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Paper prepared for presentation at the EAAE 2011 Congress
Change and Uncertainty
Challenges for Agriculture,
Food and Natural Resources

August 30 to September 2, 2011
ETH Zurich, Zurich, Switzerland

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February 2011

Abstract

This paper uses the framework of subjective wellbeing in order to analyze the welfare implication of rural households involved in modern agri-food supply chain in Senegal. It is argued that small farmers are increasingly excluded from high value commodities chain. There is also evidence that despite increasing standards, vegetable export chain can improve rural households' welfare through contract farming or by the creation of employment. As an alternative and complementary framework, this paper uses self reported happiness instead of the commonly income-based measure to assess the household welfare. We deal with the potential selection bias of participation. We find that participation in modern agri-export chain as contract farming is not related to happiness. Rather, participation as agro-industry employee is positively and significantly correlated to happiness. There is also no evidence concerning income and relative income effect on happiness. We provide some explanations.

Keywords: subjective wellbeing, modern agri-food supply chains, rural households.

JEL Classification: I31, H31, O13, C25

1. Introduction

When asked about their life satisfaction, some individuals with low incomes respond that they are satisfied, while others with the same low income state the opposite. A similar situation is observed when asking that same question to individuals with high incomes. That is, individuals answer being happy or unhappy regardless of their income level. Subjective wellbeing (SWB) surveys have often revealed this discrepancy between individuals' income and their perception of life satisfaction or happiness. In developing countries and particularly in rural areas where poverty levels are more pronounced, it follows that subjective wellbeing reported by rural households might not match results often found in studies regarding poverty reduction.

Poverty issues are most relevant among the rural agricultural population in developing countries. Like many sub-Saharan African countries, agriculture is the main economic activity in rural Senegal. About half of the active population is involved in this sector, which has been Senegal's engine of economic and social development for a long time. Many strategies have been adopted to create wealth for these poor target groups, such as the diversification and promotion of agricultural export products. Moreover, in the last two decades production and trade of high-value agricultural products have substantially increased in international food markets. And at the same time the importance and stringency of food standards have increased as well. The emerging modern agri-food supply chains have increasingly affected developing countries' agri-food systems and thus rural household's wellbeing (Swinnen, 2007 and Henson and Jaffee, 2008). This paper refers to the alternative framework of SWB to examine the welfare implications of rural households involved in the modern agri-food supply chains in Senegal.

The welfare implications of the integration of developing countries into global markets are one of the important questions raised in agricultural economics. Thus far, the answers in the literature are mixed. Some authors have argued that modern supply chains lead to the exclusion of small farmers which cannot comply with high food standards (Farina and Reardon, 2000; Swinnen, 2007). However, others have shown that high standards exports can benefit small farmers and rural households through product markets by contract farming or through labor markets by the creation of employment from large scale estate production or agro-industrial processing (Minten et al., 2009; Maertens et al., 2007). In the case of Senegal, some studies have found that the expansion of modern supply chains increases rural incomes and alleviates rural poverty (Maertens and Swinnen, 2009).

Either positive or negative, all these empirical findings are based on household income effects. However, the literature on subjective wellbeing reveals that income, albeit important, is not sufficient to assess welfare impacts and stresses the effects of other socio-economic factors (Gerdtham and Johannesson, 2001). Accordingly, using reported happiness data for rural households offers a complementary framework to income data to study how participation in modern agri-food supply chain through contract farming or employment affects the wellbeing of rural households.

First, several researchers have used individuals' or households' reported happiness to study welfare questions instead of the more common income-based measure. SWB, happiness or life satisfaction¹ reflects the own assessment of people's situation. In the words of Veenhoven (1991), happiness is conceived as the degree to which an individual judges the overall quality of his life as favorable. After psychologists, economists have

¹ Several authors use these terms interchangeably even though these concepts cover different aspects of life, such as health, financial situation, job, leisure, housing, and environment (Van Praag et al., 2003). See Fischer (2009) for a recent review of these concepts.

acknowledged that individuals' observable choices do not provide full information to infer their individual utility (Frey and Stutzer, 2005). A broad number of studies show the usefulness of subjective measures of wellbeing as a complement to traditional welfare analysis (Kahneman and Krueger, 2006). According to Graham (2005), the potential contribution of these measures increases when they are matched with objective income data from the same individual. This matching shows that non-income factors are important for individual welfare and may explain the observed discrepancy between income and reported happiness.

