dominance in the household. Third, as children, most respondents witnessed their fathers' aggressive behavior towards their mothers, or were the direct victims of domestic violence, and most of them actually accept or justify this type of behavior. On the other hand, lack of money is often a cause for tension with their spouses. Therefore, while the wife's large income increase may threaten the male status of primary breadwinner, causing frustration in husbands with traditional gender views, the increase in spousal income may also provide stress relief.

Besides increasing household income and changing the share of income earned by each spouse, Oportunidades may reduce women's vulnerability by increasing their contact with non-household members and their perception of what constitutes an acceptable social norm. This may occur through an increase in children school attendance and through participation to "platicas", as well as through the health checks. Women and children who were otherwise isolated may report abuses to teachers or medical and Oportunidades staff; bruises and signs of violence may be noticed; women may learn that violence is unacceptable. Last but not least, the program may increase the wife's bargaining power by giving her, often for the first time, direct control of part of the household income.

This description suggests a possible theory for aggressive behavior. Consider a husband whose utility is a positive function of household income, Y , and status, S . Income increases husband happiness by enabling the entire family to consume more, while lack of income causes unhappiness and frustration. The marginal utility decreases in both Y and S . Status is a positive function of the share of income earned by the husband, $\frac{Y^h}{Y}$. Domestic violence is a mean to relieve frustration and assert one's status. A husband who feels frustrated because he is poor, or whose leadership in the household is threatened, may resort to violence to reduce his frustration or re-assert his dominance. As such, the husband's demand for violence, V^h , depends inversely on household income and directly on his income share, as well as on the price of violence, p . This price depends both on the wife (H) and the community (K) tolerance of

his actions.¹⁴

$$\begin{aligned}V^h &= g(Y, S, p) \\S &= f\left(\frac{Y^h}{Y}\right) \\p &= l(H, K)\end{aligned}$$

The demand for violence is probably stable and small for a broad range of Y and S combinations, but may increase sharply, or jump discontinuously, once these variables are below a certain threshold, e.g. when husbands feels they are not providing enough income for their family, or when they perceive their status is lower than their peers'. This threshold is likely related to one's identity, beliefs, and expectations. For example, more traditional husbands may have higher thresholds for status, while husbands with more land may have higher income thresholds.¹⁵

Oportunidades affects the demand for violence in three ways. First, by increasing household income, which increases happiness, reducing the need for frustration relief. Second, by decreasing the share of income earned by the husband. Third, by potentially increasing its price. This may occur if educating wives with the health talks and increasing their social inclusion makes violence a less acceptable behavior by. Moreover, the program may make violence less acceptable for the entire community.

This model implies the program effects on aggressive behavior may vary for different households depending on the magnitude of the changes in the various program components. Consider first the effect of the cash transfers. Small income increases are more likely to reduce violence than big ones because of the curvature of the utility function. Since before the program starts the eligible households are poor and the wife earns hardly any income, the marginal utility of income is high and the marginal utility of status is low. Therefore, a small transfer probably increase husband utility through the income rise by more than it decreases utility through the status loss. Conversely, the husbands of wives entitled to large transfers may become more frustrated and resort to violence because the utility increase from a higher income is more than offset by the disutility from their large status loss. In my sample, the smallest and largest potential transfers are 100 and 625 *pesos* per month.¹⁶ For households entitled to the minimum transfer, spousal income would increase from 529 to 616 *pesos*, and the husband income share

¹⁴The price may also be a negative function of husband income share.

¹⁵This is similar to a medication model in which the medication generates utility only when health drops below a certain threshold, but not otherwise. I thank Caroline Hoxby for making this suggestion.

¹⁶The monthly transfer has a cap at 625 *pesos*.

fall from 96 to 70%. The husband would still be the main provider in the couple. However, for families in which the wife is entitled to at least 500 *pesos*, spousal income would grow from 563 to 995 *pesos*, but the husband income share would be almost halved, dropping from 96 to 52%, having husbands and wife contribute to spousal income in equal shares. The more traditional the husband beliefs, the higher the loss of utility caused by this large drop in income share.

Unlike the cash transfers, the net effect of the non-monetary program components is not ambiguous. Increased social inclusion (both directly and through child school attendance), better knowledge of health issues, increased bargaining power, and potential changes in social norms decrease violence.

One could sketch a similar demand function for alcohol abuse. Indeed, if the demand for alcohol abuse is sufficiently similar to the demand for violence, the model predictions discussed above apply also for alcoholism. This is the case if husbands choose to get drunk because they intend to commit violence, given that alcohol loosens inhibitions, or if aggressive behavior is mainly a side effect of intoxication. Unfortunately I don't have as much ethnographic information on the determinants of alcohol abuse. The available evidence is not inconsistent with modelling alcohol as an inferior good: as for violence, alcohol abuse varies inversely with wealth in the sample. However, it is not clear how much one can infer from this association because of both reverse causality and unobserved individual-specific preferences that may be correlated to alcoholism and poverty. As before, the non-monetary program component should reduce alcohol abuse. The empirical analysis will shed more light on what determines alcohol abuse in my data.

4 Identification and estimation

Consider the following average treatment effects:

$$ATE^D = E[D_{i1}|T_i = 1, E_i = 1] - E[D_{i0}|T_i = 0, E_i = 1] \quad (1)$$

$$ATE^V = E[V_{i1}|T_i = 1, E_i = 1] - E[V_{i0}|T_i = 0, E_i = 1] \quad (2)$$

$$ATE^{V|D=1} = E[V_{i1}|D_i = 1, T_i = 1, E_i = 1] - E[V_{i0}|D_i = 1, T_i = 0, E_i = 1] \quad (3)$$

where D and V are indicators for alcohol abuse ($D = 1$) and drunken violence ($V = 1$), T is an indicator for treatment ($T = 1$) and control ($T = 0$) villages and E for eligible households ($E = 1$). As usual, the subscripts 1 and 0 refer to potential outcomes in the presence and in

the absence of the treatment. The parameters ATE^D , ATE^V , and $ATE^{V|D=1}$ are the average treatment effects on eligible households' alcohol abuse and alcohol-induced aggressive behavior for the entire sample and for the groups of drinkers.

Since the program is available only in a random group of villages, identifying the first two parameters is straightforward. As long as the randomization is successful and Oportunidades does not change the behavior of households in control villages, the parameters α_1 and β_1 from the equations below, estimated as a linear probability model, identify these effects because the conditional expectations of the error terms u_i and v_i do not depend on the treatment.

$$D_i = 1\{\alpha_0 + \alpha_1 T_i + \alpha_2 X_i + u_i > 0\} \quad (4)$$

$$V_i = 1\{\beta_0 + \beta_1 T_i + \beta_2 X_i + v_i > 0\} \quad (5)$$

The X variables are household size, household wealth index, spouses age and husband schooling dummies, intensity of natural disasters at the locality level, village poverty level, and regional dummies.

