

DOCUMENT DE TRAVAIL

DT/2013-04

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UMR DIAL 225

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MIGRANT NETWORK AND IMMIGRANTS' OCCUPATIONAL MISMATCH¹

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Document de travail UMR DIAL

Avril 2013

Revised Novembre 2014

Abstract

This paper defines new measures of horizontal and vertical occupational mismatch based on the discrepancies between the skill content of occupations in which individuals have a self-assessed productive advantage and that of their actual job. Using these new indicators of mismatch, this paper provides the first direct empirical test of the causal impact of networks on occupational mismatch, in the particular case of immigrants. The data used are original survey data collected among Senegalese migrants in four host countries. Potential endogeneity issues are dealt with by estimating a bivariate probit of network use and labor market mismatch, exploiting information on migrant's ethnic characteristics for identification. Estimation results show that migrants who obtained their job through the migrant network have a lower probability of negative mismatch and thus seem to be protected from a loss in occupational status. On the other hand, network use is positively correlated with horizontal mismatch, especially in African host countries.

Key words: Occupational mismatch; networks; immigration; labor market; skill recognition.

Résumé

Ce papier présente de nouveaux indicateurs d'inadéquation professionnelle verticale et horizontale, définis à partir du décalage entre le niveau de qualifications associé au métier des individus et à leur emploi. Sur la base de ces définitions, ce papier est le premier à tester directement l'impact causal des réseaux sur l'inadéquation professionnelle, dans le cas particulier des immigrants. Les données utilisées sont des données d'enquêtes originales, collectées auprès de migrants sénégalais dans quatre pays de destination. Je traite les problèmes d'endogénéité potentiels en estimant un probit bivarié pour l'utilisation du réseau et l'inadéquation professionnelle, en exploitant l'information fournie par l'enquête sur les caractéristiques ethniques des migrants pour identifier l'effet causal du recours au réseau.

Cette analyse montre que les migrants qui ont obtenu leur emploi par leur réseau de migrants ont une probabilité moindre de déclassement professionnel, ce qui suggère que le réseau joue un rôle protecteur. Ils ont en revanche une probabilité plus élevée d'inadéquation professionnelle horizontale, notamment dans les deux pays Africains de l'échantillon.

Mots Clés : Déclassement professionnel ; immigration; réseau migratoire ; marché du travail.

JEL Code: J24; J61; F22

¹ I thank for comments Eve Caroli and participants at the 2012 CEPII-OECD "Immigration in OECD countries" Conference (OECD, Paris), the 2013 fourth Norface Conference "Migration: Global Development, New Frontiers" (UCL, London), and the 2013 "Journées de Microéconomie Appliquée" (Nice).

1 Introduction

The impact of networks on job-search and labor-market outcomes has been much investigated since the founder work of Granovetter (1974). Networks first matter in the job-search process because they are expected to reduce asymmetries of information (Montgomery, 1991). They should thus improve the quality of the match between hiring firms and applying workers. Dustmann, Glitz, and Schönberg (2011) for example, who explore both theoretically and empirically the causes of ethnic segregation at the firm level, show that referrals by members of the same minority group reduce uncertainty about the productivity of job market candidates and explain higher wage offers made by the firm.

However, recent works seem to challenge this view. Indeed, a specific trend in this literature, building on Montgomery (1991), investigates and models the impacts of network strength on wages. Goel and Lang (2009) focus in particular on the role of networks on job search outcomes of recent immigrants. By allowing migrants to use both formal job-search channels and informal ones (networks), they show that having accepted a job offer through the network has no theoretical impact on wages. Their main finding is that stronger networks are associated with lower network premiums, defined as the wage differential between jobs obtained through the network or through formal search channels. Similarly, Bentolila, Michelacci, and Suarez (2010) find that jobs found through personal contacts return lower wages than jobs obtained through formal methods. They explain this finding by a poorer quality of the match. Indeed, the basic intuition of their model is that jobs obtained through social contacts may not be perfectly adapted to individuals' skills, given the limited number of occupations in which individuals have contacts who are likely to refer them for a job. To my knowledge, Bentolila, Michelacci, and Suarez (2010) is the only paper that specifically tackles the link between networks and occupational mismatch. However, the authors cannot provide a direct test of the predictions of their theoretical model for lack of direct observations of occupational mismatch, and they indirectly study the impact of networks on wages.

Occupational mismatch is an even more acute issue for immigrants in host countries. According to the European Social Survey data covering 22 European countries and 76 immigrants' countries of origin for the 2000-2009 period, 22% of immigrants are overqualified for their job, while this is the case of only 13% of natives (Aleksynska and Tritah, 2013). Whereas immigrants' economic performance in destination countries is partly explained by migrants' self-selection (Borjas (1987) ; Chiswick (1999)), occupational mismatch of immigrants is also obviously related to the recognition at destination of the skills that they acquired in their country of origin.