Second, the reported happiness of individuals has been related to a wide range of issues related to individuals or households' environment. For instance, some studies link subjective wellbeing to migration (Knight and Gunatilaka, 2008) or labor market questions (Clark, 2003; Hamermesh, 1999). Other examples include other social dimensions such as criminal victimization (Powdthavee, 2005; Di Tella et al., 2009), as well as political aspects (Di Tella et al., 2007).

Most of these studies focus on developed countries. The literature about subjective wellbeing has only recently been applied to developing countries. To the best of our knowledge, there is little research on the relationship between subjective well-being and standard measures of poverty (Fafchamps and Shilpi, 2008; Farid and Lazarus, 2008; Pradhan and Ravallion, 2000). Yet the gap remains to be filled in African countries, and particularly in rural agricultural areas which have recently experienced structural changes in international food markets.

The objective of this study is to investigate how these structural changes are related to reported happiness levels of rural households participating in modern agri-food supply chains in Senegal. The rest of the paper is structured as follows. The next sections present the data and some descriptive statistics. Section four specifies the model, the variables of interest and the estimation method. Section five presents the results and section six discusses and concludes.

2. Data

The data used in this paper stem from a household survey implemented in July-August 2007 in Senegal. The collection of data was intended to measure the welfare impact of rural household participation in the Fresh Fruit and Vegetables export chain. The 2007 survey covered the main horticulture area, "les Niayes". Most of the export companies are based in this area where they source produce and recruit laborers.

451 households were randomly selected in 37 villages. The villages were also randomly selected in four rural communities in the regions Dakar and Thiès—Sangalkam, Diender, Noto and Darou Khoudoss. 296 households of the sample were surveyed in a previous survey organized in August–September 2005². The 2007 extended survey accounted additionally for the households that produced mangoes on contract with an agro-exporting company. The information on the households' happiness was only recorded in the 2007 survey. 445 observations are finally used in the cross section data after cleaning of the data. 16.85 % of the households took part in export supply chains through contract farming, either in green bean or mango production. 20.45% had one or more members working as employee in green bean or mangoes export agro-business. 10.34% of the households were involved in both activities. The 52.36% remaining were considered as not participating in the agri-food supply chain.

² Four households were withdrawn in the 2007 survey due to attrition and were replaced by new ones in the same villages.

3. Descriptive Statistics

The first variable of interest is the reported happiness of the households. After questions related to household's characteristics, farm and off farm activities and more other questions, the main respondent- generally the household head- was asked to answer the single question: "In general, are you happy?". We first reorder the initially coded categories from 1 (very unhappy) to 7 (very happy) and then reduce the number of self-rated to five since only six and one households fall respectively into both extreme categories³. The five-scale level of reported happiness used in this study belongs to the interval of 3 to 7 categories generally observed in many studies. Although answered by the main respondent, we note that the happiness question was addressed to the household as a whole. We believe that the response of the main respondent is not a great concern because of the likely interdependencies in wellbeing among members of household (Powdthavee, 2005; Kingdon and Knight, 2007). Nevertheless we include in our regressions both household and the main respondent characteristics in order to account for this fact.

Table 1 displays the cross tabulation between happiness and participation and income per capita tercile categories. Irrespective of the status of participation and the level of income, the distribution of the reported happiness is neither uniform, nor symmetric. As showed in table 1, the distribution has a negative skew. 27.87% of households reported being happy and 39.78% as being more or less happy. Only 7.64% and 10.79% declared being unhappy and more or less respectively. As consequence, the distributions of reported happiness over household income per capita terciles and the type of participation are not very surprising.

Indeed, considering the two high happiness scores, 72% of richest households identify as more or less happy or happy, but also 67% of the poorest households fall into those categories. Income is not correlated with happiness as the Pearson's chi-squared or the likelihood-ratio chi-squared measures show (the probability associated to the statistic is 0.6).

Table 1 : Cross tabulation between happiness and participation and income per capita tercile

Happiness	Participation				Income per capita tercile			Total
	contract	employee	both	non	1	2	3	
1	2	7	5	20	12	13	9	34
	2.67	7.69	10.87	8.58	8.16	8.67	6.08	7.64
2	12	11	3	22	19	17	12	48
	16.00	12.09	6.52	9.44	12.93	11.33	8.11	10.79
3	8	11	5	38	18	23	21	62
	10.67	12.09	10.87	16.31	12.24	15.33	14.19	13.93
4	27	43	25	82	52	63	62	177
	36.00	47.25	54.35	35.19	35.37	42.00	41.89	39.78
5	26	19	8	71	46	34	44	124
	34.67	20.88	17.39	30.47	31.29	22.67	29.73	27.87
Total	75	91	46	233	147	150	148	445
	100	100	100	100	100	100	100	100

Note : The numbers in the cells are the frequencies and the column percentages respectively.

