

Migration and Remittances in Senegal: Effects on Labor Supply and Human Capital of Households Members Left Behind¹

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ABSTRACT

Using a set of econometric models, this article investigates the role of migration and remittances in labour market participation in Senegal, and the effect of remittances on human capital. The results reveal that migration and remittances reduce labour market participation of household members left behind. We also find that remittances increase human capital development of the left-behind. Our results indicate that both the status and the levels of remittances are relevant in understanding labour market participation and human capital formation. These findings hold true across specifications and econometric estimation procedures.

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Keywords: migration, remittances, labour market participation, human capital, Senegal

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1 Introduction

During the 1970s and 1980s, Senegal via trade has traditionally been an important destination country for migrants from other African countries. Since the 1980s, the flow of migration has changed. From a country of immigration, Senegal has now become an important country of emigration (IOM, 2014). Indeed, the phenomenon of migration in Senegal affects a significant share of the population (ANSD, 2013). The United Nations indicate that the net migration rate in 2010-2015 accounts for -1.4 migrants/1000 inhabitants, suggesting an excess of persons living outside the country. Senegal is among the top ten remittance-receiving countries in sub-Saharan Africa: the country places third in absolute terms (Gupta et al., 2007). In the CFA Franc Zone, Senegal is the number one recipient country of remittances in absolute terms (Ndiaye, 2010). Remittances in 2013 contributed about 11.2% of Senegal's GDP, representing \$1,652 million in 2013 (World Bank, 2014), with a significant decline in informal remittances (African Development Bank, 2008).

International migration in Senegal has received increased attention from the government, which has become aware of the challenges and opportunities of migration and remittances. This resulted in the creation of a Ministry for Senegalese living overseas in 2003, of a Directorate-General for Senegalese living overseas in 2013, the development of enterprises in the originating regions of migrants under the strategic operation plan (POS 2014-2017) and several other structures, to protect migrants and promote remittances with a view to rethink how to channel these flows for a better development of Senegal, in terms of making migration and remittances more oriented towards productive investment and towards the development of entrepreneurship².

The phenomenon of international migration in Senegal is mainly motivated by the search for better living conditions and employment (Goldsmith et al., 2004). Migration thus appears to be one alternative for many young members of Senegalese households who are faced with the problem of unemployment (Diène, 2012). Remittances are seen as an important source of revenues for migrants' families left behind (Mohapatra and Ratha, 2001), particularly as a useful and effective way of reducing poverty and income inequality (Gupta et al., 2007; Chami et al., 2008; Roth and Tiberti, 2016) and of increasing consumption (Diagne and Diane, 2008; Beye, 2009; Daffé, 2009).

Therefore, migration and remittances could potentially play a role in labour market participation and human capital development. On a negative side, theoretically, an important implication of migration and remittances, as a non-labour source of revenue, could be the generation of a state of dependence, thereby reducing the labour market participation of households left behind (Harris and Todaro, 1970; Borjas, 2006; Berker, 2011; Schumann, 2013; Ruhs and Vargas-Silva, 2014). However, on a positive side, remittances could theoretically contribute to improve human capital of the left-behind for instance by helping them to have access to education and health services (Guilmoto and Sandron, 2003; Taylor and Mora, 2006; Özden and Schiff, 2006; Ben Mim and Mabrouk, 2011).

While the impact of migration and remittances on labor market participation has been found to be inconclusive in the empirical literature (Cox-Edwards and Rodriguez-Oreggia, 2009; Amuedo-Dorantes and Pozo, 2012; Démurger and Li, 2013; Petreski et al., 2014; Démurger, 2015), most of the previous empirical literature provide evidence of a positive effect of remittances on human capital development (Cox-Edwards and Ureta, 2003; Hildebrandt and McKenzie, 2005; Yang and Martinez, 2006; Görlich et al., 2007; Acosta, 2011 ; Antman, 2012 and 2015).

This study investigates whether and if so how positive or negative externalities result from international migration and remittances in terms of labour market participation and human capital development of households' members left behind in Senegal.

The contribution of this paper to the literature is threefold. First, only Schumann (2013) used the same dataset that we utilise. However, he focused only on the relationship between remittances and employment, ignoring the effect of migration on labour market participation. We then test for the effect of both migration and remittances on labour market³. Second, regarding the methodology,

² Some estimates indicate indeed that in Senegal only 11% of families benefiting from remittances have used these resources to fund productive investments (African Development Bank, 2008).

³ Depending on whether the migrants living abroad have or not a job, the left behind households' members with migrants may thus receive no remittances or receive small or high levels. Due to this uncertainty in the

Schuman (2013) used only a binary specification of labour market participation with a control for endogeneity and sample selection bias, whereas our study employs a set of econometric models including the endogenous switching probit (ESP) model, the probit model, the ordinary least squares method, the IV probit model and the propensity score matching (PSM) method. These models are useful for more investigations and to draw robust results. One can recall here that the ESP and the PSM models correct for the selection bias problem using different techniques. When the endogeneity bias is neglected, the two models give practically the same impact, and this may make the results robust. The ESP model has the advantage of taking into account the endogeneity bias, and the PSM model can be more robust in treating the selection bias. The IV probit model also addresses endogeneity issues and it can be justified in the case of continuous dependent variable. Although the probit model and the ordinary least squares method do not correct for endogeneity problems, they are used for robustness checks purposes. Third, with respect to the effect of remittances on human capital, to our knowledge, empirical evidence on that effect for the particular case of Senegal is missing. While previous studies focused on total consumption expenditures of households (Diagne and Diané, 2008), we assess the differential effect of remittances on health and education expenditures. Indeed, migration is a potential crucial insurance tool in protecting people from a lack of state-provided social security and basic public services such as education and health care (IFPRI, 2013). We hypothesize that this is the case for households' members left behind in Senegal as in this country the search for better living conditions is a key motive and driver for migration (Goldsmith et al., 2004; Diène, 2012).

We find that both migration and remittances generate less incentive to participate to the labor market for left behind members, showing thus the parasitism effect. The results also reveal that remittances contribute to improve human capital development of the left-behind. Interestingly, we find that both the status and the levels of remittances are relevant in understanding labour market participation and human capital formation.

The rest of the paper is organized as follows. The second section reviews the literature on the effect of migration and remittances on labour market and human capital. The third section describes the estimation procedures. The fourth section presents the data and descriptive statistics. The fifth section discusses the results, while the sixth section concludes the paper.