Given the role played by migrant networks in the economic integration of immigrants in host countries, networks very likely affect occupational mismatch. The impact of migrant networks on job-search and labor market outcomes has indeed led to a sizable literature. In particular, Munshi (2003) shows that the size of the Mexican network in the U.S. increases the probability for a Mexican immigrant to be employed, and to get a better job in the non-agricultural sector, using rainfall in Mexico to instrument for network size at destination. Amuedo-Dorantes and Mundra (2007) find, in addition, a positive impact of networks on wage of Mexican immigrants in the U.S. However, no paper has yet addressed the impact of migrant networks on immigrants' occupational mismatch.

In addition, the prevailing approach of occupational mismatch in the empirical literature is almost exclusively focused on vertical mismatch, based on discrepancies between immigrants' educational attainment and the educational requirements of the jobs that they get in host countries, as illustrated by the widespread anecdotal evidence of PhD holders working as taxi drivers. Mismatch is indeed predominantly defined as over- or under-education in papers focusing on immigrants' mismatch (Chiswick and Miller (2009); Aleksynska and Tritah (2013)), following the more general labor literature (Di Pietro and Urwin (2006)) . Such an approach has two main limitations, notably as regards the analysis of migrants' occupational mismatch. First, focusing on vertical mismatch only, may eclipse part of a more complex reality. The original survey data used in this paper,

that were collected among 1,200 Senegalese migrants in four destination countries, indeed reveal a high prevalence of other forms of mismatch, which I define as horizontal mismatch: 11% of these migrants work in a job or sector other than the one in which they have a productive advantage, even though both have similar skill requirements. Second, education-based definitions are not well adapted to low-educated populations, as could be the case of immigrant populations originated from developing countries. For such populations, these measures would in particular lead to underestimate mismatch by ruling out the possibility of occupational mismatch, including horizontal mismatch, for individuals with no formal education.

The data I use are part of the MIDDAS project¹, and were collected among around 1,000 employed Senegalese migrants in four of the top destination countries of Senegalese: two European countries, France and Italy, and two West-African countries, Mauritania and Côte d’Ivoire. Both the sampling strategy based on the latest available census data in each host country and the data collection based on random contacting of immigrants in public areas were aimed at ensuring that the resulting sample of migrants is not selected, especially with respect to their insertion in migrant networks².

In this paper, I first overcome the double limitation of education-based definitions of vertical mismatch by providing new measures of mismatch based on the discrepancies between individuals’ self-declared “profession” or “trade” (corresponding to the French notion of *métier*) and their actual occupation, using occupation codes and skill levels associated with each occupation from the 2008 International Standard Classification of Occupations (ISCO-08). I define *vertical* mismatch (either positive or negative) based on discrepancies between the level of skills required in the job in which the migrant declares that she has a productive advantage and those required in her actual job. Similarly, *horizontal* mismatch corresponds to the case of migrants having a job which does not match their self-declared productive advantage but which is ascribed the same skill level

¹MIDDAS is three-year project standing for “Migration and development in Senegal: an empirical analysis using matched data on Senegalese migrants and their origin households (MIDDAS)” funded by the French Agence Nationale de la Recherche and the Agence Française de Développement.

²See the next section and the appendix for a more detailed description of the survey design.

according to the ISCO-08 classification.

I then estimate the impact of network help to get a job on immigrants' both vertical and horizontal occupational mismatch. Potential endogeneity issues arise due to the likely non-random choice of using informal job-search channels. Immigrants who obtained their job through the migrant network may indeed have unobserved characteristics that correlate with their labor market outcomes. In order to overcome potential endogeneity problems, I estimate a bivariate probit of network use and labor market mismatch, in which the impact of network use to find a job on mismatch is identified by excluding whether the migrant is Wolof from the mismatch equation. This strategy exploits rich information on migrants' ethnic group collected in the MIDDAS survey and the historical features of Senegalese migration. The Wolof, because of their recent migration history are expected to have smaller networks, here defined as family members or migrants from the same area of origin. I indeed find a negative correlation between being a Wolof and the probability to use the migrant network to find a job. My identifying assumption is that ethnicity does not have a direct effect on mismatch. This assumption is further discussed in Section 5. Note already that the exclusion restriction may not hold if ethnicity correlates with unobserved characteristics, for example attitudes to work, affecting occupational mismatch. In order to proxy for these unobserved characteristics, I additionally control for migrants' religious affiliation by including a dummy for Mouride brotherhood.

When the potential endogeneity of network use in the job-search process is not accounted for, I find that migrants who obtained their current job through the migrant network are less likely to suffer negative vertical mismatch in both regions, Europe and Africa, and are more likely to experience horizontal mismatch, though the latter effect is significant in the two African countries only.

When tackling the endogeneity issues by estimating a bivariate probit model on the sample of immigrants in Europe, results are confirmed: obtaining one's job through the migrant network decreases the probability of negative mismatch and is positively correlated (though not significantly) with horizontal mismatch.