To identify the third parameter one must consider that treatment availability may no longer be independent of unobservable characteristics of families with drinking husbands, if Oportunidades selects a different set of drinkers in treatment villages. In this case, I can identify the causal effect of the program on drinkers' aggressive behavior using a Heckman (1979) selection model:

$$V_i = \gamma_0 + \gamma_1 T_i + \gamma_2 X_i + E(\epsilon_i|T, X, Z, D = 1) + e_i \quad (6)$$

where $e_i = \epsilon_i - E(\epsilon_i|T, X, Z, D = 1)$ and the conditional expectation of e_i is 0 by construction. The model is identified under the following assumptions. First, the error from the drinking equation has the following distribution, $u_i \sim N(0, 1)$. Second, the error of the violence equation (conditional on drinking), ϵ_i , is a linear function of u_i , i.e. $E(\epsilon_i|u_i) = \lambda u_i$. These assumptions imply that $E(\epsilon_i|T, X, Z, D = 1) = \lambda I$, where the parameter $I = \frac{\phi(\alpha_0 + \alpha_1 T_i + \alpha_2 X_i + \alpha_3 Z_i)}{\Phi(\alpha_0 + \alpha_1 T_i + \alpha_2 X_i + \alpha_3 Z_i)}$ is the inverse Mills ratio from the selection equation:

$$D_i = 1\{\alpha_0 + \alpha_1 T_i + \alpha_2 X_i + \alpha_3 Z_i + u_i > 0\}$$

Third, the variables Z affect aggressive behavior only through drinking. These instruments

are village-level price of one liter of aguardiente, a local spirit, and a dummy for price availability, as reported by the interviewed official. The lack of information on alcohol price may either mean that this product is not sold locally (e.g. if there is no local store or market), or that the respondent is either a teetotaler or does not purchase aguardiente. The absence of a local liquor retail outlet likely increases the effective price of alcohol, as one has to add transportation costs. Further, a non-drinking elected official may represent local preferences against alcohol. Thus, my last identification assumption is that, conditional on observables, villages with higher alcohol prices or with missing alcohol price data are less likely to have alcohol-abusing husbands, but that a higher price and price availability have no direct effect on alcohol-induced violence. Under this larger set of assumptions, the parameter γ_1 identifies the effect of the program on drinkers' aggressive behavior, $ATE^{V|D=1}$.

The more challenging task is understanding which program features cause behavioral changes. The difficulty arises because the program components are related to household demographics. While the ideal data would randomly assign the various program components to different families, I can still exploit the variation in both the intensity of the program components (similar families receiving different treatments) and the recipients' characteristics (different families receiving the same treatment) to test whether household behavior is at least consistent with the theory. The outcome of the former exercise must be interpreted with caution. For example, if one finds that treatment effects vary for families entitled to small and large transfers, one cannot identify which part of this variation depends on receiving a different amount of money and which part depends on households having different unobserved characteristics, despite controlling for observed household and village covariates. The latter exercise does not have this ambiguity, as it consists of testing whether the effects of the same treatment differ for households with different characteristics.

I begin by estimating program effects for households entitled to transfers of different sizes to test the model predictions that the program effects on alcohol abuse and domestic violence may differ depending on the changes it causes on spousal income and husband income share. To do that, I group households according to the number of potentially eligible children, C . On average, the higher the number of eligible children in the households, the higher the transfer to which the family is potentially entitled. I estimate the following equation for both drinking and violence (conditional and unconditional).

$$Y_i = \theta_0 + \theta_1 T_i + \theta_2 X_i + \sum_{j=1}^6 \theta_{3j} C_{ij} + \sum_{j=1}^6 \theta_{4j} T_i C_{ij} + u_i \quad (7)$$

The parameters θ_{4j} identify the program effect for households entitled to different transfers. This specification controls for husbands having different preferences for alcohol abuse and violence that are correlated with their household's demographic structure, as long as these preferences are additively separable (as in a standard fixed effect model). The set of conditioning variables X is the same I described above. Importantly, they include observable determinants of alcoholism and violence that are also correlated with potential transfer size, such as spouses age. I also estimate a similar model, replacing eligible children with potential transfer as a continuous variable. Unlike actual transfer, which is likely endogenous because households can choose how many children to send to school, potential transfer is in principle predetermined.

I then proceed to test whether female social inclusion and knowledge affect husband behavior. While all eligible women are required to have health checks, there is variation in their frequency. The mothers of children aged 2 or less have checks every 2-3 months, while women with children aged at least 17 or with no offspring have only annual checks. Therefore, the change in social contact is largest for the first group of women. The program may increase social interaction also for mothers of children who would not have gone to school in the absence of Oportunidades, and for women with no relatives in the village, who may be more socially isolated than women with relatives. Thus, if the program has a beneficial effect through social inclusion, one may expect the effect to be largest for these three groups. To test this hypothesis, I add dummies for each of this group of women to equation (7) and interact them with the treatment dummy.

Husbands' behavior may also respond to changes in social norms. The program's health talks may convince the village residents that domestic violence and alcohol abuse are unacceptable; people may learn about the health cost of excessive alcohol consumption. All this would result in an increase in the price of violence and alcohol abuse. One way to test for this additional program effect is to compare the behavior of ineligible households living in treatment and control villages. While these families are not directly affected by the program, the behavior of ineligible households in treated villages may be indirectly influenced by changes in social norms or information. Moreover, ineligible women in treated villages are also strongly encouraged to attend the meetings; however, the program does not change their income.¹⁷ Therefore, I

¹⁷Monthly food consumption for eligible and ineligible adults is 160 and 220 *pesos* per month. Therefore, the

estimate equations (4), (5), and (6) using the sample of ineligible households in control and treatment villages.

If cultural issues are strong determinants of abusive behavior, it is possible that the program has different effects for husbands with different education levels, age, and spousal age gap. Since the backwardness of one’s belief is likely negatively correlated with education and positively correlated with age and spousal age gap, one would expect the program to have the largest reduction in alcoholism and violence for the most educated and youngest husbands and for husbands who are not much older than their wives. These men’s identity is probably less deeply rooted in a “macho” culture. I test this hypothesis in two ways. First, I estimate separate treatment effects for husbands with different schooling, ages, and spousal age gap. That is, I estimate versions of equation (7) in which I interact these variables by the treatment dummy. Second, I interact the treatment dummy with potential transfer, g , letting the coefficient of this interaction vary for husbands with at least complete primary school ($E = 1$; $E = 0$ for husbands with less than complete primary school, who are 75% of my sample):

$$Y_i = \theta_0 + \theta_1 T_i + \theta_2 X_i + \theta_3 g_i + \theta_4 T_i g_i + \theta_5 E_i T_i g_i + \theta_6 E_i + u_i \quad (8)$$

The parameter θ_5 tests whether the effect of the potential transfer on abusive behavior varies depending on husbands’s education.

5 The effect of Oportunidades and its components on alcohol abuse and aggressive behavior

5.1 The average effect of Oportunidades

The first empirical task is to estimate the average program effect on eligible households. Table 2 provides OLS estimates of equations (4) and (5) and Maximum likelihood estimates of (6). While alcohol abuse is 4.2 percentage points or 15% significantly lower in treatment villages, aggressive behavior does not change on average, neither for the entire sample nor for the subset of drinkers. The absence of a link between the reduction in alcohol consumption and the level of drunken violence rules out that the latter is simply a negative externality of drinking, or that

ineligibles, though better off, are not affluent. Angelucci and De Giorgi (2008) find that ineligible households receive more transfers and loans from friends and relatives. However, this increase in income especially in 1999. Consistent with these results, in unreported regressions I find that in November 1998 there is no difference in the amounts of loans and transfers to ineligible wives in treatment and control villages.

drinking is only a tool to favor violence, in which cases we would have observed a proportional drop in aggressive behavior. On the contrary, it suggests these are distinct activities, at least for some of the husbands, and that the value of drinking may be higher for husbands who are also aggressive, since they are less likely to stop drinking than non-violent husbands.

