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Abstract

This thesis investigates two topics which are crucial in the context of international migration flows but that have been so far rather neglected by the existing literature. The first topic concerns a fundamental determinant of migration, the expectations of migrants about life and economic conditions in the (potential) destination country. Migrants' perceptions about potential gains at destination influence their propensity to move. Anecdotal evidence suggests that these expectations are often unrealistic and highly imprecise. More importantly, the frequently reported mismatch between over-optimistic expectations and realizations is at the basis of the failure of the migratory experience and frustration of a non trivial share of immigrants. The first essay of this thesis sheds light on the mechanisms and determinants that influence immigrants' expected wages at destination. More in specific, it investigates the factors that determine the accuracy of wage expectations by using data on a sample of illegal immigrants crossing Italy in 2004. I find that a large part of immigrants overestimate the expected wage. Interestingly higher expected wages are associated with migration within an established network and with previous migration experience. This study surely expands our knowledge on the, rather neglected, role of expectations in shaping the migration decision.

The second topic addressed in this thesis – developed in the second and third essays – concerns the impact of firms' internationalization on labour migration, with a particular focus on the international movement of skilled workers. In order to identify the main determinants of this process of “migration within the firm”, I use original firm-level data collected through the UNIDO Africa Investor Survey 2010 (AIS henceforth) across 16 Sub-Saharan Africa (SSA henceforth) countries. More in specific, in the second essay of this thesis, I employ a labour demand approach to understand the firm-level determinants that induce foreign firms to use foreign workers instead of native workers. The analysis is theoretically rooted in the management literature on the use of the so-called

'expatriates' workers, and particularly in the human resource management of Multinational Companies (MNCs henceforth) and their motivations for using intra-firm transfers of personnel. Our focus on Africa, a growingly important destination in the geography of global investments flows, allows me to shed some lights on the potential pro-development effects of intra-firm international migration. More specifically the present study investigates firm-level and host country level characteristics which shape labour demand by foreign firms in developing countries.

In the third essay, I test empirically a recent theoretical model developed by Jayet and Marchal (2015) which predicts complementarity between capital flows and skilled workers migration flows. The primary objective of this study is to contribute to the debate on the relationship existing between migration and FDI flows. In addition, the analysis investigates some important country characteristics and factors that affect both FDI attraction and skilled worker migration.

Keywords: *wage expectations, Italy, illegal immigrants, migration networks, FDI, Sub-Saharan Africa, skilled migration, complementarity, expatriates, foreign workers, MNCs.*

Résumé

Dans cette thèse, nous abordons deux thèmes de recherche étroitement liés à l'étude des migrations internationales. Bien qu'essentiels à la compréhension du phénomène migratoire, ces deux thématiques sont relativement peu développées dans la littérature existante. Dans un premier temps, nous traitons d'un déterminant fondamental de la migration : la formation des anticipations des migrants quant à leurs conditions de vie et leurs conditions économiques dans un pays (potentiel) de destination. Les perceptions relatives aux gains anticipés dans un pays de destination influencent l'inclination des migrants à se déplacer. Des preuves anecdotiques suggèrent que les attentes des candidats à l'émigration sont souvent irréalistes et imprécises. Il est fréquemment observé que ces individus ont des attentes trop optimistes par rapport à la réalité. Cela explique, en grande partie, l'échec de certaines expériences migratoires et la frustration d'un nombre non négligeable de migrants. Le premier essai de cette thèse porte sur les déterminants et les mécanismes de formation des anticipations de salaire dans le pays de destination des migrants. Notamment, nous étudions les facteurs influençant la précision des anticipations de salaire en utilisant des données sur un échantillon de migrants illégaux traversant l'Italie en 2004. Nos résultats montrent qu'une grande partie des immigrants forme des anticipations de salaire surestimées. Nous observons qu'une anticipation surestimée est liée à l'expérience migratoire passée de l'individu, et à l'importance du réseau de migrants auquel appartient l'individu. Plus largement, notre analyse participe à la réflexion portant sur le rôle des anticipations dans l'élaboration de la décision de migrer.

Dans un second temps, nous étudions l'impact de l'internationalisation des entreprises sur la migration du travail, et en particulier sur les mouvements internationaux de travailleurs qualifiés. Ce sujet est développé dans les second et troisième essais de cette thèse. Pour chacun de ces essais, nous utilisons des données entreprises recueillies par

l'Organisation des Nations Unies (UNIDO, 2010) afin d'identifier les principaux déterminants de la mobilité intra-firme des travailleurs. Ces données ont été recueillies grâce à une enquête réalisée auprès d'investisseurs dans 16 pays d'Afrique subsaharienne, intitulée « Africa Investor Survey ». Le second essai de cette thèse propose une analyse de la demande de travail, afin d'identifier les déterminants micro-économiques pouvant mener les entreprises étrangères à préférer des travailleurs étrangers à des travailleurs nationaux. D'un point de vue théorique, cette analyse est validée par des travaux en sciences de gestion portant sur l'emploi de travailleurs dits « expatriés ». Nous faisons référence à des travaux portant sur la gestion des ressources humaines des firmes multinationales, et sur leur motivation à utiliser la mobilité intra-firme. Nous concentrons notre analyse sur l'Afrique, une destination d'importance grandissante pour les flux d'investissements directs étrangers (IDE), afin de mettre en lumière les effets potentiellement positifs de la migration internationale intra-firme sur le niveau de développement des pays receveurs. Plus précisément, cet essai examine les déterminants microéconomiques (au niveau de la firme) et macroéconomiques (au niveau du pays d'accueil) qui influencent la demande de travail des entreprises étrangères dans les pays en développement.

Le troisième essai de cette thèse propose un test empirique du modèle théorique récemment développé par Jayet et Marchal (2015), lequel prédit une relation de complémentarité entre flux de capitaux et flux de travailleurs qualifiés. L'objectif principal de cet essai est de contribuer au débat sur la relation existant entre flux migratoires et flux d'IDE. Par ailleurs, notre analyse examine certaines caractéristiques macroéconomiques influençant à la fois l'attraction d'IDE et la migration de travailleurs qualifiés.

Mots-clés : *anticipation de salaire, Italie, immigration illégale, réseaux de migrants, IDE, Afrique Subsaharienne, migration qualifiée, complémentarité, expatriation, travailleurs étrangers, FMNs*

*To my father,
Lavdosh Hoxhaj
who always trusted in me*

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Introduction and plan of the research

In a context of increasing international interactions, the spotlight is on migration of individuals across countries' boundaries. This phenomenon is now high in the policy makers agenda, given the effects that migratory movements have on the socio-economic wellbeing of individuals and nations involved. Moreover, migratory flows are steadily increasing of about 3.6 million per year since 2010 reaching, in 2013 the amount of 232 million of individuals or almost 3% of the world population (UN-DESA and OECD 2013).

My interest in studying migration has been influenced by the enormous relevance this issue presents for the economic development of my native land, Albania. After the fall of communism, my country experienced one of the most massive emigration of recent times. In year 2000, one in five Albanians were living abroad (King and Vullnetari 2003). As part of this huge wave of out migration of Albanians in the late 90s', me and my family have directly experienced both positive and negative consequences of migration. The personal experience also stimulated my curiosity and motivated me to further extend my understanding of the topic.

Human migration studies involve a multitude of disciplines – rather interrelated among them – ranging from sociology, economics, demography and geography just to mention a few and maybe the most relevant. In economics, much has been done on determining the factors influencing migration, the impact migration has on wages and wealth of host countries and/or on development of the origin countries. However, many other issues still deserve a more exhaustive treatment from both theoretical and empirical points of view.

This thesis focuses on two specific issues rather neglected by the vast migration literature; (i) the role of information in shaping migrants' expectations; and (ii) the impact

of firms internationalization on labour migration, especially on the migration of highly-skilled workers. In the following pages, I present motivations – both personal and scientific – for studying these topics and the contribution of this thesis in understanding these issues. An outline of the content as well as the main results are also described in some detail.

Immigrants' expectations: accuracy and determinants.

I remind the first impressions I had on life in Italy by looking at the Italian TV broadcasting. In my eyes, everything looked beautiful and pleasantly different from my birthplace. At that time, I imagined myself living in a beautiful town as those frequently seen in movies but then, I settle in a very small, though nice, village in Puglia and realized there was a huge difference between reality and imagination. Once at destination, you typically also realize that "money does not grow in trees" and that the beautiful presents family friends or relatives sent to you from abroad were the fruit of hard working.

Indeed, the perception of great economic possibilities in Italy were widely spread among Albanian migrants. To quote the statement of a young Albanian:

"People who left Albania immediately after the end of the one-party state...they saw the outside world as something...I mean paradise on earth, there is everything, there is happiness, they thought there one could reach happiness...Once they went there they found out that nothing is easy to get, especially from the economic point of view...I mean...they did not expect it...not to find it there..." (Mai 2004, pp. 6)

Most of the times, as the quote suggests, expectations on the potential migration outcomes are hardly met in reality. Another clear example of the mismatch between ex-

pectations and reality is provided by employment expectations and jobs immigrants perform in the host countries. Many professionals such as engineers, doctors or people covering important positions in the Albanian society, expected to exercise the same profession in Italy but ended up in doing jobs they did not even think about before.

This anecdotal depiction of reality highlights a quite relevant question, still under-investigated by migration studies: How migrants form their expectations and which are the factors influencing them? Generally, the migration literature focus on the determinants and outcomes of migration, paying a scarce attention to the process of belief formation and expectations, which directly affect intentions to migrate (Ajzen 1991). A better understanding of the factors determining the expectations' accuracy may shed light on the stage before the decision to migrate takes place. This issue assumes greater relevance considering that – as anecdotal evidence suggests – the majority of immigrants tend to overestimate the life conditions at destination. Obviously, an overstatement of possibilities abroad is seriously detrimental to the situation of the migrant. The fact that migration is costly both in financial and psychological terms, exacerbates the negative effects of a mismatch between the realized outcome at destination and expectations before departure. As a result, migration may lead to a failure of the migratory experience and frustration among the persons involved. Furthermore, over-optimistic expectations may incentivate migratory flows and increase the migratory pressure in destination countries more than a size that can be considered optimal from a social point of view.

In my opinion, the formation of expectations is strongly related to the information set immigrants have before departure. This information is often imperfect and likely comes from several sources, which may convey rather contradictory information to potential immigrants. In this study, I use a unique data set on illegal immigrants apprehended in Italy at the moment they were crossing the border or shortly after (Survey on Illegal Immigrants in Italy, SIMI henceforth). I focus on two principal sources of information to immigrants, i.e. migration networks (Massey et al. 1993) and previous migra-

tory experience (Constant and Zimmermann 2003, 2012), and test whether these sources contribute in shaping the wage expectations. Moreover, I investigate the accuracy of expectations, measured as the difference between the expected wage of illegal immigrants and wage realizations of comparable immigrants in Italy. The analysis takes into account the immigrants' human capital and other meaningful individual characteristics.

The results of the paper show that the majority of illegal immigrants overestimate the wage they could earn in Italy. This finding is in line with what anecdotal evidence suggest and extends the range of existing works that focus on case studies (McKenzie et al. 2013 on Tonga), by providing evidence from a larger set of sending countries. On the determinants side, the analysis shows that both networks and previous experience are significant sources of information which affect the expectations of immigrants. The latter result adds to the existing literature emphasizing the active role played by both sources in shaping the migratory experience of individuals.

In my view, this simple analysis extends our understanding of issues involved in the pre-decision phase of the migratory behaviour and highlights the importance of expectations in migration studies. However, in order to have a clearer view on the formation of expectations, several issues need further exploration. A more comprehensive investigation of the information sources available to immigrants is needed to identify the determinants affecting their expectations. It would be interesting – for example – to further investigate how the new means of communication (internet, social networks, cheap calls) influence the accuracy of information. To do this, surveys collecting data on migrants should include questions about expectations (not only about wages and employment) at destination and details on the principal sources of information. This supplementary data could enable a more extensive exploration aimed at identifying the most efficient means of communication and ways to transmit valuable information, especially to

potential unskilled migrants¹. More accurate information on the real socio-economic environment in migration receiving countries – and in particular on job market opportunities – could significantly increase the benefits of migration for the migrants themselves and for both host and sending countries. In some circumstances, precise information might avoid and/or considerably reduce the phenomena of "failed migration" and lessen the migratory pressure experienced by destination countries.

Migration and firms: the international movement of the highly skilled workers

In recent years, the increasing competition in global markets has lead firms to demand continually more qualified labour. In particular, the demand for skilled workforce is steadily growing as production is oriented toward knowledge-intensive and high-tech manufacturing products. The migration literature argues that a slice of this demand by firms is likely to be satisfied by migrants who generally possess a good level of skills and abilities (due to positive self-selection). Therefore, from a policy perspective, interventions should have as a primary objective not only retaining skilled workers within borders, but also attracting new skilled immigrants in order to expand the countries' human capital capacity.

The issue of human capital accumulation and the limitation of the "brain drain" phenomenon is especially critical for developing and less developed countries. The existing literature shows that these countries have a limited ability to produce an adequate level of skills and, in addition, they are experiencing a massive outflow of this scarce resource. The beneficial role of FDI in preventing the emigration of high-skilled workers by creating employment opportunities and increasing the wages of this category of

¹ Poot (1996) argues that skilled migrants are more able to interpret the information and use more formal information channels such as journals, or positions advertised in mass-media.

workers, is documented by several studies (Feenstra and Hanson 1996; Markusen and Venables 1997). What is less investigated by the literature is the role of inward FDI as a pull factor for skilled immigration.

The second part of my research aims to contribute in this direction. It focuses on the role FDI plays as attractor of foreign skilled workers and direct contributor in fostering the human capital accumulation in less developed countries. Moreover, this study sheds light on both firm-level and country characteristics influencing the migration of foreign workers toward these countries.

More in specific, I address the following questions:

1. Is there complementarity between the capital invested by foreign firms and migration of skilled workers?
2. Which are the firm characteristics that influence the usage of foreign workers ?
3. Which are the country characteristics and specific institutional features that influence the migration of foreign workers?
4. Is there any difference between North-South investment and South-South investment in the usage of foreign workers?

To answer these questions, the study uses a rich data set containing firm-level information on foreign firms investing in SSA countries recently developed by UNIDO (AIS 2010). I believe that a significant part of the value added of my analysis is associated with the richness of the data available and the focus on a peripheral region which is almost completely neglected by current literature on migration and FDI. In addition, this study contributes at drawing attention on the crucial role firms assume as the main migration promoter and employer of immigrants (Kerr et al. 2014). Differently from existing economic literature that deals with the link between migration and FDI at the aggregate level, this study uses a firm-level approach to exploit the high degree of heterogeneity of firms' employment decisions. If policy makers are to capitalize on skilled migration and human capital accumulation in their countries, a first step is to understand

how the firms' characteristics influence the movement of foreign skilled workers. In addition, it is of crucial importance the identification of those country factors and characteristics which improve the attractiveness of skilled workers and facilitate their movement.

I find that, it exists a complementarity relation between FDI and migration of skilled workers. At the firm level, a higher capital intensity implies a higher usage of foreign skilled workers. In particular, foreign firms having higher technological capabilities – along with the beneficial effects they have in creating knowledge spillovers to the receiving economy – also contribute to increase the stock of human capital of SSA countries. For this reason, policy interventions aimed at attracting capital intensive (technology intensive) firms should be regarded as a key strategic objective.

Thanks to the detailed data at my disposal, I am able to investigate strategic management aspects of the firm that motivate the use of expatriates in foreign affiliates. In this respect, there emerge significant differences between firms originating from developed countries (North–South) as compared to firms originating from developing and less developed countries (South–South). The results suggest that foreign investors originating from emerging and/or developing countries – contrarily to those originating from rich countries – are more sensitive to wage differentials between origin and destination country; thus when the wage gap is high these investors are more likely to substitute foreign workers with host country nationals. This finding provides novel empirical insights on the expatriation cost issue. In addition, I find evidence of the importance of the quality and availability of human capital in the host country as a determinant of foreign firm staffing strategies.