This paper first contributes to the literature on occupational mismatch by providing the first direct empirical estimation of the causal impact of networks on occupational mismatch, building on the recent job-search theoretical literature. Indeed, the link between networks and occupational mismatch is at the core of the model presented by Bentolila, Michelacci, and Suarez (2010). The authors assume in a static model that occupations in which workers have a productive advantage are not necessarily the ones in which they have social contacts. Workers with smaller networks may thus choose to sacrifice their productive advantage and accept a network offer in order to reduce unemployment duration. But although their model specifically tackle the question of productive mismatch, they cannot provide a direct test of their predictions for lack of appropriate data and use wage data instead. They find, on average, a negative impact of network-based search on wages. Using survey data containing information on both individuals' actual occupation and self-assessed productive advantage, I provide in this paper the first direct empirical test of the predictions of the model by Bentolila, Michelacci, and Suarez (2010), by exploring the relationship between network referrals and occupational mismatch, in the particular case of immigrants.

Second, this paper contributes to the occupational mismatch literature by introducing new definitions of both horizontal and vertical occupational mismatch based on discrepancies between individuals' self-assessed productive advantage and actual occupation. The mismatch literature indeed almost exclusively focuses on vertical mismatch which is based on education: mismatch is defined as over- or under-education (Chiswick and Miller (2009); Aleksynska and Tritah (2013)). Even the very few studies that address the issue of horizontal mismatch similarly define mismatch based on education: horizontal mismatch captures the discrepancies between an individual's field of education and her occupation (Robst (2007); Nordin, Persson, and Rooth (2010)).

Third, this paper contributes to the theoretical and empirical literature on the impact of migrant networks on immigrants' labor market outcomes in host countries. Although the question of the impact of migrant networks on employment or wages gave rise to

substantial research (Munshi (2003); Amuedo-Dorantes and Mundra (2007)), no paper has yet addressed the impact of migrant networks on immigrants' occupational mismatch.

This paper more generally relates to the vast literature on the impact of migrant networks on job-search and labor market outcomes. The theoretical predictions regarding the role of networks in job-search models are mostly based on a comparison between formal and informal search methods (networks), and depend on assumptions about: the rate of arrival of job offers, which is for example assumed to be lower through the network than through formal search methods in Kugler (2003); the distribution of wage offers, which may differ depending on whether they are provided by networks or formal channels (Goel and Lang, 2009); the possibility for workers to use only one job-search method or compare offers obtained from different channels (as in Goel and Lang (2009)); the relative cost of network search which is assumed to be lower than formal methods search for example in Cahuc and Fontaine (2009). Most of the above mentioned papers do not specifically address the issue of migrant networks. Regarding the different channels for networks effects listed above, some specificities of migrant networks may be pointed. The rate of arrival of job offers through the network may in particular be higher and the relative cost of network search compared to formal search may be lower for immigrants. Indeed, access to formal search methods may be made more costly by the cultural distance and lead immigrants to rely more on informal network-based job search. Moreover, rejecting a job offer provided by personal contacts may be more costly than rejecting a formal offer, especially for immigrants since they may need network help only to get a job but also for example to find a housing or get over cultural barriers.

The rest of the paper is organized as follows. Section 2 describes the MIDDAS survey data and defines the mismatch and network variables that I use. Section 3 presents the empirical strategy and discusses identification issues. Section 4 reports and discusses the results and section 5 concludes.

2 Data

2.1 Description of the survey

The data used in this paper come from four surveys conducted among Senegalese migrants in 2009 and 2010, that are part of the MIDDAS project³. 300 Senegalese were surveyed in each of the top four destination countries of Senegalese migrants, according to the 2012 United Nations Database on international migrants stocks: France, Italy, Mauritania and Côte d'Ivoire. The sampling design was based on the latest census data in each country to ensure sample representativeness with regard to location, age, and gender. Fieldwork procedures and questionnaire used in each country were the same. We collected in particular detailed information on migrants' employment characteristics, wage, education, as well as their networks and contacts. A more detailed description of the MIDDAS migrant surveys' design is provided in Appendix. This paper uses data on mismatch and network use on the sample of around 1,000 employed Senegalese migrants.

Regional unemployment data are included as additional controls in some specifications for the subsample of migrants in Europe. Data on unemployment rates at the department level for France (*département*) come from the French National Statistical Institute (INSEE), and data on unemployment rates at the province level for Italy come from Eurostat⁴.

2.2 Variables

Occupational mismatch is identified based on the discrepancies between migrants' answers to two distinct survey questions: a first question about their profession or trade, and a

³This three-year project (2008-2011) entitled "International Migration and Development: an Analysis using Matched data on Migrants and Origin Households in Senegal (MIDDAS)" was funded by the French Agence Nationale de la Recherche (ANR) and the Agence Française de Développement (AFD). Overall coordination was carried out by a research team from the Institut de Recherche pour le Développement (IRD-DIAL), with fieldwork support from researchers from the Forum Internazionale ed Europeo di Ricerche sull' Imigrazione (FIERI) in Italy and the Agence Nationale de la Statistique et de la Démographie (ANSD) in Senegal. For further details on the global objectives and the institutional setting of the MIDDAS project, see http://www.dial.prd.fr/dial_enquetes/dial_enquetes_middas.htm.