As regards the other covariates in the regressions, alcohol abuse is highest for 34 year old husbands and in families with 42 year old wives, more frequent in larger households and in villages more subject to natural disasters, and, conditional on these characteristics, does not vary significantly by husband education, household wealth, or village poverty. Aggressive behavior grows with husband age, peaks when wives are 70 or 75, depending on whether I restrict the sample to drinking husbands or not, grows inversely with husband schooling, household wealth, and village poverty.¹⁸ Lastly, both price variables are negative and significant in the selection equation, i.e. higher alcohol prices or lack of price data are associated with a significantly lower likelihood of drinking.

5.2 The effects of the program's monetary and non-monetary components

My next step is testing whether the program effects vary with the transfer size and the change in frequency of social contact for eligible women.

I begin by estimating separate program effects for households with different numbers of eligible children. Table 3 shows that the treatment effect on aggressive behavior varies substantially for different households. For households with no eligible children, violence drops by 1.6 percentage points in the entire group and by 3.4 percentage points in the sample of drinkers (columns 1.1 and 1.2). This is a large decrease: drunken violence is 37% lower for households with no eligible children, almost 40% of all eligible households in the sample, and 23% lower for drinkers. The effect of Oportunidades on violence is very small and statistically insignificant for families with an intermediate number of eligible children (1 to 3) and positive for households with 5 or more eligible children. For example, the program effects on families with 5 eligible children are 0.035 for the unconditional group and 0.119 conditional on drinking (p-values 0.120 and 0.051, respectively), that is the program causes violence to approximately double among these households. The program effect is equally large, albeit imprecisely estimated, for families with 6 or more children. Luckily, families with 5 or more eligible children are only 4% of the total sample. Thus, with the exception of households with 4 eligible children, which also experience a drop in domestic violence, the program's drop in aggressive behavior seems to be

¹⁸In unreported regressions, I reject the hypothesis of a quadratic or cubic relationship between husband age and violence.

inversely related to the transfer size, consistent with the model predictions.

I obtain a similar result interacting the treatment effect with potential transfer using both linear and log-linear specifications (columns 1.3 to 1.6). This is not surprising, since this variable is highly correlated with eligible children (the correlation coefficient is 0.92). Although I impose specific functional forms on this relationship, I am simply interested in checking how the treatment effect on violence varies with potential grant. The linear projection, presented in Figure 1, confirms that Oportunidades causes a drop in violence, both unconditional and conditional on drinking, for households entitled to the smallest transfer size and a rise in violence for households entitled to the maximum grant.

Note that the frequency of violence does not vary by eligible children or by potential transfer size among control households (I cannot reject the hypothesis that the coefficient of the child number dummies are jointly zero in columns 1.1 and 1.2, and the coefficient of potential transfer is negative and insignificant in columns 1.3 and 1.4). Thus, husbands with the same level for aggressive behavior in the absence of the program behave differently depending on the amount of money their wives are entitled to.

Unlike its effect on aggressive behavior, the program effect on alcohol abuse does not vary for families with different demographics, suggesting that the change in alcoholism is not a function of the transfer size (columns 2.1 and 2.2). This result suggests the program may affect different “types” of husbands differently depending on the potential transfer size. For example suppose that violence is an innate personality trait and there are two types of husbands, “violent”, who may be aggressive when drunk, and “non-violent”, who are not aggressive when drunk. The share of drinkers does not change differently for low and high transfer households, but the frequency of aggressive behavior decreases in the former case and increases in the latter. This implies it is mainly “non-violent” husbands who decrease alcohol abuse in high-transfer households. In fact, some latent “violent” husband in this group react to the program by starting to behave aggressively when drunk. Conversely, in low-transfer households “violent” husbands either stop behaving aggressively when drunk or reduce drinking more than “non-violent” types.

Table 4 shows that the effects of Oportunidades on aggressive behavior and alcohol abuse do not differ for households with no relatives in the village, with infants, and with eligible children who were not going to school before the program started (columns 1.1, 1.2, and 4.1). The program supposedly causes the biggest increase in social inclusion for women in these families. Thus, the observed change in domestic violence and alcoholism is likely not related to the change in social interactions, in which case we would have observed a drop in violence

and alcohol abuse in these families. This lack of effect of the “social inclusion” aspect of the program is perhaps not surprising, since most adults are only required to have one health check per year. Moreover, it turns out that most households have health checks irrespective of the program: 72% of households in control villages had health checks in the six months before the interview, against 86% in treatment villages. Similarly, since most children were already going to school before the program started, the increase in female social inclusion caused by higher school attendance is probably not very large.

Columns 2.1, 2.2, and 6.1 from Table 4 provide estimates of the program effect on violence for ineligible households. If the program changed social norms, making abusive behavior less acceptable, alcoholism and violence would decrease among these households. I fail to find these effects in the data, suggesting that either the program does not reduce the tolerance of abusive behavior, or this change does not spill over to the ineligibles. In fact, the estimates are actually positive, although the standard errors are large. In unreported regressions I let the effect of the treatment on ineligible households vary according to the share of eligible households in the village. This is because social norms may be more likely to change and to affect ineligibles’ behavior if a larger share of households is treated. However, in unreported regressions I find that the effects on ineligibles do not vary with the share of eligible households.

Columns 3.1 and 5.1 from Table 4 show IV estimates of the effect of the *actual* transfer. These estimates have a causal interpretation only under the assumptions that the program non-monetary components have no influence on the outcomes of interest, consistent with the evidence discussed before, and that unobserved preferences for violence and alcoholism are not correlated with number of potential grant. Under these assumptions I can estimate the effect of the program transfer on abusive behaviors by 2SLS, using potential transfer as instrument. The intuition is that actual transfer may be endogenous. For example, controlling husbands may both prevent the wife to comply with some of the program requirements and have different preferences for violence and alcohol abuse from non-controlling husbands. Potential transfer is positively correlated with actual transfer and, if the above assumptions hold, has no direct effect on the outcomes. Consistent with the previous results, the IV regressions show that a larger transfer causes an increase in domestic violence: according to these estimates moving from the 25th to the 75th percentile of the transfer distribution increases aggressive behavior by 1.7 percentage points and further moving from the 75th to the 99th percentile increases violence by an additional 4.5 percentage points.¹⁹

Unlike its effect on domestic violence, the program transfer does not seem to affect alcohol

¹⁹The transfers for households in the 25th, 75th, and 99th percentiles are 105, 305, and 850 *pesos*.

abuse. While the transfer coefficient is negative, suggesting a higher drop in alcohol abuse for families that receive a larger transfer, it is not significantly different from zero at conventional levels.

5.3 Heterogeneous effects: education and age

To conclude the investigation of the determinants of alcohol abuse and aggressive behavior, I test whether the treatment effects vary by husband education, age, and spousal age gap. If the increase in female financial independence causes a surge in violence for husbands who find this a threat to their identity, conditional on potential transfer I should observe higher increases in violence for less educated, older husbands married to younger women, as these men are most likely to have traditional views of gender roles.

