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Migration, remittances, labor market and human capital in Senegal

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Abstract

This study investigates how migration and remittances affect labour market participation in Senegal. Further, it examines the effect of remittances on human capital development. The results reveal that migration and remittances reduce labour market participation of household members with migrants. More importantly, we find that the labour market participation depends negatively on the level of remittances, which supports the reservation wage theory. We also find that remittances increase expenditures on human capital development, as approximated by education and health spending. These findings hold true across specifications and econometric estimation procedures.

JEL Classification: F22, F24, J21, J24

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

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List of abbreviations

ANSD	Agence Nationale de la Statistique et de la Démographie
BAOS	Bureau d'Accueil, d'Orientation et de Suivi des Émigrés
CFA	Coopération Financière Africaine
CRES	Consortium pour la Recherche Économique et Sociale
DAIP	Direction de l'Appui à l'Investissement et aux Projets
ESP	Endogenous Switching Probit
ESPS	Enquête de Suivi de la Pauvreté au Sénégal
EU	European Union
FAISE	Fonds d'Appui à l'Investissement des Sénégalais de l'Extérieur
HCSE	Haut Conseil des Sénégalais de l'Extérieur
HDI	Human Development Index
IFPRI	International Food Policy Research Institute
IOM	International Organization for Migration
IV	Instrumental Variables
MDG	Millennium Development Goals
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
POS	Plan d'Orientation Stratégique
PSM	Propensity Score Matching
SNDES	Stratégie Nationale de Développement Économique et Social du Sénégal
UNDP	United Nations Development Program

I. 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 non-negligible share of the population (ANSD, 2013). The net migration rate in 2010-2015 accounts for -1.4 migrants/1000 inhabitants, suggesting an excess of persons living outside the country (United Nations Department of Economic and Social Affairs). Due to this phenomenon, Senegal experiences a high concentration of the active population in urban centers and more particularly in its capital, accentuating an unequal distribution of its population across the territory (Madon, 2008).

According to Goldsmith et al. (2004), migration in this country is mainly motivated by the search for better living conditions and employment. Migration thus appears to be one alternative for many young members of Senegalese households who are faced with the problem of unemployment which is a major quandary for Senegal (Diène, 2012). In general, the hope of the emigrant is to alleviate the financial constraints of the family. By sending remittances, migrants are able to help their family more so than if they stay at home in a situation of unemployment. Remittances are an important source of revenues for migrants' families, particularly for poor households. Recent studies have found that remittances are a useful and effective way of reducing poverty and income inequality (Baruah, 2006; Gupta et al., 2007; Chami et al., 2008). It has been reported that, as the principal source of external financing, remittances play an important role in the financing of household budgets and poverty reduction in Senegal (Mohapatra and Ratha, 2001). Previous studies in Senegal have found a positive effect of remittances on consumption and on poverty using different sources of data (Diagne and Diane, 2008; Beye, 2009; Daffé, 2009).

The high level of migration in Senegal is combined with a high volume of remittances totalling $1,652 million in 2013, representing 11.2% of 2013 GDP (World Bank, 2014), with a significant decline in informal remittances (African Development Bank, 2008). Senegal is in the top ten recipients of remittances 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).

The Government of Senegal has therefore become aware of the challenges and opportunities of migration and remittances. The Government thus created in 2003 a Ministry for Senegalese living overseas. This creation came from suggestions received during a symposium held in 2001 between the Government, various associations of migrants, and non-Government actors involved in the management of migration. The missions of this Ministry are to manage, to protect and to promote Senegalese living overseas. This Ministry has initiated in 2006 and re-updated in 2011 a migration sector-based policy letter whose objective is to have an appropriate strategy for interventions in favour of Senegalese living overseas. Recently (in 2013), the Government created a Directorate-General of Senegalese living overseas, which has two main institutions: the Directorate for support to investment and projects (DAIP) and the Directorate for assistance and promotion. The Government has put into place several other structures for Senegalese living overseas, notably: the *Fonds d'Appui à l'Investissement des Sénégalais de l'Extérieur (FAISE)*, a tool to fund projects hold

by Senegalese migrants; the *Bureau d'Accueil, d'Orientation et de Suivi des Emigrés (BAOS)*, a reception, information and advice center for migrant workers aiming to come back to the country and invest in national production; and the *Haut Conseil des Sénégalais de l'Extérieur (HCSE)* that coordinates and conducts the Government policy aiming to ensure the blooming of Senegalese living overseas. The Directorate-General of Senegalese living overseas aims to make migration oriented towards productive investment and the creation and development of enterprises in the originating regions of migrants, under the Plan of strategic direction (POS 2014-2017).