The high number of countries involved in the analysis, allowed me to analyse several aspects of policy and regulation that might ease the movement of foreign skilled workers. Among other factors, I found that simpler bureaucratic procedures for the free movement of workers and more suitable working regulations improve the country attractiveness and reduce the firms' cost of foreign workers recruitment or transfer. In ad-

dition, a better institutional quality and lower levels of corruption are also associated with a reduced number of foreign expatriates.

Finally, it is worth noting that results have strong policy implications for the economies under analysis wishing to boost labour demand of host country nationals by foreign firms. However – in my opinion – they also have a general validity for countries facing similar circumstances, including the majority of developing and less developed countries.

I Part

1. Wage expectations of Illegal immigrants: The role of networks and previous migration experience

1.1 Introduction

“I came to America because I heard the streets were paved with gold. When I got here, found out three things: First, the streets weren't paved with gold; second, they weren't paved at all; and third, I was expected to pave them”.

Anonymous Italian immigrant in Ellis Island, New York in early 1900's

Expectations about future condition in the destination country are a fundamental determinant of emigration. Anecdotal evidence, such as the quote above suggests that often migrant's expectations at the time of the move are not met in reality. The mismatch between expectations and realizations depends on the uncertain nature of human life but also on *a priori* unrealistic and/or wrong expectations based on inaccurate information

about life conditions and earning potential at destination. Many studies underline how the socio-economic behaviours of return or visiting immigrants might incorrectly shape the perception of residents about life abroad. According to Gmelch (1980) return immigrants have the tendency to emphasize mainly their positive experiences in the host country in order to show their successful migration experience. For instance status consumptions by return migrants might convey signals of high returns associated to the migration experience to family and friends in the home location.

Also mass media have an important role on the formation of expectations. The TV broadcasting has significantly influenced the perception of young Albanians on the life conditions in Italy. Braga (2010) and Mai (2004) found a positive relation between exposure to Italian TV shows and propensity to migrate out of Albania. These studies suggest that emigrants often undertake an experience abroad with overoptimistic expectations about life at the destination country. A recent paper by McKenzie et al. (2013) on emigration from Tonga to New Zealand finds evidence of underestimation of potential wages. As explained by the authors, these results may depend heavily on the specific socio-economic and cultural environment of Tongan Islands.

The aim of this paper is to shed light on the accuracy of wage expectation of illegal immigrants. In order to examine the research question I use a unique data set on illegal immigrants apprehended in Italy at the moment they were crossing the border or shortly after (Survey on Illegal Immigrants in Italy, SIMI). The data set contains a rich set of information on individual characteristics as well as on migrants' expectations at the moment when the migration decision took place. SIMI includes emigrants from 55 origin countries crossing the Italian borders in 2003. In order to evaluate the accuracy of expected wage, I firstly employ a Mincer wage equation in order to estimate for each illegal migrant included in SIMI a potential wage. The potential (or benchmark) wage is derived under the hypothesis that migrants in SIMI can access the same pool of job opportunities available to (legally residing) foreign workers in the Italian labour market in the same period. An initial raw measure of accuracy is then derived by comparing ex-

pected wages with the estimated predicted wage. Secondly, I investigate the role of different sources of information available to individuals before migration – in particular migration networks and previous experience at destination – in shaping wage expectations.

To the best of my knowledge, this is the only paper – together with the study of McKenzie et al. (2013) on Tonga – that investigates the accuracy of the wage expectation of emigrants and its main determinants. While McKenzie et al. (2013) focuses on legal migrants from Tonga – a small country with a longstanding migratory history – I focus on illegal migrants originating from several origin countries.

I find that emigrants on average overestimate the wage that they can get abroad. It is worth to note that the benchmark potential wage is computed using information on the job market performance of legal migrants in Italy. The comparison does not take into account the fact that wages of illegal migrants are likely to be lower than those of legal migrants with the same human capital characteristics. A recent study by FRDB and EBRD (2010) shows an average wage difference of approximately 12% between legal and illegal immigrants in Italy. Hence, the overestimation found in this paper might be even larger.

The data in hand allows me to analyze the role of two types of networks (i) network ties in the country of destination; and (ii) networks in countries other than the destination. The separate specifications are relevant since they contribute to the nascent literature on the impact of network typologies (Elsner et al. 2014; Somerville 2011). I found a significant positive impact of networks on wage expectations. In addition, networks reduce the impact of individual skills and human capital on expected wages. This finding seems to suggest that networks convey information on the low returns from human capital in the destination country associated with the status of ‘illegal migrant’, i.e. a skills waste. Similarly, previous direct experience in the country of destination leads to higher wage expectations. Experienced immigrants can better exploit their direct knowledge of the destination country and better employ their skills (DaVanzo 1983).

The paper is organized as follows. *Section 1.2* presents a short review of the related literature. In *Section 1.3* I describe the data set used in the analysis and provide descriptive statistics. *Section 1.4* presents the estimation methodology while the main findings are reported in *Section 1.5*. Some conclusive remarks are reported in *Section 1.6*.

1.2 Literature review

The main purpose of this section consists in reviewing the main contributions on the link between information sources, information quality and migration. It discusses both theoretical and empirical studies, focusing on the main sources of information to immigrants – i.e. network ties and previous experience – and their impact on the wage expectations at destination.

1.2.1 Information sources, quality of information and immigrants' expectations

As for many other activities, peoples' decision to migrate is based on possible realizations of expected outcomes. According to Ajzen (1991), expectations determine intentions and therefore the actual or prospective behavior of individuals. Surprisingly, the issue of expectations has been neglected in both theoretical and empirical investigation of migration. The bulk of the studies have relied on the rational expectations theoretical stream (Muth, 1961) which assumes that migrants collect and process all relevant information and behave rationally. The neoclassical theory for example, motivates migration with the difference in expected income between origin and destination where expectations are identified as the subjective probability of finding employment at a given wage (Todaro, 1969). No attempt is made to investigate how expectations about wages are formed or the factors influencing them. Studies in job-search

literature instead acknowledge the effect of incomplete information on people's migration decision and therefore on expected outcomes (Demiralp, 2010). In this strand of the literature expectations are mainly identified as an indicator of the imperfect knowledge of the wage distribution at destination (Allen 1979; Herzog et al. 1985).

In the migration context, the underlying process of beliefs and expectations formation is founded on the information set an individual has on the migration outcome. The literature identifies several channels which enable the information flow to potential migrants. Most likely, a potential immigrant is exposed to several sources of information contemporaneously. Hence, one should think of these sources as interacting or even having contrasting effects on the information quality to migrants.

A primary source of information consists in the previous experience immigrants have had in the destination country. There is extensive evidence that migration is usually a repeated action, when migrants move back and forth through international borders. Repeated or circular migration allow a direct collection of information through a personal experience on living conditions, job opportunities and wages at destination (Constant and Zimmermann 2003). According to Constant and Zimmermann (2012) subsequent moves are characterized by lower uncertainty and larger migration experience on that destination. Hence, access to information is less costly (DaVanzo 1983), more abundant and reliable. The link between this information type and expectations may be identified through the adaptive expectations theory (Nerlove 1958). Contextualizing this theory, the migrant perception of a future outcome, depends on its past values. Thus, migrants having experienced a movement in the past are more able to anticipate the consequences of a future migration behavior. It implies that migrants having previous experience have more realistic information, and therefore behave more rationally as compared to first movers. However, the role of experience on the prediction quality of migrants is not validated by the scant literature on this issue. Schmalensee (1976) underlines the risk of excessive dependence on old information as in McKenzie et al. (2013) where potential immigrants wrongly based their wage expectations on informa-

tion from earlier cohorts of immigrants. Kau and Sirmans (1977) confirm the positive effect previous experience has on migration decision-making process by reducing the information cost. They find a lower uncertainty of repeat immigrants as compared to new immigrants and also a lower information dependence of repeat immigrants on the previous cohorts of migrants.

Likely, the information sources the potential immigrants have access to, are rather anecdotal descriptions of the reality at the destination country by friends and relatives living abroad or visiting their origin country. Networks in first place are identified as a permanent source of information to prospective immigrants (see Massey et al. 1993). Concerning availability of jobs and wages, most of the studies focus on how networks contribute on the outcome of those immigrants already migrated (Munshi 2003, Banerjee 1983), notably to illegal immigrants (Epstein 2003; Taylor 1987). Few papers investigate the quality of information to potential immigrants from established migration networks at destination. A paper by Elsner et al. (2014) found that better integrated networks seem to better signal Mexican immigrants on the wage differential existing between Mexico and US. The information from this network type decreases the likelihood to make an error on the potential wage outcome. The authors argue that networks that are well integrated within the local context generate higher information exchange and therefore convey better knowledge of labour market and wage prospects. This result suggests that, not necessarily a large migration network could result in a more accurate information flow to prospective immigrants.

Information accuracy may depend also by where it originates. Prospective immigrants may have access to information from networks established in different countries. Hence, monitoring of the migration outcomes in geographical dispersed areas becomes fairly complicated. Somerville (2011), investigating Indian ‘pioneer migrants’², found that information on employment from networks settled in countries other than their destination was often inaccurate. She explains how transnational networks disseminate un-

² People who migrate in countries with no previous migration network.

verified information and contribute to misinform relatives back in India on life conditions in Canada.

Furthermore, misinformation originates from the distorted perception local people have of the wealth of visiting migrants. According to Gmelch (1980) return immigrants have the tendency to emphasize mainly their positive experiences in the host country in order to show their successful migration experience. For instance, status consumptions by return migrants might convey signals of high returns associated to the migration experience to family and friends in the home location. This is what is found by Sabates–Wheeler et al. (2009) in a qualitative investigation on Ghanaian immigrants. Detailed interviews showed that prospective immigrants use to collect information on destination from networks, return migrants and mass–media. Their pre–departure expectations tend to be adapted downwards once at destination due to the distorted information they received before moving. In addition, such changes and difficulties encountered during their migratory experience were not perceived by the families back home, in turn, contributing to inaccurate and over–optimistic expectations of family members. This study highlights the difficulty of exchanging information and the imperfect monitoring of migration outcomes, even between household members as in Chen (2006). On the contrary, networks may disseminate incorrect information on wages in order to alleviate their responsibilities toward people left behind. McKenzie et al. (2013) found out that Tongan people having extended family³ members in New Zealand tend to underestimate the potential earnings. According to this study, extended family may under–report wage in order to reduce the demand for remittances from friends and relatives back home.

Several studies have investigated the role media and communication technology have in conveying information to potential migrants. Poot (1996) investigates the way Information Technology (IT) affects the flow of information to migrants' home countries. He shows that the availability of communication devices make easier to gather information and take contact with relatives and friends in countries of destination. A more

³ With extended family the authors mean aunts, uncles and cousins.

recent paper by Vertovec (2004) points out that IT improvements in terms of international call costs have granted access to a broad population of potential migrants in developing countries. Concerning rural to urban migration, Lu et al. (2013) found that an improvement in access to landline phones communication, positively affected internal migration in China. They stress the important role communication has on the accuracy of information about external labour markets and the reduction of physiological costs of migration. Recent developments of social media, though not yet investigated, are supposed to have the same facilitator effect on real time information, enhanced by the internet diffusion even to low budget users.

More investigated is a the role television has on the migration decision and perception of life in destination countries. Mai (2004) in an anecdotal description of field interviews with young Albanian people, found that what transmitted in Italian TV broadcasting affect their subjective project to migrate. It emerged that the perception of lifestyle and wealth in Italy was highly influenced by what shown in television programs but moderated by other sources such as friends and relatives living abroad. Braga (2010), instead, tests empirically the relation between radio and television exposure and the probability to migrate. Using an original analysis, Braga proxies television usage with people's exposure to radio and television waves before and after the disruption of the dictatorial regime in Albania. She found significant and positive effect of exposure on the probability to migrate, not only to Italy but also to other western countries. On the contrary, in a similar study, Farré and Fasani (2013) find that television have a discouraging effect on internal migration in Indonesia. They argue that television exposure enable potential migrants to make a more realistic cost-benefit analysis of migration. In addition, it suggests that television convey a more accurate information on the net gains of internal migration in this area, mitigating the over-estimation of outcomes by prospective migrants.

1.3 Data and descriptive statistics

The data employed in the following analysis are based on two different sources. The first data set (SIMI) was generated by a team of researchers at the University of Bari in 2003. It contains data on the main individual characteristics of 920 illegal immigrants interviewed within 6 months upon arrival in the Italian territory. SIMI is unique in providing detailed information on migrants' push and pull factors 'at the border' and it includes a section on migrants' future projects, income expectations and socio-economic conditions in the country of origin at the moment when the decision to migrate was taken. The illegality status is determined by the illegal attempt to cross the Italian border and the lack of the permit to stay in Italy. Data is collected for immigrants over 18 years old residing in Centres of Temporary Permanence (CTPs henceforth), Reception Centers (RCs henceforth)⁴ and other meeting points (such as public canteens). According to Chiuri et al. (2007) the short lapse of time improves the quality of answers on previous situation in home countries and their expectations before departure. The sample of 920 immigrants is quite heterogeneous. It includes 55 different nationalities where the three largest groups of immigrants are composed as follows: Iraq (9.6%), Liberia (9%) and Sudan (5.4%). The average immigrant is about 27 years old and 15% of them are woman. The large part of them are literate (87%), with highest degree as follows: 30% have obtained primary diploma, 30% middle school (which corresponds to 8 years of education), 13.8% have secondary education, 8.3% have vocational education and only 3.9% has obtained the university degree. Expected income is reported in two ways in the data set. In a first stage the immigrant is asked to state the income value they expected to earn at destination before departure. If a point value was not reported, the respondent was asked to state in which increasing ranges of income he/she thinks the expected income would fit in. Immigrants not reporting the expected income were dropped from the

⁴ According to the Italian immigration law, undocumented immigrants stopped in the Italian territory are transferred in CTP centers in order to ascertain their identity. Asylum seekers are transferred in RC after their identification (see Chiuri et al. 2007 for a description of the survey methodology and data).

data set, decreasing the number of usable observations to 809. In SIMI, immigrants also report their country of final destination. Destinations are mainly OECD countries, with Italy being the main destination followed by Germany, France and Great Britain. In the analysis I consider only immigrants having as final destination Italy due to lack of harmonized surveys on income and individual characteristics on all 4 countries⁵. This process and the missing values on crucial human capital variables and network variables decreased the sample to 555 usable observations.

Table 1. Descriptive statistics

VARIABLE	Underestimation		Overestimation		SIMI Sample		IT-SILC Sample	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Age	28.3	7.3	27.3	6.3	27.5	6.5	37	9.5
Female	0.12	0.32	0.15	0.36	0.147	0.35	0.65	0.47
No Education	0.2	0.4	0.12	0.32	0.135	0.34	0.031	0.17
Primary	0.29	0.46	0.30	0.46	0.3	0.46	0.092	0.29
Middle	0.31	0.46	0.30	0.46	0.30	0.46	0.32	0.47
Secondary	0.088	0.28	0.15	0.35	0.138	0.34	0.41	0.49
Vocational	0.055	0.23	0.088	0.28	0.083	0.27	0.04	0.19
University	0.033	0.18	0.041	0.20	0.039	0.19	0.092	0.29
Network	0.14	0.25	0.20	0.29	0.19	0.44		
Distance	3609	1546	3265	2076	3322	2002		
Experience	0.022	0.15	0.12	0.32	0.10	0.3		
Observations	91		464		555		1584	

Source: SIMI data set

The second survey employed in my analysis is the Italian Statistics on Income and Living Conditions (IT-SILC, 2004-2006)⁶. This survey is used to generate counterfactual wages - the potential wage the immigrants would have earned if working in Italy. Technically, it means comparing the wages of illegal immigrants with those of legal migrants in Italy. I assume that illegal immigrants have access to the same set of jobs that legal migrants have. Moreover, it is implicitly assumed the absence of wage discrimination between legal and illegal immigrants, given their human capital endowment. This benchmark is the main limit of this study. The literature reports both a high likelihood of skills waste of immigrants (Mattoo et al. 2009) and differences in wages between legal

⁵ EU-SILC for year 2004 is available only for Italy and France, while for 2005 and 2006 the data is available for all 4 countries.