Before estimating an econometric model, it is useful to look at the data. Table 5 groups households depending on whether the husbands have completed primary school (this is the “high” education category) or not (in which case they have “low” education). About three quarters of husbands belong to the latter category. Consider the top panel. The first column shows how number of eligible children, potential grant, husband and wife age, wealth, spousal income, and husband income share vary with education for eligible households in control villages. The households with the least educated husbands have more eligible children, older spouses, and lower spousal income, although overall they have the same wealth level as households with more educated husbands. Importantly, husband income shares are almost equally high, averaging 96% and 98% for low and high education husbands.

Comparing the first and second columns shows that these variables generally are not statistically different for households in control and treatment villages, and if they (weakly) differ, the averages by village type are similar. The only exceptions are spousal income and husband share, which change because women in treatment villages receive the Oportunidades transfer. However, while the change in husband income share is not too different for low and high educated husbands, as this share drops to 61 and 68%, spousal income increases proportionally more for the least educated, i.e. by roughly 46% versus the 26% increase for the more educated. Thus, if these two groups of husbands had similar preferences, one would expect the program to potentially decrease violence more for the least educated, whose status change is similar to the change for the more educated, but whose bigger income change should increase their utility comparatively more, reducing the need for violence.

Table 5’s lower panel reveals that, while less and more educated husbands in control villages have the same levels of alcohol abuse and aggressive behavior, the program effect on aggressive

behavior is dramatically different: violence drops by more than one third among more educated husbands but does not change for less educated ones. Consistent with the model insights, this finding suggests that for traditional husbands status, and ultimately utility, are much more sensitive to changes in spousal relative income than for more open-minded husbands. For this latter group, any possible disutility from a status loss is more than compensated by the income increase. Alcohol abuse decreases by about 18% for the more educated and by 12% for the less educated, but this difference is not large enough to reconcile the differential response for violence.

Table 6 explores how the program may affect households differently depending on husband cultural norms in a more formal way and considers spousal age as well as husband education. That is, I estimate versions of equations (7) and (8) in which I let program effects vary by education and age. Consistent with the previous evidence, I find that the program effect on violence decreases with husband schooling, increases with his age, and, conditional on husband age, is higher the younger the wife (columns 1.1 and 1.2). Low education, older age, and having considerably younger wives are probably more common among husbands with a more traditional cultural background. As before, the effect on violence is positively correlated with potential transfer.

The next four columns test whether the program effect on violence is really a function of education, or rather whether it depends on current or permanent poverty, which are negatively correlated with schooling.²⁰ The evidence from columns 1.3 to 1.6 rejects this hypothesis: the treatment effect on violence does not vary as a function of husband income or of household wealth, reinforcing the claim that the different program effects depend on one's cultural background.

I further test whether the relationship between the potential transfer and the program effect on aggressive behavior varies depending on husband education. The estimates from this regression, presented in columns 1.7 and 1.8, show that the effect of Oportunidades on violence is an increasing function of potential transfer only for less educated husbands. According to the estimates in column 1.7, the program effect for a couple of average age (i.e. the wife is 38 and the husband 42) is negative and significant if they are entitled to the minimum transfer irrespective of husband schooling. The ATEs on violence are -1.62% and -1.97% for households entitled to the minimum grant with low and high education husbands; they are both statistically significant. However, while the decrease in aggressive behavior for more educated

²⁰For example, husbands who are either temporarily or permanently poor may have a lower tolerance to female financial independence than husbands in better off households, although the model suggests that these husbands would also benefit the most from the income increase caused by the program.

husbands becomes slightly larger (and less precisely estimated) for higher potential transfers, less educated husbands whose wives are entitled to a high transfer become more violent. This effect is statistically insignificant in the entire sample for a couple of average age, but becomes positive and significant as the spousal age gap increases. For example, aggressive behavior significantly increases by 1.4 percentage points for 40 year old husbands married to 30 year old wives.²¹ The estimates for the sample of drinkers provide a similar pattern of results, as shown in Figure 2 for low-education husbands, with the difference that there is a positive and significant increase in violence among recipients of the largest grants, irrespective of spousal age.²² For example, aggressive behavior significantly increases by 30% among drinkers with wives entitled to at least 500 *pesos*.

As a further check that the monetary effect of the program differs depending on one’s cultural background, I estimate the effect of actual transfer on aggressive behavior for eligible households by 2SLS, interacting the transfer with the high education dummy. The results, shown in column 2.1, confirm that aggressive behavior is a positive function of the transfer size only for less educated husbands, while violence does not vary with the transfer for more educated husbands.

Once more, the incidence of alcohol abuse in control villages does not depend on spouses’ age, husband education, or potential transfers, and the program effects do not differ depending on the levels of these variables, or on actual transfer. A tentative interpretation of the results in light of the theoretical model could be that, while the program reduces alcohol abuse for all husbands, the additional reduction in frustration caused by larger transfer sizes is perfectly offset by the reduction in status caused by the wife’s higher power in the household. However, besides showing that the program causes a drop in alcoholism and that drunken violence is not simply a side effect of alcohol abuse for all husbands, this analysis does not provide further conclusive evidence on the determinants of alcohol abuse.

5.4 Consistency checks

This Section investigates how the program affects the frequency of alcoholism and violence, besides its effect on the share of abusive husbands, and discusses the implications of observing only one type of aggressive behavior, drunken violence.

²¹Luckily, this large age gap is uncommon. The median spousal age gap in the sample is 3 and 4 years for less and more educated husbands.

²²I obtain the estimates of the treatment effect in Figure 2 and its 95% confidence interval by smoothing the estimated effects for different potential transfer sizes and spousal ages from column 1.8, using a locally weighted regression, a tri-cube weighting function, and a bandwidth of 0.3.

It is important to establish how the frequency of abusive acts, as well as the number of abusive husbands, is affected by the program, as Oportunidades may have different effects on the extensive and intensive margins of alcohol abuse and aggressive behavior. I group husbands according to the frequency of alcohol abuse and violence. Infrequent alcohol abuse occurs up to several times per month, but less than once a week, while frequent alcohol abuse occurs at least weekly. The information on aggressive behavior is less detailed, as the respondents are asked only if this behavior is rare, occasional, or frequent. I consider the first two responses as infrequent violence.

Table 7 compares the abusive behavior of eligible husbands in control and treatment villages both for the entire sample and considering less and more educated men separately. The pattern of results is similar to the outcomes at the extensive margin, as frequent and infrequent abusive behavior changes in the same direction, albeit perhaps to different extents. For example, while on average there is no change for low-education husbands, frequent and infrequent violence decrease from 1% to 0.5% and from 3.6% to 2.3% among the more educated. Thus, it appears that frequent abuses drop proportionally more than infrequent abuses, i.e. by 50% versus 36.1%. The change in alcoholism follows a similar pattern, as both frequent and infrequent alcohol abuse drop for the whole sample, the former from 11.6% to 9.2% and the latter from 20.7% to 18.5%, i.e. by 20.7% versus 10.6%. This pattern is independent of husband education, although, as already noted, there is a slightly bigger drop in alcoholism among more educated husbands. To conclude, the program decreases alcohol abuse for all and violence for more educated husbands at both the extensive and intensive margins.

