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Migration, Remittances, Labor Market and Human Capital in Senegal

Ameth Saloum Ndiaye
Oumoul Khayri Niang
Ya Cor Ndione
Sessinou Erick Abel Dedehouanou

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policy analysis on growth and employment

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Abstract

This study analyzes the impact of migration and remittances on labor market participation in Senegal. Further, it examines the effect of remittances on the development of human capital. The found results reveal that migration leads to a significant decline in labor market participation of household members with migrant. Further, the remaining household members have less incentive to create their own business.. Also, the results show that remittances increase significantly the expenditures on the human capital development, as approximated by education and health expenditures. The main recommendation is the urgent need of the governmental policies aiming to create economic opportunities that motivate households with migrants to develop entrepreneurship, as well as, to invest more on the human capital. This will be useful in order to re-allocate remittances flows more towards productive circuits.

JEL: F22, F24, J21, J24

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

Authors

Dr. Ameth Saloum Ndiaye:
Assistant Professor, Department of Economics & CREA, University of Dakar
HLM Grand Médine, villa n° 247, Dakar, Senegal
ameth.sndiaye@gmail.com asandiaye@yahoo.fr ameth.ndiaye@ucad.edu.sn

Oumoul Khayri Niang:
Technical Advisor n°1, Ministry of Women, Family and Children
8876, Sacré Cœur 3, Dakar, Senegal
oumoukhayri@yahoo.fr ekhayril@gmail.com

Ya Cor Ndione:
PhD Student at the University of Dakar and Research Assistant at IPAR
ISRA-LNERV /Hann-Village, Dakar, Senegal
mamicor9@yahoo.fr

Erick Abel Sessinou Dedehouanou:
Universty of Abomey Calavi, Porto Novo, Benin
erickdedehouanou@yahoo.fr

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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

Executive summary

The phenomenon of migration in Senegal is mainly motivated by the search for better living conditions and employment. Migration appears thus to be a crucial alternative for many young members of Senegalese households who are faced with the problem of unemployment and where labor market in some regions is struggling to absorb the labor supply.

In this study, we ask whether and how positive or negative externalities result from migration and remittances in terms of labor market participation and human capital development. The specific research questions in this study are then the following: Do migration and remittances affect labor market participation in Senegal? What is the effect of remittances on expenditures on education and on health? The first objective is then to analyze the impact of migration on labor market participation. The second objective is to highlight the role of remittances in labor market participation, while the third objective is to examine the effect of remittances on expenditures on health and on education.

To achieve these objectives, we use statistic and econometric methodologies, and data from the *Migration and Remittances Household Survey,* implemented in Senegal in 2009 by the World Bank. 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. Particularly relevant for our analysis in the survey is information on migration and transfers 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 labor market status of the household members, as well as expenditures on education and health. Our estimates show that 36% of households are with no migrants, 30% with internal migrants and 34% with international migrants.

The descriptive evidence shows that households with migrants are less likely to participate in the labor market than households without migrants. Moreover, households with migrants spend more on education and health than households without migrants. Households participating in the labor market receive fewer remittances, and spend less on education and health than households not participating in the labor market.

The econometric analysis reveals that the phenomenon of migration leads to an important decline in labor market participation. Households with migrants participate less to the labor market, as they have less incentives to create own business due to the remittances flows they receive. We find also that remittances reduce significantly the incentive of participating to the labor market. In addition, the results show that the reception of remittances contributes to increase significantly expenditures on education and health.

Note that the reduction in labor market participation of those with migrants does not necessarily imply the need to reduce migration for greater labor market participation. In fact, in the literature, migration is seen as important for development. Indeed, households

with migrants are generally poor, and count importantly 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 importantly to the labor market. The Government of Senegal needs to put into place policies aiming to create economic opportunities that motivate households with migrants to develop entrepreneurship and tore-allocate remittances flows towards productive circuits. This is in line with the National Strategy for Economic and Social Development (SNDES, 2012) that suggests to involve Senegaleses living oversea to contribute to the national development efforts via the promotion of productive investments opportunities with these Senegalese migrants. However, there is a 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 design a national migration policy in order to promote migration. This national migration policy would identify key constraints and would define key axes for a greater contribution of migration and remittances to employment creation. As the labor market in some localities is struggling to absorb the labor supply, migration and remittances become the main keys to reduce unemployment, to create richness and to enhance the inclusive growth within the regions with economic booms and the high demand of labor force.

Moreover, based on the results of this study, remittances appear to be crucial for better improvement of human capital in the country, particularly in terms of access to education and health services. Indeed, there are persistent weaknesses in the sector of education in Senegal in terms of achieving the primary cycle, of increasing the quality and performance of the education system, of building schools and raising the number of professors. The country has not reached the goal “education for all” as recommended by the Millennium Development Goals (MDG) (SNDES, 2012). There are also important weaknesses in the health sector, regarding the provision of medicines, the health infrastructures, the health human resources and the country has problems to reach the MDG related to health (SNDES, 2012).