⁴Disaggregate unemployment data are not available for the two African countries.

second question about their actual job⁵. The first question is intended at capturing individual comparative productive advantages and its formulation invites migrants to answer according to their self-assessed productive skills⁶.

By comparing answers to these two questions and coding them using the 2008 International Standard Classification of Occupations (ISCO-08), I am able to further define *vertical (negative) mismatch*, when the migrant’s actual job corresponds to a lower skill level than his declared comparative advantage and *horizontal mismatch*, when the migrant’s actual job does not match her self-declared “profession” or “trade” but when both correspond to the same skill level. The ISCO-08 skill level classification ranges from 1 (elementary occupations) to 4 (highest skill level)⁷. The mapping of ISCO-08 major groups to the four skill levels is reproduced in Appendix.

The coding of mismatch can be illustrated by the two following examples: a migrant who declares being an accountant (skill level 4) and is actually employed as a workman (skill level 1) experiences a negative mismatch. However, being a self-declared tailor and working as a cook is regarded as an horizontal mismatch (both are classified at skill level 2). Importantly, discrepancies between the migrant’s self-assessed productive advantage and actual job may capture in part a subjective inadequacy between a migrant’s qualification and her occupation.

The distribution of skill levels corresponding on the one hand to migrants’ self-declared productive advantage and actual job are represented in Figure 1 in Appendix.

The proportion of migrants experiencing different types of mismatch, for the separate European and African sub-samples is shown in Table 1. The proportion of migrants experiencing horizontal mismatch is very similar in both host regions, whereas negative mismatch is much more frequent in Europe (12.7%) than in Africa (2.2%)⁸.

⁵The rationale behind these two questions was to capture the different notions, in French, of *métier* and *emploi*.

⁶The exact wording of the two questions in French is the following: *Avez-vous un métier* and *Aujourd’hui, quelle est votre profession principale ?* Note that the two questions belonged to different non-consecutive sections of the questionnaire.

⁷See <http://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm>

⁸Since the number of observed cases of positive vertical mismatch is very low (around 1% of the whole sample), in the subsequent empirical application they are considered horizontal mismatch.

Table 1: Horizontal and vertical occupational mismatch, by host region

	France and Italy	Mauritania and Côte d'Ivoire
No mismatch (%)	73.3	86.8
Horizontal mismatch (%)	11.1	10.6
Vertical negative mismatch (%)	12.7	2.2
Vertical positive mismatch (%)	2.9	0.4
Observations	442	539

Source: MIDDAS survey, 2009-2010

As for network use, I construct a dummy variable, denoted network help NH , that equals one for migrants who obtained their current job through the migrant network. The migrant network is here defined in a broad sense, including both family members and non related Senegalese⁹. Table 2 shows the percentage of migrants in Europe and in Africa who obtained their current job with the help of their network.

2.3 Summary statistics

Table 2 presents summary statistics of individual demographic characteristics and network use of employed migrants, by destination (Europe and Africa). The main differences between migrants in Africa and in Europe concern education: the share of migrants with medium to high levels of education is much higher in France and Italy than in African countries, which explains the observed low percentage of negative mismatch in Mauritania and Côte d'Ivoire, shown in Table 1 (2.2%). Indeed, negative mismatch is negatively correlated with education since migrants with low educational attainments are more likely to declare that they have a comparative productive advantage in a job requiring one of the lowest skill levels, and are therefore unlikely to have an even less skilled job.

⁹The network dummy variable is generated by coding answers to the following multiple choice question relative to interviewees' current occupation: How did you get your job ? (in French: *Comment avez-vous obtenu votre emploi*). NH is equal to one if the interviewee obtained her current job through a family member, a friend or acquaintance from the same origin village or region or from the same religious community, or through a migrant association.

Table 2: Summary statistics by host region

	France/Italy (1)	Mauritania/Côte d'Ivoire (2)	(3)
Male (%)	76.9	77.7	*
Age	37.3	37.6	**
Migration duration (years)	12.5	10.5	
Age at arrival	24.9	27.1	***
No or primary degree (d)	37.8	83.6	***
Intermediate or vocational secondary degree (%)	25.8	11.1	***
Secondary degree (<i>bac</i>) (%)	11.7	3.4	***
University degree (%)	24.7	2.0	***
Mouride (%)	41.3	37.7	**
Wolof (%)	52.7	59.3	*
Italy (%)	52.0		
Côte d'Ivoire (%)		47.3	
Network help to find current job(%)	20.7	16.0	
Observations	442	539	

Notes: χ^2 /t/Fisher mean or proportion tests in column (3)