⁶ The data refers to the time span 2003-2005 since the survey collects information on the previous year.

Table 2. Descriptive statistics by network type and previous experience

VARIABLE	Network in other				Previous migration				No previous	
	Network in Italy		destinations		No network		Experience		migration experience	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Age	28.8	6.8	26.7	6.8	27.5	6.46	28.6	7.5	27.4	6.4
Female	0.47	0.5	0.13	0.33	0.12	0.33	0.24	0.43	0.136	0.34
No Education	0.83	0.28	0.15	0.36	0.135	0.34	0.07	0.25	0.14	0.35
Primary	0.16	0.38	0.27	0.45	0.32	0.47	0.2	0.4	0.31	0.46
Middle	0.36	0.48	0.31	0.47	0.29	0.45	0.26	0.44	0.30	0.46
Secondary	0.19	0.4	0.13	0.33	0.135	0.34	0.25	0.44	0.12	0.33
Vocational	0.11	0.32	0.11	0.32	0.075	0.26	0.14	0.34	0.076	0.26
University	0.083	0.28	0.014	0.12	0.04	0.2	0.068	0.25	0.036	0.19
Exp. Income \$	789	365	994	1139	837	474	973	389	840	614
Observations	36		70		449		58		497	

Source: SIMI data set

and illegal immigrants (Hall et al. 2009; Kossudji and Cobb–Clark 2002). However, due to lack of official data on undocumented migrants, this data is the best available comparison for illegal immigrants’ wages. IT–SILC collects information on individual characteristics, income and wealth of households. The sample used in the current study contains all three yearly surveys pooled together in order to have a sufficient number of observations on foreign workers employed in the Italian labour market. An immigrant is considered an individual born in a country other than Italy. The immigrants national of OECD countries are excluded from the sample in order to have a more reliable comparison with migrants in SIMI who come exclusively from middle income or developing countries. I use the monthly wage net of taxes, gained in the principal full time job excluding the self–employed⁷. Individuals that declare zero income were also dropped from the sample⁸. Since SIMI collects information on expected wages before the year 2003, I discount IT–SILC (2004–2006)⁹. Monthly wage is also converted in US dollars¹⁰. In total, the usable IT–SILC sample is composed by 1584 observations.

⁷ For this category income data are often understated or referred to highly-skilled occupations which are unlikely to be the available to irregular migrants.

⁸ This portion of immigrants was quite low allowing their exclusion (0.2% of the sample)

⁹ The average wage increase for Italy was of about 5 percent yearly (2003=2%; 2004=5.4%; 2005=7.5%) as reported by the Italian National Institute of Statistics (ISTAT) with reference year 2002.

¹⁰ I use a three-year average exchange rate (1 Euro = 0.94\$)

Table 1 presents relevant comparative statistics of the two samples. The average age of IT-SILC is about 9 years higher than the average age of SIMI and also shows higher variability (9.5 vs. 6.6). Instead, the portion of male is higher in SIMI than in IT-SILC. There are significant differences in the education attainment between the two samples. The most relevant differences concern the illiterate individuals in SIMI, almost 4 times the number of illiterates in the IT-SILC sample while the individuals who have primary school diploma are three times the number of IT-SILC. On average, immigrants of IT-SILC have a higher level of education than the one in the SIMI sample. Immigrants that declare to have relatives residing in the final destination or in other destinations abroad are almost 20 percent while 10 percent of the sample declares to have been in the final destination before. In *Table 2* I report the main statistics by type of network and previous migration experience. Concerning expected income, it is noteworthy to remark the higher average wage expectations of ‘frontrunner’ immigrants with no network (837 \$) as compared to those individuals who migrate within a network of established migrants (789\$).

Migrants having networks in other destinations (column 2) have remarkable difference in the average expected income (994\$) as compared with those migrating within a network in Italy (789\$). The other characteristics are comparable except the tertiary education attainment of migrants within the network which is 6 times larger than the tertiary education attainment of those having networks in other destinations. With regard to migrants having previous experience, they are on average slightly older and have higher expected income than the sample of migrants with no previous experience. It is consistent with what expected since older migrants have higher probability to engage in repeat migration due also to higher expectations about income at destination. It is interesting to note the lower percentage of female in the sub-sample new migrants as compared with experienced migrants.

1.4. Empirical strategy

The aim of the empirical analysis is twofold. First, I assess the extent to which immigrants overestimate or underestimate wages at destination by comparing their expectations with a ‘counterfactual’ potential wage. Second, I explore the effect of some covariates of interest – such as migration networks – on wage expectations. To accomplish the first objective, one needs to estimate an hypothetical wage – predicted wage – that an immigrant in SIMI would have obtained if employed in Italy in the period considered and compare this predicted wage with his/her wage expectation at the time of departure. In order to find an acceptable benchmark for the immigrant's potential wage at destination, I use labour market performances of a sample of immigrant workers in Italy (IT–SILC). As in Elsner et al. (2014), I compute a counterfactual wage by attributing to every immigrant in SIMI the wage of an average immigrant in Italy with similar and observable human capital characteristics. As mentioned above, the first drawback of this method is the comparison between legal and illegal migrants. Thus, this analysis do not take into consideration the possible wage discrimination existing between legal and illegal immigrants as reported by FRDB and EBRD (2010). Keeping this in mind, one should interpret the benchmark as an ‘upper floor’ of the potential wages that illegal immigrants might obtain in the Italian labour market (hence the difference between potential and expected wages is likely to be underestimated).

To predict the counterfactual wage I firstly estimate using OLS method a simplified Mincer equation based on information contained in the IT–SILC sample. The formulation of the Mincer equation is the following:

$$\begin{aligned} \text{Log}W_i = & \text{Log}\alpha_0 + \beta_1\text{Age}_i + \beta_2\text{Age}_i^2 + \beta_3\text{Female}_i + \beta_4\text{Married}_i + \beta_N\text{Edu}_i \\ & + \beta_I\text{Interact}_i + \epsilon_i \quad [1] \end{aligned}$$

where $\text{Log}W_i$ is the natural logarithm of wages for each immigrant i in sample IT–SILC, Age and Age^2 are the age and age squared of immigrants used to proxy for ex-

perience, *Female* is a dummy having a value of 1 if the immigrant is female and 0 otherwise, *Married* is a dummy having value of 1 if the individual is married and 0 otherwise, *Edu* is a set of education dummies as displayed in *Table 3* (omitted class is secondary education), *Interact* is the set of interactions of the variable *Female* with all the other variables, α_0 is the intercept and ϵ is the random error term. The result of the OLS estimation is showed in *Table 3*.

Table 3. Mincer equation estimates

Variables	Coefficients		Variables
age	0.0270** (0.00776)	0.000531** (0.000158)	female_age2
age2	-0.000259** (9.36e-05)	0.0298 (0.0414)	female_married
No education	-0.174* (0.0802)	0.0132 (0.207)	female_no_edu
Primary	-0.0785* (0.0325)	-0.0732 (0.0630)	female_primary
Middle	-0.0418+ (0.0215)	0.0554 (0.0489)	female_middle
Vocational	0.111** (0.0400)	0.0397 (0.0705)	female_vocat
Tertiary	0.121** (0.0412)	0.136* (0.0634)	female_tertiary
Female	0.599* (0.251)	5.720** (0.152)	Constant
Married	0.0325 (0.0230)	0.136	R-squared
female_age	-0.0435** (0.0131)	1584	Observations

Note: Dependent variable is the Log. of monthly wage. Std. errors in parentheses
 ** p<0.01 * p<0.05 + p<0.1

I predict the potential wage using the estimated coefficients in equation (1) on the characteristics of every immigrant in SIMI as follows:

$$\text{Log}W_j^p = \text{Log}\hat{\alpha}_0 + \hat{\beta}_1 \text{Age}_j + \hat{\beta}_2 \text{Age}_j^2 + \hat{\beta}_3 \text{Female}_j + \hat{\beta}_4 \text{Married} + \hat{\beta}_N \text{Edu}_j + \hat{\beta}_I \text{Interact} \quad [2]$$

where $\text{Log}W_j^p$ is the predicted logarithm of wage of the immigrant j in SIMI, with characteristics $\text{Age}, \text{Age}^2, \text{Female}, \text{Edu}$ and $\hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3, \hat{\beta}_4, \hat{\beta}_N, \hat{\beta}_I$ are the estimated coef-

ficients recovered from the regression [1]. Finally, I use interval regression method to estimate the extent the wage expectations of immigrants are consistent with the potential wage they could earn in Italy. Additionally, the equation includes the variables that account for information flow and other relevant control variables. The baseline formulation is as follows:

$$\text{Log}W_j^e = \text{Log}\alpha_0 + \delta_1 \text{Log}W_j^p + \delta_2 \text{Net}_j + \delta_3 \text{Exp}_j + \delta_M \mathbf{X}_{M,j} + \delta_N \mathbf{Y}_{N,j} + \epsilon_j \quad [3]$$

where the dependent variable $\text{Log}W_j^e$ is the logarithm of the expected wage of immigrant j , Net is a dummy equal to 1 if the immigrant has a relative abroad and 0 otherwise. This variable is included in different specifications in the estimations. The dummy Exp is equal to 1 if the immigrant has been before in the final destination and 0 otherwise. The vector \mathbf{Y}_N includes dummies that account for migration motivations while the vector \mathbf{X}_M includes a set of characteristics of the origin regions of the immigrants. Information on opportunities (and wages) at the destination countries might flow by means of ‘strong individual ties’, such as relatives already in the destination country but also by means of ‘weak ties’ such as compatriots residing in the intended destinations or in other countries. In order to control for these possible indirect sources of information, I include in the specification the stock of immigrants from the same origin country in Italy. This variable controls for the effect of non-personal network on the wage expectations of immigrants. Another element which might affect the quantity and quality of information about the destination country is distance. Additionally, I include in the estimation macro-region dummies (Europe, Asia, North Africa, Rest of Africa and South America) that control for regional effects. To account for cultural similarity at the individual level, I introduce the dummy variable *Catholic* having value equal to 1 if the immigrant is catholic and 0 otherwise¹¹. Finally, I use the GDP per capita with reference year 2002 to control for country differences in wealth (see *Table 1* in *Appendix* for the definitions of the covariates employed in the analysis). Given the nature of the dependent variable, I

¹¹ Italy is a very religious country where the striking majority of people is catholic. This variable is supposed to capture to some extent the variability related to cultural differences at the individual level.

employ an interval regression approach. This method is appropriate when, as in our case, the dependent variable is expressed both in wage value¹² and in wage intervals. Two additional technical considerations are worth to note. Firstly, in the Mincer equation, I use age to proxy for experience given the higher heterogeneity of schooling years in the sample which covers more than 50 origin countries¹³. Secondly, I pool male and female in the Mincer equation given the limited number of observation on migrant workers in Italy in the considered period¹⁴. In order to capture any differences existing between male and female in the observed characteristics, I added interactions of the female variable with all the other variables considered in the Mincer equation.

1.5. Results

The starting point of my analysis is the estimation of a baseline model where I simply regress expected individual wages on the predicted ‘benchmark’ wages obtained using, as explained above, a Mincerian equation (see *Model 1* in *Table 4*). Under the following two hypothesis: (i) perfect information on the job market opportunities in Italy; (ii) access to a pool of job opportunities equivalent to that achieved by legal immigrants in Italy at the time of migration; we should expect an estimated coefficient on the predicted wage equal to unity and, in addition, an estimated coefficient for the constant equal to zero ($\delta_1=1$ and $\alpha_0=0$). Graphically in a Cartesian space where the expected wage is represented in the *Y axes* and predicted wage in the *X axes*, accurate expectation would imply that the clouds of points lies on the line with slope 1 starting from the origin (the red line in *Graph 1*). The result show expected wages seems to reflect individual human

¹² Several papers use wage expectations collected as a point value (Jensen 2010; Nguyen 2008). The main advantage as compared to the subjective probability distribution method relies in its simplicity to be understood by less educated respondents as in the case of the SIMI respondents. However, this data collection method does not take into account the degree of uncertainty that respondents have on a future event (Dominitz, 1998).

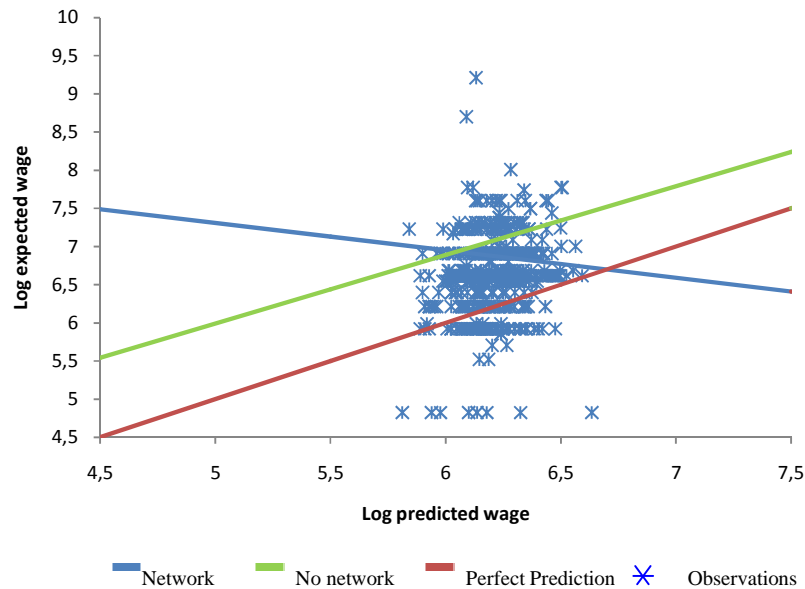
¹³ Therefore, the standard way to assess a proxy for experience (age - education years = experience) could be not homogeneous for different nationalities.

¹⁴ It is standard in the literature to estimate male and female separately since they have different unobserved characteristics. Moreover, McKenzie et. al. (2013) show that female acquire information on wages quite differently as compared to male.

capital characteristics – as captured by the Mincer equation – although not perfectly ($\alpha_0 = 2.16$; $\delta_1 = 0.72$) and a tendency of wage overestimation of illegal immigrants in Italy.

In Table 4, columns 2 – 4, I extend the baseline estimation by introducing a set of additional factors which might affect wage expectations. In column 2, I introduce the covariates (*Experience*), (*Network Other*) and (*Network Dest*) controlling for previous experience and network ties in destination other than Italy and network ties in Italy, respectively. Both (*Experience*) and (*Network Other*) seem to positively affect the expected wage of immigrants. Individuals with previous migration experience expect higher wages, *ceteris paribus*. The same result holds for immigrants having a network in a destination other than Italy. Instead, I do not find evidence that the networks in Italy affect the wage expectations of immigrants.

Graph 1. Average effect of networks on expected wage



In column 3 and 4, I investigate the effect of previous experience and network ties on expected wage by skill level. This is accomplished by introducing two interaction terms. The first interaction term concerns the networks in other destination and predicted wage (*Network-Inwage*) while the second concerns the previous experience and predicted wage (*Experience-Inwage*). In *Table 5*, I summarize the average effects¹⁵ of networks and previous experience on the expected wage of immigrants.