2 Past evidence on the economic effects of migration and remittances

2.1. Past evidence on the effect of migration and remittances on labour market participation

Recipients in households with migrants might change their labour force status in response to remittances (Görlich et al., 2007; Acosta, 2011; Atamanov and van den Berg, 2012). For instance, migration and remittances can reduce labour supply and create a culture of dependency (Chen, 2006; Yang, 2008; Rodriguez and Tiongson, 2001; Cox-Edwards and Ureta, 2003; Kim, 2007; Grigorian and Melkonyan, 2011; Alcaraz et al., 2012; Roth and Tiberti, 2016). However, the impact of migration and remittances on labour market participation is mitigated, and empirical results were found to be conditional on gender issues, education, age, and labor market locations.

With respect to gender issues, migration can reduce labour force participation for family members left behind, especially for women (Démurger, 2015). Male migration has a negative impact on the level of the labour market participation by women in the migrant-sending household (Lokshin and Glinskaya, 2009). Binzel and Assaad (2011) indicate that women living in rural areas and affected by migration are much more likely to be employed in non-wage activities and subsistence work compared to women in non-migrant households. Empirical evidence from Albania shows that only salaried non-migrant employees substitute income for leisure when they receive sizeable amounts of remittances (Narazani, 2009), and especially for females both in terms of the probability of working and the number of hours of work (Kalaj, 2009). However, for the same country, Dermendzhieva (2010) finds for females and for older males, large and positive coefficients of having a migrant within the family and large and negative coefficients for receiving remittances. Cox-Edwards and Rodriguez-Oreggia (2009) use the propensity score matching to calculate the average treatment effects of persistent

connection between migration and remittances, it is important to investigate the effect of both migration and remittances on labour market participation of the left behind members.

remittances on men and women labour force participation decisions in Mexico. They do not find strong evidence. For the same country, Amuedo-Dorantes and Pozo (2012) go further and model labour supply of remittance-receiving Mexican men and women as a function of both the level and the predictability with which remittances are received. They find that the labour supply response of women to increases in remittances income uncertainty appears significantly larger than that of men. Some studies have found that remittances reduce labour supply of women left behind (Amuedo-Dorantes and Pozo, 2006; Lokshin and Glinskaya, 2009).

Regarding education, Schumann (2013) shows that the link between remittances and employment depends on the level of schooling or that of skill. Schumann (2013) finds that more highly educated men are more likely to be self-employed when they receive remittances and less likely to be wage-employed. He finds no evidence for the labour supply responses of lower educated individuals.

Concerning age, Petreski et al. (2014) find that youth in households, which receive remittances, have considerably larger probability of establishing their own business, compared to their non-youth non-receiving counterparts. Chen (2013) found that, when the father migrates without his family, children spend more time in household production, while mothers spend less time in both household production and income-generating activities.

As for labor market locations, migration induces a decrease in wage work in both rural and urban areas (Binzel and Assaad, 2011). Démurger and Li (2013) show that individual occupational choice in rural China is responsive to migration, at both the individual and the family levels, but the impacts differ as individual migration favors subsequent local off-farm work, whereas at the family level, migration drives the left-behinds to farming rather than to off-farm activities. Madon (2008) finds that, in the urban labour market in Senegal, migrants cannot generally have an employment in the formal sector, as well as in the public sector and in the formal private enterprises. Most of them can only enter into the informal sector for non-qualified employments.

In exploring the effect of migration and remittances on labor market, past studies did not disaggregate the levels of remittances. The differentiation by levels of remittances is useful to know whether the labour market effect of remittances depends on the levels of remittances and not only the status of receiving or not remittances. The effects of international migration on local labour supply have not really been investigated for Senegal (Fall and Cissé, 2007).

2.2. Past evidence on the effect of remittances on human capital

The idea according to which remittances could have an impact on human capital is based on 3 main theories. Firstly, remittances help beneficiaries to have access to education and health services. For example, remittances can make up for the absence or the insufficiency of the health insurance systems and medical infrastructures (Guilmoto and Sandron, 2003). However, the impact of remittances on expenditures on health and education might be limited when the beneficiaries of these remittances do not have access to needed services, particularly when they live in poor rural sectors (Taylor and Mora, 2006; Özden and Schiff, 2006). Secondly, if the household revenue increases due to remittances, their families tend to minimize the burden of work imposed on their children, and this rises the time available for education (Ben Mim and Mabrouk, 2011). These authors indicate also that remittances can create negative incentives for the education of children, because the parental absence can have a negative impact on the school performances of children. Finally, the decision to allocate remittances to education and health spending depends on several factors, notably the type of migration, permanent or temporary (Domingues Dos Santos and Postel-Vinay, 2004; Naiditch, 2009), and the personal interest from the parents (Ben Mim and Mabrouk, 2011).

On an empirical basis, remittances lead to an increase in the schooling and health of the child left behind (Alcaraz et al., 2012; Antman, 2012 and 2015). Several studies have found a positive impact of remittances on human capital, for Latin American countries (Kanaiaupuni and Donato, 1999; Cox-Edwards and Ureta, 2003; Hanson and Woodruff, 2003; Lopez-Cordova, 2005; Hildebrandt and McKenzie, 2005; Amuedo-Dorantes and Pozo, 2006; Amuedo-Dorantes et al., 2007; Adams and Cuecuecha, 2010; Acosta, 2011), for Asian countries (Yang and Martinez, 2006; Görlich et al., 2007; Yang, 2008; Bansak and Chezum, 2009; Painduri and Thangavelu, 2011), for sub-Saharan African countries (Brockhoff, 1990; Kifle, 2007; Gubert, 2009; Démurger, 2015), and for a wider panel data (Gupta et al., 2007; Drabo and Ebeke, 2010; Ben Mim and Mabrouk, 2011; Zhunio et al., 2012).

Few empirical papers have found a negative effect of remittances on human capital (McKenzie, 2006 for Mexico; Painduri and Thangavelu, 2011 for Indonesia; Cattaneo, 2012 for Albania).

To estimate the effect of remittances on human capital, past studies did not consider a differentiation by levels of remittances. In this paper, we consider both this decomposition and the status of receiving or not remittances. A systematic econometric analysis of the effect of remittances on human capital in Senegal, specifically on education and health, has not been undertaken.