Table 8 estimates the program effects by multinomial logit using this new grouping for aggressive behavior and alcohol abuse. Two things are worth mentioning. First, these regressions broadly confirm the results from the analysis at the extensive margin. Second, all the significant interactions are in the odd columns, for infrequent drinking and violence. Thus, the increase in violence among less educated men with wives entitled to large transfers is probably caused by husbands who were previously not behaving aggressively (column 1.5) and, among the more educated, the receipt of a large transfer induces some infrequent drinkers to stop drinking (column 2.5). The only new result from this Table that is not consistent with the remaining evidence is the significant increase in alcohol abuse in families in which children were previously not going to school.²³

Since I cannot observe non-drunken violence, one potential concern is whether some hus-

²³However, note that the overall effect of the program on alcohol abuse for families with eligible children previously not going to school is statistically insignificant at the extensive margin and negative and significant at the intensive margin.

bands switch from drunken to sober violence. This appears inconsistent with the evidence from follow-up interviews to the program recipients, undertaken in May 1999 in the same sample of treated villages I observe in November 1998. These interviews show the recipients have a positive perception of the program overall effects. When asked about how being an Oportunidades beneficiary affected their lives, the recipients' most common answers suggest increased freedom and security: 55% of women report feeling safer, 50% having money at their disposal, 20% being able to decide what to purchase, and 13% being free to spend on whatever they need. 72.6% of women report an improvement in at least one of the previous categories and only 0.1% report having problems with their spouses. This additional evidence suggests that husbands in households with drops in drunken violence are not simply changing their type of violent behavior (e.g. from drunken to sober violence), but that the quantity of overall domestic violence must also be dropping.

Interestingly, the share of women with increased life satisfaction and security is significantly higher among those entitled to the largest grants: 69% of women eligible for the smallest grant, 100 *pesos* per month, have increased freedom and security, versus 75% of women entitled to at least 500 *pesos* per month. This result confirms that probably only a small fraction of women ends up suffering from an increase in domestic violence because of the program.

The improvements in life satisfaction and security are more frequent for wives of more educated husbands, especially for women entitled to large transfers. For example, the increase in life satisfaction is 1.4 percentage point (or 2%) more frequent for women eligible for the smallest grant if their husband is more educated, and 3.8 percentage point (or 5%) higher for women entitled to at least 500 *pesos* per month if their husband is more educated. This is consistent with the hypothesis that women from less traditional households benefit more from the program, as implicitly predicted by the model.

6 Domestic violence: alternative explanations

The empirical evidence suggests that culture is an important determinant of domestic violence. Understanding what causes this behavior helps us predict which households are at risk of higher domestic violence as consequence of welfare programs that target women, or, more broadly, how exogenous changes in absolute and relative spousal income affect aggressive behavior. Therefore, it is especially important to check whether the main alternative theories are consistent with the observed behavior. In general, the alternative theories I consider are inconsistent with the empirical evidence for two reasons. First, their predicted change in violence holds only for

selected groups of households. Second, even for these selected groups, the pattern of inter-spousal transfers does not seem consistent with what these alternative theories imply.

First, consider the intrinsic view of domestic violence. According to this theory, violence provides direct utility to the husbands. Since violence supposedly reduces the wives' wellbeing, these women could use the program transfer to pay their husbands to reduce their aggressive behavior.²⁴ There is evidence that, as the share of household income brought by the wife (Attanasio and Lechene (2002)) or the transfer size (Rubalcava *et al.* (2006)) increase, the consumption of food and child clothing and the quantity small livestock increase. Moreover, this theory correctly predicts the observed drop in domestic violence for low-transfer households. However, it fails to explain the increase in aggressive behavior for older, less educated husbands whose wife is entitled to a large transfer. In fact, according to the intrinsic view, the drop of in violence should be highest for these households. Further, if wives used the program transfer to pay for a reduction in violence, we would observe a reduction in net transfers from their husbands. However, I find no evidence of this change: only 0.15% and 0.27% of women entitled to the smallest and highest grants - 100 and at least 500 pesos per month - hand some money to their husbands. On the contrary, husbands reduce the transfers to their wives more if the wives are entitled to large transfers. For example, the likelihood that husbands make smaller transfers to their wives is 1.6 percentage points, or 35% larger among wives entitled to the biggest transfers than among recipients of the smallest potential transfers.²⁵

An alternative explanation consistent with intrinsic view, but not involving changes in intra-household transfers, is that eligible wives may use the divorce threat to bargain for lower violence. That is, the program existence may favor the dissolution of abusive relationships and reduce the level of violence in surviving relationships by making divorce a more credible threat.²⁶ However, the threat of divorce does not predict the observed increase in aggressive behavior among a minority of households. Moreover, the divorce threat is probably not credible among households in which violence drops, i.e. the ones entitled to the smallest transfer. First, wives could barely survive with 100 *pesos* per month if they were to leave their husbands, since food consumption alone averages 160 *pesos* per adult per month in the absence of the program (Angelucci and De Giorgi, 2008). Second, at the beginning the program was not guaranteed

²⁴See, e.g., Aizer (2007) for US evidence consistent with violence being inversely related to wife bargaining power.

²⁵The significance of this difference decreases as I condition on other household and spousal characteristics.

²⁶There are examples of this type of behavior in Canada and the U.S.A.: using Canadian data, Bowlus and Seitz (2006) find that violent marriages end in divorce when the wife has the possibility to leave; Stevenson and Wolfers (2006) establish a negative relationship between the adoption of unilateral divorce law and domestic violence in the U.S.A..

to continue after 1999. Thus, wives do not expect a large change in their permanent income. Lastly, divorce is not as socially acceptable in Mexico as in other countries. For example, the divorce rate in rural Mexico is 0.10 per thousand inhabitants, 5.7 times as small as the U.S. rate (United Nations Demographic Yearbooks 2002 and 2003). Overall, this evidence provides little support for the intrinsic view.

An alternative theory posits that husbands use violence to control their wives' resources.²⁷ According to this view, the program's cash transfers to women should result in higher violence, as husbands use it to take the money away from their wives. This theory does not seem to explain the behavior of the sampled households, since violence actually decreases for a large group of households. Moreover, in the context I am analyzing this theory has two shortcomings, one theoretical and the other empirical. At the theoretical level, the need for actual violence arises only if the wife has imperfect information on whether her husband would truly resort to aggressive behavior to take her money. However, unless the relationship is recent, the wife likely knows her husband's "type", therefore there is no need for violence in equilibrium (i.e. the wife hands the money to her husband without being beaten up). At the empirical level, the data do not support this theory, as hardly any wife entitled to high transfers has the program money confiscated by her husband, as I showed before.²⁸ In sum, the change in violence in my data seems related to the interplay between changes in spousal total and relative income and husband cultural background.

It is important to reconcile the potentially contradictory results of increased expenditure on child-specific goods with the observed increase in violence for some households. In other words, if women are successful at bargaining for more children clothes, why can't they also bargain for lower domestic violence? While it is probably impossible to answer this question with certainty given the available data, here are some tentative explanations. First, the observed change in the composition of consumption is consistent with at least two alternative mechanisms besides an increase in female bargaining power. One is a knowledge shock: the change in budget composition is caused by the nutrition and health talks, which, e.g., inform eligible households about the importance of a diverse diet, especially for children. An additional one is a "mental accounting" mechanism: the program recipients know they are receiving money to improve their and their children health and nutrition, and behave accordingly (Thaler (1992) and Duflo and

²⁷E.g. using South Indian data, Bloch and Rao (2002) find that husbands are more likely to beat wives who belong to rich families to extract more resources from them.