³ The recoded values of reported happiness are: 1 "unhappy", 2 "more or less unhappy", 3 "not happy/not unhappy", 4 "more or less happy" and 5 "happy".

“non” means non-participating in agri-food supply chain.

The distribution of participation is weakly correlated with happiness (the probability associated to the Pearson's chi-squared statistic is 0.08). Whether participating or not in the export supply chain, about 65% of the households declared at least being “more or less” happy. In short, this is one example of the discrepancy observed in SWB data. Having (low) high income or (not) participating in agri food supply chain can be matched with high score of reported happiness. In the next section we address this issue more in detail taking into account other factors like households characteristics.

4. Model, variables of interest and estimation method

In this section we formalize the link between modern agri-food supply chain participation and the happiness of rural households involved in this chain in Senegal.

4.1. Model and variables of interest

The model we estimate takes the general implicit form:

$$H_h = f(y_h, P_con_h, P_emp_h, y_{rh}, x_h) \quad (1),$$

where H_h , is the happiness of household h ; y_h , the household's income, and x_h is a vector of non-income variables including socio-economic and demographic characteristics of the household as highlighted in SWB literature.

We focus on the case of rural households in Senegal in the specific context of agri-food supply chains. Participation in agri-food supply chains may in itself be a source of satisfaction for rural households. At the labor market perspective related to SWB (see Clark and Oswald, 1996, Hamermesh, 1999), we can consider participation as an employment status. Therefore controlling for household's income, we include in the equation (1) a variable that reflects participation in contract farming P_con_h and one that reflects participation as agro-industry employee P_emp_h which may affect wellbeing.

The variable y_{rh} in equation (1) stands for the relative income. The introduction of this variable takes into account the discrepancy often observed between reported happiness and income. For a given distribution of income, higher income might be matched with a lower reported happiness score. The SWB literature attributes this negative influence on wellbeing to the relative income. Individuals compare their income relatively to a norm and feel happy as long as their income is greater than the reference income. Simply stated, the relative income hypothesis assumes that the rise in this standard income level might eliminate or reduce the effect of the increased income (McBride, 2001). In our model, we use two measures of the relative concept. The first is related to the income per capita and the second to the level/years of education of the main respondent. We restrict our notion of space-based comparison groups to the village and the age assuming that households are most likely to compare themselves to others within the most nearest area or group to which they belong. We also follow the definition of McBride (2001) by assuming that household (the main respondent in fact) compares his income with the average income of other from 5 years younger than him to 5 years older than him. Table A1 in appendix lists all the variables used in the regressions.

4.2. Estimation method

We estimate an explicit model derived from the general implicit form (1). The model focuses on the effect of participation in the modern agri-food supply chain without and with controlling respectively for the relative income:

$$H_h = \gamma_1 y_h + \gamma_2 P_con_h + \gamma_3 P_emp_h + \gamma_4 y_{rh} + \gamma_5 x_h + \alpha_3 + \varepsilon_{1h} \quad (2)$$

where ε_{1h} are the errors terms.

One important caveat deserves attention in the model. Many sources of bias can arise when identifying welfare effects from subjective data (Ravallion and Lokshin, 2001; Fischer, 2009). Two important sources of bias are endogeneity and heterogeneity problems. Assuming homogeneity between households is quite a strong hypothesis since personality traits are one of the main sources of heterogeneity in perceived wellbeing. Ideally the model should take into account time variant household specific effects and time invariant household fixed effects. In line with several studies, since personality traits are related to many demographic variables (Ferrer-i-Carbonell and Frijters, 2004), we include many household demographic variables in x_{ht} .

Yet, there might be other unobserved factors and it is hard to rely only on observable control variables. Particularly, in the model (2), there are three potential endogeneity problems which stem from the three variables of interest. The first one is an issue usually addressed in the literature and concerns the income variable. The two latter are specific to our case. Participation in FFV export production - either as contract farming or agro-industrial employees - is likely to be non-random. Maertens and Swinnen (2009) provide at least two important reasons for this. First, households can decide—based on their access to resources and their preferences—to participate and self-select into contract farming or into agro-industrial employment. Second, exporting companies might select or exclude potential employees and potential contractors based on their skills, access to resources, etc. In these cases, standard regressions results may be biased and inconsistent if unobserved factors in the error terms ε_{1h} affecting happiness are correlated with those affecting the participation process.