Table 4. Interval regression results. Dep. variable: Logarithm of expected wage

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6) "Man Only"	Model (7)
<i>LogW_j^p</i>	0.719** (0.173)	0.679** (0.175)	0.538** (0.195)	0.919** (0.178)	0.557** (0.197)	0.433+ (0.225)	0.559* (0.218)
<i>Experience</i>		0.171* (0.0689)	-5.471* (2.314)		-7.001* (2.821)	-8.428* (4.132)	0.282** (0.0617)
<i>Network Other</i>		0.143* (0.0619)		7.181* (3.088)	0.148* (0.0606)	0.126+ (0.0702)	0.107* (0.0526)
<i>Network Dest</i>		-0.0357 (0.0636)		-0.0319 (0.0622)	0.0137 (0.0642)	0.0325 (0.0808)	-0.00283 (0.0628)
<i>Europe</i>		0.00217 (0.0784)	0.00278 (0.0814)	0.0343 (0.0786)	0.00192 (0.0781)	0.0421 (0.101)	0.0234 (0.0881)
<i>Asia</i>		-0.0159 (0.0641)	-0.0194 (0.0647)	-0.0127 (0.0636)	-0.0155 (0.0639)	-0.0165 (0.0675)	-0.0553 (0.0674)
<i>North Africa</i>		0.182* (0.0901)	0.191* (0.0911)	0.230** (0.0875)	0.187* (0.0901)	0.212* (0.103)	0.224* (0.113)
<i>South America</i>		0.0911 (0.0933)	0.0706 (0.0963)	0.0895 (0.0944)	0.0964 (0.0939)	0.139 (0.111)	0.142 (0.105)
<i>Mig Stock</i>		0.0125 (0.0125)	0.0110 (0.0128)	0.0116 (0.0125)	0.0114 (0.0123)	0.0113 (0.0135)	0.0286* (0.0132)
<i>GDPpc2002</i>		-0.0537+ (0.0306)	-0.0524+ (0.0309)	-0.0518+ (0.0308)	-0.0515+ (0.0304)	-0.0575 (0.0393)	-0.0569+ (0.0332)
<i>Catholic</i>		-0.0314 (0.0678)	-0.0538 (0.0647)	-0.0154 (0.0675)	-0.0436 (0.0676)	-0.0733 (0.0812)	-0.00928 (0.0663)
<i>Experience-Inwage</i>			0.905* (0.369)		1.164* (0.455)	1.397* (0.662)	
<i>Network-Inwage</i>				-1.139* (0.499)			
<i>Experience Dest.</i>					-0.469 (0.326)	-0.543 (0.346)	
<i>Asylum seeker</i>							0.0923 (0.0596)
<i>Constant</i>	2.157* (1.075)	2.604* (1.084)	3.509** (1.206)	1.109 (1.091)	3.349** (1.227)	4.165** (1.398)	3.154* (1.335)
<i>Lnsigma</i>	-0.748** (0.0571)	-0.772** (0.0612)	-0.770** (0.0594)	-0.773** (0.0591)	-0.783** (0.0563)	-0.746** (0.0590)	-0.799** (0.0476)
<i>Observations</i>	555	555	555	555	555	473	466

Note: The reference region is Rest of Africa, while the omitted class of network ties is (No network). The number of observations varies for the 2 last columns due to lower population. Robust standard errors in parentheses ** p<0.01 * p<0.05 + p<0.1

¹⁵ The average effect is assessed as the sum of coefficients of the variables and their interactions.

As reported in the first column of *Table 5*, having a relative in a country other than the destination has on average a positive effect on the wage expectation of immigrants (the value of the intercept is positive). As compared to immigrants aiming to settle in Italy, immigrants having networks in other destinations may have the intention to joint their relatives later on. Hence, they could be more motivated to work harder or have more favourable unobserved characteristics. This could explain their more optimistic expectations as compared to the other immigrants.

Table 5. Average effects of network ties and previous experience

<i>Coefficients</i>	<i>Network = 1</i> (1)	<i>Network = 0</i> (2)	<i>Experience=1</i> (3)	<i>Experience=0</i> (4)
α_0 (<i>intercept</i>)	8.83	1.1	- 1.96	3.5
$\delta_2; \delta_3$ (<i>slope</i>)	- 0.22	0.92	1.44	0.54

The results suggest that immigrants, on average, expect a negative premium for their skills in Italy (green line in *Graph 1*). The marginal effect of network conditional on the level of predicted wage is reported in *Graph 3* in the Appendix (the 95% confidence lines are reported as well). For those individuals in the sample with a relatively low predicted wage – hence those migrants with a relatively weak human capital endowment – I find a positive and statistically significant effect of network on expected wages (this lower bound of predicted wage ranges from 5.8 to 6.2 in logarithmic scale and contains almost 57% of the sample). On the contrary belonging to a network does not significantly affect expectations of more skilled migrants. This finding seems to support the hypothesis of ‘distort’ information flowing through networks of already established migrants. This result is also consistent with the literature on skills waste and wage discrimination of immigrants at destination as found – among others – by Rivera-Batiz (1999) in a study comparing the wages of legal and illegal Mexican immigrants in

the US labour market. The rather ‘flat’ slope depicted in graph 1 perhaps is due to a “brain-waste effect” of illegal status which is a well-known empirical regularity also in the Italian labour market: whatever their initial skills most illegal migrants end up in performing low-skilled and menial jobs where human capital is of little or no use. One possible alternative interpretation of the effect of networks on expected wages might be that although they somehow ‘inflate’ the likely wages that immigrants would earn in the destination country they are able to convey more accurate information with respect to the reduced ability to fully employ human capital and already acquired skills. Coniglio et al. (2010) employing the same data set, SIMI, find a higher likelihood for skilled migrants to return home due to prospects of ‘skills waste’ in the migrants’ destination countries. The authors argue that social networks could lessen this effect by decreasing the integration costs of migrants.

Similarly to what found for networks, the effect of previous experience on wage expectations is positive. Moreover, as compared to the new immigrants (column 4 in *Table 2*), return migrants expect a higher remuneration to their skills as plotted in *Graph 2* in the Appendix. This is significant for the upper bound of predicted wage ranging from 6.2 to 6.7 as showed by the marginal effect plot in *Graph 4* in the Appendix. The range includes almost 50% of immigrants. Repeat immigrants possess more accurate information on the job opportunities at destination country and, following (DaVanzo 1983), expect to better employ their skills. However, the job-search literature suggests that return immigrants may have higher reservation wages and therefore higher expectations but not necessarily better pre-move information on destination (Herzog et al. 1985).

In *Model 5*, I investigate if immigrants already migrated within a network have different wage expectations as compared with those who do not. The interaction (*Experience Dest*) between previous experience and network at destination has a negative effect, though not significant. It suggests that immigrants having previous experience are not dependent on the information coming from networks at destination. Similar results are found when investigating the expectations of earning-motivated immigrants. As

compared to immigrants moving for political¹⁶ or family reunification reasons the earning-motivated immigrants have on average higher wage expectations. Earning-motivated immigrants expect a positive premium for their skills in Italy (see *Table 2* in *Appendix*). This result replicates what found for previous experience given that almost 80 percent of experienced immigrants are earning-motivated immigrants.

Interestingly, I find differences in wage expectations across macro regions of origin of the immigrants. Illegal immigrants coming from the North African region – mostly from Algeria, Egypt, Morocco and Tunisia – shows significantly higher wage expectations as compared to those belonging to other origin regions. In *Table 4, Model 7*, I include in the estimation a variable controlling for the migration status of the immigrants (*Asylum seeker*)¹⁷. It shows no significant differences between immigrants asking asylum in Italy and those being clandestine. I expected that asylum seekers would have lower wage expectations than clandestine immigrants since their aim of immigration is not related to economic reasons. Hence, their information on wages is supposed to be less accurate than clandestine immigrants.

Finally, as the large part of the literature do, I estimate a separate equation for male immigrants (see *Table 4, Model 6*). The underlying rationale is to avoid any impact in the analysis of the different labour market selection process and/or potentially different returns to education and experience for male as compared to female immigrants. Moreover, McKenzie et al. (2013) point out the different information channels and attitudes in forming expectations female have as compared to male. The results show no significant differences as compared to the sample which includes both genders. Unfortunately,

¹⁶ The significance of the coefficient is very close to the 5% level (5.8%).

¹⁷ There are 2 additional classes of immigrants not included in the analysis, i.e. waiting for rejection and expulsion. The later categories are not clearly specified and may contain both ex-clandestine or asylum seekers that did not succeed in having asylum. Hence only clandestine and asylum seekers compose the dummy *Asylum seeker*. This dummy is not included in all the estimations because in doing so I would lose considerable information (from 555, the sample drops to 468 observations).

a straightforward comparison between male and female sub-samples was not possible due to the small number of female immigrants in the data set.

The accuracy of expectations for each individual may be proxied by the relative distance between predicted wage and expected wages; this allows me also to measure the extent to which immigrants overestimate or underestimate wage in Italy before departure. I find that almost 84% of immigrants overestimate their wages given the level of their human capital and the performance of similar (but legal) workers currently employed in the Italian labour market. *Table 1* display some descriptive statistics on both overestimation and underestimation sub-samples.

1.6. Conclusion

The decision to migrate is largely dependent on expectations on wages that it is possible to obtain at the intended destination, which in turn is largely dependent on the set of available information before departure. The existing literature suggests that migration networks and previous migration experiences are two fundamental sources of information for immigrants. In this study, I investigate the accuracy of wage the expectation of illegal immigrants entering Italian borders and its determinants. I find that network ties affect significantly the expected wage. Having a relative in a country different from the destination, on average, influences positively the expected wage of immigrants. One possible explanation of my findings could be the distort and unrealistic information that often networks of immigrants convey back home which, in turn, generate over-optimism about socio-economic conditions in potential destination countries (Somerville 2011). Although distorting upwards wage expectations, I find that wage expectations of illegal migrants within networks are influenced by individual human capital. This result might be due to the fact that networks contribute in informing potential immigrants about the presence of skills waste in the destination's labour market.

Previous experience is a significant source of information to immigrants. It has a positive impact on wage expectations. A possible explanation could be related to skills and knowledge acquired during previous trips. This asset could be employed once at destination. Contrarily to the effect of networks, the expected skills premium of experienced immigrants is positive. Immigrants with a past migration experience expect to have on average a greater remuneration of their skills than individuals who never migrated to that destination.

This paper contributes to the empirical literature on the determinants of expectations. To my knowledge, this is the first paper that deals with this issue with a particular focus on illegal immigrants. My results show a general overestimation of the potential wage in Italy by almost 84% of the immigrants. This result is in line with what anecdotal evidence suggest on overoptimistic expectations by migrants (in particular low-skilled ones originating from poor countries). Since expectations are the main drive of behaviour, this study suggests that more information on the real socio-economic environment in migration receiving countries, and in particular on job market opportunities, could significantly increase the benefits of migration for the migrants themselves and for both host and sending countries. In some circumstances, precise information might avoid and/or considerably reduce the phenomena of "failed migration" and lessen the migratory pressure experienced by destination countries.

APPEDIX 1

Table A 1. Definitions of the variable included in the model

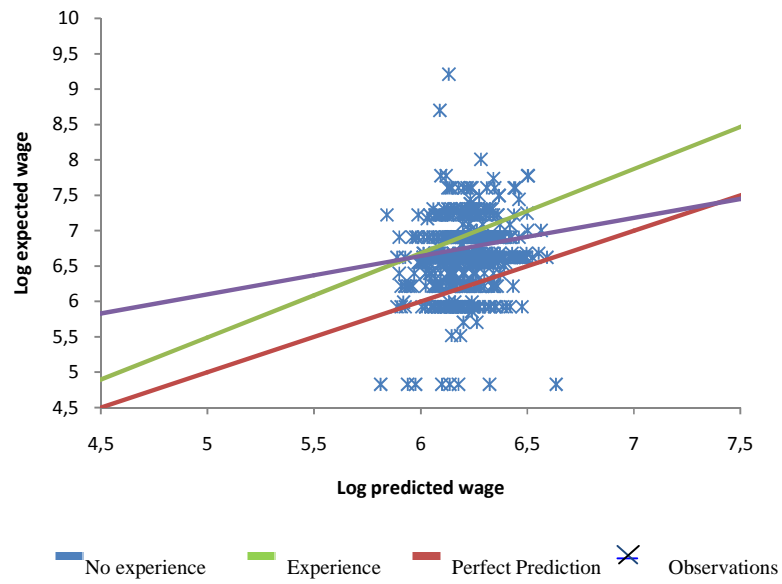
<i>Variables</i>	<i>Definition</i>	<i>Source</i>
Baseline variables		
$LogW_j^e$	Logarithm of expected wage (dependent variable)	SIMI
$LogW_j^p$	Predicted wage	Assessed from SIMI
<i>Network</i>	Network variable with specifications (a,b,c,d) below	--
<i>Experience</i>	Immigrants declaring previous experience in Italy	--
Network variables		
a) <i>Network Dest</i>	Immigrants declaring to have relatives at destination	SIMI
b) <i>Network Other</i>	Immigrants declaring to have relatives in other countries	--
c) <i>No Network</i>	Immigrants declaring to have no relatives abroad (Omitted class)	--
d) <i>Nr_Network</i>	Number of relatives in abroad	--
Country controls		
<i>GDPpc2002</i>	Gross domestic product per capita in year 2002	World Bank (2001)
<i>Mig Stock</i>	Total stock of immigrants from each origin country in Italy	Global Migration Database World Bank (WB)
<i>LnDistance</i>	Log of the distance between capital cities of origin and Italy (GPS coordinates)	Google Maps
Regional dummies		
<i>Europe</i>	Immigrants coming from the European Continent	--
<i>North Africa</i>	Immigrants coming from North African region	--
<i>Rest of Africa</i>	Immigrants coming from the rest of Africa	--
<i>Asia</i>	Immigrants coming from Asia	--
<i>South America</i>	Immigrants coming from South America	--
Motivations to migrate		
<i>Earners</i>	Main motivation to earn	SIMI
<i>Political</i>	To be (politically) free	--
<i>Rejoin family</i>	To rejoin family members	--
<i>Better future</i>	To insure a better future to children	--
<i>Safety</i>	To earn greater safety	--
<i>Healthcare</i>	To get healthcare	--
<i>Study</i>	To study	--
<i>Other</i>	Other	--