3 Estimation procedures

Effect of migration on labour market participation

The specification of the labour market model draws on the literature. The model specifically allows for migration (Dermendzhieva, 2010), which may influence the degree of participation in the labour market. To estimate the effect of migration on labour market participation in Senegal, we use a set of appropriate econometric models. First, we estimate the following simple probit model:

$$E_i^* = \alpha_0 + \alpha_1 M_i + X_i \alpha_2 + \varepsilon_i \quad (01)$$

$$M_i^* = \beta_0 + X_i \beta_1 + Z_i \beta_2 + u_i \quad (02)$$

$$\text{With } E_i = \begin{cases} 1 & \text{if } E_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (03)$$

Where E_i is an observed variable indicating whether individual i is employed (waged or self-employed) or not in the labour market. M_i , the explanatory variable of interest, takes a value of 1 if the individual i lives in a household with a member currently abroad. E_i^* and M_i^* are the corresponding latent variables of employment and migration respectively. X_i is a set of control variables including observable individual and household characteristics such as household size, sex, age, marital status, education, ethnicity, number of elderly, proprietary status, geographical location (region and urban versus rural location). Z_i contains the potential covariates for selection adjustment (instruments), and ε_i and u_i are the error terms. According to Roth and Tiberti (2016), the literature on migration considers migration networks as one of the influential unobservable variables (for example Taylor et al., 2003). Z_i is thus the migration networks. Following Roth and Tiberti (2016), we use the percent share of migrants to the total population in the district as a proxy for migration networks to address potential unobservable indicators. This network variable is computed using the 2009 Senegalese Migration and Remittances Household Survey (World Bank, 2009)⁴.

Second, we use the endogenous switching probit model (ESP) that has been developed by Lokshin and Sajaia (2011). As described by these authors, the adequate specification of our model is that of the ESP. Indeed, as both our dependent variable (labour market participation) and our main independent variable of interest (migration) are dummy variables, the ESP is then more suitable, and it also corrects for endogeneity issues and selection bias problems. Mainly, we assume that a switching equation sorts individuals over two different states. Contrary to the usual *endogenous switching regression model* (ESR), the ESP assumes that no observable outcome is a latent variable and enables the use of a dummy variable (0/1) as the observed outcome. We have a model in which we consider the behavior of an agent with two binary outcome equations (participate in labour (with migrant/without migrant)) and a criterion function T_i that determines which regime the agent faces (with migrant/without migrant). T_i can be interpreted as a treatment:

$$T_i=1 \quad \text{if } Z_i\gamma + u_i > 0 \quad (04)$$

$$T_i=0 \quad \text{if } Z_i\gamma + u_i \leq 0 \quad (05)$$

$$\text{Regime 1 : } y_{1i}^* = X_{1i}\beta_1 + \varepsilon_{1i} \quad \text{and } y_{1i} = I[y_{1i}^* \geq 0] \quad (06)$$

⁴ The choice of good instrumental variables is very important as appropriate instruments can contribute to a very good empirical framework of identifying the effects of migration on labour market participation (Gibson et al., 2011).

$$\text{Regime 0 : } y_{0i}^* = X_{0i}\beta_0 + \epsilon_{0i} \quad \text{and} \quad y_{0i} = I[y_{0i}^* \geq 0] \quad (07)$$

where y_{1i}^* and y_{2i}^* are the latent variables of a given binary outcome. We assume that the three residuals (u_i, ϵ_{1i} et ϵ_{0i}) are normally distributed, with a mean-zero vector and a covariance matrix:

$$\Omega = \begin{bmatrix} 1 & \rho_0 & \rho_1 \\ 1 & 1 & \rho_{0,1} \\ 1 & & 1 \end{bmatrix} \quad (08)$$

Where $\rho_l = Cov(u, \epsilon_l)$ and $l \in \{0,1\}$. Since y_{1i} and y_{0i} are not observed simultaneously, the joint distribution of (ϵ_1, ϵ_0) cannot be identified. In this estimation, we assume that $\rho_{0,1} = 1$.

The estimation is done by the full specification of a maximum likelihood model. This model also enables us to estimate the treatment effect on the treated and untreated.

Third, we use the propensity score matching (PSM) approach (Cox-Edwards and Rodriguez-Oreggia, 2009; Binzel and Assaad, 2011; Xie et al., 2012; Roth and Tiberti, 2016). The outcome is the probability of participating in the labour market and the treatment is that of migrating. The impact of the treatment on the outcome is assessed as follows:

$$\tau|_{D=1} = E[Y_{i,1}|T = 1] - E[Y_{i,0}|T = 1] \quad (09)$$

Where $Y_{i,T}$ denotes the outcome of individual i and T is equal to 1 if the unit is treated and 0 otherwise. The component $E[Y_{i,0}|T = 1]$ is what is not observed.

The PSM aims to construct a counterfactual group starting from the non-treated group. This counterfactual group is assumed to be a random sample of the effective treated group.

Effect of remittances on labour market participation

The model, which is drawn on the literature, specifically allows for remittances, since as a non-labour source of revenue, they might reduce the labour market participation of the recipient household (Borjas, 2006; Berker, 2011; Schumann, 2013; Ruhs and Vargas-Silva, 2014). We use a set of econometric models to estimate the effect of remittances on labour market participation. The first model is a simple probit model that is estimated as follows:

$$E_i = \partial_0 + \partial_1 R_i + X_i \partial_2 + \epsilon_i \quad (10)$$

where E_i is an observed variable indicating whether individual i is employed (waged or self-employed) or not in the labour market and R_i is log of per capita remittances⁵. In addition, we consider various levels of remittances and we generate different dummy variables: (dummy_0) the household receives no remittances, (dummy_1) the household receives more than CFAF 100,000 in remittances, (dummy_2) the household receives more than CFAF 200,000 in remittances, and (dummy_3) the household receives more than CFAF 300,000 in remittances. This differentiation by level of remittances is helpful for one who might be interested to know whether the effect of remittances on labour markets also depends on the level of remittances and not only the status of receiving or not remittances. X_i is the vector of controls including individual and household characteristics such as household size, sex, age, marital status, education, and geographical location.

The second model is an IV probit model. The previous probit model does not address endogeneity problems. To address this problem, we use the IV probit model that is more suitable in the case where some non-observed factors can jointly affect the participation and the remittances outcomes. The IV model is estimated as follows:

$$E_i = \gamma_0 + \gamma_1 R_i + X_i \gamma_2 + \epsilon_i \quad (11)$$

⁵ The reason is that we find that log (per capita remittances) follows a normal distribution.

$$R_i = \delta_0 + X_i' \delta_1 + Z_i' \delta_2 + u_i \quad (12)$$

where Z_i is the instrumental variables. As indicated above, to address potential unobservable indicators, Z_i includes the migration networks that are one of the influential unobservable variables (Taylor et al., 2003) and we use the percent share of migrants to the total population in the district as a proxy for migration networks (Roth and Tiberti, 2016).

The third model that we propose is that of the PSM method. The outcome is the probability of participating in the labour market and the treatment is that of receiving remittances. The impact of the treatment on the outcome is assessed as above (equation 09).