Starting from the fact of the rapid expansion of migration and remittances, there is a growing need to rethink how to channel these flows for better development of Senegal. The issues of migration and remittances have been very little discussed in the National strategy for economic and social development (SNDES, 2012). Without a national migration policy, the Government would not achieve the expected favorable results of migration for development, in terms of making migration oriented towards productive investment and towards the development of entrepreneurship. Indeed, some estimates indicate that in Senegal only 11% of families benefiting from remittances have used these resources to fund productive investments (African Development Bank, 2008). This does not then contribute to important employment creation in the country, while the Government has considered employment as one of the key priorities indicated in the National Strategy for Economic and Social Development (SNDES, 2012).

However, an important implication of migration and receiving remittances, as a non-labour source of revenue, could be the generation of a state of dependence, thereby reducing the labour market participation of the recipient household as well as its production effort (Harris-Todaro, 1970; Borjas, 2006; Lassailly and Jacob, 2006; Jean and Jiménez, 2007; Berker, 2011; Schumann, 2013; Ruhs and Vargas-Silva, 2014). This paper thus intends to understand how migration and remittances influence labour market participation, and the implications of remittances for human capital development in Senegal. The country is indeed faced with poor performance in terms of human capital. The Human Development Index (HDI) rank for Senegal in 2013 is 163rd of 187th (UNDP Human Development Report 2014).

In this study, we ask whether and if so how positive or negative externalities result from migration and remittances in terms of labour market participation and human capital. The specific research questions are then the following: How do migration and remittances influence labour market participation in Senegal? What is the effect of remittances on expenditures on education and on health?

In the literature, economic analyses of the implications of migration for low-income African countries are very few in number (Shaw, 2007). In highlighting the gaps in the literature, the contribution of this article is fourfold. First, to our knowledge, only Schumann (2013) used the same dataset as in our paper. However, while Schuman (2013) focuses on only the relationship between remittances and employment (and not migration), we also test for the effect of migration on labour market participation. It is important indeed to investigate the effect of both migration and remittances on labour market participation as the amplitude of the impact of migration and remittances may differ. Second, Schuman (2013) used only a binary specification of labour market participation with a control for endogeneity and sample selection bias, whereas our study uses a set of econometric techniques including the endogenous switching probit (ESP) model that has been recently developed (Lokshin and

Sajaia, 2011), 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. The ESP and the PSM models correct for the selection bias problem using different techniques. When the endogeneity bias is a neglected component, the two models give practically the same impact, and this may make the results that we find robust. The ESP model has the advantage of taking into account the endogeneity bias, and the PSM model helps to investigate the effect on the treated and the untreated. The IV probit model also addresses endogeneity issues and it can be justified in the case of continued dependent variable. Although the probit model and the ordinary least squares method do not correct for endogeneity problems, they are helpful for robustness checks. Third, we take into account the non-linearity that may exist between receiving remittances and labour market participation. Fourth, with respect to the effect of remittances on human capital, to our knowledge, empirical evidence on that effect is missing in the literature for the case of Senegal. While previous studies focused on total consumption expenditures of households (Diagne and Diane, 2008), we assess the differential effect of remittances on health and education expenditures. Indeed, migration is a potential crucial insurance function 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 in Senegalese households. The reason behind the importance of examining the effect of remittances on human capital in Senegal is related to the fact that in this country the search for better living conditions is a key motive and driver for migration (Goldsmith et al., 2004; Diène, 2012). This implies that remittances are expected to have an impact on human capital development.

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 participation, and the influence of remittances on human capital. The third section presents the methodology and the data. The fourth section discusses stylized results and econometric results, while the fifth section concludes the paper and discusses the policy implications.