1 Introduction

During the 1970s and 1980s, Senegal via trade has traditionally been an important country of destination for migrants from other African countries. From 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 part of the population (ANSD, 2011). Net migration rate in 2010-2015 accounts for -1.4 migrants/1000 populations, 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 the urban centers and more particularly in its capital, accentuating an unequal distribution of its population in 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 appears thus 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 better than if they stay initially at home with the unemployment situation. 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 up to $ 1,652 million in 2013 (World Bank, 2014), with a significant decline in informal circuits of remittances (African Development Bank, 2008). Senegal is in the top ten recipients of remittances in sub-Saharan Africa: third country in absolute terms (Gupta et al, 2007). In the Franc Zone, Senegal is the first 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 has then created in 2003 a Ministry for Senegaleses living oversea. 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 Senegaleses living oversea. 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 favor of Senegaleses living oversea. Recently (in 2013), the Government has created a Directorate-General of Senegaleses living oversea, 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 Senegaleses living oversea, notably: the *Fonds d'Appui à l'Investissement des Sénégalais de l'Extérieur (FAISE)* that is a tool to fund projects hold by Senegalese migrants; the

Bureau d'Accueil, d'Orientation et de Suivi des Emigrés (BAOS) that is a reception, information and advice center for migrants workers aiming to come back to the country and invest in national circuits of production; the *Haut Conseil des Sénégalais de l'Extérieur (HCSE)* that coordinates and conducts the Government policy aiming to ensure the blooming of Senegaleses living oversea. The Directorate-General of Senegaleses living oversea 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 on how to channel these flows for better development of Senegal.. The issues of migration and remittances have been very slightly 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 thus contribute to important employments 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-labor source of revenue, might be to generate a state of dependence, reducing then the labor market participation of the recipient household and its production effort (Harris-Todaro, 1970; Borjas, 2004; Lassailly and Jacob, 2006; Jean and Jiménez, 2007; Berker, 2011; Schumann, 2013; Ruhs and Vargas-Silva, 2014). This paper intends then to understand how migration and remittances influence labor market participation, and the implications of remittances for human capital development in Senegal. The country is indeed facing with poor performance in terms of human capital. The Human Development Index (HDI) rank for Senegal in 2013 is 163rd of 187th, UNDP's Human Development Report 2014).

In this study, we ask whether and how positive or negative externalities result from migration and remittances in terms of labor market participation and human capital. The specific research questions are then the following: How do migration and remittances influence labor 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 the low-income African countries appear to be unavailable (Shaw, 2007). For the case of Senegal, we are aware of, to our knowledge, only the recent work of Schumann (2013) that used the same and new large dataset as in our paper. However, Schuman (2013) focuses on only the relationship between remittances and employment (and not migration). The difference between Schuman (2013) and our paper is twofold. Firstly, contrary to Schuman (2013), we test in addition for the effect of migration on labor market participation. Secondly, Schuman (2013) uses only a binary specification of the labor market participation with a control for endogeneity and sample selection bias. In our paper, we use the endogenous switching probit model that has been recently developed (Sajaia and Luskin, 2011). Also, we use the probit model, the ordinary least squares method, the IV probit model and the

propensity score matching method for more investigations and to draw robust results. Moreover, we take into account the non-linearity that may exist between receiving remittances and the labor market participation. With respect to the effect of remittances on human capital, to the best of our knowledge, empirical evidence on that effect is missing in the literature in Senegal. To our knowledge, previous studies have focused on total consumption expenditures of households (Diagne and Diane, 2008). We assess the differential effect of remittances on expenditures on health and education. 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 rest of the paper is organised as follows. The second section reviews the literature on the effect of migration and remittances on labor 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.

2 Literature review

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

According to the literature, recipients in households with migrants might change their labor force status in response to remittances (Acosta, 2006; Görlich et al., 2007). There is no consensus about the impact of migration and remittances on labor market participation in the literature review. For instance, 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 female both in terms of the probability of working and the hours of work (Kalaj, 2009). However, for the same country, Dermendzhiev (2010) finds for females and for older males, large and positive coefficients for 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 labor force participation decisions in Mexico. They do not find strong evidence of labor force participation effects. For the same country, Amuedo-Dorantes and Pozo (2012) go further and model labor 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 labor supply response of women to increases in remittances income uncertainty appears significantly larger 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 wage-employed. He finds no evidence for the labor supply responses of lower educated individuals. In general, studies show that the impact of migration and remittances on the labor 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

labor 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 employments. However, this sector cannot contain in long-term the flows of urban labor. This situation facilitates migration towards other spaces, in particular international emigration (Madon, 2008). International migrations in Senegal are important but badly known (Fall and Cissé, 2007). There is a need to recognize that the effects that international migration has on local labor have not been really investigated in Senegal. The IOM (2009) indicates also 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 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 3 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 o increases due to remittances, their family tend to minimize the burden of work imposed on their children, this rises 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 and focuses mainly on Latin American countries. Many studies have found a positive effect of remittances on human capital. Cox-Edwards and Ureta (2003), in a case study for Salvador, have found that remittances contribute significantly to decrease the risk of leaving prematurely school. 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 if remittances lead to a rise in the proportion of girls in full-time education in Salvador, they do not have however 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 increase 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 fall of 5% in infant mortality, a rise of 4% in school attendance and an important reduction of 40% in illiteracy (Lopez-