Source: MIDDAS survey, 2009-2010

3 Empirical specification

As a first step, I explore the potential impact of the migrant network on the probability to experience occupational mismatch by estimating the following equation by a standard probit:

$$M_i^* = \alpha_0 + X_i' \alpha_1 + \alpha_2 NH_i + \delta_j + \epsilon_i \quad (3.1)$$

where M_i^* denotes the latent mismatch status of migrant i and is only observed as:

$$M_i = \mathbb{1}_{\{M_i^* > 0\}} \quad (3.2)$$

where NH_i is the network help dummy, and X_i is a set of control variables including in the baseline specification age, gender, and education. δ_j are country fixed-effects. M_i is here a generic notation for mismatch but two sets of equations are separately estimated, the dependent variable being alternately a dummy variable for horizontal and negative mismatch.

However, coefficients estimated by a standard probit are likely to be biased if unobserved variables drive both the probability to find a job through the network and the probability of mismatch.

3.0.1 Bivariate probit

In order to overcome potential endogeneity problems, I jointly estimate the network use and mismatch equations by maximum likelihood. Assuming that the errors in both equations are jointly distributed as bivariate normal, the likelihood has a bivariate probit form, which accounts for the possible endogeneity of network use.

$$NH_i^* = \beta_0 + \beta_1' X_i + \beta_2' Z_i + \delta_j + \nu_i \quad (3.3)$$

$$M_i^* = \alpha_0 + \alpha_1 NH_i + \alpha_2' X_i + \delta_j + \epsilon_i \quad (3.4)$$

with the same notations as above, NH_i^* and M_i^* being latent continuous variables and NH_i being an indicator variable for having obtained one's job through the migrant network, which equals one when $NH_i^* > 0$. Similarly, the indicator variable M_i for mismatch, alternately horizontal and negative, equals one when $M_i^* > 0$. ν_i and ϵ_i are individual error terms.

In order to identify the parameters without relying on non-linearities at least one variable Z_i in the network use equation must be excluded from the mismatch equation. I exploit information on migrants' ethnicity available in the survey to construct a dummy variable that equals one for migrants belonging to the Wolof ethnic group. First, the Wolof dummy is expected to be negatively correlated with network use. Indeed, the Wolof are the largest ethnic group in Senegal, with 43% of the population but their migration history is more recent than that of other Senegalese ethnic groups. Senegalese migrations have deep historical roots but the first region of Senegal to participate in massive international migration was the Senegal River valley adjoining Mauritania and Mali, mainly populated by Halpulaar'en, as documented by Clark (1994), and Soninké. The Wolof are thus expected to have smaller networks, here defined as family members or friends from the same area of origin, than other Senegalese ethnic groups, in particular in France, which is the historic host country of Senegalese migrants. Second, the Wolof variable satisfies the exclusion restriction if being a member of the Wolof group has no direct impact on the probability of job-market mismatch. Note that ethnicity could directly affect mismatch in host countries mainly through the two following channels. First, Wolof migrants may differ from migrants from other ethnic groups and have particular unobserved characteristics that correlate with labor-market outcomes. Identification of the causal impact of network use on mismatch relies on the assumption that belonging to the Wolof ethnic group may affect migrants' probability of experiencing labor market mismatch in Europe only through network effects. Note however that this assumption

is less strong than it first seems: it does not imply that ethnicity is uncorrelated with migrants choice of sector or activity. Belonging to the Wolof ethnic group may indeed be correlated with unobserved characteristics affecting a migrant’s attitude to work in general. What is assumed is that being a Wolof has no effect, other than through the migrant network, on the probability to be mismatched, that is, on the observed discrepancies between a migrant’s productive comparative advantage (which may well be affected by her ethnic origin) and her actual job. Moreover, in order to proxy for potential unobserved characteristics of the Wolof that would be correlated with both network use and mismatch, I exploit available information on migrants’ religious brotherhood affiliation contained in the MIDDAS data. I additionally control for a dummy variable that equals one for migrants belonging to the Mouride brotherhood in both equations of the bivariate probit model above described. Indeed, socio-anthropological studies document the strength of network links in the widespread Mouride diaspora, and the distinctive work ethic of members of the Mouride brotherhood(see for example Bava (2003)).

Second, Wolof migrants may be offered different kind of jobs by employers. This could be the case in particular in Mauritania, since the Wolof account for almost 8% of the Mauritanian population: cultural proximity or a common language could thus explain different labor-market outcomes of the Wolof. The exclusion restriction is less likely to be satisfied for African destinations than for European ones, I thus focus on the subsample of migrants in France and Italy when estimating the bivariate probit model.

4 Results

4.1 Probit estimates of horizontal and negative mismatch

Results from standard probit estimations of horizontal and negative mismatch equations are presented in table 3. Migrants from all four surveyed countries are pooled. These results suggest that network help has a contrasted impact on the different types of mismatch: indeed, finding a job through the migrant network seems to increase the

probability of horizontal mismatch but to decrease the probability of negative mismatch.