Effect of remittances on human capital

The human capital models are drawn on the literature. Specifically, we allow for remittances that have been found as an important driver of human capital in several studies (Cox-Edwards and Ureta, 2003; Hildebrandt and McKenzie, 2005; Yang and Martinez, 2006; Bansak and Chezum, 2009; Adams and Cuecuecha, 2010; Acosta, 2011; Painduri and Thangavelu, 2011; Zhunio et al., 2012; Cattaneo, 2012). To examine the impact of remittances on human capital, we first use ordinary least squares (OLS) method estimated as follows:

$$\text{Expend}_i = \varphi_0 + \varphi_1 R_i + X_i \varphi_2 + \varepsilon_i \quad (13)$$

where Expend_i are either per capita expenditures on education or per capita expenditures on the health of household i and R_i is per capita remittances. X_i is a vector of controls including observable individual and household characteristics such as household size, sex, age, marital status, education, ethnicity, number of elderly, proprietary status and geographical location.

Secondly, we use the propensity score matching method where the outcome is the level of spending on education and on health and the treatment is that of receiving remittances.

4 Data and descriptive statistics

This study uses data sourced from the Senegalese Migration and Remittances Household Survey 2009 (World Bank, 2009), with 17,878 individuals and 1,953 households interviewed in 11 regions (36% of households with no migrants and 34% with international migrants). We use the sampling weight to estimate the results. For the analysis, working age population is considered, namely those between 15 and 65 years old. Then, these individuals are split in two parts: on the one hand, there are those that are in the labour force (either working or looking for work) or the participating group, and on the other hand, there are those that are out of the labour force or non-participating. At a household level, the proportion of participating members is computed using the same range of age and grouping criteria, and we distinguish between households with at least one migrating member and those without.

Table 1 reports descriptive statistics for the main variables⁶. Households with migrants are less likely to participate in the labour market than households without migrants. Therefore, households participating in the labour market have fewer migrants compared to the complement group. Households with migrants have smaller total per capita expenditures than households without migrants, suggesting that households with migrants are basically poor. However, households with migrants spend more on education and health than households without migrants. Households participating in the labour market receive fewer remittances, have smaller total expenditures and spend less on education and health than households not participating in the labour market. Irrespective of the type of households (with or without migrants, participating or not in the labour market), the structure of expenditures in Table 1 shows that households spend more on education than health. Households' education spending on average in Senegal account for 4.4% of households' total spending, compared

⁶ These statistics do not include the migrant members.

to only 0.1% for health (ANSD, 2013). This average share of households' education expenditures in Senegal (4.4%) is higher than that of 15 African countries (4.2%) (UNESCO, 2012)⁷.

⁷ This sample includes: Benin, Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Gabon, Madagascar, Mali, Mauritania, Niger, Malawi, Rwanda, Sierra Leone, Tanzania and Chad.

Table 1: Descriptive statistics for the main variables

	Household with migrants		Household without migrants		Participating in labour market		Not participating in labor market	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Participate in labour market	0.524	0.499	0.58	0.494				
Live in household with migrants					0.552	0.497	0.607	0.488
Per capita expenditures	12002.18	14645.93	13254.35	21700.88	13949.61	21592.2	14005.35	16940.8
Per capita remittances	4945.452	9840.38	0	0	2372.412	7428.021	3622.446	9381.927
Per capita expenditures on education	663.5362	2048.899	529.4105	1142.396	608.7029	1777.931	740.4203	1918.599
Per capita expenditures on health	434.801	1058.288	385.765	1280.706	404.5134	982.8361	577.1058	1822.683
Household size	13.998	7.256	10.773	5.182	11.958	6.624	12.129	6.383
Squared household size	248.602	271.934	142.903	171.205	186.857	231.727	187.861	224.619
Bachelor diploma (d)	0.012	0.111	0.022	0.146	0.027	0.163	0.029	0.169
Education years	2.021	3.591	2.248	3.801	2.532	4.125	3.769	4.584
Male (d)	0.458	0.498	0.491	0.5	0.609	0.488	0.253	0.435
Age	22.663	18.79	23.044	18.222	34.268	13.02	28.263	13.155
Squared age	866.636	1298.563	863.02	1216.556	1343.75	992.175	971.814	960.666
Married (d)	0.209	0.407	0.249	0.432	0.441	0.497	0.315	0.464
Number of elderly	0.558	0.685	0.323	0.582	0.403	0.615	0.438	0.624
Urban area (d)	0.378	0.485	0.488	0.5	0.428	0.495	0.564	0.496
District remittances rate	84.687	9.787	84.695	6.883	84.405	8.542	84.959	7.821
Dependency ratio	1.051	0.726	0.908	0.631	0.823	0.602	0.764	0.602
Total participating other members	5.264	3.95	3.121	2.278	4.623	3.84	3.533	2.579
Diourbel (d)	0.139	0.346	0.036	0.187	0.066	0.248	0.113	0.317
Fatick (d)	0.062	0.24	0.049	0.215	0.055	0.228	0.038	0.192
Kaolack (d)	0.157	0.364	0.131	0.337	0.172	0.377	0.09	0.286
Kolda (d)	0.047	0.211	0.071	0.257	0.058	0.234	0.034	0.18
Louga (d)	0.089	0.285	0.021	0.144	0.068	0.252	0.046	0.21
Matam (d)	0.075	0.264	0.115	0.32	0.056	0.23	0.109	0.312
Saint-Louis (d)	0.045	0.207	0.036	0.187	0.039	0.194	0.044	0.206
Tambacounda (d)	0.037	0.19	0.044	0.206	0.05	0.217	0.027	0.163
Thies (d)	0.168	0.374	0.153	0.36	0.168	0.374	0.165	0.371
Ziguinchor (d)	0.014	0.119	0.023	0.151	0.017	0.128	0.028	0.165

Source: Authors' computations using data from World Bank (2009).

Notes: Columns 6 to 9 refer to the labour market participation of households. SD stands for Standard Deviation. (d) means discrete change of dummy variable from 0 to 1.

5 Discussing the results

Results for the effect of migration on labor market participation in Senegal

This section presents the econometric results of the effect of migration on labour market participation in Senegal. The results are reported in Table 2.

Using firstly a simple probit model, we find negative and statistically significant coefficients of migration. Being a household with a migrant leads to a 9.4% decline in labour market participation, on average. The results hold true after controlling for several variables including the individual characteristics and the regions.