Cordova, 2005). Using also 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 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 explaining empirically the reasons for the inactivity of households with migrants in the labor 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 compensation mechanism of 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 labor. 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 the children 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 recently 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 used mainly panel data. Therefore, in addition to Brockerhoff (1990) who finds that rural exodus of women increases considerably 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 reduce infant mortality. According to these authors, remittances seem to be more effective in reducing infant mortality for the wealthiest household. With the instrumental variables techniques, Drabo and Ebeke (2010) examine also the effects of remittances as well as other variables on the access to health services in developing countries including Senegal. They find that remittances are, among others, important determinants of the access to health services in the recipient countries. Kifle (2007) indicate that remittances increase the education of children in Eritrea. An 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 we use in this study shows that health expenditures seem to weight more 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 even so the quality of the education of children in Indonesia. The fact that one of the parents leaves the house in order to work abroad tends to have a negative impact on human capital accumulation for children.

3 Methodology and data

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

3.1. The models and the methods of estimation

Effect of migration on labor market participation

To estimate the effect of migration on labor market participation in Senegal, we use a set of the appropriate econometric models. First, we start by estimating 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 labor market, M_i, the explanatory variable of interest taking the value 1 if individual i lives in a household with a member currently abroad (either internal or international migration). E_i^* and M_i^* are the corresponding latten 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 are potential covariates for selection adjustment (instruments, ε_i and u_i are the error terms. From the literature (Amuedo-Dorantes and Pozo, 2006; McKenzie, 2005), Z_i may include among other variables such as the migration rates by region[1].

[1] Zi includes also the number of Western Union offices by region or the migration networks by region. We did not succeed to have the data on these variables.

Second, we use the Endogenous Switching Probit model (ESP) that has been recently developed (Sajaia and Luskin, 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 (labor market participation) and our main independent variable of interest (migration) are dummy variables, the ESP is then more suitable, and in addition it corrects for endogenous and selection bias problems. Mainly, we assume a switching equation sorts individual over two different states. Contrary to the usual *Endogenous Switching Regression model* (ESR), the ESP assumes that a no observable outcome is latent variable and enables the use 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 to labor (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:

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

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

$$\text{Regime1} : y_{1i}^* = X_{1i}\beta_1 + : \epsilon_{1i} \quad \text{and} \quad y_{1i}=\text{I}[y_{1i}^* \geq 0] \tag{06}$$

$$\text{Regime0} : y_{0i}^* = X_{0i}\beta_0 + : \epsilon_{0i} \quad \text{and} \quad y_{0i}=\text{I}[y_{0i}^* \geq 0] \tag{07}$$

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 Maximum Likelihood model. This model enables also to estimate the treatment effect on treated and untreated.

Third, we use the propensity score matching approach. The outcome is the probability of participating to the labor 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 the individual i and T is equal to 1 if the unit is treated and 0 otherwise. The component $E\big[Y_{i,0}|T=1\big]$ 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 as a random sample of the effective treated group, but in the case of non-treatment.

Effect of remittances on labor market participation

We use a set of econometric models to estimate the effect of remittances on labor market participation. The first model is a simple Probit model that is estimated as follows:

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

Where E_i is an observed variable indicating whether individual i is employed (waged or self-employed) or not in the labor market, R_i is log of per capita remittances. Indeed, we find that log (per capita remittances) follows a normal distribution. In addition, in order to appreciate how the impact can depend on the level of remittances, we generate different dummy variables: (dummy_0) the household receive remittances, (dummy_1) the household receive more than 100 000 F CFA of remittances, (dummy_2) the household receive more than 200 000 F CFA of remittances, etc. 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 affect jointly the participation and the remittances outcomes. The IV model is estimated as follows:

$$E_i = \gamma_0 + \gamma_1 R_i + X_i \ \gamma_2 + \varepsilon_i \quad (11)$$
$$R_i = \delta_0 + X_i'\delta_1 + Z_i'\delta_2 + u_i \quad (12)$$

Where Zi are instrumental variables including the remittances district rates.