II. Literature review

2.1. Effect of migration and remittances on labour market participation in the literature

According to the literature, recipients in households with migrants might change their labour market status in response to remittances (Acosta, 2006; Görlich et al., 2007). There is no consensus about the impact of migration and remittances on labour market participation in the literature review. For instance, 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 migration induces a decrease in wage work in both rural and urban areas and 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. 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 because 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. Migration induces lost labour in Kyrgyzstan (Atamanov and van den Berg, 2012). 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, Dermendzhiev (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 method to calculate the average treatment effects of persistent remittances on men and women labour force participation decisions in Mexico. They do not find strong evidence of labour force participation effects. 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. Schuman (2013) shows that the relationship between remittances and employment depends on the level of schooling or that of skill. Schuman (2013) finds that more highly educated men are more likely to be self-employed when they receive remittances and less likely to be in wage employment. He finds no evidence for the labour supply responses of less educated individuals. Findings from Amuedo-Dorantes (2014) indicate that remittances can reduce labour supply and create a culture of dependency. Remittances reduce labour participation of left behind children (Cox-Edwards and Ureta, 2003; Alcaraz et al., 2012; Yang, 2008). Several studies have found a negative impact of remittances on labour market participation (Grigorian and Melkonyan, 2011; Kim, 2007; Rodriguez and Tiongson, 2001; Funkhouser, 1992). Some studies have found that remittances reduce labour supply of women left behind (Amuedo-Dorantes and Pozo, 2006; Lokshin and Glinskaya, 2009).

In general, studies show that the impact of migration and remittances on labour supply is conditioned on gender, the nature of remittances and even on the methodologies used.

In Senegal, according to Madon (2008), the informal sector is the only space of integration into the workplace for people looking for employment. Once in the urban labour market, migrants in Senegal 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 employment. However, this sector cannot absorb the flows of urban labour in the long term. This situation facilitates migration towards other spaces, in particular international emigration (Madon, 2008). International migrations in Senegal are important but poorly known (Fall and Cissé, 2007). There is a need to recognize that the effects of international migration on local labour have not really been investigated in Senegal. The IOM (2009) also indicates that the impact of the mobility of the workforce on the opportunities differentiated by gender remains to be explored.

2.2. Effect of remittances on human capital in the literature

Existing studies on remittances focus on their effects on economic growth, financial development and poverty reduction. Few works were devoted to study of the relationships between remittances and expenditures on education and health. The idea according to which remittances could have an impact on human capital is based on three main theories. Firstly, remittances help beneficiaries to have access to education and health services which were not accessible to them previously. For example, remittances can make up for the absence or the insufficiency of the health insurance systems and medical infrastructures in the field of health (Guilmoto and Sandron, 2003). However, the impact of remittances on expenditures on health and on 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, thus increasing the time available for doing studies (Ben Mim and Mabrouk, 2011). According to Ben Mim and Mabrouk (2011), remittances can also create negatives 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 spending and to expenditures on health 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).

However, empirically, the literature on the relationship between remittances and human capital is extensive. Many studies have found a positive effect of remittances on human capital. Amuedo-Dorantes (2014) find that *remittances can facilitate the accumulation of human capital by making possible improved sanitary conditions, healthier life styles, proper healthcare, and greater educational attainment*. Démurger (2015) find also a favorable impact of remittances on human capital. Remittances lead to an increase in the schooling and health of the child left behind (Cox-Edwards and Ureta, 2003; Alcaraz et al., 2012; Yang, 2008).

Several studies focus mainly on Latin American countries. Cox-Edwards and Ureta (2003), in a case study for Salvador, have found that remittances contribute significantly to decreasing the risk of leaving school prematurely. According to these authors, this positive effect of remittances on the education of children is found in urban zones as well as in rural areas, even if the impact seems to be more important in urban zones. Acosta (2011) shows that while remittances lead to a rise in the proportion of girls in full-time education in Salvador, they do not however have an effect on the education of boys. This suggests differences in the allocation of remittances in the household. In this connection, Hanson and Woodruff (2003) show that remittances contribute to increasing the proportion of children between 10 and 15 years old in full-time education in Mexico. This effect is more acute for girls. Furthermore, an increase in the number of households benefiting from remittances in a Mexican municipality is associated with a 5% fall in infant mortality, a 4% rise in school attendance and an important 40% reduction in illiteracy (Lopez-Cordova, 2005). Also using Mexican data, Franck and Hummer (2002), Hildebrandt and McKenzie (2005), Amuedo-Dorantes and Pozo (2006), and Amuedo-Dorantes, Sainz and Pozo (2007) associate

remittances with a decline in the risk of a weight smaller than the norm for children at birth and with an increase in expenditures on health for poor households. Kanaiaupuni and Donato (1999) show that remittances play an important role in the negative relationship between migration and the infant mortality rate in Mexico. Adams and Cuecuecha (2010) find a positive impact of remittances on the education of children in Guatemala.