We address mainly in this study the potential endogeneity problem from the participation dummies. We consider the participation dummies as endogenous selection (treatment) variables and then use (2) as an Endogenous switching (ES) model. At this stage, P_con_h and P_emp_h are replaced in the structural equation (2) by their predicted probabilities estimated from the first stage bivariate probit model:

$$\begin{aligned} \hat{P}_con_h &= \lambda_1 z_{1h} + \varphi_1 + \mu_{1h} \\ \hat{P}_emp_h &= \lambda_2 z_{2h} + \varphi_2 + \mu_{2h} \end{aligned}$$

z_{ih} are potential covariates for selection adjustment and μ_{ih} , the errors terms. z_{ih} include variables (see table A1 in appendix) such as observable characteristics related to households' access to resources, their access to information, their skills and ability; their preferences; and geographic location. Although no exclusion restrictions are needed to identify the switch model, z_{ih} include most of variables which do not belong to x_{ht} . That makes the estimates more robust. In the ES models, endogeneity is modeled through the correlation between the errors terms ε_{1h} and μ_{ih} and can be tested.

The models are intended to be estimated primarily by ordered probit (OP) to account for the ordinal comparability in rated SWB. Yet it is difficult to estimate such ES model with ordered probit. The conditional mixed process estimator (cmp) is an alternative which is more suitable for multiple equations estimations involving different types of

dependent and independent variables (see Roodman, 2009). By applying this estimator, we are thus able to jointly estimate the system of reduced and structural equations in the ES form assuming ordinal comparability. We consider also cardinal comparability in self reported happiness - as psychologists often assume - as a robustness check. Ferrer-i-Carbonell and Freijters (2004) find that assuming ordinal or cardinal comparability does not lead to very different results. Furthermore there is not much problem with a continuous outcome variable in the ES estimation procedure. So long as we assume cardinality in happiness, it becomes less hard to estimate the mixed equations evolved in that procedure.

5. Estimation results

The estimation results from the first stage bivariate probit model are summarized in table 2.

Table 2 : First stage bivariate probit results		
Variables	P_con	P_emp
labor	0.030* (0.01)	0.172*** (0.06)
labor ²		-0.005* (0.00)
land02	0.043*** (0.01)	-0.005 (0.01)
HHhead_educ	0.277 (0.17)	0.402** (0.16)
HH_ethnic_nonwolof	-0.245 (0.15)	-0.628*** (0.15)
HH_migr		0.319* (0.16)
union	0.134 (0.13)	-0.005 (0.13)
near_road	0.451** (0.21)	0.438** (0.18)
region	-0.508*** (0.17)	0.018 (0.14)
Constant	-1.305*** (0.26)	-1.785*** (0.35)

The Number of observations is 445. Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1. Wald test of rho=0: chi2(1) = .462; Prob > chi2 = 0.49. Table A1 in appendix gives the definition of variables.

Farmers with more initial land endowment are more likely to be involved in contract farming for green beans and mangoes export production. Owned more or less land does not influence the likelihood to participate as agro-industry employee. Instead households with more labor endowment and with a household head with at least primary education are more likely to be involved in the supply export chain as agro-industry employee. So are households that live in village near an asphalted road or migrant households. These results are very similar to those found by Maertens and Swinnen (2009) except the impact of the region dummy variable. The Wald test of the independence between the error terms of the participation equations indicates that the bivariate probit model is not appropriate and that both type of participation should be modeled separately when estimating the ES model.

Table 3 presents ordered probit and OLS estimation results of the ES model. The coefficient of `atanrho_12` is not significant indicating that the error terms of the probit equation for contract farming and the happiness equation are not correlated. That means that participation as contract farmer is not endogenous in the model. Contrary, participation as agro-industrial employee is endogenous and its coefficient is significantly positive. In these regressions, income per capita and the participation as contract farming are not insignificant. All the control variables have the expected sign as in the SWB literature.