Being a man and age at arrival in the host country are positively and significantly correlated with horizontal mismatch. Moreover horizontal mismatch is significantly higher in Italy than in France. This result is very likely explained by the greater specialization of Senegalese migrants in Italy in informal trade. The significantly lower probability of negative mismatch in Mauritania and Côte d'Ivoire than in France is a direct consequence of the smaller share of migrants with secondary and tertiary education in Africa.

Table 3: Probit estimates for horizontal and negative mismatch; whole sample

	(1) Horizontal mismatch	(2) Negative mismatch (d)
Network help	0.254* (0.136)	-0.396* (0.208)
Migration duration	0.015** (0.006)	-0.003 (0.008)
Male (d)	0.266* (0.138)	-0.099 (0.156)
Age at arrival	0.020*** (0.007)	0.001 (0.009)
Intermediate or vocational secondary degree (d)	0.134 (0.147)	0.277+ (0.182)
Secondary degree (<i>bac</i>) (d)	0.312* (0.189)	0.378+ (0.237)
University degree (d)	-0.050 (0.190)	0.418** (0.211)
Italy (d)	0.229+ (0.154)	0.190 (0.167)
Mauritania (d)	-0.073 (0.173)	-0.943*** (0.268)
Cote d'Ivoire (d)	0.041 (0.163)	-0.487** (0.210)
Constant	-2.223*** (0.277)	-1.321*** (0.317)
Observations	967	967
Pseudo R^2	0.038	0.128

Robust standard errors in parentheses

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(d) for dummy variables

Table 4 presents the same regressions depending on the broad host region: results

Table 4: Probit estimates for horizontal and negative mismatch: Europe and Africa

	Europe		Africa
	(1) Horizontal mismatch (d)	(2) Negative mismatch (d)	(3) Horizontal mismatch (d)
Network help	0.112 (0.192)	-0.373**** (0.227)	0.381* (0.195)
Migration duration	0.026*** (0.010)	-0.009 (0.010)	0.008 (0.008)
Male (d)	0.407** (0.203)	-0.059 (0.185)	0.144 (0.186)
Age at arrival	0.023* (0.012)	-0.001 (0.011)	0.019** (0.008)
Intermediate or vocational secondary degree (d)	0.042 (0.192)	0.159 (0.208)	0.295 (0.218)
Secondary degree (<i>bac</i>) (d)	0.282 (0.230)	0.111 (0.251)	0.215 (0.356)
University degree (d)	-0.160 (0.213)	0.099 (0.215)	0.269 (0.433)
Italy (d)	0.292* (0.160)	0.189 (0.167)	
Cote d'Ivoire (d)			0.223 (0.163)
Constant	-2.499*** (0.427)	-1.073*** (0.395)	-2.176*** (0.343)
Observations	428	428	539
Pseudo R^2	0.054	0.023	0.032

Robust standard errors in parentheses

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(d) for dummy variables

of probit regressions for horizontal and negative mismatch run on the subsample of migrants in France and Italy are presented in column (1) and (2), and results for horizontal mismatch in African countries in column (3). Due to the small proportion of negative mismatch in Mauritania and Côte d'Ivoire, the equation for negative mismatch in Africa cannot be estimated. The breakdown of migrants according to their location suggests that network help has a similar impact on horizontal mismatch in Africa and Europe, although the coefficient on network help is not significant in the latter case.

Alternative specifications, not shown here, were tested, including unemployment data at a disaggregate level as additional controls to account for labor market conditions at the time the migrant first arrived in the host country, for the French and Italian subsamples only, due to data availability. I find no significant correlation between the regional unemployment rate and the probability to experience mismatch, and controlling for unemployment does not change the coefficients on network help. This result is consistent with the absence of long-term effects of unemployment at arrival on immigrants' labor market status found in Chiswick, Cohen, and Zach (1997).

It could be argued that host language proficiency should be included in the set of control variables. Indeed, as shown by Dustmann and Soest (2002), language proficiency increases immigrants' earnings. However, although information on the language spoken at home is available in the MIDDAS survey data, it cannot be exploited for three reasons: first, it is at best a very imprecise proxy of language proficiency. Indeed, answers are heavily dependent on the structure of the household in the country of destination¹⁰. Second, migrants in the four countries of the survey cannot be compared in that respect. A large majority of migrants in France speak French due to the historical links between France and Senegal and the place of the French language in the formal education system in Senegal. By contrast, very few Senegalese in Italy speak Italian. Language proficiency cannot be controlled for since it is highly correlated with the country dummies in the

¹⁰For example, a migrant living with Senegalese from the same ethnic group (for example family members), say Wolof, will very likely report to speak Wolof at home, even if she is perfectly fluent in French.