Even if the simple probit model gives some pictures on the linkage between migration and labour participation, it can be easily criticized. The estimated coefficients cannot be inferred to the whole population because the migration status is not a random program, and thus we may have a selection bias. In addition, some non-observable factors may jointly affect migration and labour market participation decisions, and this may generate an endogeneity bias problem. To overcome these weaknesses, we secondly use the *endogenous switching probit* (ESP) model that allows us to estimate the treatment effect (see Table 2). To tackle the endogeneity problem in the model, we use a set of instrumental variables including, among others, the district migration rate. The Wald test is found to be significant, confirming the presence of endogeneity in the model and validating the selected instrumental variables. This suggests that there are unobservable factors that are not influenced by the dependent variable (labour market participation) but that explain the variable of interest (migration). The correlation coefficient ρ_0 is negative but not significant in the equation for labour market participation with migrants, indicating that a member of a household with migrants does not have a different probability of participation to the labour market than a member of a household randomly selected from the sample. In contrast, in the equation for labour market participation without migrants, the correlation coefficient ρ_1 is found to be statistically significant at one per cent, suggesting a failure to reject the hypothesis of sample selection bias. This parameter ρ_1 has a negative sign, implying that a member of a household without migrants has a significantly higher probability of participation in the labour market than a member of a household randomly selected from the sample. Household with migrants will then have the lowest probability of participation.

To have more robust evidence on the impact of migration on labour market participation, we thirdly use the propensity score matching (PSM) model. To this end, we start by selecting the appropriate variables that can satisfy the balancing test. Of course, this process has the inconvenience of limiting the set of explanatory variables, and this will reduce the goodness of fit of the model. Table A.1 in Annex A shows the variables that satisfy the balancing test. For all of the retained variables, the matching process seems to reduce the divergence between means, and this, within the matching blocks. Figure A.1 in Annex B shows a large common support of comparison between the treated and the untreated as for each block it is possible to construct a counterfactual group. Figure A.2 in Annex B indicates that without balancing, there is a big difference between the distributions of propensity scores matching of the treated and the untreated groups. In contrast, with the matching, the distribution of scores of the treated and the untreated groups become similar. The results with the PSM method are presented in Table 2. In general, there is no significant effect on the treated, but the results indicate significant and negative effects on the untreated, suggesting that households with migrants do not participate significantly in the labour market, while households without migrants participate significantly in the labour market. Therefore, for the untreated, if they migrate, this leads to a significant and negative effect on labour market participation. Then, the PSM approach also suggests a negative and statistically significant effect of migration on labour market participation.

The negative and statistically significant coefficients of migration suggest that migration significantly reduces labour market participation in Senegal. Households with migrants are then less motivated to participate in the labour market because the remittance flows they receive from migrants can be a source that discourages them from participating. Due to remittances flows, migration in Senegal generates therefore parasitism and reduces the incentive of operating one's own business. This result is consistent with findings from Harris and Todaro (1970), Borjas (2006), Berker (2011), and Ruhs and Vargas-Silva (2014).

Table 2: Migration and labour market participation in Senegal

	Probit models and marginal effects			Endogenous switching probit model			Propensity score matching (PSM) approach		
	Labour market participation	Marginal effect	Household with migrants	Migration	Labour market participation With migrant	Labour market participation Without migrant	Treatment effect on the Treated	Treatment effect on the Untreated	TOTAL
Households with migrants (d)	-0.242***	-0.0943***							
District migration rate			0.0281***	0.0300***					
Nearest Neighbor (5) Radius [caliper (0.01)]							0.00516	-0.0424**	-0.0102
Individual characteristics							-0.0146	-0.0594**	-0.0291
Household size	-0.0577***	-0.0226**	0.0137**	0.0887***	-0.0417***	-0.0341**			
Squared Household size				-0.00138***	0.000834**	0.000599**			
Male (d)	1.356***	0.488***	-0.108*	-0.121**	1.218***	1.379***			
Age	0.180***	0.0704***	-0.0162	-0.0225*	0.160***	0.163***			
Squared age	-0.00210***	-0.000821***	0.000237	0.000310**	-0.00189***	-0.00186***			
Married (d)	0.125*	0.0488*	0.0499	0.0631	0.146**	0.140			
Bachelor diploma (d)	0.109	0.0423	-0.432**	-0.413**	-0.00830	0.301			
Education years	-0.0407***	-0.0159***	0.0166*	0.0159**	-0.0526***	-0.0330**			
Total participating other members	0.160***	0.0628***	0.125***						
Urban area (d)	-0.379***	-0.148***	-0.0730	-0.0417	-0.433***	-0.340***			
Region									
Diourbel (d)	-0.0999	-0.0394	0.329**	0.286**	-0.552***	-0.305			
Fatick (d)	0.203	0.0776	0.0210	0.0271	0.154	0.201			
Kaolack (d)	0.349**	0.132***	-0.0578	-0.129	0.403***	0.217			
Kolda (d)	0.425**	0.157**	-0.140	-0.196	0.0567	0.680***			
Louga (d)	0.134	0.0520	0.108	0.128	-0.0523	0.252			
Matam (d)	-0.371**	-0.147**	0.428***	0.186	-0.837***	-0.490**			
Saint-louis (d)	0.115	0.0445	-0.130	-0.202*	0.00531	-0.0524			
Tambacounda (d)	0.0223	0.00872	-0.0373	-0.0682	-0.120	0.440			
Thies (d)	0.162	0.0626	0.0462	-0.0165	0.123	0.134			
Ziguinchor (d)	-0.238	-0.0946	-0.439*	-0.543***	-0.721***	-0.168			
Ethnic									
Bambara (d)			-0.241	-0.156					
Diola (d)			1.310***	1.242***					
Mancagne (d)			0.764	0.780					
Mandingue (d)			0.798*	0.693**					
Manjaque (d)			1.139***	1.177***					
Pular (d)			0.0666	0.0327					
Sarakhole (d)			0.385*	0.441**					
Serer (d)			-0.205*	-0.229***					
Balante (d)			2.608***	2.128***					

(Continued on next page)

Table 2: (continued)

	Probit models and marginal effects			Endogenous switching probit model			Propensity score matching (PSM) approach		
	Labour market participation	Marginal effect	Household with migrants	Migration	Labour market participation With migrant	Labour market participation Without migrant	Treatment effect on the Treated	Treatment effect on the Untreated	TOTAL
<i>Proprietary status</i>									
Own agricultural land at present (d)			-0.364***	-0.290***					
Own non-agricultural land at present (d)			0.206**	0.357***					
Own house at present (d)			0.374***	0.323***					
Own other buildings at present (d)			0.304*	0.365***					
Number of elderly			0.129**	0.165***					
Constant				-2.256***	-2.327***	-2.935***			
Observations	10233	10233	10233	10233					
Pseudo R ²	0.290	0.290	0.254						
Rho 1				-0.321***					
Rho 0				-0.0148					

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

Wald test of indep. eqns. (rho1=rho0=0):chi2 (2) = 11.31 Prob > chi2 = 0.0035

Note: (d) means discrete change of dummy variable from 0 to 1. The Standard Error is estimated with the bootstrap technic with 100 replications.