Table 3 : Endogenous Switching regression results. The dependent variable is Happiness

Variables	Ordered probit		OLS	
	1	2	3	4
<code>lnHH_incl</code>	0.013 (0.02)	0.017 (0.02)	0.021 (0.03)	0.026 (0.03)
<code>P_con</code>	-0.049 (0.09)	-0.073 (0.10)	-0.030 (0.12)	-0.059 (0.13)
<code>P_emp</code>	1.175*** (0.19)	1.088*** (0.34)	0.795** (0.33)	0.672** (0.34)
<code>Hhsize_total</code>	-0.027*** (0.00)	-0.027*** (0.00)	-0.028** (0.01)	-0.026** (0.01)
<code>HHhead_age</code>	0.001 (0.02)	0.005 (0.02)	-0.00 (0.02)	0.002 (0.02)
<code>HHhead_age2</code>	0.000 (0.00)	-0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
<code>HHhead_female</code>	-0.416 (0.26)	-0.443 (0.28)	-0.660* (0.37)	-0.639* (0.37)
<code>HHhead_educ_yrs</code>	0.022* (0.01)	0.027** (0.01)	0.015 (0.01)	0.024 (0.01)
<code>HH_ethnic_nonwolof</code>	0.367*** (0.11)	0.293** (0.13)	0.275** (0.13)	0.179 (0.13)
<code>LAND_owned</code>	0.018 (0.01)	0.013 (0.01)	0.017 (0.01)	0.009 (0.01)
<code>LIV_unit</code>	0.021** (0.00)	0.022*** (0.00)	0.021*** (0.00)	0.021*** (0.00)
<code>HOUSING_dirtfl</code>	-0.352** (0.13)	-0.387** (0.16)	-0.535*** (0.15)	-0.526*** (0.15)
<code>HOUSING_comb</code>	0.262* (0.14)	0.328** (0.16)	0.303* (0.162)	0.377** (0.15)
<code>IHOUSING_surf</code>	0.136*** (0.04)	0.177*** (0.05)	0.217*** (0.05)	0.265*** (0.06)
Constant			2.379** (0.95)	1.645* (0.97)
<code>atanrho_12</code>	-0.217 (0.29)	0.138 (0.17)	-0.233 (0.16)	0.175 (0.54)
<code>atanrho_13</code>	-1.078*** (0.34)	-0.972** (0.38)	-0.451** (0.19)	-0.436** (0.17)
<code>atanrho_23</code>	0.062 (0.09)	0.089 (0.08)	0.045 (0.09)	0.071 (0.09)
Rural Community dummies	No	Yes	No	Yes

The models are estimated using the `cmp` command (see Roodman, 2009). The coefficients of `atanrho_ij` are the transformed versions of ρ which indicate the correlation between the error terms of the happiness equation, the contract farming equation and the agro-industry employee equation in that order. The Number of observations is 445. Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1. Table A1 in appendix gives the definition of variables.

Finally we explore whether households care about their position relative to others with respect to their income and their education as was found in some studies. We find no evidence on the role of other's income in the explanation of rural household's happiness. Neither space-based comparator nor age-based comparator matters in our estimates⁴. Relative income measured as the average income of others in the same village or as the average income within a certain range of age seems not to determine rural household's happiness. Nevertheless, we need to notice that other's educational level decreases the happiness of rural household heads though weakly. So, one seems to value his income level relative to the income of others with the same level of education.

6. Discussion and conclusion

Which factors govern happiness for rural households involved in modern agri food supply chain in Senegal? Our first discussion concerns whether participating in these agri-food supply chains contributes to the happiness of rural household. The results show that it is less likely to happen for participation through contract farming. The results might be surprising at first sight, given that rural households benefit from contract farming by their derived income (Maertens and Swinnen, 2009). However, abstracting from the income effect, participation as contract farming per se might in the end not contribute to the determination of their happiness. A plausible explanation is that although farmers gain from contract farming, small farmers might face difficulties related to this process. Thus the difficulties they encounter are such that they might hide the satisfaction derived from the revenue. The smaller revenue gain from participation highlighted in the modern agri supply chain literature might be attributed to these difficulties.

Some studies highly relate personality traits like moods to happiness (Stewart et al., 2005; Tkach, 2006). It might be expected that moods are more likely to be affected by daily problems, which in turn impact on happiness. Agricultural activities in general and the modern agri-food supply chain in particular is one of the contexts which can put a strain on farmer's nerves. In our sample, half of rural households involved in green bean contract farming have coped with a refusal of share of their produce from the company they contract with. And most of them have reported quality problems as the main raison.