Some other studies include Asian countries. In empirically explaining the reasons for the inactivity of households with migrants in the labour market in Moldova, Görlich et al. (2007) find that young adults in families with migrants are much more likely to go to university. Because of the flows of remittances that relieve credit constraints, the influence on schooling decisions is likely. Using panel data for Asia-Pacific countries in the period 1993 to 2003, Jongwanich (2007) find that remittances can have an indirect effect on poverty reduction as they can affect economic growth and human capital. This importance of remittances as to pay for the education system is supported by Yang and Martinez (2006) who show that in Philippines remittances lead to a rise in education and a fall in child labour. The same result is found in Bansak and Chezum (2009) who indicate that the positive impact of remittances is more acute on the education of boys than that of girls in Nepal. Painduri and Thangavelu (2011) find that remittances increase children's school attendance in Indonesia.

There are some studies that have used panel data with countries from various continents. Using a sample of 76 developing countries including 24 sub-Saharan African countries, Gupta, Pattillo and Wagh, (2007) show that most of the remittances are used to fund consumption or to invest in education and health. Ben Mim and Mabrouk (2011) show that remittances accelerate the accumulation of human capital in 19 countries belonging to 6 different regions, particularly in countries where the level of public expenditures on education is high, and where per capita income is low. This suggests that remittances act in complementarity with policies aiming to develop human capital. Using a panel data for 69 countries, Zhunio et al. (2012) show that remittances play an important role in reducing infant mortality and in improving the level of education of children at primary and secondary stages.

For the case of Senegal as well as other sub-Saharan African countries, to our knowledge, there are few studies on the effects of remittances on expenditures on education and on health. These studies in most of the cases have mainly used panel data. Therefore, in addition to Brockerhoff (1990) who finds that rural exodus of women considerably increases the chances of survival for children in Senegal, Chauvet et al. (2008) using panel data and sectional data by quintile for respectively 84 and 46 developing countries including Senegal suggest that remittances contribute to reducing infant mortality. According to these authors, remittances seem to be more effective in reducing infant mortality for the wealthiest households. Using the instrumental variables techniques, Drabo and Ebeke (2010) also examine the effects of remittances as well as other variables on access to health services in developing countries including Senegal. They find that remittances are, among others, important determinants of access to health services in the recipient countries. Kifle (2007) indicates that remittances increase the education of children in Eritrea. Evidence from the region of Kayes in Mali shows that remittances are used to some extent as an insurance arrangement (Gubert, 2009). A report from the same database that we use in this study shows that health expenditures seem to be more heavily weighted in the budget of

households with migrants than for households without migrants. With respect to expenditures on education, households with migrants spend more on their budget than households without migrants (World Bank and CRES, 2009).

Other authors in the literature have found a negative effect of remittances on human capital. McKenzie (2006) in a study on Mexico finds a negative influence of remittances received in households with educated parents on the proportion of children between 16 and 18 years old in full-time education. This negative influence of remittances on expenditures on education is consistent with findings from Cattaneo (2012) for the case of Albania. Painduri and Thangavelu (2011) indicate that remittances do not increase the quality of the education of children in Indonesia. The fact of one of the parents leaving the house in order to work abroad tends to have a negative impact on human capital accumulation for children.

III. Methodology and data

We start by introducing the econometric models used to estimate the effects of migration and remittances. Also, we introduce the data used in this section.