European subsample. In the two African countries, the official language (Arabic in Mauritania, French in Côte d’Ivoire) coexists with several other languages spoken by large shares of the population, making the notion of host language proficiency more complex to measure and not captured by the spoken at home language question. Third, as noted by Dustmann and Soest (2002), language proficiency is unlikely exogenous, and may be correlated with the same unobservable individual characteristics that drive occupational mismatch. Because of these limitations, I stick with the baseline specification including migration duration, education dummies and country dummies which are likely to capture most of the language proficiency effect.

As discussed above, the results from the standard probit estimations are likely to be biased. For example, if migrants with the highest unobserved skills (social skills, motivation,...) are also those who are the most likely to get a job through their Senegalese contacts, then for example, the negative coefficient on the network help dummy in the negative mismatch equation, in table 3 (column 2), may merely reflect the fact that those migrants with the highest unmeasured ability are both more likely to use their connections to find a job and to get a job which matches their productive skills. This potential endogeneity issue is dealt with by estimating a bivariate probit model.

4.2 Bivariate probit estimation results

Bivariate probit results for horizontal and negative mismatch are presented in tables 5 and 6. Both tables report estimated coefficients and marginal effects for both mismatch and network help equations. The first two columns in each table correspond to the mismatch equation, and the last two columns to the network help equation.

Results presented in tables 5 and 6 suggest that network help decreases the probability of negative mismatch and increases the probability of horizontal occupational mismatch, although the effect is not significant in the latter case. Having obtained one’s job through the migrant network decreases the probability to be negatively mismatched by 0.42. As expected, the Wolof dummy is negatively correlated with the use of the migrant network

Table 5: Bivariate probit estimates: Europe

Dependent variable	(1) Horizontal mismatch (d)	(2) ME	(3) Network help (d)	(4) ME
Network help (d)	1.241 (1.061)	0.274		
Time since arrival	0.024*** (0.008)	0.005***	-0.005 (0.011)	-0.001
Male (d)	0.345* (0.179)	0.076**	-0.001 (0.208)	-0.000
Age at arrival	0.022* (0.013)	0.005*	0.002 (0.011)	0.000
Intermediate or vocational secondary degree (d)	0.104 (0.249)	0.023	-0.283 (0.196)	-0.072
Secondary degree (<i>bac</i>) (d)	0.345* (0.176)	0.076*	-0.664** (0.277)	-0.169**
University degree (d)	0.014 (0.226)	0.003	-0.723*** (0.180)	-0.184***
Italy (d)	0.298* (0.168)	0.066	-0.114 (0.155)	-0.029
Mouride (d)	0.040 (0.150)	0.009	0.452* (0.233)	0.115*
Wolof (d)			-0.454* (0.275)	-0.116*
Constant	-2.643*** (0.394)		-0.487 (0.342)	
Correlation factor	-0.617 (0.513)	p-value =0.3845		
Observations	428			

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

ME are average marginal effects

The p-value for the correlation factor is obtained after a Wald test.

Table 6: Bivariate probit estimates: Europe

Dependent variable	(1) Negative mismatch (d)	(2) ME	(3) Network help (d)	(4) ME
Network help (d)	-1.566*** (0.272)	-0.416***		
Time since arrival	-0.010 (0.007)	-0.003	-0.003 (0.009)	-0.001
Male (d)	-0.024 (0.191)	-0.006	-0.037 (0.207)	-0.010
Age at arrival	-0.004 (0.008)	-0.001	0.001 (0.012)	0.000
Intermediate or vocational secondary degree (d)	-0.012 (0.181)	-0.003	-0.217 (0.195)	-0.055
Secondary degree (<i>bac</i>) (d)	-0.184 (0.209)	-0.049	-0.564** (0.275)	-0.144**
University degree (d)	-0.245 (0.229)	-0.065	-0.728*** (0.188)	-0.186***
Italy (d)	0.081 (0.205)	0.022	-0.177 (0.163)	-0.045
Mouride (d)	0.010 (0.123)	0.003	0.475** (0.212)	0.121**
Wolof (d)			-0.429* (0.228)	-0.109*
Constant	-0.369 (0.451)		-0.495 (0.387)	
Correlation factor	0.833 (0.236)	p-value =0.1193		
Observations	428			

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

ME are average marginal effects

The p-value for the correlation factor is obtained after a Wald test.

to find a job. Note that the correlation factor between the two error terms in the bivariate probit models is found to be not statistically different from zero at the 10% level, for both horizontal and negative mismatch (although it is significant at the 15% level for negative mismatch). It is thus not a surprise that the bivariate probit results confirm the results of the estimation of standard probit models, presented in table 3.