The third model, that we propose, is that of the PSM method. The outcome is the probability of participating to the labor 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

To estimate the effect of remittances on the outcomes variables that are expenditures on education and on health, we use firstly Ordinary Least Squares (OLS) method estimated as follows:

$$Expend_i = \varphi_0 + \varphi_1 R_i + X_i \ \varphi_2 + \varepsilon_i \quad (13)$$

Where $Expend_i$ are either per capita expenditures on education or per capita expenditures on health of a household i, 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, 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 available online. The poor quality of data in sub-Saharan African countries has often impeded the analysis of matters such as migration and labor. 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, 17878 individuals and 1953 households were interviewed in 11 regions of Senegal (36% of households with no migrants, 30% with internal 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 labor 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 labor force (either working or looking for work) or the participating group, and on the other hand, there are those that are out of the labor 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.

4 Application and results

4.1. Migration, labor 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 labor market than households without migrants. Consequently, households participating in labor 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 migrant are basically poor. However, households with migrants spend more on education and health than households without migrants. Households participating in the labor market receive fewer remittances, have smaller total expenditures and spend less on education and health than households not participating in the labor market.

Table 1: Descriptive statistics for the main variables

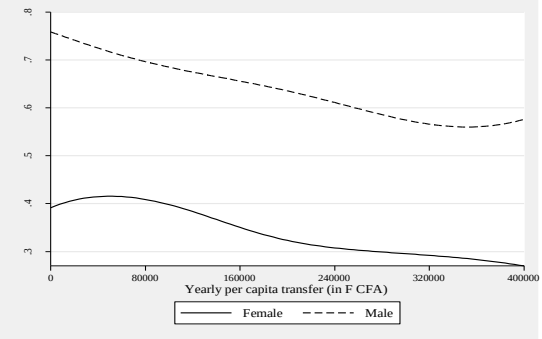
	From household with migrants		From household without migrants		Participating in labor market		Not participating in labor market	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Participate in labor market	0.524	0.499	0.58	0.494				
Live in household with migrants					0.552	0.497	0.607	0.488
Per capita expenditures	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
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
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
Total participating other members	5.264	3.95	3.121	2.278	4.623	3.84	3.533	2.579
Urban area (d)	0.378	0.485	0.488	0.5	0.428	0.495	0.564	0.496
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
District: receiving remittances rate	84.687	9.787	84.695	6.883	84.405	8.542	84.959	7.821
Number of elderly	0.558	0.685	0.323	0.582	0.403	0.615	0.438	0.624
Dependency ratio	1.051	0.726	0.908	0.631	0.823	0.602	0.764	0.602

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

Figure 1 presents the link between remittances and labor market participation in Senegal, which is estimated with a non-parametric approach. An increase in remittances seems to be associated with a fall in labor market participation. Men receiving remittances are more likely to participate in the labor market than women receiving remittances.

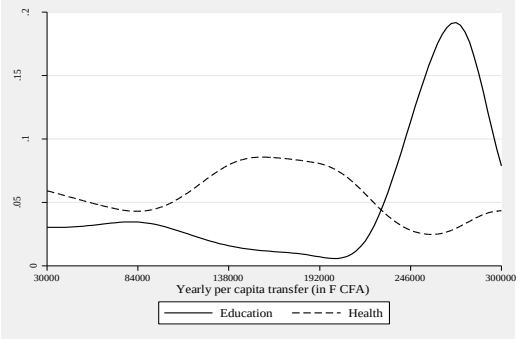
Figure 2 describes the relationships between remittances and the shares of expenditures on education and health. The link seems to be not linear. Indeed, households receiving remittances spend more on health up to a certain level of remittances beyond which they spend more on education. Irrespective 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 labor market participation in Senegal



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

Figure 2: Linking remittances and human capital in Senegal



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

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

This section presents the econometric results of the effect of migration on labor market participation in Senegal, and this, by 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 migrant leads to a decline of 9.4% in labor market participation, on average. The results hold true after controlling for several variables. Among them, the most important variables that affect significantly and positively labor market participation, as the proportion of men in the household, the age, the marital status, the total participating other members, and the belonging in some regions (Kaolack and Kolda). Other control variables explain significantly and negatively labor market participation, including household size, squared age, education years, urban areas, and the 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 labor 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 affect jointly migration and labor participation decisions, and this may generate an endogeneity bias problem. To overcome these weaknesses, we use

the *Endogenous Switching Probit* (ESP) model that allows to estimate the treatment effect (see Table 3). 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 (labor market participation) but that explain the variable of interest (migration). The correlation coefficient ρ_0 is negative but not significant in the equation for labor market participation with migrants, indicating that a member of a household with migrants does not have a different probability of participation to the labor market than a member of a household randomly selected from the sample. In contrast, in the equation for labor 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 to the labor market than a member of a household randomly selected from the sample. Or inversely, we can say that, household with migrant will have a lowest probability of participation.