3.1. The models and the methods of estimation

Effect of migration on labour market participation

The specification of the labour market model draws on the literature. The model specifically allows for migration (Dermendzhiev, 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 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 contains the potential covariates for selection adjustment (instruments), and ε_i and u_i are the error terms. Z_i is the migration rates by region (Amuedo-Dorantes and Pozo, 2006; McKenzie, 2007). The regional migration rate is the number of households with migrants divided by the total households in the region. The choice of this instrument for Senegal is related to the fact that the country is experiencing high migration levels across its various regions, with an excess of

persons living outside the country (United Nations Department of Economic and Social Affairs). 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, McKenzie and Stillman, 2011).

Second, we use the endogenous switching probit model (ESP) that has been recently developed (Lokshin and Sajaia, 2011). As was described by these authors, the adequate specification of our econometric 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. Precisely, 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:

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

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

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

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

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

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

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 approach. The outcome is the probability of participating in the labour market and the treatment is that of migrating. The impact of treatment on the outcome is assessed as follows:

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

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 $E\left[Y_{i,0}|T=1\right]$ 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, but in the case of non-treatment.

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; Lassailly and Jacob, 2006; Jean and Jiménez, 2007; 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:

$$\mathrm{E_i} = \partial_0 + \partial_1 \mathrm{R_i} + \mathrm{X_i}\ \partial_2 + \varepsilon_\mathrm{i} \quad (10)$$

where $\mathrm{E_i}$ is an observed variable indicating whether individual i is employed (waged or self-employed) or not in the labour market and $\mathrm{R_i}$ is log of per capita remittances. Indeed, we find that log (per capita remittances) follows a normal distribution. 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 200,000 CFAF in remittances, and (dummy_3) the household receives more than 300,000 CFAF 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. $\mathrm{X_i}$ 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:

$$\mathrm{E_i} = \gamma_0 + \gamma_1 \mathrm{R_i} + \mathrm{X_i}\ \gamma_2 + \varepsilon_\mathrm{i} \quad (11)$$

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

where Zi are instrumental variables including the remittances district rates. This instrument is drawn from the literature on migration (Amuedo-Dorantes and Pozo, 2006; McKenzie, 2007). The district remittances rate is the number of households receiving remittances divided by the total number of households in the region. This instrument is important for Senegal as the country receives a high volume of remittances and is among the sub-Saharan African countries with highest level of remittances (World Bank, 2014). Appropriate instruments can do a very good job of identifying the effects of remittances on labour market participation (Gibson, McKenzie and Stillman, 2011).

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 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 which have been found as important driver of human capital in several studies (Franck and Hummer, 2002; Cox-Edwards and Ureta, 2003; Hildebrandt and McKenzie, 2007; Amuedo-Dorantes and Pozo, 2006; Yang and Martinez, 2006; Gupta, Pattillo and Wagh, 2007; Chauvet et al., 2008; Bansak and Chezum, 2009; Adams and Cuecuecha, 2010; Drabo and Ebeke, 2010; Acosta, 2011; Painduri and Thangavelu; 2011; Ben Mim and Mabrouk, 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:

$$\mathrm{Expend_i} = \varphi_0 + \varphi_1 \mathrm{R_i} + \mathrm{X_i}\ \varphi_2 + \varepsilon_i \qquad (13)$$

where $\mathrm{Expend_i}$ are either per capita expenditures on education or per capita expenditures on the health of household i and $\mathrm{R_i}$ is per capita remittances. $\mathrm{X_i}$ 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 (region and urban versus rural 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.

3.2. The data: Description and sources

This study uses data sourced from the Migration and Remittances Household Survey implemented in Senegal in 2009 by the World Bank and is available online. The poor quality of data in sub-Saharan African countries has often impeded the analysis of matters such as migration and labour. Contrary to previous surveys, the World Bank Migration and Remittances Household Survey 2009 addresses, among other questions, the motives for migration, the estimated remittances sent through formal and informal channels, the remittances sent by former and non-former household members and return migration. As such this survey fills the information gap by being exclusively devoted to migration and being national representative.

In this World Bank Migration and Remittances Household Survey 2009, 17,878 individuals and 1,953 households were interviewed in 11 regions of Senegal (36% of households with no migrants and 34% with international migrants). Particularly relevant for our analysis in the survey is information on migration and remittances received from former household members, migration and remittances received from people who have never been members of the household. The survey also provides information on the labour market status of household members as well as their expenditures. We use the sampling weight to estimate

the results and appropriate covariates are used to stratify the balancing condition for estimating the propensity scores.