Table A 2. Estimation using the purpose to migrate

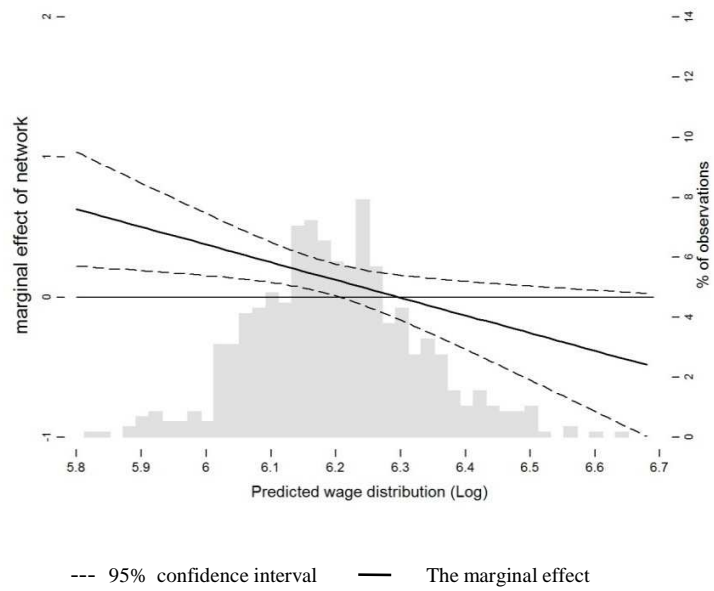
VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
<i>LogW_j^p</i>	0.684** (0.175)	0.331 (0.264)	0.699** (0.174)	0.966** (0.173)	0.661** (0.179)
<i>Nr_Networks</i>	0.0154 (0.0167)	0.0157 (0.0167)	0.0139 (0.0170)	0.0164 (0.0168)	0.0152 (0.0159)
<i>Mig Stock</i>	0.00930 (0.0129)	0.00847 (0.0128)	0.00785 (0.0131)	0.00514 (0.0130)	0.00652 (0.0129)
<i>GDPpc2002</i>	-0.0464 (0.0311)	-0.0418 (0.0311)	-0.0455 (0.0310)	-0.0450 (0.0307)	-0.0448 (0.0307)
<i>Catholic</i>	-0.0256 (0.0651)	-0.0309 (0.0651)	-0.0309 (0.0650)	-0.0463 (0.0646)	-0.0272 (0.0652)
<i>Europe</i>	0.0193 (0.0820)	0.0143 (0.0821)	0.0159 (0.0814)	0.0317 (0.0821)	0.0140 (0.0807)
<i>Asia</i>	-0.00923 (0.0640)	-0.0156 (0.0637)	-0.0131 (0.0640)	-0.0236 (0.0642)	-0.00703 (0.0638)
<i>North Africa</i>	0.215* (0.0909)	0.206* (0.0909)	0.198* (0.0903)	0.205* (0.0889)	0.210* (0.0911)
<i>South America</i>	0.0530 (0.0991)	0.0550 (0.0981)	0.0368 (0.0959)	0.0640 (0.100)	-0.0366 (0.104)
<i>Rejoin family</i>					-0.287** (0.105)
<i>Safety</i>					-0.0599 (0.0593)
<i>Healthcare</i>					0.406** (0.134)
<i>Study</i>					-0.266 (0.176)
<i>Better future</i>					0.0892 (0.104)
<i>Other</i>					-0.0997 (0.0962)
<i>Political</i>			-0.106+ (0.0628)	8.393* (3.363)	-0.120+ (0.0641)
<i>Earners</i>	0.0701 (0.0432)	-4.570* (2.110)			
<i>Earners-lnwage</i>		0.748* (0.340)			
<i>Political-lnwage</i>				-1.369* (0.540)	
<i>Constant</i>	2.532* (1.083)	4.700** (1.634)	2.512* (1.073)	0.876 (1.042)	2.764* (1.094)
<i>Lnsigma</i>	-0.771** (0.0586)	-0.775** (0.0585)	-0.772** (0.0588)	-0.782** (0.0584)	-0.782** (0.0597)
<i>Observations</i>	563	563	563	563	563

Robust standard errors in parentheses ** p<0.01, * p<0.05, + p<0.1

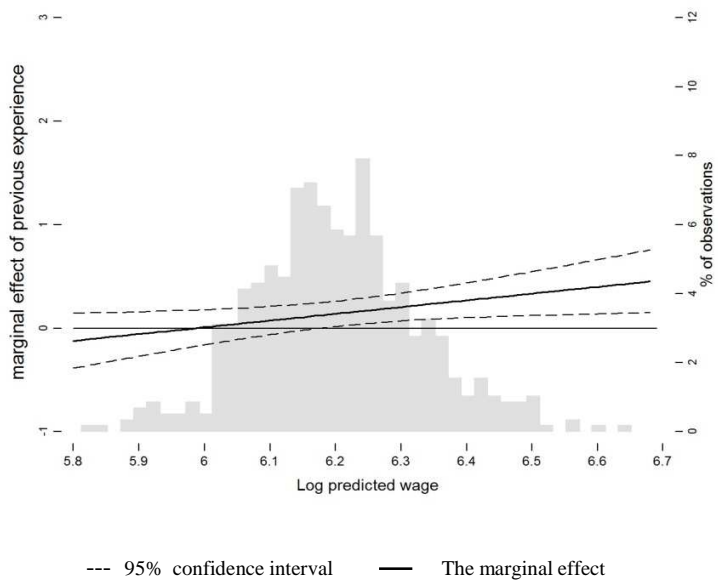
Graph A 2. Previous experience



Graph A 3. Marginal effect of Network in other destination



Graph A 4. Marginal effect of previous experience



II Part

Do foreign firms determine migration flows? Evidence from Sub-Saharan Africa.

This second part of the thesis is composed by two essays. Both of them exploit the data from AIS (2010) on 16 Sub-Saharan Africa countries.

The first essay investigates the main determinants that induce foreign firm to use foreign workers in their operations abroad. The empirical analysis tests several hypothesis on the usage of expatriates by MNCs and extends the literature toward relatively unexplored issues such as local embeddedness and expatriation cost. The analysis is carried out at the management level since the rationale for employing expatriates is tightly linked with strategic decision-making and human resource management practices.

The second essay investigates the extent FDI inflow in Sub-Saharan Africa affects migration of skilled workers toward these countries. The analysis relies on the main predictions of a recent theoretical contribution by Jayet and Marchal (2015). We empirically test if it exists a relationship of complementarity between FDI and migration of skilled workers toward SSA countries.

2. Why do foreign firms use foreign workers? Determinants and hypothesis.

2.1 Introduction

The internationalization of production entails management challenges for firms, stemming from the additional complexity of foreign operations and of coordinating the different units of a firm across borders. These challenges are particularly evident during the initial stages of activity, in particular in the context of developing countries. Subsidiaries located in foreign countries need to develop production and administrative capacities and to build the practices and organizational tools that allow a smooth integration of the foreign unit within the rest of the firm. Expatriates play an important role in this process as they represent the main channel for knowledge transfer between foreign subsidiaries and the headquarter and they are often the main agents in charge of management and operational capacity building.

Several studies have analysed the firm-level determinant of expatriates. Most studies are limited to a particular class of foreign workers – often managers – or to foreign firms originating from a given source country (Belderbos and Heijltjes 2005; Gaur et al 2007 on Japanese multinational) or investing in a single host country (Tsang 1999 and Leung et al. 2009 on China; Tzeng 1995 on Taiwan).

The aim of this paper is to investigate the determinants of the number of foreign workers by a large set of foreign investors – approximately 1400 – operating in 16 Sub-Saharan African countries using a rich firm-level database recently developed by UNIDO, AIS 2010 (see UNIDO 2012). To our knowledge this is the first paper with a specific focus on the African continent which represents the ‘last frontier’ of interna-

tional investments¹⁸. The African continent is also particularly interesting since it has attracted investments both from developed countries (North) and from other developing and emerging economies (South). Given the large set of origin and destination countries (87 and 16, respectively), our analysis has also the ambition of shedding light into differences in the determinants of the number of foreign workers for investors belonging to different business culture and environments.

It is of particular interest the development of such practices in Sub-Saharan Africa countries, which are completely neglected by the management research. The aim of this paper is to investigate the determinants of foreign labour demand by a large set of foreign investors in 16 SSA countries. We are able to shed lights on the micro and macro level determinants of foreign staffing levels of foreign investors in the context of a pool of less developed countries.

In support of the ‘knowledge creation and learning’ role attributed to expatriation by early theoretical arguments (see Downes and Thomas 2000, Edstrom and Galbraith 1977, 1994), we find that the firms' demand for foreign workers depend positively on the knowledge intensity of their business, and negatively on their degree of embeddedness in the host country economy. We find that Greenfield investments generate a higher share of foreign workers but firms' experience in the host country, i.e. years since operation started, mitigates this initial effect. Finally, our results suggest that foreign investors originating from emerging and/or developing countries – contrarily to those originating from rich countries – are more sensitive to wage differentials between origin and destination country; thus when the wage gap is high these investors are more likely to substitute foreign workers with host country nationals. This finding provides novel empirical insights on the expatriation cost issue. We find evidence of the importance of the quality and availability of human capital in the host country as a determinant of foreign firm staffing strategies. In addition a better Institutional quality and lower levels of corrup-

¹⁸ UNCTAD (2014) reports that in 2013 investments toward the African continent rose by 4% over the previous year, reaching 57 billion \$.

tion are also associated with a reduced number of foreign expatriates. This result has important policy implications for those developing countries wishing to boost labour demand of host country nationals by foreign firms.

Our study contributes, given its specific focus on the relatively under-investigated phenomena of foreign firms behaviour in Africa, to both the international business and development economics literature. To our knowledge this is the first study which investigates the demand of expatriates at all levels – i.e. not exclusively in management positions – in Sub-Saharan Africa.

The paper is organized as follows. In *Section 2.2*, we discuss testable hypothesis on the link between firm characteristics and foreign firms demand of foreign workers in their operation oversea. *Section 2.3* describes the most relevant features of the data employed in the analysis. *Section 2.4* explains in details the methodology and the variables used in the parametric estimates. The empirical results are presented in *Section 2.5*. Conclusive remarks are reported in *Section 2.6*.

2.2 Why foreign firms use foreign workers? A short literature review and testable hypothesis

Firms investing abroad, have two staffing alternatives: (i) employ a parent country national or a third country national (most likely working for the same company); or (ii) assign a host country worker. There are several advantages of employing a host country worker. The lower cost of a local worker compared with the high cost of expatriates (Reynolds 1997) is one of the most relevant, notably in a developing country. Depending on the type of business and the targeted market, host country workers can be more suitable in performing the assigned tasks when the effectiveness of these tasks crucially depends on interactions with the host country institutional, cultural and socio-economic

environment (Harzing 2001). For example, for a marketing position, a service firm targeting the local market is more likely to employ a domestic/local employee than a foreign employee.

Notwithstanding these disadvantages, foreign firms use extensively expatriates in their operations abroad. The literature identifies some key functions that expatriates undertake in foreign affiliates. In what follows, we briefly describe some of the stylized facts established by previous authors and discuss the main hypothesis that are tested in the present study.

2.2.1 Foreign workers as a means of knowledge transfer

Knowledge is fundamental source of competitive advantage for the firm (Argote and Ingram, 2000; Grant, 1996; Peteraf, 1993). According to Bartlett and Ghoshal (1992b), the main challenge for internationalized firms is to create a learning organization able to develop and integrate knowledge throughout their cross-border activity. Evidence shows that MNC's subsidiaries rely heavily on knowledge created at the parent company level (Caves 1996). Hence, the knowledge transfer from the parent company to the controlled affiliates becomes a crucial competitive factor. To transfer knowledge, MNCs can exploit efficiently their internal circuit of human capital movement (Gupta and Govindarajan, 2000). The existing literature emphasizes the importance of expatriates as an effective mechanism through which the tacit knowledge is transferred between the different units of a firm (Athanassiou and Nigh 1999). The use of qualified staff to transfer the firm's tacit know-how is deemed necessary since it is usually individual-specific, not codified or easily formalized in standard operations (Polanyi 1962; Hocking et al. 2004). From the management prospective, expatriates are both a means of knowledge transfer and knowledge transfer facilitators (Fang et al. 2010). On one side, they transfer firm-specific organizational and management practices (Tsang

1999), on the other side, they coordinate the parent-subsiary or subsidiary-subsiary knowledge exchange channels (Edstrom and Galbraith 1977).

Given the crucial role of expatriates as gatekeeper and transmission mechanisms of the firm knowledge base their use is expected to be more intensive in those sectors using more extensively knowledge-based capabilities (the IT sector in Millar and Salt 2007; or firms offering financial services in Beaverstock, 2002). Several studies compare the use of expatriates between sectors with relevant differences in technological content and management complexity. Brewster (1988), for example, asserts that the technology intensive sectors demanding a specific type of expertise, such as electronics and petroleum, require more expatriates than transportation or food industries.

In our empirical analysis we test the following hypothesis:

***Hypothesis 1:** Foreign firms having higher level of knowledge capabilities, ceteris paribus, will employ more foreign workers, in particular the highly-skilled ones.*

To date, only few empirical studies have investigated the relation between knowledge transfer and the use of foreign workers by firms investing abroad (see Gupta and Govindarajan 2000, Bjorkman et al. 2004). These studies focus mainly on expatriate managers moving from MNC's headquarter to subsidiaries. Delios and Bjorkman (2000) studying Japanese affiliates in China and the USA found no evidence of a relationship between the marketing and knowledge capabilities of the parent firm and the transfer of expatriates in the foreign subsidiaries. Similarly, using the R&D intensity to proxy for the knowledge intensity of the parent firm, Harzing (2001) found no impact of knowledge intensity on the usage of expatriate managers. To our knowledge no studies have tested the importance of firm's knowledge intensity in the context of FDI inflows in developing countries. Given the generally weak human capital endowment, we expect that the use of expatriates might be more accentuated in the context of poor host countries.

2.2.2 Local embeddedness, vertical integration and the use of foreign workers

Following Schuler et al. (1993), the two major strategic concerns of the MNCs are; (i) the necessity to manage the linkages between a large number of units operating in different countries; and (ii) to manage the internal operations and interdependences with the local environment. Inter-unit management often requires coordination among units' operations and between units and headquarter operations. Coordination is essential, especially when the MNC's products and activities are vertically integrated, i.e. when each unit outputs are used as inputs in the production process of the other units (Bonache et al. 2001). Information flows are crucial to align the parent company strategic activity with the local activity. For Edstrom and Galbraith (1977), expatriates create efficient communication networks moving personally to subsidiaries and transmitting relevant information. Therefore, the main task of expatriates is the coordination and control of the single subsidiaries in order to ensure the compliance of their practices with the companies' business objectives and shared values (Bartlett and Ghoshal, 1991). Following the international business literature on expatriates, vertically integrated firms need higher levels of coordination given the intra-organizational interdependency of their operations (Richards 2001). These considerations lead to the following testable hypothesis:

Hypothesis 2a: *Vertically integrated firms use more foreign employees than not integrated firms.*

On the contrary, locally embedded subsidiaries develop inter-organizational interdependencies with local partners. This operational structure leads to a broader horizontal interaction with local firms, rather than a vertical interaction. The need for a greater autonomy of the foreign affiliate will be more evident for example for firms that acquire

a relevant part of their inputs from local firms. In this case, foreign units need relatively less informational exchange and less coordination and control from the parent company (Boyacigiller 1990). Hence, companies having stronger local linkages are more prone to employ local workers – in particular, but not necessarily only, in managerial and high-skilled positions. In this regard, Belderbos and Heijlties (2005) found that firms building local partnerships are less likely to appoint a parent country national as a managing director. Moreover, firms having local linkages are more likely to establish relations of trust and collaboration with locals that could lead to a more extensive use of local human resources. This is particularly true for firms aiming to serve the local market. Orientation toward local sales requires the adaptation of the product to the local demand. Compared to foreign employees, local staff has a better knowledge of the local market and of local consumers specific tastes (Peixoto 2001), local norms (Gaur et.al 2007), customs and language (Harzing 2001).