To have more evidence on the impact of migration on labor market participation, also we propose to assess the effect based on the popular Propensity Score Matching (PSM) model. For this end, we start by selecting the appropriate variables which can satisfy the balancing test. Of course, this process has the inconvenient 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 seams to reduce the divergence between means, and this, within the matching blocks. Figure A.1 in annex A 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 A indicates that without balancing, there is a big difference between the distributions of prosperity 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 4. In general, there is no significant effect of the treated, but indicate significant and negative effect of the untreated, suggesting that households with migrants do not participate significantly to the labor market, while households without migrants participate significantly to the labor market. Therefore, for the untreated, if they migrate, this leads to a significant and negative effect on labor market participation. Then, the *Propensity Score Matching* (PSM) approach supports as well the negative and statistically significant effect of migration on labor market participation.

The negative and statistically significant coefficients of migration suggest that migration reduces significantly labor market participation in Senegal. Households with migrants are then less motivated to participate in the labor market because the remittances flows they receive from the migrants can be the source that discourages them to participate. Due to remittances flows, migration in Senegal generates therefore parasitism and declines the incentive of doing own business. This result is supported by Harris-Todaro (1970); Borjas (2004); Lassailly and Jacob (2006); Jean and Jiménez (2007); Berker (2011); Ruhs and Vargas-Silva (2014), who found that migration leads to a decline in labor market participation.

Table 2: Migration and labor market participation in Senegal: Probit models and Marginal effects

	Labor market participation	*Marginal effect*	Household with migrants	*Marginal effect*
Individual characteristics				
Household size	-0.0577***	-0.0226***	0.0137**	0.00519**
Male (d)	1.356***	0.488***	-0.108*	-0.0411*
Age	0.180***	0.0704***	-0.0162	-0.00616
Squared age	-0.00210***	-0.000821***	0.000237	0.0000897
Married (d)	0.125*	0.0488*	0.0499	0.0189
Bachelor diploma (d)	0.109	0.0423	-0.432**	-0.170*
Education years	-0.0407***	-0.0159***	0.0166*	0.00629*
Total participating other members	0.160***	0.0628***	0.125***	0.0475***
Urban area (d)	-0.379***	-0.148***	-0.0730	-0.0277
Region				
Diourbel (d)	-0.0999	-0.0394	0.329**	0.118**
Fatick (d)	0.203	0.0776	0.0210	0.00794
Kaolack (d)	0.349**	0.132***	-0.0578	-0.0221
Kolda (d)	0.425**	0.157**	-0.140	-0.0539
Louga (d)	0.134	0.0520	0.108	0.0403
Matam (d)	-0.371**	-0.147**	0.428***	0.150***
Saint-louis (d)	0.115	0.0445	-0.130	-0.0502
Tambacounda (d)	0.0223	0.00872	-0.0373	-0.0142
Thies (d)	0.162	0.0626	0.0462	0.0174
Ziguinchor (d)	-0.238	-0.0946	-0.439*	-0.173*
HH with migrants (d)	**-0.242*** **	**-0.0943*** **		
District migration rate			0.0281***	0.0106***
Ethnic				
Bambara (d)			-0.241	-0.0941
Biola (d)			1.310***	0.330***
Mancagne (d)			0.764	0.236*
Mandingue (d)			0.798*	0.244**
Manjaque (d)			1.139***	0.304***
Pular (d)			0.0666	0.0251
Sarakhole (d)			0.385*	0.134*
Serer (d)			-0.205*	-0.0793*
Balante (d)			2.608***	0.374***
Proprietary status				
Own agricultural land at present (d)			-0.364***	-0.137***
Own non-agricultural land at present (d)			0.206**	0.0764**
Own house at present (d)			0.374***	0.146***
Own other buildings at present (d)			0.304*	0.109*
Number of elderly			0.129**	0.0490**
Observations	10233	10233	10233	10233
Pseudo R^2	0.290	0.290	0.254	0.254

Source: Produced by the authors using data from World Bank (2009).
Note: (d) for discrete change of dummy variable from 0 to 1
* p < 0.05, ** p < 0.01, *** p < 0.001

Table 3: Migration and labor market participation in Senegal: Endogenous Switching Probit Model

	Migration	Labor market participation *With migrant*	Labor market participation *Without migrant*
Individual characteristics			
Household size	0.0887***	-0.0417***	-0.0341**
Squared Household size	-0.00138***	0.000834**	0.000599**
Male	-0.121**	1.218***	1.379***
Age	-0.0225*	0.160***	0.163***
Squared age	0.000310**	-0.00189***	-0.00186***
Married	0.0631	0.146**	0.140
Bachelor diploma	-0.413**	-0.00830	0.301
Education years	0.0159**	-0.0526***	-0.0330**
Urban area	-0.0417	-0.433***	-0.340***
Region			
Diourbel	0.286**	-0.552***	-0.305
Fatick	0.0271	0.154	0.201
Kaolack	-0.129	0.403***	0.217
Kolda	-0.196	0.0567	0.680***
Louga	0.128	-0.0523	0.252
Matam	0.186	-0.837***	-0.490**
Saint-louis	-0.202*	0.00531	-0.0524
Tambacounda	-0.0682	-0.120	0.440
Thies	-0.0165	0.123	0.134
Ziguinchor	-0.543***	-0.721***	-0.168
District migration rate	0.0300***		
Ethnic			
Bambara	-0.156		
Biola	1.242***		
Mancagne	0.780		
Mandingue	0.693**		
Manjaque	1.177***		
Pular	0.0327		
Sarakhole	0.441**		
Serer	-0.229***		
Balante	2.128***		
Proprietary status			
Own agricultural land at present	-0.290***		
Own non-agricultural land at present	0.357***		
Own house at present	0.323***		
Own other buildings at present	0.365***		
Number of elderly	0.165***		
_cons	-2.256***	-2.327***	-2.935***
Observations	10233		
Rho 1	-0.321***		
Rho 0	-0.0148		