Results for the effect of remittances on labor market participation in Senegal

This section presents the results of the econometric estimation of the effect of remittances on labour market participation in Senegal.

The results with the probit model are reported in Table 3. In this table, we estimate five different models, depending on how we measure remittances. In the first model (M1), we consider a level of per capita remittances higher than 0. In the models M2, M3 and M4, per capita remittances stand at respectively CFAF 100,000 at least, at CFAF 200,000 at least and at CFAF 300,000 at least. In the model M5, we use the logarithm of per capita remittances. These different segmentations based on the level of remittances are motivated by the linkage between the incentive to participate to labour market and the level of remittances. The results show that households without remittances are significantly motivated to participate in the labour market. When the volume of remittances increases, households become less motivated to participate to the labour market, and this appears to be significant with a certain level of remittances. As a whole, the findings indicate a negative and statistically significant coefficient on the logarithm of per capita remittances. These results hold true after controlling for several variables including the individual characteristics and the regions.

Table 3 reports the results with the IV probit model. We test for the endogeneity presence. The significance of the parameter ρ validates the presence of endogeneity. To correct for this, we use the district remittances rate as an instrument. The significance of the Wald test validates the quality of this instrument. The results show negative and statistically significant coefficients for remittances. An increase by one unit in remittances significantly reduces labour market participation by 2.9%.

The results with the propensity score matching (PSM) are presented in Table 3. Remittances are disaggregated into four models. We find systematically negative and statistically significant effects of remittances on the untreated, irrespective of the volume of remittances. In contrast, with the treated, this effect is found to be insignificant. But it becomes negatively significant with a high level of remittances. This supports the view that remittances reduce labour market participation.

The negative and significant coefficients of remittances imply that remittances reduce the incentive to participate in the labour market. This finding is also consistent with Schumann (2013)⁸. Based on the results, the labour market decision of the left behind members does not depend only on the status of receiving or not remittances, but also (mainly) on the level of remittances. This aspect was largely neglected in previous empirical works.

The reservation wage theory provides some explanation of why remittances decrease labour market participation (Borjas, 2013)⁹. In the labour economics literature, the reservation wage is the wage that makes a person indifferent between working and not working, and thus is the lowest wage rate at which a worker would be willing to accept employment. With the assumption that leisure is a normal good, the theory suggests that an increase in non-labour income raises the reservation wage. The reason is related to the fact that as workers want to consume more leisure as non-labour income increases, a larger inducement will be required to convince a wealthier person to participate to the labour market. Since remittances are a non-labour source of revenue, a rise in remittances increases then the reservation wage. According to this theory, the individual's decision to work depends on a comparison between the market wage rate and the individual's reservation wage level. This implies that a person will not work at all if the market wage is less than the reservation wage, while a person will enter the labour market when the market wage rate exceeds the reservation wage. Consequently, this theory implies that someone who has a higher reservation wage is less likely to work. This theory is supported empirically by Prasad (2003), which found that workers with higher reservation wages tend to have longer unemployment spells. Therefore, based on this theory and this empirical evidence, remittances increase the reservation wage, which in turn decreases labour market participation.

In addition to the reservation wage, the neoclassical model of labour-leisure choice provides also another explanation of the negative effect of non-labour income on labour market participation by accounting for "tastes for work" (Borjas, 2013). The theory considers that, assuming that leisure is a normal good, an increase in non-labour income reduces the likelihood that a person participates to the

⁸ Schumann (2013) found that the relationship between remittances and labour market participation depends on the level on schooling.

⁹ For more details, see Chapter 2: Labour Supply, pp. 21-83.

labour market because workers with more non-labour income consume more leisure. Some studies that account for the correlation between “tastes for work” and non-labour income find that increases in non-labour income do indeed reduce hours of work (Smith, 1980). Based on this theory and this empirical evidence, remittances as non-labour income thus reduce labour market participation.

Table 3: Remittances and labour market participation in Senegal

	Probit models and marginal effects					IV Probit models and marginal effects			Propensity score matching (PSM) method			
	M1	M2	M3	M4	M5	Labour market participation	Remittances	Marginal effects	M1	M2	M3	M4
<i>PeCapRe</i>												
> 0	-0.0776**											
> 100000		-0.0553										
> 200000			-0.0706									
> 300000				-0.175**								
<i>LPeCapRe</i>												
DisMigRat					-0.00749***	-0.0728**	0.0405***	-0.0286**				
TEfTreat									0.0130	-0.0112	-0.0843	-0.193**
									(0.0244)	(0.0411)	(0.0652)	(0.0823)
TEfUtreat									-0.0531**	-0.0621**	-0.0689**	-0.137***
									(0.0221)	(0.0286)	(0.0314)	(0.0420)
All									-0.0200	-0.0557**	-0.0700**	-0.139***
									(0.0168)	(0.0259)	(0.0300)	(0.0410)
<i>Ind Charac</i>												
HHS	-0.0300***	-0.0307***	-0.0308***	-0.0309***	-0.0303***	-0.0736***	-0.0233	-0.0289***				
SqHHS	0.000235	0.000260*	0.000265*	0.000241*	0.000248*	0.000676*	0.000950	0.000265*				
Male (d)	0.488***	0.490***	0.490***	0.491***	0.487***	1.270***	-0.607***	0.462***				
Age	0.0705***	0.0705***	0.0705***	0.0708***	0.0705***	0.173***	-0.0119	0.0680***				
Sq age	-0.000824***	-0.000824***	-0.000825***	-0.000828***	-0.000824***	-0.00202***	0.000101	-0.000795***				
Married	0.0508*	0.0488*	0.0484*	0.0482*	0.0504*	0.131*	0.151	0.0513*				
Bach Dipl	0.0486	0.0550	0.0550	0.0523	0.0479	0.0757	-0.856	0.0295				
Educat	-0.0165***	-0.0170***	-0.0168***	-0.0165***	-0.0164***	-0.0360***	0.0729**	-0.0141***				
TPOM	0.0619***	0.0584***	0.0578***	0.0584***	0.0617***	0.175***	0.391***	0.0687***				
Urban	-0.150***	-0.150***	-0.152***	-0.154***	-0.149***	-0.368***	-0.746**	-0.144***				
<i>Region</i>												
Diourb	-0.0390	-0.0648	-0.0633	-0.0548	-0.0352	0.213	4.212***	0.0818				
Fatick (d)	0.0692	0.0625	0.0651	0.0653	0.0667	0.160	1.263**	0.0618				
Kaolac	0.133***	0.118**	0.121**	0.121**	0.130**	0.392***	1.359***	0.147***				
Kolda (d)	0.151**	0.148**	0.151**	0.151**	0.148**	0.329*	-0.807	0.124*				
Louga (d)	0.0357	0.0182	0.0195	0.0214	0.0376	0.255	3.115***	0.0970				
Mata (d)	-0.150**	-0.157**	-0.156**	-0.153**	-0.153**	-0.385**	0.476	-0.152**				
St Louis	0.0439	0.0302	0.0323	0.0361	0.0445	0.192	1.505***	0.0739				
Tamba	-0.00153	-0.00441	-0.00265	-0.000140	-0.00403	-0.0561	0.0207	-0.0221				
Thies (d)	0.0558	0.0519	0.0539	0.0550	0.0547	0.156	1.102***	0.0605				
Ziguin	-0.115	-0.114	-0.112	-0.112	-0.118	-0.342	-1.680***	-0.136				