These examples show that although they benefit from contract farming through income gain, rural households' happiness might be affected by the stringent agri-food context documented in the literature. And these concerns might offset the potential positive effect from contract farming on wellbeing. Their initial enthusiasm becoming contracting may fall down. In fact, the shifting of rural household's participation in high standards exports from contract farming to agro industrial employees that is actually observed in the region reinforces the argument that the latter is more valuable for them.

Unlike contract farming participation, the results show that happiness is more sensitive to the participation as agro-industrial employee. If we see this type of participation as an employment status, our findings are consistent with other studies (Clark, 2003; Graham, 2005) that account for this variable in the determination of happiness. The results are also consistent with the findings that households benefit more directly from agro industrial processing and the creation of employment in the modern agri-food supply chain in Senegal (Maertens and Swinnen, 2009).

⁴ Not reported here.

Employment is an ultimate goal of people and even more of individuals living in rural agricultural areas where employment opportunities are less. So being involved as agro-industry employee in this context is worthwhile for a rural household. The satisfaction of their own needs and the family help are most of the reasons given by households' members in our sample concerning their participation as agro industry employee. Most of them have stated they were never involved in any previous employment activities.

A lack of evidence regarding the income effect on happiness is another observation noted in our results. Although positive, there is no significant income impact. This result goes against some studies in the SWB literature even if they nevertheless recognize the weak impact of income. The aspiration (Easterlin, 2001) and social comparison (Diener and al., 1993) arguments advance that there is only a weak link between income and happiness if income increases along with desires or the reference group's income. While the "desires" argument is plausible in our case, the reference group's income argument does not hold, since neither absolute income nor relative income seems to be relevant for rural households in our sample.

Income gained by rural households might be viewed as not so substantial in this area as their needs increase. Contrary to a permanent salary, rural households' income might be volatile so that they live from day to day. Even if income is consistent, it might be that community relationships (solidarity) are important between households and that the income gained is shared through this channel. In addition we find that stable goods such as asset variables and access to utilities play a more important role in the determination of happiness than income.

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Appendix

Table A1 : Definition of the variables used

Variables	Definition	Mean	S.D.
Interest variables			
Hap	Household's reported happiness; 1 "unhappy" to 5 "happy"	3.69	1.20
P_con	Dummy if household participates as contract farming=1; 0 otherwise	.27	.44
P_emp	Dummy if household participates as agro industry employee=1; 0 otherwise	.30	.46
Main respondent's characteristics			
HHhead_age	Age of household head	54.77	12.90
HHhead_edu~s	Years of education for household head	1.34	3.19
Household characteristics			
lnHH_inc1	Ln(household per capita income + 1)	11.69	1.94
HHsize_total	Household size	11.68	5.49
lvgtoger	Dummy for household head married/union=1; 0 otherwise	.94	.22
HHhead_fem~e	Dummy for households with female head=1; 0 otherwise	.03	.18
HH_et~nwolof	Dummy if household belongs non-wolof ethnies=1; 0 otherwise	.33	.47
LAND_owned	Owned land, including land leased out	3.78	4.26
LANDless	Dummy if household does not own any land=1; 0 otherwise	.11	.32
LIV_unit	Number of livestock units (cow, horse is 1; donkey is 0.8; sheep, goat is 0.2)	2.60	5.95
HOUSING_di~1	Dummy if household lives with a dirt floor in the house=1; 0 otherwise	.15	.35
HOUSING_comb	Dummy if household uses a non-wood energy source for cuisine=1; 0 otherwise	.13	.33
IHOUSING_s~f	Ln(surface of the house)	4.89	1.08
Observables covariates for selection bias adjustment			
labor	Household labor endowments	8.14	4.17
land02	Household landholdings in 2002 or before	3.76	4.31
HHhead_educ	Dummy for household head with primary education or higher=1; 0 otherwise	.18	.38
HH_migr	Dummy if household head is not born in the village=1; 0 otherwise	.21	.41
union	Dummy for membership of farmer's union in 2002 or before=1; 0 otherwise	.49	.50
near_road	Dummy if household's village is situated near an asphalted road=1; 0 otherwise	.81	.38
region	Dummy if region is Dakar=1; 0 otherwise	.37	.48
Comparison variables			
hhhedys_nv	Village average of household mean years of education	1.22	1.22
lny_nv	Ln(village average of household per capita income)	12.15	.35
lny_na2	Ln(age average of household per capita income)	12.29	.13