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

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

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

Table 4: Migration and labor market participation in Senegal: Treatment effect and the Propensity Score Matching (PSM) approach

	Treatment effect on the Treated	*Treatment effect on the Untreated*	*TOTAL*
Nearest Neighbor (5)	0.00516	-0.0424**	-0.0102
Radius [Caliper (0.01)]	-0.0146	-0.0594**	-0.0291

Source: Produced by the authors using data from World Bank (2009).
Note: The Standard Error is estimated with the bootstrap technic with 100 replications.

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

This section presents the results of the econometric estimation of the effect of remittances on labor 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 5. In this table, we estimate five different models, depending on how we measure remittances. In the first model (M1), we consider the non-nil per capita remittances. Per capita remittances stand at FCFA 100,000 at least, FCFA 200,000 at least and FCFA 300,000 at least, respectively in the models M2, M3 and M4. In the model M5, we use logarithm of per capita remittances. These different segmentations based on the level of remittances are motivated by the linkage between the incitation to participate to labor market and the level of remittances. The results show that households without remittances are significantly motivated to participate to the labor market. When the volume of remittances is increasing, households become less motivated to participate to the labor 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 of logarithm of per capita remittances. These results hold true after controlling for several variables including the individual characteristics and the regions.

Table 6 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 instrument. The significance of the Wald test validates the goodness of this instrument. The results show negative and statistically significant coefficients of remittances. An increase by one in the log of remittances is found to reduce significantly labor market participation by 2.9%.

Table 7 reports the results with the Propensity Score Matching (PSM) method. Remittances are disaggregated in 4 models defined as in Table 5. We find systematically negative and statistically significant effect of remittances with 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 then that remittances reduce labor market participation.

The negative and statistically significant coefficients of remittances imply that remittances reduce the incentive of participating to the labor 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 labor market decision of the rest of household members that receive remittances do not depend only on the status of

receiving or not remittances, but it also depends (mainly) on the level of remittances. This aspect was largely neglected in other empirical works.

Table 5: Remittances and labor market participation in Senegal: Probit models and marginal effects

	M1	M2	M3	M4	M5
Individual characteristics					
Household size	-0.0300***	-0.0307***	-0.0308***	-0.0309***	-0.0303***
Squared Household size	0.000235	0.000260*	0.000265*	0.000241*	0.000248*
Male (d)	0.488***	0.490***	0.490***	0.491***	0.487***
Age	0.0705***	0.0705***	0.0705***	0.0708***	0.0705***
Squared age	-0.000824***	-0.000824***	-0.000825***	-0.000828***	-0.000824***
Married (d)	0.0508*	0.0488*	0.0484*	0.0482*	0.0504*
Bachelor diploma (d)	0.0486	0.0550	0.0550	0.0523	0.0479
Education years	-0.0165***	-0.0170***	-0.0168***	-0.0165***	-0.0164***
Total participating other members	0.0619***	0.0584***	0.0578***	0.0584***	0.0617***
Urban area (d)	-0.150***	-0.150***	-0.152***	-0.154***	-0.149***
Region					
Diourbel (d)	-0.0390	-0.0648	-0.0633	-0.0548	-0.0352
Fatick (d)	0.0692	0.0625	0.0651	0.0653	0.0667
Kaolack (d)	0.133***	0.118**	0.121**	0.121**	0.130**
Kolda (d)	0.151**	0.148**	0.151**	0.151**	0.148**
Louga (d)	0.0357	0.0182	0.0195	0.0214	0.0376
Matam (d)	-0.150**	-0.157**	-0.156**	-0.153**	-0.153**
Saint-Louis (d)	0.0439	0.0302	0.0323	0.0361	0.0445
Tambacounda (d)	-0.00153	-0.00441	-0.00265	-0.000140	-0.00403
Thies (d)	0.0558	0.0519	0.0539	0.0550	0.0547
Ziguinchor (d)	-0.115	-0.114	-0.112	-0.112	-0.118
Remittances					
Per capita remittances more than 0 (d)	**-0.0776****				
Per capita remittances more than 100000 F CFA (d)		**-0.0553**			
Per capita remittances more than 200000 F CFA (d)			**-0.0706**		
Per capita remittances more than 300000 FCFA (d)				**-0.175****	
Log (per capita remittances)					**-0.00749*****
Observations	10233	10233	10233	10233	10233
Pseudo R^2	0.289	0.287	0.287	0.288	0.289