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 distinguished between households with at least one migrating member and those without.

IV. Application and results

4.1. Migration, labour market participation, remittances and spending on education and health in Senegal: Some stylized facts

Table 1 reports descriptive statistics for the main variables. Beforehand, note that these statistics do not include the migrant members. Households with migrants are less likely to participate in the labour market than households without migrants. Consequently, households participating in the labour market have fewer migrants compared to the complement group. Households with migrants receive remittances and have smaller total per capita expenditures than households without migrants. This indicates 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 migrants or without migrants, participating in the labour market or not participating in the labour market), the structure of expenditures in Table 1 shows that households spend more on education than health. Households' education expenditures on average in Senegal account for 4.4% of households' total spending on average, compared to only 0.1% for health (ANSD, 2013). This share of households' education expenditures in Senegal (4.4%) is higher than the average share of households' education expenditures across a sample of 15 African countries (4.2%) (UNESCO, 2012)[1]. The most important component of households' education expenditures in Senegal is school materials (books and uniforms) with 43.2% of total households' education expenditures, followed by school fees (registration and schooling) with 36.9%,, and by other households' education expenditures (food, transport, private coaching and other education spending) with 19.9% (ANSD, 2013). On the contrary, for the sample of 15 African countries, UNESCO (2012) indicates that on average 54.8% of their households' education expenditures is allocated to school fees, 33.9% to school materials and 11.3% for the other education spending.

[1] This sample includes the following 15 countries: Benin, Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Gabon, Madagascar, Mali, Mauritania, Niger, Malawi, Rwanda, Sierra Leone, Tanzania and Chad.

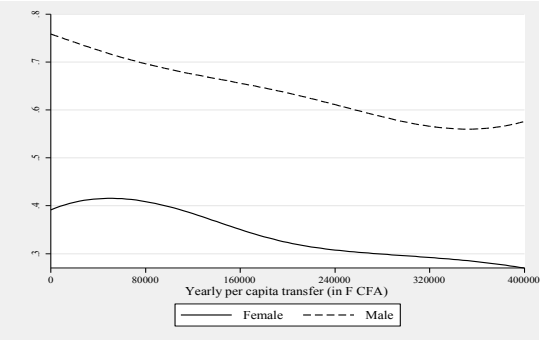
Table 1: Descriptive statistics for the main variables

	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

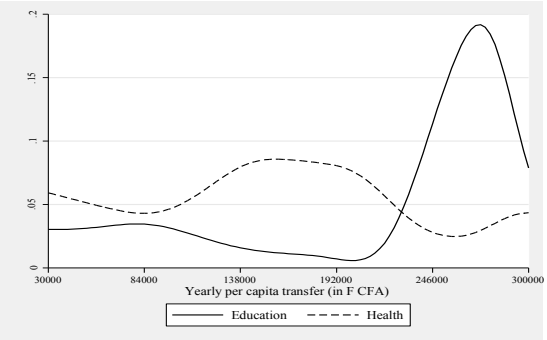
Figure 1 presents the link between remittances and labour market participation in Senegal, which is estimated with a non-parametric approach. An increase in remittances seems to be associated with a fall in labour market participation. Men receiving remittances are more likely to participate in the labour market than women receiving remittances. Figure 2 describes the relationships between remittances and the shares of expenditures on education and health. The link seems to be not linear. Indeed, households receiving remittances spend more on health up to a certain level of remittances beyond which they spend more on education. Irrespective of the type of expenditures (education or health), the link seems to be irregular and volatile, implying that an increase in remittances is related to either a decline or a rise in spending on these items.

Figure 1: Linking remittances and labour market participation in Senegal



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

Figure 2: Linking remittances and human capital in Senegal



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

4.2. Migration and labour market participation in Senegal: Econometric results

This section presents the econometric results of the effect of migration on labour market participation in Senegal, which is evaluated using various techniques. Firstly, we run regressions using a simple probit model. The results are reported in Table 2. 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. Among them, the most important variables that significantly and positively affect labour market participation are the proportion of men in the household, age, marital status, the total number of other participating members, and region (Kaolack and Kolda). Other control variables with significant and negatively effect on labour market participation include household size, squared age, education years, urban areas, and belonging in the region of Matam.