²⁸Also, it is unlikely that husbands in this sample commonly use violence to take their wives' money, since most wives earn no income in the absence of the program. On the other hand, it is still possible that husbands may resort to aggressive behavior to control wives' non-monetary resources, or that Oportunidades may be changing their behavior, since for the first time it causes women to have some financial resources.

Udry (2004)). Second, we don't know how expenditures change in households that experience a surge in violence; perhaps different households have different changes in expenditures. Third, wives of traditional husbands may also have traditional beliefs and accept - and even justify - their husbands' abusive behavior. They may not oppose their husbands' violence in the same way the husbands justify the violence they were subjected to as children (Maldonado *et al.* (2005)). To conclude, the observed increase in violence for some households is not inconsistent with the observed changes in budget shares.

7 Conclusions and Policy Implications

Oportunidades's benefit package - which improves health and school enrollment, increases average wife's monthly income by 20 dollars (a 13-fold increase) and favors social inclusion for women - causes a 15% reduction in alcohol abuse and a 37% decrease in drunken violence among households entitled to the minimum transfer, about 40% of the sample. At the same time, the program causes an increase in violence committed by uneducated husbands, especially when married to younger women, if their wives are entitled to large transfers. This higher incidence of violence for a specific group of households is consistent with the concern of the program managers, who expected husbands with traditional views of gender roles to become violent in response to the perceived threat in their identity posed by their wives' receipt of the program transfers. The empirical evidence also suggests that the change in violence appears to be caused by the monetary program component, rather than by the change in women social inclusion and knowledge.

If one is willing to generalize these results, they have the following implications. First, this evidence indirectly rejects income pooling among spouses. However, unlike most of the existing empirical evidence, in some households the increase in female income share has some harmful effects for women, as it increase their husbands' aggressive behavior. Second, while welfare programs that increase women's income, such as conditional cash transfers and micro-finance programs, may have additional benefits besides their direct ones, as they reduce alcohol abuse and domestic violence for many poor households, these programs may also increase the incidence of violence in a minority of households that can be easily identified by looking at husband education and spousal age. Additional policies aimed at, e.g., making violence more costly, should be implemented to protect the members of these households.²⁹ The magnitudes of the additional benefits for households that experience lower alcoholism and violence are hard

²⁹For example, one may increase the frequency of visits from program promoters to families at high risk of violence, or the frequency of health checks.

to quantify, as to my knowledge there are no estimates of the cost of alcoholism and domestic violence for Mexico.³⁰ Third, the evidence of increased violence among a minority of households suggests that some women from households at risk may choose not to participate to income-enhancing or lending programs, or even to refrain from working, for fear of the repercussions. Reducing domestic violence by increasing its price in the short run and changing traditional gender views in the long run may then help reduce poverty and promote development.

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³⁰The World Health Organization (WHO, 2004) reported an increase in mortality rates from ischaemic heart disease and cirrhosis of the liver, for which alcohol is one of the underlying risk factors: for example, liver cirrhosis is one of the top 10 causes of death among the Mexican population, and it is the most common cause of death among males between 35 and 54 years of age. The mortality rate due to alcohol has increased from 7.8/100 000 persons in 1970 to 12/100 000 persons in 1995 within the population 15 years of age and older (Medina-Mora *et al.*, 2000). Higher mortality is only a fraction of the overall costs of alcohol abuse and domestic violence.

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Table 1: Means and standard deviations of the main variables

	Aggressive behavior	Alcohol abuse	Eligible children	Potential transfer	Spousal income	Husband income share
Control	0.047 [0.212]	0.321 [0.467]	1.46 [1.49]	281.7 [192.0]	551.9 [746.3]	0.966 [0.149]
Treatment	0.043 [0.202]	0.279 [0.449]	1.51 [1.52]	290.4 [195.8]	778.3 [857.7]	0.624 [0.315]
Difference (p-value)	(0.277)	(0.007)	(0.182)	(0.082)	(0.000)	(0.000)
	Wife age	Husband age	Household size	Husband education ^a	Wealth	No relatives
Control	38.4 [13.7]	43.0 [14.8]	5.87 [2.52]	1.06 [0.99]	690.74 [118.84]	0.199 [0.400]
Treatment	38.1 [13.6]	42.5 [14.6]	5.89 [2.46]	1.10 [1.03]	683.79 [113.71]	0.177 [0.382]
Difference (p-value)	(0.528)	(0.272)	(0.767)	(0.065)	(0.336)	(0.185)
	Child not in school ^b	Household with infant ^c	Natural disaster ^d	Village poverty ^e	Price of alcohol ^f	Price unavailability ^g
Control	0.043 [0.203]	0.412 [0.492]	0.48 [0.26]	0.48 [0.74]	11.95 [4.90]	0.74 [0.44]
Treatment	0.041 [0.198]	0.423 [0.494]	0.46 [0.25]	0.46 [0.71]	12.06 [4.75]	0.78 [0.41]
Difference (p-value)	(0.589)	(0.407)	(0.456)	(0.843)	(0.741)	(0.315)

I used standard errors clustered at the village level to compute the p-values. 12700 observations. Potential and current transfers are for the previous two months. ^a: dummies for i) no education, ii) some and iii) complete primary school, iv) some and v) complete middle school, and vi) beyond 9th grade. I report the p-value of a Mann-Whitney test that this variable has the same distribution for treatment and control households. ^b: no eligible children in the households or no relatives in the village. ^c: at least one child aged 2 years or less in the households. ^d: at least one natural disaster in the village in the previous six months (flood, frost, drought, fire, earthquake, pests). ^e: village marginalization index. ^f: price of one liter of aguardiente. Daily wages (in *pesos*) are average wages for male agricultural workers. ^g: alcohol price data not provided by village public servant. Natural disasters, village poverty, and price data averages are based on 506 observations, the number of villages in the sample.

Table 2: Abusive behavior - average treatment effects

	Alcohol abuse OLS -1	Aggressive behavior OLS -2	Heckman -3
Treatment	-0.042	-0.006	0.002
	[0.016]***	[0.005]	[0.014]
Husband age	0.004	-0.001	-0.001
	[0.003]	[0.000]**	[0.001]
Husband age ² /100	-0.006		
	[0.002]**		
Wife age	0.005	0.003	0.007
	[0.002]**	[0.001]***	[0.004]**
Wife age ² /100	-0.006	-0.002	-0.005
	[0.002]**	[0.001]***	[0.003]
Average natural disasters	0.099	0.010	-0.010
	[0.036]***	[0.012]	[0.035]
Household size	0.006	0.001	-0.001
	[0.002]***	[0.001]	[0.003]
Incomplete primary	0.003	-0.006	-0.019
	[0.011]	[0.005]	[0.018]
Complete primary	0.004	-0.004	-0.012
	[0.016]	[0.007]	[0.022]
Incomplete middle school	-0.051	-0.018	-0.041
	[0.033]	[0.012]	[0.046]
Complete middle school	-0.012	-0.020	-0.060
	[0.025]	[0.009]**	[0.032]*
Beyond 9th grade	-0.050	-0.020	-0.051
	[0.037]	[0.015]	[0.057]
Wealth index	0.081	-0.049	-0.215
	[0.054]	[0.022]**	[0.065]***
Village poverty	0.009	-0.011	-0.047
	[0.013]	[0.004]***	[0.012]***
From selection regression:			
Alcohol price			-0.181
			[0.048]***
Price availability			-0.013
			[0.006]**
Observations	12700	12700	3757

Standard errors clustered at the village level. *, **, *** significant at 10%, 5%, and 1%. See Table 2 for the complete set of covariates.