Source: Produced by the authors using data from World Bank (2009).
Note: (d) for discrete change of dummy variable from 0 to 1
* p < 0.05, ** p < 0.01, *** p < 0.001

Table 6: Remittances and labor market participation in Senegal: IV Probit models and marginal effects

	IV Probit		
	Labor market participation	Log (remittances)	*Marginal effects*
Log (per capita remittances)	**-0.0728****		**-0.0286****
Individual characteristics			
Household size	-0.0736***	-0.0233	-0.0289***
Squared Household size	0.000676*	0.000950	0.000265*
Male (d)	1.270***	-0.607***	0.462***
Age	0.173***	-0.0119	0.0680***
Squared age	-0.00202***	0.000101	-0.000795***
Married (d)	0.131*	0.151	0.0513*
Bachelor diploma (d)	0.0757	-0.856	0.0295
Education years	-0.0360***	0.0729**	-0.0141***
Total participating other members	0.175***	0.391***	0.0687***
Urban area (d)	-0.368***	-0.746**	-0.144***
Region			
Diourbel (d)	0.213	4.212***	0.0818
Fatick (d)	0.160	1.263**	0.0618
Kaolack (d)	0.392***	1.359***	0.147***
Kolda (d)	0.329*	-0.807	0.124*
Louga (d)	0.255	3.115***	0.0970
Matam (d)	-0.385**	0.476	-0.152**
St-louis (d)	0.192	1.505***	0.0739
Tambacounda (d)	-0.0561	0.0207	-0.0221
Thies (d)	0.156	1.102***	0.0605
Ziguinchor (d)	-0.342	-1.680***	-0.136
District receiving remittances rate		0.0405***	
Ethnic			
Bambara		0.272	
Biola		2.012***	
Mancagne		1.539	
Mandingue		-1.400	
Manjaque		-2.593***	
Pular		-0.338	
Sarakhole		0.662	
Serer		-1.154***	
Balante		0.121	
Proprietary status			
Own agricultural land at present		-1.790***	
Own non-agricultural land at present		0.157	
Own house at present		1.643***	
Own other buildings at present		1.318***	
Number of elderly		1.184***	
Observations	10233		10233
Rho	**0.25669****		
Sigma	**4.3924*****		

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

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

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

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 7: Remittances and labor market participation in Senegal: Propensity Score Matching (PSM)

	(1) Remittances more than 0	(2) Remittances more than 100000	(3) Remittances more than 200000	(4) Remittances more than 300000
Treatment effect on the Treated	0.0130	-0.0112	-0.0843	-0.193**
	(0.0244)	(0.0411)	(0.0652)	(0.0823)
Treatment effect on the Untreated	-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)
Observations	10232	10232	10232	10232

Source: Produced by the authors using data from World Bank (2009).
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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 8 reveal positive and significant coefficients of remittances. An increase in remittances of one F CFA raises both expenditures on education and health by respectively 0.01.6 and 0.014 F CFA. The results with the PSM are reported in Table 9 (for expenditures on education) and Table 10 (for expenditures on health). As it was the case in Table 5, we use the same decomposition of remittances in 4 various models. For the untreated, we find systematically positive and statistically significant coefficients of both expenditures on education and health, while there is no significant effect for the treated. The positive and significant coefficients of both expenditures on education and health remain true as a whole, suggesting therefore that remittances influence significantly 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 (Cox-Edwards and Ureta, 2003; Acosta, 2011; Hanson and Woodruff, 2003; Lopez-Cordova, 2005; Franck and Hummer, 2002; Hildebrandt and McKenzie, 2005; Amuedo-Dorantes and Pozo, 2006; Amuedo-Dorantes, Sainz and Pozo, 2007; Kanaiaupuni and Donato, 1999; Gupta, Pattillo and Wagh, 2007; Jongwanich, 2007; Yang and Martinez, 2006; Kifle, 2007; Adams and Cuecuecha, 2010; Bansak and Chezum, 2009; Painduri and Thangavelu, 2011; Ben Mim and Mabrouk, 2011; Zhunio et al., 2012).