The usage of foreign workers could also be influenced by business partnership the foreign investor has with local partners. For instance, when creating a joint-venture with a local partner, we would expect that the foreign investor has less discretion to appoint home country nationals in both managerial and production positions. However, several studies show that control on staffing policy may depend also on other issue such as the ownership share (Wang et al. 1998) and the policy restrictions on equity ownership existing in some countries (Delios and Bjorkman 2000). These considerations lead to following hypothesis:

Hypothesis 2b: *A firm having: (i) a larger inter-organizational relations (linkages) with local firms;(ii) a local partnership and; (iii) as a target the local market, will employ less foreign workers.*

2.2.3 Mode of entry and firm's experience in the host country

The time since the firm operates in the country of investment might be an important factor in shaping the demand of expatriates. Resource dependence theory asserts that young subsidiaries are less autonomous and rely on the parent company resources, including human resources. It takes time for newly established foreign firms to build up the necessary capabilities, including appraisal of the local context and local staffing development (Peng and Beamish 2011). Training of local employees generally requires time and often such activities are among the main tasks that expatriates accomplish during their assignment. Time since the initial investment took place may have two effects on the number of foreign workers employed by the firm: (i) the number of expatriates decreases since training becomes less resource demanding in later stages of the firms establishment, and (ii) foreign workers are gradually replaced by trained host country employees (Peixoto 2001, Gong 2003). The replacement of foreign workers by local workers – in particular at a managerial level – at different growth stages of the firm is reported in early and later studies (Franko 1973; Riaz et al. 2014). However, the appointment and replacement with local staff may depend on the skills availability at the local level. Indeed, according to Edstrom and Galbraith (1977), MNE's use foreign staff to fill the highly qualified and technical positions, especially in developing countries where skills are scarce. In relation to local embeddedness, over time, the subsidiary gains more confidence with the environment, more exchanges with local partners and consequently gains more operational autonomy. Hence the coordination and control from the parent company becomes less relevant, meaning lower levels of expatriate staffing. In contrast, Gaur et al. (2007) concludes that in presence of a distant institutional environment between the origin and the destination country of the firm, age could have the opposite relation and lead to an over-time increase in the use of parent country

managers. Over time, the local legitimacy¹⁹ of foreign firms increases the ability to overcome local environment hurdles using parent country managers.

When considering the mode of entry, greenfield investment - as compared to the acquisition or privatization of an existing company - presents some operational specificities that generally requires a more intensive use of expatriates (at least in the initial stage). Most of the organizational and production processes are to be build ex-novo, requiring a more conspicuous employment of foreign staff at all levels of skills (Peixoto 2001; Harzing 2001) and of foreign trainers of local employees. Meyer and Estrin (2001) assert that usually in acquisitions, firms tend to use mainly the assets of the acquired firm, including managerial capabilities. Additionally, acquisitions and privatization may include legal restrictions aimed to preserve the existing employment in those firms. It is likely that the new owner would be less independent in applying own staffing policy.

However, we should expect that over time the higher employment of foreign workers by greenfield investors would be absorbed as more and more local workers substitutes them. The considerations above lead to the following hypothesis we aim to test:

Hypothesis 3a: *Companies that operate in a given country for a longer period, employ less foreign workers than newly established companies.*

Hypothesis 3b: *Firms making greenfield investments use more foreign workers than those making brownfield investments. This effect moderates over time.*

¹⁹ With local legitimacy Gaur et al. (2007) means the pressure to generate spillovers such as local employment or/and knowledge transfer to local firms.

2.3 Data description

Our study on the determinants of the demand for foreign workers uses firm-level data collected by the United Nation Industrial Development Organization (UNIDO) in 19 Sub-Saharan African countries²⁰ in 2009-2010, AIS 2010. AIS 2010 surveys both manufacturing and service firms. The database contains detailed information on a large sample of foreign investors as well as domestic firms: firms characteristics, sector of activity, organizational structure, main company accounts, foreign trade activities, market orientation, local sourcing strategies and workforce composition. For each firm, foreign and domestic, we know the number of foreign full time employees belonging to the following three categories; (i) production workers; (ii) clerks and administrative staff; and (iii) managers, technicians and supervisory staff. For the sake of exposition, we label these categories as low-skilled workers, mid-skilled workers and high-skilled workers, respectively. It is worth noting that we do not observe the nationality of the employee, nor whether the foreign employee is an intra-firm transferee, a self-initiated foreign worker²¹ (Suutari and Brewster 2000) or an immigrant already established in the host country before the investment took place²². Hence, strictly speaking our definition of expatriate is not confined to foreign country national subject to an intra-firm transfer (Edstrom and Galbraith 1977, Hocking et al. 2004) but also includes other categories of foreign workers. Given the relatively low immigration in the covered countries, it is highly likely that most of the foreign workers employed in foreign firms can be considered as expatriates in the ‘classical’ sense of being workers who are transferred (or migrated) within the firm. This is even more likely to happen for the foreign highly skilled workers, since the pool of foreign highly skilled immigrants in SSA countries is rather

²⁰ Burundi, Burkina Faso, Cameroon, Cape Verde, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Niger, Nigeria, Mozambique, Rwanda, Senegal, Uganda, United Republic of Tanzania and Zambia.

²¹ This type of workers do not transfer within the same firm, but make their own job arrangements.

²² We explicitly take into account in our analysis the possibility that foreign workers might be immigrants already residing in the country rather than intra-firm expatriates. Our parametric analysis controls for the stock of immigrants residing in the host countries.

low (Ratha et al. 2011). In our data we can distinguish foreign firms on the basis of their ownership structure as follows: (i) subsidiaries of MNCs with headquarters in third countries and (ii) firms owned by an individual foreign investor, family or business group other than MNCs.

The number of foreign firms covered by AIS 2010 dataset is around 2400 unities. After dropping observations that have missing values on the dependent variable and on our main covariates of interest and observations from destination countries²³ for which human capital endowment data are not available, we are left with a final sample of 1428 foreign firms. Most of the firms operate in the manufacturing (747), and service (465) sectors while 109 firms are in the primary sector and 107 are construction firms. It is interesting to note that most investors in Sub-Saharan Africa can be classified as stand-alone investors (693). MNEs subsidiaries are 461 while 274 firms are part of a family or group of companies.

Table A2.1 in the Appendix reports that the number of firms from northern and southern countries is quite balanced (688 vs. 740). The average employment of foreign workers is the highest in Uganda, Mozambique and Tanzania with, 17.7%, 12.4% and 12.3% of the whole firms' workforce, respectively. South-South investors are defined as those investors belonging to a less developed or a developing source/origin country²⁴. The relatively large share of South-South investors represents an interesting peculiarity of the recent flows of FDI in the African continent and, more generally a new feature of the global geography of investment flows, which allows researchers to compare different ways of 'doing business' of investors belonging to traditional rich origin countries with those belonging to new emerging markets.

In *Table 2.1* we report some summary statistics of the dependent variable and other characteristics of foreign investors in SSA and distinguish these characteristics ac-

²³ We exclude observations on the following three countries: Cape Verde, Niger and Rwanda.

²⁴ We adopt the World Bank definition and classify a source country as South when GNI per capita is lower than 12,616\$.

ording to the origin area, North versus South respectively. The average share of foreign workers in foreign firms is about 9% of the whole workforce. Interestingly, firms from the South employ more foreign workers than those from the North, 11% and 7%, respectively.²⁵ The average age and size are higher for Northern firms reflecting the recent investment history of the Southern firms in this area of Africa. Southern firms are on average also more oriented to the local market than Northern firms while they create on average less local partnerships with domestic firms, and generally are less embedded in the local environment as reported by Morrissey and Zgovu (2011). The lower presence of Southern MNCs in this area is showed by the lower share of subsidiaries as compared to the northern MNCs (26% vs. 38%). The information and communication technology (ICT henceforth) stock at the affiliates level – a good proxy of the knowledge intensity of firms – is, as expected, almost the double for Northern firms compared to Southern ones; this points to a relevant differences in knowledge content of production.

Table 2.1 Descriptive statistics

VARIABLES	<i>Full sample</i>		<i>North-South (1)</i>		<i>South-South (2)</i>	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
<i>Foreign workers</i>	0.09	0.12	0.07	0.10	0.11	0.13
<i>Age (years)</i>	17.1	16	21.5	18	13	11.4
<i>Size (Nr.empl)</i>	211	646	237	793	187	513
<i>Market intensity</i>	0.82	0.32	0.80	0.33	0.84	0.30
<i>ICT intensity (\$)</i>	5448	64000	7118	81106	3896	36564
<i>Subsidiary</i>	0.32	0.47	0.38	0.48	0.26	0.44
<i>Local partner</i>	0.22	0.41	0.26	0.44	0.19	0.39
<i>Greenfield</i>	0.86	0.34	0.85	0.35	0.87	0.33
<i>Interdependence</i>	0.31	0.46	0.34	0.47	0.29	0.45
<i>Linkages (% input)</i>	20	31	23.8	33.2	18.2	29.5
Observations	1428		688		740	

(1) Foreign investors belonging to developed countries; (2) Foreign investors belonging to other poor or emerging economies

²⁵ Coniglio et al. (2014) investigate the heterogeneous labour market effect of North versus South FDI in Sub-Saharan Africa. In particular their study finds that South investors tend to demand a higher number of workers but generally they tend to be less-skilled intensive and pay lower wages. Chinese investors employ a significant share of expatriates at all skills levels.

2.4 Methodology and variables description

Since the dependent variable is a count with a high proportion of zero values, we use a Negative Binomial model for the estimation. As compared to the Poisson model, the Negative Binomial method allows for the over-dispersion of the variance, i.e. the variance is higher than the mean. Our data imply three cross-section dimensions, the reporting firm n with $n=1, \dots, N$, the investor's origin country i with $i=1, \dots, I$, and the firm's operating country j with $j=1, \dots, J$. We use the mean-dispersion model referred as NB2 (Greene 2012), to estimate the determinants of the employment of foreign workers. The model is specified as follows:

$$Pr(Y = y_{nij}|x_{nij}) = \frac{\Gamma(\theta+y_{nij})}{\Gamma(y_{nij}+1)\Gamma(\theta)} \left(\frac{\lambda_{nij}}{\theta+\lambda_{nij}}\right)^{y_{nij}} \left(1 - \frac{\lambda_{nij}}{\theta+\lambda_{nij}}\right)^\theta \quad (2.1)$$

Our dependent variable is denoted by y_{nij} ²⁶ and represents the number of full time foreign employees, working in the foreign establishment at the time of the interview. x_{nij} denotes a vector of regressors. Γ denotes the Gamma function and θ denotes the dispersion parameter. The unconditional mean of this model is $E(y_{nij}|x_{nij}) = \lambda_{nij}$, and the unconditional variance is $Var(y_{nij}|x_{nij}) = \lambda_{nij} \left(1 + \frac{\lambda_{nij}}{\theta}\right)$ ²⁷. The vector of regressors is:

²⁶ The dependent variable is expressed as y_{nij} to facilitate the notation in the equation. It represents $lnforeign_{nij}$ or $lnforeignHS_{nij}$ depending on the equation.

²⁷ The NB2 model is an extension of the Poisson model to which we add a stochastic term. If we denote our conditional distribution function by $Pr(Y = y_{nij}|x_{nij}, u_{nij})$ and the corresponding conditional mean by $E(Y = y_{nij}|x_{nij}, u_{nij}) = \lambda_{nij} + u_{nij}$, where $u_{nij} = \exp(\varepsilon_{nij})$ and denotes the stochastic part of the function, and ε_{nij} denotes the error term. If $u_{nij} = 0$, then our model consists in a Poisson model. If we assume u_{nij} has a Gamma density function we obtain a NB2 model and we can write the unconditional distribution function as in equation (2.3).

$$x_{nij} = (1, Firm'_{nij}; CountryControls'_{ij}) \quad (2.2)$$

Then, the unconditional mean which we estimate is given by:

$$E(y_{nij}|x_{nij}) = \lambda_{nij} = \exp(\beta_0 + \beta_1 Firm'_{nij} + \beta_2 CountryControls'_{ij}) \quad (2.3)$$

and its log-linear form is :

$$\ln[E(y_{nij}|x_{nij})] = \ln\lambda_{nij} = \beta_0 + \beta_1 Firm'_{nij} + \beta_2 CountryControls'_{ij} \quad (2.4)$$

Finally, the model we test is the following :

$$\ln y_{nij} = \beta_0 + \beta_1 Firm'_{nij} + \beta_2 CountryControls'_{ij} + \varepsilon_{nij} \quad (2.5)$$

The vector of regressors (2.2) is composed by 2 vectors of variables of dimension $1 \times k$. $Firm'_{nij}$ considers the firm's characteristics, including the main variables I test according to the hypothesis of the previous section, and $CountryControls'_{ij}$ is a set of covariates related to the investor's origin country and the operating country of the firm. β_0 is the constant term, β_1 and β_2 are vectors of parameters to be estimated and ε_{nij} the error term. The next paragraphs define the variables composing these vectors while in *Table A2.5* in the Appendix, I summarize variable's definition and relative sources.

2.4.1 Firm level variables

As discussed above, foreign workers play a crucial role in complex knowledge-intensive organization. We measure knowledge intensity at the firm level using the value of ICT assets per employee (*ICT intensity*). We believe that this variable is a suitable proxy of the knowledge-base of firms; the higher the need to store, process and exchange knowledge the higher will be the ICT assets purchased by the firm. We use the lagged values²⁸ in order to avoid the potential simultaneity with our dependent variable. In addition, we use in some estimations an alternative proxy of knowledge intensity; the lagged value of Intellectual Property (IP) assets per employee (*IP intensity*)²⁹.

We expect that high knowledge-intensive firms hire a higher number of foreign employees, in particular skilled ones, in order to effectively store, transfer and manage and further develop knowledge flows with parent and/or associate firms. Contrary to previous literature that measures the firm's knowledge intensity at the headquarters level³⁰ (Delios and Beamish 2001, Belderbos and Heijlties 2005, Chang 1995, Riaz et al. 2014), we use information on firms' knowledge intensity at the foreign productive unit. This measure has the advantage of proxing knowledge intensity precisely at the level of the foreign productive unit rather than the 'potential' knowledge transferring capacity of parent firm at the headquarter's level.

We control for the existence of a strong vertical integration by means of a dummy variable (*Vertical integration*), which takes value of 1 if the firm has an export or import

²⁸ Lagged values are measured as the value of asset at the beginning of the last financial year. Note that when the dependent variable employed in the estimation is the number of foreign highly skilled workers, the issue of endogeneity remains potentially relevant. Skilled workers, including foreign ones, are more likely to be employed by firms to develop and manage the technological content of firms' operations including patents and copyrights assets. Hence, the results in terms of direction of causality of the estimations using the high-skilled variable should be interpreted with the appropriate caution.

²⁹ We use in the baseline specification the variable *ICT intensity versus IP intensity* for two reasons. The first one is related to the higher risk of endogeneity of this variable in particular with respect to the high skilled workers. Secondly, this variable presents a large number of zeros, since investments in SSA countries have, on average, a low IP content.

³⁰ These studies measure knowledge intensity as R&D assets on sales.

relation with parent or associate firms, and 0 otherwise. Local embeddedness is measured by employing two control variables: the *linkages* with local suppliers expressed as the percentage of inputs acquired from local firms (Belderbos et al. 2001; Amendolagine et al. 2013) and a dummy variable equal to 1 if the firm has a local partner, and 0 otherwise (*Local Partner*). Since market orientation might affect the choice of hiring a local or a foreign worker, we introduce as a control variable the share of production sold in the host-country market over total sales (*Host-market Importance*). We expect that firms that are more oriented toward host-country markets would employ a relatively lower number of foreign workers than the export oriented one (Peixoto 2001).

Firm's experience in the destination country is measured by using the number of years since the firm was established in the country, *Age* (Harzing 2001, Gaur et al. 2007, Riaz et al. 2014). We also test for the existence of non linear effects of experience on the employment of foreign workers by using the square of the variable age, *Age squared*. The mode of entry is introduced in the model as a dummy variable (*Greenfield*) with value of 1 if the firm is a greenfield investment, and 0 for privatizations or acquisitions. We also test for the relevance of the ownership structure by using the dummy (*Subsidiary*) which takes the value of 1 if the firm is a subsidiary of a parent firm with the headquarter in another country, and 0 if the firm is owned by an individual investor, family or business group. The model includes the *Size* of the firm measured as the logarithm of the number of full time employees. Finally, all regressions include a set of sectoral dummies variables.