Table 3: Changes in abusive behavior by eligible children and potential transfer

	Aggressive behavior				Alcohol abuse			
	Eligible children		Potential grant		Eligible children		Potential grant	
	OLS	Heckman	OLS	Heckman	OLS	Heckman	OLS	Heckman
Treatment	-0.016 [0.005]***	-0.034 [0.018]*	-0.016 [0.006]**	-0.040 [0.020]**	0.002 [0.007]	0.032 [0.020]	-0.044 [0.019]**	-0.026 [0.020]
T*(potential transfer)			0.017 [0.010]*	0.070 [0.027]**				-0.030 [0.024]
T*ln(potential transfer)					0.010 [0.005]**	0.041 [0.015]***		
Potential transfer			-0.001 [0.009]	-0.010 [0.025]				0.026 [0.023]
ln(potential transfer)					-0.002 [0.005]	-0.011 [0.014]		
T*(1 child)	0.013 [0.011]	0.029 [0.034]					0.026 [0.025]	
T*(2 children)	0.019 [0.011]*	0.070 [0.032]**					-0.004 [0.026]	
T*(3 children)	0.023 [0.012]*	0.063 [0.035]*					0.015 [0.030]	
T*(4 children)	-0.012 [0.015]	0.004 [0.042]					-0.053 [0.034]	
T*(5 children)	0.051 [0.023]**	0.153 [0.061]**					0.008 [0.057]	
T*(>5 children)	0.053 [0.053]	0.188 [0.126]					-0.118 [0.114]	
P-values:								
Joint sign. Of T*(child no.)	0.049	0.028					0.418	
Joint sign. Of child no.	0.423	0.191					0.705	
Observations	12700	3757	12700	3757	12700	3757	12700	3757

Standard errors clustered at the village level. *, **, *** significant at 10%, 5%, and 1%. See Table 2 for the complete set of covariates.

Table 4: Changes in abusive behavior by various household characteristics and actual transfer

	Aggressive behavior				Alcohol abuse			
	Eligibles		Ineligibles		Eligibles	Eligibles		Ineligibles
	OLS	Heckman	OLS	Heckman	2SLS	OLS	2SLS	OLS
	1.1	1.2	2.1	2.2	3.1	4.1	5.1	6.1
Actual transfer					0.083 [0.031]***		-0.030 [0.081]	
Treatment	-0.020 [0.007]***	-0.052 [0.024]**	0.009 [0.006]	0.031 [0.022]		-0.033 [0.021]		-0.004 [0.017]
T*potential transfer	0.034 [0.019]*	0.137 [0.055]**				-0.061 [0.049]		
T*no school	0.019 [0.018]	0.040 [0.058]				0.061 [0.041]		
T*no relatives	0.003 [0.011]	0.019 [0.033]				0.006 [0.023]		
T*infant	0.007 [0.008]	0.018 [0.023]				0.011 [0.018]		
Potential transfer	-0.006 [0.018]	-0.037 [0.052]				0.049 [0.045]		
No school	-0.015 [0.013]	-0.032 [0.043]				-0.048 [0.031]		
No relatives	0.009 [0.009]	0.021 [0.025]				0.002 [0.017]		
Infant	-0.003 [0.007]	-0.003 [0.018]				-0.014 [0.015]		
P-values:								
Joint sign. T*(vulnerable)	0.603	0.722				0.495		
1st stage IVs joint sign.					337.82		337.82	
Observations	12700	12700	3242	3242	7626	12700	7626	3242

Standard errors clustered at the village level. *, **, *** significant at 10%, 5%, and 1%. See Table 2 for the complete set of covariates. “Vulnerable” wives are wives whose eligible children were not going to school before the program, who have no relatives in the village besides their nuclear family, or who have infants.

Table 5: Household characteristics by husband education and village type

Husband schooling	Control	Treatment	Difference by village type
Eligible children			
low	1.55	1.62	[0.144]
high	1.18	1.22	[0.589]
p-value	[0.000]	[0.000]	
Potential transfer			
low	0.29	0.30	[0.081]
high	0.24	0.25	[0.367]
p-value	[0.000]	[0.000]	
Husband age			
low	45.94	45.93	[0.987]
high	33.10	32.23	[0.088]
p-value	[0.000]	[0.000]	
Wife age			
low	40.90	41.18	[0.619]
high	29.69	28.85	[0.085]
p-value	[0.000]	[0.000]	
Wealth index			
low	0.69	0.68	[0.377]
high	0.70	0.69	[0.299]
p-value	[0.106]	[0.174]	
Husband income share			
low	0.96	0.61	[0.000]
high	0.98	0.68	[0.000]
p-value	[0.002]	[0.000]	
Spousal income			
low	513.81	750.57	[0.000]
high	684.21	863.09	[0.001]
p-value	[0.000]	[0.005]	
Aggressive behavior			
low	0.048	0.046	[0.763]
high	0.047	0.031	[0.038]
p-value	[0.956]	[0.005]	
Alcohol abuse			
low	0.320	0.281	[0.020]
high	0.331	0.272	[0.016]
p-value	[0.538]	[0.515]	

Table 6 – continued from previous page

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	3.1	3.2	3.3
T*wealth					0.008	0.018						
					[0.036]	[0.108]						
Potential transfer	0.009	-0.035	0.008	-0.04	0.007	-0.041	0.008	-0.039	0.054	0.054	0.052	
	[0.017]	[0.047]	[0.017]	[0.047]	[0.018]	[0.048]	[0.017]	[0.048]	[0.049]	[0.049]	[0.048]	
Schooling	0.001	0.003							0.004	0.004		
	[0.004]	[0.011]							[0.008]	[0.008]		
School dummy (if ≥ primary sch.)							0.004	0.016			0.015	
							[0.022]	[0.062]			[0.058]	
Wife age	0.015	0.052	0.015	0.053	0.015	0.053	0.015	0.052	0.009	0.050	0.049	0.056
	[0.005]***	[0.016]***	[0.005]***	[0.016]***	[0.005]***	[0.016]***	[0.005]***	[0.015]***	[0.013]	[0.046]	[0.046]	[0.028]**
Wife age ²										-0.006	-0.005	-0.006
										[0.005]	[0.005]	[0.003]**
Husband age	-0.010	-0.025	-0.011	-0.027	-0.010	-0.025	-0.010	-0.025	0.008	0.047	0.046	0.037
	[0.005]**	[0.015]*	[0.005]**	[0.015]*	[0.005]**	[0.015]*	[0.005]**	[0.015]*	[0.012]	[0.045]	[0.044]	[0.033]
Husband age ²										-0.007	-0.007	-0.006
										[0.004]	[0.004]	[0.003]*
Husband income			-0.006	-0.021					0.000			0.000
			[0.004]	[0.015]					[0.003]			[0.007]
Wealth	-0.039	-0.212	-0.044	-0.225	-0.050	-0.236	-0.044	-0.227	0.009	0.082	0.077	0.071
	[0.022]*	[0.065]***	[0.022]**	[0.064]***	[0.031]	[0.082]***	[0.022]**	[0.064]***	[0.034]	[0.054]	[0.053]	[0.092]
1st stage IV joint sig.: actual transfer									171.08			167.57
1st stage IV joint sig.: actual transfer (if ≥ primary sch.)									497.03			444.81
Obs.	12700	12700	12700	12700	12700	12700	12700	12700	7626	12700	12700	7626

Standard errors clustered at the village level. *, **, *** significant at 10%, 5%, and 1%. See Table 2 for the complete set of covariates.