Table 8: Remittances and expenditures on education and health in Senegal: Ordinary Least Squares (OLS)

	Expenditures on:	
	Education	*Health*
Per capita remittances	**0.0159*****	**0.0142*****
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***
District receiving remittances rate	24.29**	-4.876
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
R^2	0.145	0.068

Marginal effects

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

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

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 9: Remittances and per capita spending on education in Senegal: Propensity Score Matching (PSM)

	(1) Remittances more than 0	(2) Remittances more than 100000	(3) Remittances more than 200000	(4) Remittances more than 300000
Treatment effect on the Treated	-101.0	1,679	3,211**	7,767**
	(915.5)	(1,743)	(1,584)	(3,068)
Treatment effect on the Untreated	1,537***	3,289***	4,739***	5,025***
	(420.4)	(561.2)	(963.5)	(1,550)
All	717.5	3,086***	4,636***	5,108***
	(476.3)	(502.5)	(916.8)	(1,510)
Observations	10232	10232	10232	10232

Standard errors in parentheses

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

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

Table 10: Remittances and per capita spending on health in Senegal: Propensity Score Matching (PSM)

	(1) Remittances more than 0	(2) Remittances more than 100000	(3) Remittances more than 200000	(4) Remittances more than 300000
Treatment effect on the Treated	-878.1	2,582*	4,588*	-592.3
	(1,192)	(1,547)	(2,559)	(3,598)
Treatment effect on the Untreated	2,874***	3,683***	5,345***	5,928***
	(692.7)	(820.0)	(1,547)	(1,706)
All	996.3	3,544***	5,294***	5,730***
	(719.5)	(765.1)	(1,493)	(1,669)
Observations	10232	10232	10232	10232

Standard errors in parentheses

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

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

5 Conclusions and policy implications

The issue of migration in Senegal is mainly motivated by the search for better living conditions and employment. This phenomenon is thus seen as an important alternative for many young members of Senegalese households who are faced with the problem of unemployment and the labor market that is struggling to absorb the labor supply. The first objective of this study was to analyze the impact of migration on labor market participation. The second objective was to highlight the role of remittances in labor market participation. In addition, this study examined the effect of remittances on expenditures on health and on education. To achieve these objectives, we used different econometric models, including: the probit model, the endogenous switching probit model, the propensity score matching method, IV probit model, and ordinary least squares method.

The analysis revealed three main findings. Firstly, the phenomenon of migration leads to an important decline in labor market participation. Households with migrants participate less to the labor market, as they have less incentives to create own business due to the remittances flows they receive. Secondly, remittances reduce also significantly the incentive of participating to the labor market. Finally, the reception of remittances contributes to increase significantly expenditures on education and health.

These results do not imply that there is need to reduce migration for greater labor market participation. In fact, in the literature, migration is seen as important for development. Indeed, households with migrants are generally poor, and count importantly 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 importantly to the labor market. The Government of Senegal needs to put into place policies aiming to create economic opportunities that motivate households with migrants to develop entrepreneurship and to re-allocate remittances flows more towards productive circuits. This is in line with the National Strategy for Economic and Social Development (SNDES, 2012) that suggests to involve Senegaleses living oversea to contribute to the national development efforts via the popularization of productive investments opportunities with these Senegalese migrants. However, there is a 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. This national migration policy would identify key constraints and would define key axes for a greater contribution of migration and remittances to employment creation. As the domestic labor market in Senegal is struggling to absorb the labor supply, migration and remittances can then be key to reducing unemployment.

Based on the results, remittances appear to be crucial for better improvement of human capital in the country, particularly in terms of access to education and health services. Indeed, there are persistent weaknesses in the sector of education in Senegal in terms of achieving the primary cycle, of increasing the quality and performance of the education system, of building schools and raising the number of professors. The country has not reached the goal “education for all” as recommended by the Millennium Development Goals (MDG) (SNDES, 2012). There are also important weaknesses in the health sector, regarding the provision of medicines, the health infrastructures, the health human resources and the country has problems to reach the MDG related to health (SNDES, 2012).

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Annex

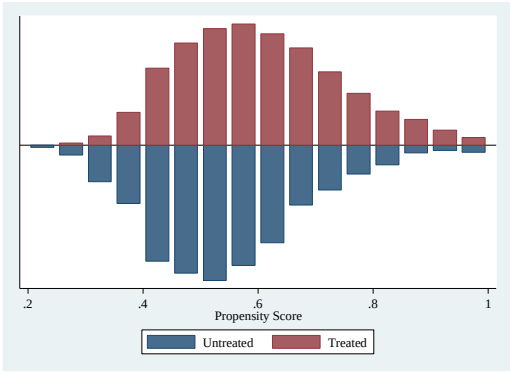
Annex A:

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

Variable	Sample	Mean 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

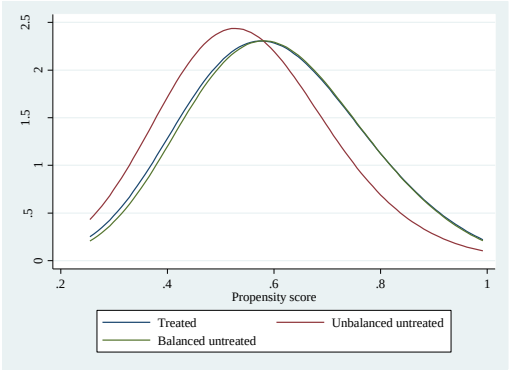
Source: Produced by the authors using data from World Bank (2009).

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