2.4.2 Country level variables

The employment of foreign workers in foreign firms might be strongly affected by the socio-economic environment within which the investments take place but also on the

socio-economic, linguistic and cultural distance between the origin and destination countries.

Clearly, the availability of adequate human capital is a fundamental element of foreign firms choices. This is particularly important for skilled workers (Edstrom and Galbraith 1977, Tung 1982, Torbiorn 1994). In order to control for human capital ‘supply’ in the host country, we introduce a variable (*Human Capital*) from the World Economic Forum (2010), which measures the level of secondary and tertiary education and training level of the workforce in the destination country. We expect this variable to be negatively related with the share of foreign workers – in particular the skilled ones – employed by foreign firms.

Quite often destination country impose artificial administrative and legislative impediments to the transfer and hiring of non-national workers, ‘anti-expatriates barriers’ as asserted by De Smet (2013). Generally, the higher are the visa restrictions the less easy for the foreign workers to enter and work in the destination country. In order to capture these barriers we employ the ‘freedom to visit for the foreigners’ (*Freedom of mobility*), which is measured as the percentage of foreign countries for which the visa is required (Fraser Institute 2010).

Given that our data do not allow us to distinguish expatriates from other categories of foreign workers, we include in our estimates the percentage of immigrants in the population of the host country (*Migrant Stock*). The higher the stock of immigrants the higher will be the share of foreign workers employed by all firms, both domestic and foreign ones.

We consider as a measure of cultural distance a dummy variable equal to 1 if the source and host country have the same official language, and 0 otherwise (*Common language*).³¹ We also include in our estimates a measure of *Corruption* from the Fraser In-

³¹ Several studies show that cultural distance affects the need for firms to use expatriates (Wilkinson et al. 2008; Colakoglu and Caliguri 2008). The assessment of the cultural distance using the GLOBE project method by Dorfman et al. (2009) as in Riaz et.al. (2014) was not feasible due to lack of data on the majority of SSA countries.

stitute (2010) measured as the extent firms make extra payments or bribe public officials in order to receive favoritisms. As a measure of the relative level of development and of average wages we employ the GDP per capita (GDP_{pc}) of the host countries. We expect an ambiguous effect of this variable on the number of foreign workers. On one side a lower GDP per capita signals a weaker endowment of human capital – and hence a higher likelihood of employing expatriates to fulfil vacancies. On the other side, a lower GDP per capital implies lower wages and hence a higher opportunity cost of hiring foreign workers.

We use the institutional quality (*Institutional quality*) of the source country developed by the World Economic Forum (2010). This is a composite index measuring the efficiency and reliability of the public and legal institutions as well as the business standards in terms of property rights protection, regulation and respect of ethical norms. As in Estrin et al. (2009) and Gaur et al. (2007) we introduce in the estimation a measure of institutional quality differences between source and host countries ($\Delta Institutional\ quality$) although, due to lack of data on Sub-Saharan Africa, we are not able to make the distinction between regulative and normative aspects of institutional quality. In addition, we include the GDP per capita difference (ΔGDP_{pc}) as a proxy for differences in average wages. Brookfield (2010) reports that 65% of the firms set the salary of expatriates on the basis of the source-country wages to which an expatriates wage premium is added. We expect that, the higher is the GDP difference, the lower is the usage of foreign workers by the firm.

Following the recent rise of South-South foreign direct investments (UNCTAD 2014), several observers and researchers have started to analyze and discuss the different business practices and behaviors of these new important players compared to traditional investors from rich OECD countries (North-South investors). According to Dixit (2012), South-South investors might have an advantage over North-South investors in poor developing countries like Sub-Saharan African countries due to the higher familiarity of these firms with weak institutional frameworks. For instance, the foreign staffing

decision of South investors might be less affected compared to Northern ones by institutional quality or cultural distance. In our analysis, we test for different behaviors of investors originating from different groups of origin countries by estimating the model separately for North and South foreign investors and by using origin country area dummies (*Europe, China, India, South Africa, SSA, MENA Other Asia, North America, Latin America and Other*).

2.5 Results

Our baseline estimation of the determinants of the demand for foreign workers by foreign firms is reported in *Table 2.2*. Referring to *Hypothesis 1*, our results show that the coefficient of firm's knowledge intensity is significant and positive suggesting that knowledge intensive foreign firms in Sub-Saharan Africa employ more intensively foreign workers. The effect of knowledge intensity is slightly stronger when considering only foreign high-skilled workers, who are most likely to serve as the main vehicles of knowledge transfer across borders (see *Model 2*). In *Model 3-4*, we run separate estimates for Southern and Northern firms in order to control for unobserved characteristics that might affect differently the knowledge transfer attitude of these two groups of firms. The result in *Model 3* shows that the knowledge intensity of Northern firms is associated to a greater usage of foreign high skilled workers, while the effect is positive but not statistically significant for Southern firms (*Model 4*). This result may reflect the fact that the firm-level comparative advantage of North-South investors is generally more rooted in their knowledge capacity compared to South-South investors. As a consequence, Northern firms employ significant quantities of foreign high skill workers and managers in order to transfer knowledge and manage operations abroad. We estimate the same model by using as a proxy for knowledge intensity the Intellectual Property intensity measure at the firm level (*Model 5*). The results are in line with what we found for the *ICT intensity* variable.

It is worthwhile noting that South-South foreign firms use, on average, more foreign workers than northern firms even after controlling for a large set of covariates (the dummy *South* is positive and significant). With respect to the source countries of the investors, results show that investors from Asian countries (China, India and Other Asia) and SSA countries use more foreign workers as compared to European firms³² (*Model 6*). This finding is in line with recent studies that have documented that FDI from China and India use extensively foreign workers, both skilled and unskilled, in their investments in SSA countries (Morrissey and Zgouva 2011). With respect to foreign investors originating from other SSA countries, the extensive use of foreign workers may depend on countries cultural and geographical proximity. The short distance between origin and destination countries, or even sharing the border in some cases, may significantly reduce the costs for firms to deploy expatriates workers. Firms coming from developing countries seem to contribute relatively less in creating employment opportunities for native workers, in particular at high-skill levels, compared to firms coming from the developed countries.

Table 2.2 Determinants of demand for foreign workers

VARIABLES	(1) Model	(2) Model High-skill	(3) Model North-South	(4) Model South-South	(5) Model	(6) Model
Age	-0.0138** (0.00447)	-0.00704 (0.00458)	-0.0118* (0.00591)	0.00133 (0.00918)	-0.0130** (0.00452)	-0.0135** (0.00440)
Age squared	0.000123* (5.78e-05)	7.32e-05 (5.75e-05)	0.000134+ (7.13e-05)	-0.000313+ (0.000167)	0.000113+ (5.86e-05)	0.000125* (5.64e-05)
Size	0.651** (0.0233)	0.584** (0.0252)	0.624** (0.0356)	0.663** (0.0305)	0.645** (0.0234)	0.659** (0.0232)
Greenfield	0.255** (0.0788)	0.157+ (0.0845)	0.111 (0.120)	0.372** (0.107)	0.259** (0.0785)	0.248** (0.0778)
Host- market importance	-0.116 (0.154)	-0.417* (0.164)	-0.109 (0.234)	-0.120 (0.210)	-0.0963 (0.155)	-0.121 (0.153)
ICT Intensity	0.0266** (0.00865)	0.0298** (0.00957)	0.0527** (0.0134)	0.000724 (0.0113)		0.0289** (0.00856)
Subsidiary	0.0488 (0.0613)	0.0128 (0.0651)	0.0145 (0.0941)	0.0349 (0.0816)	0.0376 (0.0613)	0.0445 (0.0614)
Local Partner	-0.231** (0.0665)	-0.120+ (0.0712)	-0.280** (0.0983)	-0.118 (0.0904)	-0.228** (0.0669)	-0.209** (0.0658)
Human Capital	-1.284** (0.105)	-0.935** (0.113)	-1.494** (0.163)	-1.063** (0.140)	-1.217** (0.103)	-1.341** (0.104)
GDPpc	0.153+ (0.0796)	0.245** (0.0871)	0.207+ (0.123)	0.110 (0.105)	0.130 (0.0794)	0.151+ (0.0798)

³² European foreign investors are the reference category in Table 1.

Table 2.2 (continued)

VARIABLES	(1) Model	(2) Model High-skill	(3) Model North-South	(4) Model South-South	(5) Model	(6) Model
Migrant Stock	0.542** (0.0686)	0.524** (0.0754)	0.695** (0.114)	0.434** (0.0865)	0.507** (0.0693)	0.565** (0.0693)
Common language	-0.0707 (0.0575)	0.0336 (0.0614)	0.0664 (0.0856)	-0.227** (0.0776)	-0.0637 (0.0581)	-0.0742 (0.0682)
Freedom of mobility	0.148** (0.0181)	0.124** (0.0197)	0.138** (0.0312)	0.145** (0.0231)	0.146** (0.0183)	0.140** (0.0182)
Institutional quality	-0.890** (0.118)	-0.739** (0.127)	-1.000** (0.181)	-0.849** (0.154)	-0.877** (0.117)	-0.858** (0.117)
China						0.596** (0.119)
India						0.351** (0.0883)
South Africa						-0.133 (0.106)
SSA						0.211* (0.0867)
MENA						-0.137 (0.117)
Other Asia						0.443** (0.143)
North America						0.286* (0.127)
Latin America						0.0524 (0.511)
Other						0.0768 (0.344)
South	0.196** (0.0584)	0.1530* (0.0628)			0.192** (0.0587)	
IP intensity					0.0347** (0.00963)	
Sector dummies	YES	YES	YES	YES	YES	YES
Constant	2.988** (0.576)	0.815 (0.616)	3.401** (0.883)	3.085** (0.762)	3.012** (0.581)	2.954** (0.576)
lnalpha	-0.363** (0.0492)	-0.365** (0.0598)	-0.256** (0.0721)	-0.588** (0.0699)	-0.377** (0.0499)	-0.410** (0.0499)
Observations	1,428	1421	688	740	1400	1428

Dependent variable: Number of foreign workers in the firm and foreign high skill workers. Standard errors in parentheses.
 ** p<0.01, * p<0.05, + p<0.1

Referring to the *Hypothesis 2*, *Table 2.3* reports the result of estimations including variables capturing the foreign firm's local embeddedness and their degree of vertical integration. In line with what predicted, the higher is the share of inputs acquired from local suppliers the lower is the share of foreign workers. In particular in the context of developing countries, it is likely that inter-organizational interaction with local firms are more effectively managed by local staff which have higher communication skills and a

better knowledge of their institutional, economic and social environment. Hence, the result suggests that foreign firms creating local linkages also have a direct positive impact on the employment of domestic workers³³.

We do not find significant differences between firms having import-export relations with parent or associate firms and those who do not. The dummy for vertically integrated firms shows a positive but not statistically significant effect. As predicted, we find that foreign firms having a local partner, which share by definition the firm ownership, employ a lower share of foreign workers as compared to local workers.

We do not find robust evidence on a higher propensity of foreign firms that are more oriented toward the host-country market to use local workers. However, if we restrict the analysis to the number of foreign high-skilled workers, the coefficient measuring the host market importance turns negative and significant at the 5% level (*Table 2.3, Model 5*). Hence, this result indicates that activities asking a good knowledge of the local environment such as adaptation and commercialization of products are more likely to be carried out in firms which use a higher share of local skilled workers. This result supports the assumption that local human capital is an efficient choice for firms seeking to adapt their goods and services to local customer needs and tastes. An important corollary of the result is that as Africa becomes over time a growingly important final-consumer market, we should also expect a greater demand by foreign firms of highly skilled local workers. This trend might, in turn, represent a big booster for human capital investments in these countries.

³³ For a study on the determinants of local sourcing by foreign firms in Sub-Saharan Africa see Amendolagine et al. (2013).

Table 2.3 Determinants of demand for foreign workers

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	Model(5) High skill
Age	-0.0153** (0.00469)	-0.0151** (0.00471)	-0.0151** (0.00467)	0.0182 (0.0156)	0.0223 (0.0164)
Age squared	0.000145* (5.78e-05)	0.000139* (5.83e-05)	0.000142* (5.76e-05)	-0.000353 (0.000248)	-0.000431+ (0.000259)
Size	0.623** (0.0269)	0.626** (0.0269)	0.620** (0.0269)	0.659** (0.0231)	0.587** (0.0248)
Greenfield	0.236** (0.0854)	0.233** (0.0855)	0.233** (0.0854)	0.560** (0.168)	0.383* (0.179)
Host- market importance	-0.217 (0.163)	-0.221 (0.164)	-0.202 (0.164)	-0.116 (0.153)	-0.417* (0.163)
ICT Intensity	0.0389** (0.00970)	0.0390** (0.00967)	0.0384** (0.00969)	0.0278** (0.00855)	0.0318** (0.00944)
Subsidiary	0.0124 (0.0696)	-0.0139 (0.0784)	-0.0203 (0.0788)	0.0387 (0.0614)	0.00963 (0.0652)
Local Partner	-0.190** (0.0718)	-0.206** (0.0714)	-0.193** (0.0717)	-0.211** (0.0657)	-0.102 (0.0704)
Human Capital	-1.321** (0.117)	-1.371** (0.115)	-1.318** (0.117)	-1.318** (0.105)	-0.949** (0.112)
GDPpc	0.161+ (0.0874)	0.172* (0.0871)	0.161+ (0.0875)	0.140+ (0.0799)	0.212* (0.0872)
Migrant Stock	0.476** (0.0759)	0.479** (0.0756)	0.473** (0.0758)	0.562** (0.0693)	0.538** (0.0753)
Common language	-0.00874 (0.0779)	-0.0296 (0.0774)	-0.00913 (0.0779)	-0.0780 (0.0683)	0.0276 (0.0733)
Freedom of mobility	0.123** (0.0201)	0.124** (0.0201)	0.122** (0.0201)	0.141** (0.0182)	0.115** (0.0197)
Institutions quality	-0.767** (0.129)	-0.745** (0.129)	-0.762** (0.130)	-0.863** (0.117)	-0.682** (0.126)
Linkages	-0.00258* (0.00105)		-0.00247* (0.00105)		
Vertical Integration		0.0738 (0.0732)	0.0640 (0.0734)		
Age*Green				-0.0344* (0.0161)	-0.0311+ (0.0169)
Age2*Green				0.000509* (0.000255)	0.000536* (0.000265)
Sector dummies	YES	YES	YES	YES	YES
Origin dummies	YES	YES	YES	YES	YES
Constant	2.919** (0.645)	2.815** (0.643)	2.894** (0.645)	2.716** (0.586)	0.617 (0.630)
lnalpha	-0.474** (0.0575)	-0.470** (0.0572)	-0.477** (0.0575)	-0.415** (0.0500)	-0.433** (0.0614)
Observations	1,110	1,113	1,109	1,428	1,421

Dependent variable: Number of foreign workers and foreign high skill workers in the firm.

Standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1

We find strong support for *Hypothesis 3a* – related to time since the start of operations in the host country – in most of the specifications which consider as dependent variable the whole foreign workforce within the firm. However, the age of the firm seems not significantly when we restrict the analysis to the use of foreign high skilled

workers. One possible explanation for the latter finding might be related to the difficulties to substitute high skilled expatriates with local skilled employees due to a scarce endowment of suitable human sources in the host country. Overall the results suggest the existence of a significative degree of substitution over time of foreign workers having less specific competences with host country nationals.

The findings reported in *Table 2.3, Model 4* confirm our *Hypothesis 3b*. Greenfield investments employ, on average, more foreign workers as compared to brownfield investments. In line with the above-specified hypothesis, the higher initial staffing with foreign workers is absorbed over time as the coefficient of the interaction between *age* and *Greenfield* is negative and significant.³⁴ The result is very similar when we only consider as our dependent variable the number of foreign high skilled workers, though the effect is statistically weaker³⁵ (*Model 5*). As concluded above, the result on skilled workers may depend on the more limited availability of adequate human resources in the host country.