Table 7: Changes in the frequency of abusive behavior.

	Whole sample		Low education		High education	
	Proportion	Std. Err.	Proportion	Std. Err.	Proportion	Std. Err.
Violence:						
No violence						
Control	0.953	0.003	0.953	0.004	0.952	0.006
Treatment	0.958	0.003	0.955	0.003	0.970	0.004
Infrequent						
Control	0.031	0.002	0.030	0.003	0.036	0.005
Treatment	0.027	0.002	0.028	0.002	0.023	0.003
Frequent						
Control	0.015	0.001	0.016	0.002	0.010	0.003
Treatment	0.013	0.001	0.015	0.001	0.005	0.001
Alcohol:						
No alcohol						
Control	0.676	0.012	0.679	0.012	0.666	0.019
Treatment	0.722	0.010	0.720	0.011	0.729	0.015
Infrequent						
Control	0.207	0.009	0.203	0.009	0.220	0.014
Treatment	0.185	0.008	0.183	0.008	0.190	0.011
Frequent						
Control	0.116	0.008	0.117	0.008	0.113	0.013
Treatment	0.092	0.006	0.096	0.006	0.080	0.010

Standard errors clustered at the village level. Alcohol abuse: infrequent=rarely to several times per month; frequent=once per week or more often. Aggressive behavior: infrequent=rarely or occasionally; frequent=frequently. Low and high education refer to husband schooling. Low= no schooling or incomplete primary school; high=at least complete primary school.

Table 8: Changes in frequent and infrequent abusive behavior

	Aggressive behavior					Alcohol abuse						
	1.1	1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3	2.4	2.5	2.6
	Infreq.	Freq.	Infreq.	Freq.	Infreq.	Freq.	Infreq.	Freq.	Infreq.	Freq.	Infreq.	Freq.
Treatment	-0.004 [0.003]	-0.002 [0.002]	-0.020*** [0.007]	-0.003 [0.004]	-0.001 [0.010]	0.006 [0.006]	-0.027** [0.012]	-0.018* [0.010]	-0.024 [0.018]	-0.014 [0.014]	0.041 [0.083]	-0.044 [0.069]
T*(potential transfer)			0.035*** [0.013]	-0.003 [0.009]	0.041*** [0.013]	-0.003 [0.009]			-0.027 [0.039]	-0.018 [0.027]	0.005 [0.050]	-0.029 [0.033]
T*(potential transfer (if \geq primary sch.) T*wife age					-0.041** [0.020]	-0.006 [0.019]					-0.092* [0.053]	0.003 [0.045]
T*husband age					-0.001*** [0.000]	-0.000 [0.000]					-0.002 [0.006]	-0.001 [0.004]
T*no school			0.037 [0.039]	-0.001 [0.007]	[0.000]	[0.000]			0.120** [0.052]	-0.026 [0.020]	[0.005]	[0.004]
T*no relatives			0.001 [0.007]	0.001 [0.005]					-0.000 [0.020]	0.003 [0.014]		
T*infant			0.004 [0.006]	0.005 [0.005]					0.003 [0.014]	0.006 [0.012]		
T*wife age ²											0.003 [0.006]	0.000 [0.004]
T*husband age ²											0.001 [0.005]	-0.002 [0.004]
Observations	12658	12658	12658	12658	12658	12658	12700	12700	12700	12700	12700	12700

Robust standard errors clustered at the village level in brackets. *, **, *** significant at 10%, 5%, 1%.

Potential transfer in thousands of pesos. Age and age squared divided by 10 and 100.

See Table 2 for the complete set of covariates.

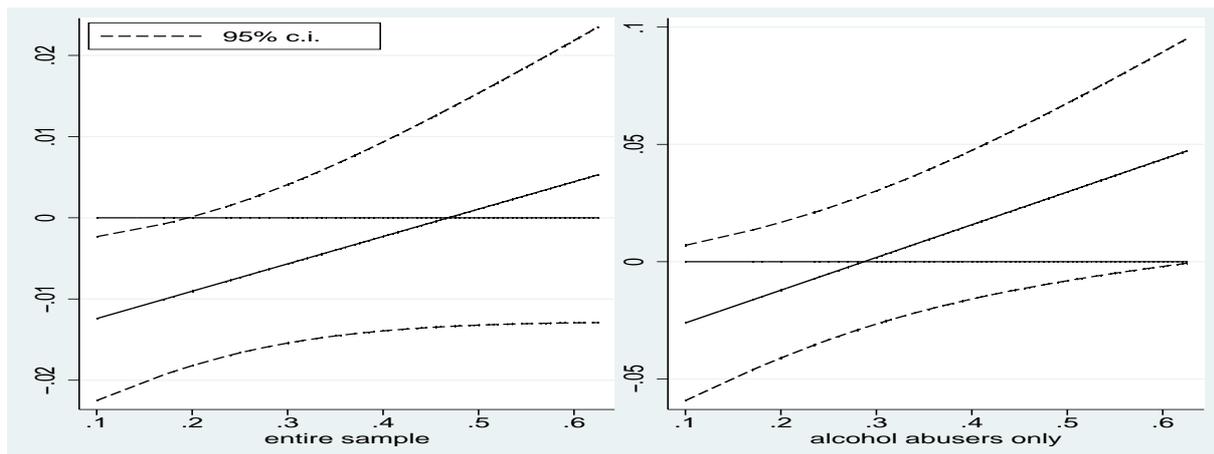


Figure 1: Effect of Oportunidades on likelihood of aggressive behavior by potential transfer (in 1000 *pesos*).

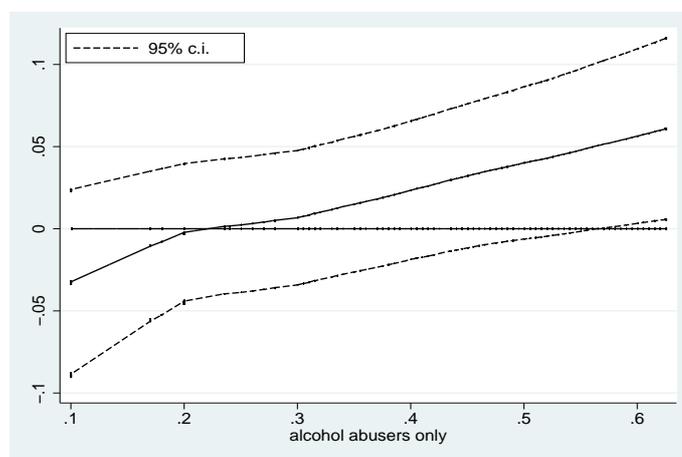


Figure 2: Effect of Oportunidades on likelihood of aggressive behavior for low-education alcohol abusers, by potential transfer (in 1000 *pesos*).