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Table 3: (continued)

	Probit models and marginal effects					IV Probit models and marginal effects			Propensity score matching (PSM) method			
	M1	M2	M3	M4	M5	Labour market participation	Remittances	Marginal effects	M1	M2	M3	M4
<i>Ethnic</i>												
Bambara							0.272					
Diola							2.012***					
Manca							1.539					
Manding							-1.400					
Manjaque							-2.593***					
Pular							-0.338					
Sarakho							0.662					
Serer							-1.154***					
Balante							0.121					
<i>Pro status</i>												
OAglan							-1.790***					
ONAglan							0.157					
Ohouse							1.643***					
OObuil							1.318***					
Nelderly							1.184***					
Observ	10233	10233	10233	10233	10233	10233		10233	10232	10232	10232	10232
Pseudo R ²	0.289	0.287	0.287	0.288	0.289							
Rho							0.25669**					
Sigma							4.3924***					

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

Standard errors in parentheses

Wald test of exogeneity (/athrho = 0): chi2 (1) = 3.73 Prob > chi2 = 0.0535

Note: (d) means discrete change of dummy variable from 0 to 1.

PeCapRe is per capita remittances; >0 means per capita remittances more than 0 (d); >100,000 means per capita remittances more than CFAF 100,000 (d); >200,000 means per capita remittances more than CFAF 200,000 (d); >300,000 means per capita remittances more than CFAF 300,000 (d); LPeCapRe is Log (per capita remittances); DisMigRat is district remittances rate; TEfTreat means treatment effect on the treated; TEfUtreat means treatment effect on the untreated; Ind Charac is Individual characteristics; HHS is household size; SqHHS is squared household size; Sq age is squared age; Bach Dipl means bachelor diploma (d); Educat is education years; TPOM is total participating other members; Urban is urban area (d); Diourb is Diourbel (d); Kaolac is Kaolack (d); Mata is Matam (d); St Louis is Saint-Louis (d); Tamba is Tambacounda (d); Ziguin is Ziguinchor (d); Manca is Mancagne; Manding is Mandingue; Sarakho is Sarakhole; Pro status is proprietary status; OAglan is own agricultural land at present; ONAglan is Own non-agricultural land at present; Ohouse is own house at present; OObuil is own other buildings at present; Nelderly is number of elderly; Observ is observations.

Results for the effect of remittances on expenditures on education and health in Senegal

In this section, we present the results of the effect of remittances on expenditures on education and health in Senegal, which are used as proxy indicators for human capital development. The reported results with the ordinary least squares (OLS) in Table 4 reveal positive and significant coefficients for remittances. A CFAF 1 increase in remittances raises both expenditures on education and health by respectively CFAF 1.6 and CFAF 1.4.

The results with the PSM are reported in Table 4. We use the same decomposition of remittances in four models as above. For the untreated, we find systematically positive and significant coefficients of expenditures on education and health, while there is no significant effect for the treated.

The positive and significant coefficients of expenditures on education and health remain true as a whole, suggesting then that remittances significantly improve human capital in Senegal. Several studies in the literature have found a positive effect of remittances on human capital (Acosta, 2011; Kifle, 2007; Adams and Cuecuecha, 2010; Painduri and Thangavelu, 2011; Zhunio et al., 2012). However, our article pays more attention to the differentiation of this impact by level of remittances, which is less covered by previous empirical works.

The positive relationship between remittances and expenditures on education and health thus implies that households with remittances spend more on education and health than those without remittances, as in Table 1. However, this does not mean that households with remittances have better health and education outcomes than those without. In fact, as shown in Table 1, education outcomes in terms of bachelor's diploma and number of years of education are better for households without remittances than those with remittances¹⁰. The link between education and health expenditures and education and health outcomes may indeed depend on several factors¹¹.

¹⁰ Data on health outcomes are not available in the World Bank's *Migration and Remittances Households survey* 2009.

¹¹ One of them might be the volatility and the frequency of funds allocated to education and health spending. Households with migrants mainly have income from remittances, which are volatile and then may not be received on a regular basis, while households without migrants may have stable and regular revenues, which help them to spend regularly on education and health, and then have better education and health outcomes. Therefore, the regularity of spending on education and health is a crucial factor that affects outcomes.

Table 4: Remittances and expenditures on education and health in Senegal

	Ordinary least squares		Propensity score matching (PSM), education				Propensity score matching (PSM), health			
	Expenditures		Remittances				Remittances			
	Education	Health	> 0	> 100000	> 200000	> 300000	> 0	> 100000	> 200000	> 300000
Per capita remittances	0.0159***	0.0142***								
District remittances rate	24.29**	-4.876								
Treatment effect on the Treated			-101.0 (915.5)	1,679 (1,743)	3,211** (1,584)	7,767** (3,068)	-878.1 (1,192)	2,582* (1,547)	4,588* (2,559)	-592.3 (3,598)
Treatment effect on the Untreated			1,537*** (420.4)	3,289*** (561.2)	4,739*** (963.5)	5,025*** (1,550)	2,874*** (692.7)	3,683*** (820.0)	5,345*** (1,547)	5,928*** (1,706)
All			717.5 (476.3)	3,086*** (502.5)	4,636*** (916.8)	5,108*** (1,510)	996.3 (719.5)	3,544*** (765.1)	5,294*** (1,493)	5,730*** (1,669)
<i>Individual characteristics</i>										
Household size	18.87	-268.6***								
Squared Household size	-0.439	4.913***								
Male	48.84	21.16								
Age	-30.20**	-16.93								
Squared age	0.462*	0.361								
Married	160.9	182.9								
Bachelor diploma	1127.0	-842.5								
Education years	268.4***	169.8*								
Total participating other members	-85.52***	-55.03								
Urban area	2047.3***	1420.6***								
<i>Region</i>										
Diourbel	-2089.1***	-1510.7***								
Fatick	67.13	-749.6*								
Kaolack	-1538.2***	-558.0								
Kolda	-921.4***	-603.7								
Louga	-2181.9***	-261.4								
Matam	-1086.6***	128.8								
Saint-Louis	-2035.3***	4888.9*								
Tambacounda	-1024.7***	2252.0**								
Thies	-1499.6***	-978.3***								
Ziguinchor	672.5	-2029.4***								