In sum, migrant network is found to decrease the probability of drop in social or occupational status, which is consistent with the theoretical literature modelling the fact that personal referrals reduce uncertainty about migrants productivity and increase the quality of the match. On the other hand, this paper finds a positive correlation, however not significant in the two European countries of my sample, between the use of the migrant network to get a job and immigrants' probability to experience horizontal occupational mismatch. This finding is consistent with the theoretical predictions of the model presented by Bentolila, Michelacci, and Suarez (2010): migrants who obtained their job through their network are on average more likely to get a different occupation from the one in which they have a productive advantage, especially in African host countries. The data used in the paper do not allow to discriminate between different possible underlying explanations, such as a higher cost for immigrants to reject a job offer made by the migrant network or the tradeoff between finding a job rapidly and finding a job matching exactly one's skills. A next step in the analysis of immigrants' both horizontal and vertical mismatch would consist in investigating the potentially detrimental impact of mismatch, and in particular horizontal mismatch, on wages. Descriptive statistics suggest that wages are similar for migrants correctly matched and those experiencing horizontally mismatch. However the identification of a causal impact of mismatch on wages would imply being able to solve still another endogeneity issue caused by migrants' unobserved characteristics affecting both their probability of mismatch and their wage. Moreover, since information on network use is available only for migrants currently employed, I cannot investigate the initial selection of migrants into employment, which may be facilitated by a larger network. Both issues are thus left for future research.

5 Conclusion

Using data on labor market outcomes in host countries of around 1,000 employed Senegalese immigrants this paper finds evidence of an impact of network use to find a job on occupational mismatch. Using the ISCO-08 classification, I define horizontal and negative mismatch depending on whether the occupied position and the self-declared occupation in which workers have a comparative productive advantage are associated with similar or different skill levels.

In order to account for potential endogeneity biases due to omitted variables affecting both migrants' probability to be helped by their network and migrants' status on the labor market, I jointly estimate two equations for mismatch and network use by maximum likelihood. Parameters identification relies on the exclusion of migrants' ethnic characteristics from the mismatch equation.

I find that migrants who obtained their current job through their migrant network are less likely to be experience negative mismatch, ie to have a job requiring a lower skill level than that of the occupation in which they have a comparative productive advantage. On the impact of network use to get a job on horizontal mismatch is positive, though not statistically significant at conventional levels: migrants having obtained their job through their network are more likely to have a job other than the one in which they have a comparative advantage although both require similar skill levels. This paper suggests new avenues of research on occupational mismatch not exclusively focused on education.

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Appendix

The MIDDAS migrant surveys

The MIDDAS migrant surveys took place in four waves between 2009 and 2010, successively in France, Italy, Mauritania and Côte d'Ivoire and using common sampling design, fieldwork procedures and questionnaire. Any attempt to carry out a representative survey focused on international migrants faces the issue that they usually represent a very small proportion of the population in a given country and that no survey frame is available¹¹. To mitigate these two problems, a survey methodology similar to the one applied by Lydié, Guilbert, and Sliman (2008) in their survey on Sub-Saharan Africans in Greater Paris was adopted. First, the most recent population censuses were used in each country to identify regions, and within them cities and districts, hosting significant populations of Senegalese migrants. When the number of potential districts to be surveyed within a region or city was important, three strata were constructed according to the density of the Senegalese population in each district. Districts to be surveyed were then randomly drawn within each stratum with probabilities proportional to the number of Senegalese in those districts. The number of migrants to be interviewed was finally determined using the relative weight of the relevant district in the total Senegalese population. This sampling method aimed at achieving representativeness especially at the geographic level.

To get as various a sample as possible, surveyors were then sent in the selected cities/districts and tasked with getting randomly in contact with Senegalese migrants in public spaces (streets, markets or shopping centers, public transport stations, etc.). To be eligible, interviewees had to meet three compulsory criteria: (i) being aged 18 and over; (ii) residing in the relevant city/district; and (iii) either being a Senegalese national or a former Senegalese national. To further ensure representativeness, surveyors were also asked to keep diversity according to gender, age, education and migration history. Contacting groups and snowballing were prohibited. For comparative purposes,

¹¹For a detailed discussion on issues raised by migrant surveys and a comparison of the performance of alternative survey methods, see McKenzie and Mistiaen (2009)

the same full questionnaire was administered in each country, with nonetheless marginal adaptations depending on the context. The MIDDAS survey was designed to cover a wide range of quantitative and qualitative aspects of the migrant experience, including socio-demographic characteristics, housing and living conditions, employment and earnings, migration history, links to the origin household, remittance behavior, return and investment projects in Senegal, insertion and social networks in the host country.

Table 7: Mapping of ISCO-08 major groups to skill levels

ISCO-08 major groups	Skill level
1 Managers	3+4
2 Professionals	4
3 Technicians and Associate Professionals	3
4 Clerical Support Workers	2
5 Services and Sales Workers	2
6 Skilled Agricultural, Forestry and Fishery Workers	2
7 Craft and Related Trades Workers	2
8 Plant and Machine Operators, and Assemblers	2
9 Elementary Occupations	1
0 Armed Forces Occupations	1 + 2 + 4

Source: ILO

Figure 1: Distribution of skill levels (ISCO-08 definition) of self-declared comparative advantage and actual job