It is worth noting that, even if the simple probit model gives some picture on the linkage between migration and labour participation, it can be easily criticized. First, the estimated coefficients cannot be inferred to the whole population. This is because the migration status is not a random program, and thus we may have a selection bias. Second, 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 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. Or inversely, we can say that household with migrants will have the lowest probability of participation.

To have more evidence on the impact of migration on labour market participation, we also propose to assess the effect based on the popular propensity score matching (PSM) model. To this end, we start by selecting the appropriate variables which 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 *propensity score matching* (PSM) approach also suggests the conclusion of 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 the migrants can be the source that discourages them from participating. Due to remittances flows, migration in Senegal therefor generates therefore parasitism and reduces the incentive of operating one`s own business. This result is supported by Harris-Todaro (1970); Borjas (2006); Lassailly and Jacob (2006); Jean and Jiménez (2007); Berker (2011); and Ruhs and Vargas-Silva (2014), who found that migration leads to a decline in labour market participation.

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)							0.00516	-0.0424**	-0.0102
Radius [caliper (0.01)]							-0.0146	-0.0594**	-0.0291
Individual characteristics									
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			

(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*
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***					
Proprietary status									
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.

4.3. Remittances and labour market participation in Senegal: Econometric results

This section presents the results of the econometric estimation of the effect of remittances on labour market participation in Senegal, using a probit model, an IV probit model and the propensity score matching (PSM) method.

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 of higher than 0. In models M2, M3 and M4, per capita remittances respectively stand at at least CFAF 100,000, at least CFAF 200,000 and at least CFAF 300,000.. In 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 of the model. The significance of the parameter Rho validates the presence of endogeneity problem. 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 the log of remittances is found to significantly reduce labour market participation by 2.9%.

Table 3 reports the results with the propensity score matching (PSM) method. Remittances are disaggregated into four models as defined in Table 5. 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 transfers. This supports the view that remittances reduce labuor market participation.

The negative and statistically significant coefficients of remittances imply that remittances reduce the incentive to participate in the labour market. This relationship has been also found in Schumann (2013), but the link depends on the level on schooling.

Based on the results found in this study, the labour market decision of the rest of household members that receive remittances do not depend only on the status of receiving or not receiving remittances, but it also depends (mainly) on the level of remittances. This aspect was largely neglected in other empirical works.

Reservation wage theory provides some explanation of why remittances decrease labour market participation (Borjas, 2013)[2]. In the labuor 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

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

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 because workers want to consume more leisure as non-labour income increases, a larger inducement will be required to convince a wealthier person to enter the labour market. As 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-labuor 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 enters the labour force 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 therefore reduce labour market participation, as remittances are non-labour income.

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
PeCapRe												
> 0	*-0.0776***											
> 100000		-0.0553										
> 200000			-0.0706									
> 300000				-0.175**								
LPeCapRe					-0.00749***	-0.0728**		-0.0286**				
DisMigRat							0.0405***					
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)
Ind Charac												
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***				
Region												
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				

(Continued on next page)

Table 3: (continued)

	Probit models and marginal effects					IV Probit models and marginal effects			Propensity score matching (PSM) method			
	M1	M2	M3		M1	M2	M3		M1	M2	M3	
Ethnic												
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					
Pro status												
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.

4.4. Remittances and expenditures on education and health in Senegal: Econometric results

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. We use the *ordinary least squares* (OLS) method and the PSM method. The reported results in Table 4 reveal positive and significant coefficients for remittances. A one CFAF 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 for expenditures on education and for expenditures on health. As was the case in Table 3, we use the same decomposition of remittances in four models. For the untreated, we find systematically positive and statistically significant coefficients of expenditures on both education and health, while there is no significant effect for the treated.

The positive and significant coefficients of expenditures on both education and health remain true as a whole, suggesting therefore that remittances significantly improve human capital in Senegal, as measured using education and health expenditures. It is worth noting that several studies in the literature have found a positive effect of remittances on human capital (Acosta, 2011; Jongwanich, 2007; Yang and Martinez, 2006; Kifle, 2007; Adams and Cuecuecha, 2010; Painduri and Thangavelu, 2011; Ben Mim and Mabrouk, 2011; Zhunio et al., 2012). However, this article pays more attention to the differentiation of this impact by level of remittances, which is less covered in other empirical works.