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Table 4: (continued)

	Ordinary least squares		Propensity score matching (PSM), education				Propensity score matching (PSM), health			
	Expenditures		Remittances				Remittances			
	Education	Health	> 0	> 100000	> 200000	> 300000	> 0	> 100000	> 200000	> 300000
<i>Ethnic</i>										
Bambara	-1813.1***	1535.3								
Biola	1928.6**	-995.5								
Mancagne	-1039.2	-1021.6								
Mandingue	352.4	-2220.9***								
Manjaque	1619.7	-3462.1***								
Pular	-481.2**	-870.4*								
Sarakhole	556.6	-1818.3**								
Serer	-359.4	-742.0**								
Balante	2013.7***	-1524.6***								
<i>Proprietary status</i>										
Own agricultural land at present	537.7*	-269.2								
Own non-agricultural land at present	275.9	219.1								
Own house at present	-12.57	-546.7								
Own other buildings at present	344.0	897.3								
Number of elderly	-20.14	860.9***								
Dependency ratio	-371.3***	-565.8***								
Observations	17871	17871	10232	10232	10232	10232	10232	10232	10232	10232
R ²	0.145	0.068								

Standard errors in

parentheses

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

Marginal effects

Note: (d) means discrete change of dummy variable from 0 to 1.

6 Conclusion

Senegal is an important country of emigration, and the level of remittances sent by migrants to their families is among the highest in sub-Saharan Africa. The main motive for migration in Senegal is related to the widespread need to address the unemployment problem and to look for better living conditions, particularly in Western countries.

The paper analyzed then the impact of migration and remittances on labour market participation and examined whether remittances affect human capital expenditures. The analysis revealed three main findings. Firstly, migration decreases labour market participation, as households with migrants participate less in the labour market than households without migrants. Secondly, remittances, which are non-labour income, reduce the incentive to participate in the labour market. Finally, remittances contribute to increase expenditures on education and health.

These results do not imply that there is need to reduce migration to achieve greater labour market participation. In fact, in the literature, migration is seen as important for development. Indeed, households with migrants are generally poor, and count heavily on their migrants in order to finance their daily needs. This is the case in Senegal as people migrate basically in order to look for better living conditions. Therefore, in this country, migration needs to be promoted in a way to motivate households with migrants to do business and participate more in the labour market. The Government of Senegal needs to put into place policies aiming at creating economic opportunities that motivate households with migrants to develop entrepreneurship and to re-allocate remittance flows more towards productive circuits. Remittances appear to be crucial for a better improvement of human capital in the country. There is then a strong need for the Government to create a national migration policy in order to promote migration and remittances.

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Annex

Annex A:

Table A.1: Variables that satisfy the balancing test (tolerated level of significance 0.1%)

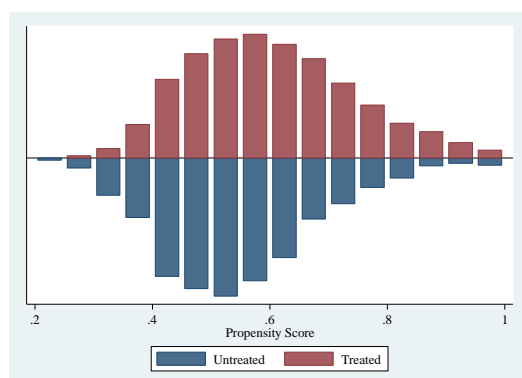
Variable	Sample	Mean		%bias	%reduct bias	t-test	
		Treated	Control			t	p> t
hhsz	Unmatched	12.769	10.626	30.3		14.33	0.000
	Matched	12.769	12.86	-1.3	95.8	-0.70	0.486
hhsz ²	Unmatched	213.21	162.72	17.0		8.43	0.000
	Matched	213.21	231.54	-6.2	63.7	-3.25	0.001
age	Unmatched	31.752	32.641	-6.6		-3.11	0.002
	Matched	31.752	32.717	-7.2	-8.5	-4.13	0.000
age ²	Unmatched	1194.2	1243.5	-4.9		-2.30	0.021
	Matched	1194.2	1261.7	-6.7	-37.0	-3.85	0.000
gender	Unmatched	.41421	.49335	-15.9		-7.56	0.000
	Matched	.41421	.43544	-4.3	73.2	-2.53	0.011
married	Unmatched	.35124	.40568	-11.2		-5.35	0.000
	Matched	.35124	.37522	-5.0	56.0	-2.93	0.003
educ_years	Unmatched	3.7805	4.0287	-5.0		-2.39	0.017
	Matched	3.7805	3.6655	2.3	53.7	1.39	0.163
dep_rat	Unmatched	.79448	.70878	13.8		6.48	0.000
	Matched	.79448	.7981	-0.6	95.8	-0.34	0.732
nelderly	Unmatched	.52802	.3948	20.1		9.36	0.000
	Matched	.52802	.55633	-4.3	78.8	-2.34	0.019

Source: Authors' computations using data from World Bank (2009).

Note: hhsz is household size. educ_years is education years. dep_rat is dependency ratio. nelderly is number of elderly. See Table 1 above for the measurement of all variables.

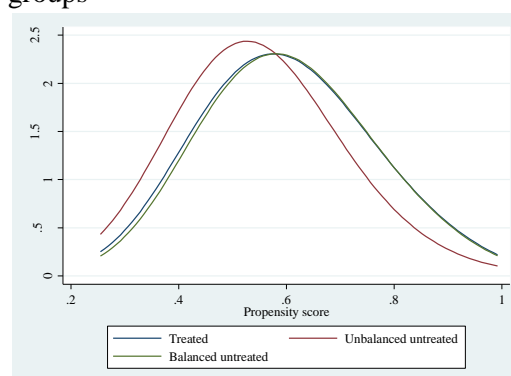
Annex B:

Figure A.1: The common support of comparison



Source: Produced by the authors using data from World Bank (2009).

Figure A.2: The density curves of propensity score matching for the different groups



Source: Produced by the authors using data from World Bank (2009).