The positive relationship between remittances and expenditures on education and on health thus implies that households with remittances spend more on education and health than those without remittances in Senegal, as indicated 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 remittances.[1] The relationship between education and health expenditures and education and health outcomes may indeed depend on several factors. 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.

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

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	1,679	3,211**	7,767**	-878.1	2,582*	4,588*	-592.3
			(915.5)	(1,743)	(1,584)	(3,068)	(1,192)	(1,547)	(2,559)	(3,598)
Treatment effect on the Untreated			1,537***	3,289***	4,739***	5,025***	2,874***	3,683***	5,345***	5,928***
			(420.4)	(561.2)	(963.5)	(1,550)	(692.7)	(820.0)	(1,547)	(1,706)
All			717.5	3,086***	4,636***	5,108***	996.3	3,544***	5,294***	5,730***
			(476.3)	(502.5)	(916.8)	(1,510)	(719.5)	(765.1)	(1,493)	(1,669)
Individual characteristics										
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***								
Region										
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***								

(Continued on next page)

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
Ethnic										
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***								
Proprietary status										
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.

V. Conclusions and policy implications

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 look for better living conditions, particularly in Western countries. Many young members of Senegalese households thus consider migration as an important alternative to address the problem of unemployment.

The paper analyzed the impact of migration and remittances on labour market participation and examined whether remittances affect human capital expenditures. The article used various specifications and different econometric models, including: a probit model, the ordinary least squares method, an endogenous switching probit model, the propensity score matching method, and an IV probit model.

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 increased expenditures on education and health. These findings are robust to variations in specifications and econometric estimation techniques, and are consistent with the theoretical and empirical literature.

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.

This is in line with the National Strategy for Economic and Social Development (SNDES, 2012) that suggests involving Senegalese living overseas to contribute to national development efforts via the popularization of productive investments opportunities with these Senegalese migrants. However, there is very little discussion of migration issues in the SNDES (2012). There is no migration policy in Senegal for now. Clearly, there is a strong need for the Government to put into place a national migration policy in order to promote migration. Based on the results, remittances appear to be crucial for better improvement of human capital in the country, particularly in terms of education and health spending.

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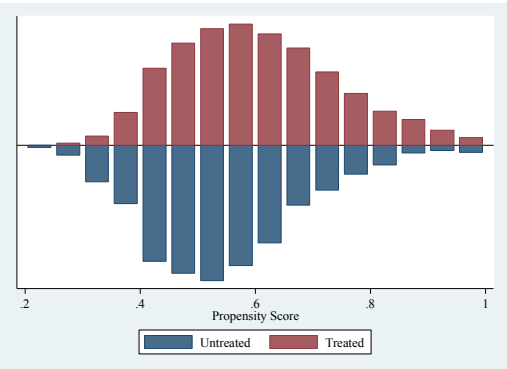
Annex

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

Variable	Sample	Mean Treated	Mean Control	%bias	%reduct |bias|	t-test t	t-test p>|t|
hhsize	Unmatched	12.769	10.626	30.3		14.33	0.000
	Matched	12.769	12.86	-1.3	95.8	-0.70	0.486
hhsize2	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
age2	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

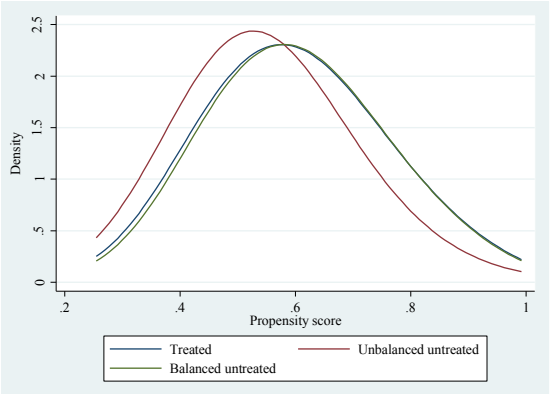
Source: Authors' computations using data from World Bank (2009).

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).

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