Interestingly, our estimates show no significative differences between subsidiaries of MNEs and individual investors in their employment of foreign workers in SSA. One possible reason for this result is related to the fact that also these foreign investors seems to rely heavily on external knowledge flows. In *Table A2.2* in the Appendix we report the share of foreign investors according to the relative self-declared importance associated to the possibility to access to external technological assistance and know-how transfer from other related companies. These knowledge transfers are, as expected, highly important for most of the subsidiary of MNEs in our sample, but we find that such knowledge flows are equally important to foreign investors belonging to business/family groups.³⁶

³⁴ We find evidence of a non-linear effect of the interaction term; the speed of convergence to the staffing practices of brownfield investors is initially faster and then declines.

³⁵ The p-value of the interaction is close to the 5% significance level (- 0.067).

³⁶ Data on external assistance and external knowledge transfers is self-reported by the firm. The question of the survey for the subsidiaries is the following: "How important is the assistance of the parent company in the following area: technology and know-how transfer?" The question of the survey for the individual investors is the following: "If

In the last step of our analysis we investigate the effect of some macro variables that might constrain/affect firms' decision over the strategic use of expatriates (*Table 2.4*). The quality and availability of human capital in the host country is negatively associated with the use of foreign workers by foreign firms. The effect of the lagged migration stock variable is positive and significant suggesting, as expected, that the pool of immigrants already residing in the destination country affects staffing decisions of foreign expatriates.³⁷

Table 2.4 Determinants of demand for foreign workers

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model
Age	-0.0170** (0.00440)	-0.0133** (0.00439)	-0.0128** (0.00450)	-0.0114* (0.00453)
Age squared	0.000143* (5.82e-05)	0.000112+ (5.78e-05)	0.000118* (5.78e-05)	0.000104+ (5.87e-05)
Size	0.652** (0.0234)	0.654** (0.0237)	0.655** (0.0237)	0.653** (0.0242)
Greenfield	0.271** (0.0789)	0.296** (0.0801)	0.248** (0.0809)	0.279** (0.0825)
Host- market importance	-0.0705 (0.154)	-0.0895 (0.157)	-0.114 (0.158)	-0.111 (0.165)
ICT Intensity	0.0241** (0.00865)	0.0215* (0.00877)	0.0321** (0.00891)	0.0299** (0.00910)
Subsidiary	0.0354 (0.0613)	-0.00883 (0.0622)	0.0707 (0.0622)	-0.00571 (0.0638)
Local Partner	-0.235** (0.0666)	-0.265** (0.0675)	-0.268** (0.0681)	-0.279** (0.0701)
Human Capital	-1.321** (0.105)	-1.175** (0.104)	-1.284** (0.107)	-1.067** (0.104)
GDPpc	0.180* (0.0793)	-0.0175 (0.0759)	0.148+ (0.0826)	-0.0425 (0.0814)
Migrant Stock	0.541** (0.0687)	0.454** (0.0687)	0.581** (0.0718)	0.421** (0.0729)
Common language	-0.0652 (0.0578)	-0.0618 (0.0589)	-0.0964 (0.0588)	-0.0520 (0.0609)
Freedom of mobility	0.161** (0.0178)	0.116** (0.0177)	0.143** (0.0186)	0.118** (0.0187)
Institutional quality	-0.912** (0.118)		-0.841** (0.119)	
Corruption		-0.217** (0.0472)		
Δ GDPpc			-0.0928** (0.0207)	

the owner has other ongoing operations as a part of a family or business group/trust, how important is the assistance to this company of other associate companies in the business group in the following area: technology and know-how transfer?" The degree of assistance is reported in *Table A2.2* in the appendix.

³⁷ Note that the stock of immigrants as a percentage of native population is rather low in all Sub-Saharan African countries. In year 2005 the percentage of foreigners ranges from 0.19 in Madagascar to 2.17 in Ghana. As mentioned before, immigrants in SSA countries are mainly low skilled workers coming from neighboring countries.

Table 2.4 (continued)

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model
ΔInstitutional quality				-0.0435 (0.0389)
Sector dummies	YES	YES	YES	YES
Constant	3.045** (0.578)	1.843** (0.547)	3.119** (0.596)	1.067* (0.534)
lnalpha	-0.353** (0.0491)	-0.315** (0.0485)	-0.378** (0.0506)	-0.320** (0.0498)
Observations	1,428	1,428	1,365	1,328

Dependent variable: Number of foreign workers in the firm. Standard errors in parentheses

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

We find evidence of an important role played by visa and immigration restrictions – as measured by our variable *Freedom of mobility*. Higher barriers to entry and costly bureaucratic practices for foreigners, hamper the use of expatriates by foreign firms.

Table 2.5 Determinants of demand for foreign workers. The impact of wage differential

VARIABLES	(1) Model North-South	(2) Model South-South	(3) Model North-South	(4) Model South-South	(5) Model North-South High skill	(6) Model South-South High skill
Age	-0.0107+ (0.00594)	0.00256 (0.00939)	-0.00900 (0.00605)	0.00841 (0.0103)	-0.00535 (0.00629)	0.00538 (0.0104)
Age2	0.000127+ (7.22e-05)	-0.000350* (0.000170)	0.000114 (7.28e-05)	-0.000404* (0.000193)	7.36e-05 (7.29e-05)	-0.000216 (0.000188)
Size	0.630** (0.0358)	0.676** (0.0306)	0.647** (0.0366)	0.675** (0.0318)	0.556** (0.0402)	0.613** (0.0319)
Greenfield	0.0913 (0.120)	0.353** (0.109)	0.150 (0.122)	0.414** (0.114)	0.0379 (0.136)	0.288* (0.113)
Host-market importance	-0.107 (0.234)	-0.129 (0.211)	-0.168 (0.241)	-0.274 (0.227)	-0.576* (0.254)	-0.158 (0.227)
ICT Intensity	0.0474** (0.0130)	0.00766 (0.0114)	0.0517** (0.0134)	0.0164 (0.0123)	0.0343* (0.0148)	0.0361** (0.0125)
MNEs Subsidiary	0.0209 (0.0947)	0.0676 (0.0808)	-0.0151 (0.0987)	0.0358 (0.0856)	0.0806 (0.104)	-0.109 (0.0842)
Local Partner	-0.278** (0.0986)	-0.185* (0.0937)	-0.258* (0.101)	-0.241* (0.0974)	-0.138 (0.109)	-0.193+ (0.100)
Human capital	-1.325** (0.130)	-1.024** (0.114)	-1.204** (0.131)	-0.998** (0.118)	-0.906** (0.146)	-0.621** (0.119)
Migrant Stock	0.722** (0.114)	0.457** (0.0925)	0.502** (0.115)	0.480** (0.106)	0.712** (0.128)	0.399** (0.106)
Common language	0.0641 (0.0859)	-0.429** (0.0854)	0.0697 (0.0878)	-0.397** (0.0895)	0.0809 (0.0973)	-0.186* (0.0889)
Freedom of mobility	0.121** (0.0290)	0.127** (0.0237)	0.0969** (0.0305)	0.0886** (0.0249)	0.0776* (0.0323)	0.0771** (0.0259)
Institutional Quality	-0.918** (0.175)	-0.635** (0.148)			-0.793** (0.201)	-0.256 (0.156)
Human capital (origin country)					-0.0704 (0.152)	0.291** (0.0943)

Table 2.5 (continued)

VARIABLES	(1) Model North-South	(2) Model South-South	(3) Model North-South	(4) Model South-South	(5) Model North-South High skill	(6) Model South-South High skill
Δ GDPpc	-0.107 (0.157)	-0.314** (0.0574)	-0.341+ (0.204)	-0.412** (0.0752)	-0.00823 (0.235)	-0.345** (0.0653)
Institutional quality (origin country)			0.0562 (0.0919)	0.149 (0.0977)		
lnalpha	(0.908) -0.250** (0.0720)	(0.696) -0.681** (0.0748)	(0.688) -0.214** (0.0710)	(0.556) -0.666** (0.0770)	(1.071) -0.160+ (0.0845)	(0.812) -0.939** (0.104)
Observations	686	679	674	608	670	606

Dependent variable: Number of foreign workers in the firm. Standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1

Interestingly, countries with a higher level of corruption – i.e. with a lower value of variable *Corruption* in our analysis – attract also a higher number of foreign workers. A more general measure of institutional efficiency (*Institutional quality*) gives the same results. This finding suggests that foreign workers are used extensively by foreign firms investing in countries with relatively higher corruption and institutional dysfunctions. A lower quality of institutional quality and a higher intensity of corruption might induce firms to use a larger share of foreign workers in order to maintain an adequate level of control, monitoring and coordination of the productive unit with the parent company.

In *Table 2.4, Model 3*, we investigate the effect of GDP per capita differences between source and host countries on the use of foreign workers. This variable is a proxy for differences in average wages between the two countries. The result shows that the larger is the GDP per capita difference the lower the usage of foreign workers by foreign firms. The finding confirms the importance of the cost of expatriates in terms of wages – mostly paid as a premium over wages prevailing in the origin country. When the wage gap is high foreign firms find more profitable employing a domestic worker instead of transferring a foreign worker.

In *Table 2.5*, we estimate separately our model on the determinants of foreign workers for North-South and South-South investors. Interestingly firms originating from developing source countries are more sensitive to wage differentials. The results show that

ΔGDP_{pc} coefficient is negative and significant only for firms coming from Southern countries. This finding reveals that these firms are able/willing to substitute more easily foreign and local workers compared to Northern investors for which foreign staffing practices are less elastic to the relative costs of expatriates. North-South investors generally are more likely to possess specific characteristics that explain – as the positive and significant coefficient on the variable *ICT intensity* suggest – their higher rigidity to substitute foreign workers with local human resources. However, note that ΔGDP_{pc} might also capture unobserved country effects – related to their level of development – other than wage differential that are related to the use of foreign workers. In addition we consider in our estimations measures of *Institutional quality* and *Human capital* endowment of the source country. These controls do not seem to be statistically related to our dependent variable(s) – with the partial exception of *Model 6* in *Table 2.5* where we find that a higher endowment of human capital in the source country of the Southern investors is positively associated with the number of high-skilled expatriates employed. More importantly, the results of GDP per capita differential remain robust to the inclusion of these variables, increasing our confidence on the accuracy of this proxy.

2.6 Conclusion

The role of expatriates in international business has been widely acknowledged and investigated in management research (Galbraith and Edstrom 1976, 1977, 1994; Kobrin 1988; Hebert et al. 2005) in the past decades but surprisingly few papers have attempted to empirically investigate the specific factors that affect the demand of foreign workers in foreign operations. Even less research effort has been devoted to uncovering these issues in the context of developing countries. In this paper we investigate the determinants of foreign workers using data on 1428 foreign investors from a large sample of both developed and developing economies in 16 Sub-Saharan African countries

(UNIDO 2012). To our knowledge this is the first study on expatriates in Africa, a continent that is attracting a large inflow of investments both from rich OECD countries and from ‘Southern’ investors sourcing from emerging and developing economies.

Our study confirms the importance of expatriates as gatekeepers of knowledge within complex international operations even in the context of developing countries . The use of foreign workers is particularly high in Greenfield investments but these effects tend to be absorbed over time. In line with the important role of foreign workers in control and monitoring we find evidence that a larger degree of ‘local linkages’ with the host country economy and a higher orientation toward the host country market is typically associated with a reduced deployment of foreign workers at all skills level.

Interestingly, we find evidence of a fundamental importance of host country characteristics, in particular foreign firms tend to employ a large number of expatriates when the Institutional quality of the host country is low and when corruption is highly pervasive. This last finding lends support to policy effort by policymakers in host countries to improve business conditions in order to maximise the potential benefits deriving from foreign investments inflows.

Our paper is, to our knowledge, the first one which shed lights on a rather different behaviour in the context of developing countries between investors originating from rich countries – here defined as North-South investors – and those originating from emerging countries (such India and China) or other developing economies – or South-South investors. In this respect we find that on average, and even controlling for a large set of firms’ specific characteristics, investors from other developing countries employ a larger share of foreign workers at all skills levels compared to rich countries investors. The number of expatriates for the latter investors (more) strongly depends on knowledge intensity of the local productive unit but it is also more sensitive with Institutional quality, corruption levels and human capital endowments of the host country (Dixit 2012). On the contrary, staffing strategies with respect to foreign workers are less ‘price-sensitive’ for Northern investors; in fact, we find that higher wage differentials between source and

host countries are negatively associated with the number of foreign workers only for South-South investors which seems more able or willing to substitute expatriates with host country nationals has the wage gap increases.

Given the growing importance in the global geography of international investments of firms from emerging and developing markets these findings brings new insights on their strategic behaviour which calls for further – and more in depth analysis. A task that is left to future research.

APPENDIX 2

Table A2.1 Foreign firms by country of destination

COUNTRIES	Nr. firms	Southern Firms	Northern Firms	Foreign workers Share (%)
<i>Burundi</i>	12	2	10	7.5
<i>Burkina Faso</i>	3	1	2	9.4
<i>Cameroon</i>	88	15	73	5.27
<i>Ethiopia</i>	90	41	49	7.1
<i>Ghana</i>	118	67	51	8.78
<i>Kenya</i>	224	90	134	3.9
<i>Lesotho</i>	40	38	2	4.6
<i>Madagascar</i>	855	34	51	2.1
<i>Mali</i>	60	31	29	8.6
<i>Mozambique</i>	101	45	56	12.4
<i>Malawi</i>	19	11	8	5.7
<i>Nigeria</i>	65	37	28	5.7
<i>Senegal</i>	48	10	38	4.9
<i>Tanzania</i>	95	62	33	12.3
<i>Uganda</i>	313	217	96	17.7
<i>Zambia</i>	67	39	28	7.38
Total	1428	740	688	100

Source: UNIDO (2012)

Table A2.2 Foreign firms: knowledge transfer and technological assistance from parent/headquarters or associated firm.

<i>Knowledge transfer intensity</i>	Subsidiaries % total firms	Individual investors % total firms
Not received	3.7	27.2
Not important	3.3	7
Slightly important	5.4	7
Important	24.3	24.8
Very important	35.6	24.7
Crucial	27.6	8.9
Total number of firms	424	684

Source: UNIDO (2012)

Table A2.3. Correlation matrix. Firm variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
<i>ICT intensity</i>	(1)	1									
<i>IP intensity</i>	(2)	.27	1								
<i>Age</i>	(3)	.11	.16	1							
<i>Vertical Integration</i>	(4)	.048	.078	.11	1						
<i>Linkages</i>	(5)	.016	-.046	.11	-.084	1					
<i>LocalPartner</i>	(6)	.034	-.033	.09	-.047	.15	1				
<i>Host-Market importance</i>	(7)	.094	.032	.044	-.189	-.045	.084	1			
<i>Greenfield</i>	(8)	.01	.016	.035	-.07	.01	-.031	.024	1		
<i>Subsidiary</i>	(9)	.087	.14	.12	.51	-.123	-.132	-.143	-.119	1	
<i>Size</i>	(10)	.12	.14	.28	.17	-.123	-.132	-.141	-.142	.216	1

Source: UNIDO (2012)

Table A2.4 Correlation matrix. Country variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
<i>GDPpc</i>	(1)	1								
<i>Migrant Stock</i>	(2)	.172	1							
<i>Common language</i>	(3)	-.048	-.04	1						
<i>Freedom of Mobility</i>	(4)	.038	.30	.136	1					
<i>Corruption</i>	(5)	-.016	.08	-.16	-.085	1				
<i>Institutional quality</i>	(6)	.0139	.28	-.086	.27	.69	1			
<i>Institutional (origin country)</i>	(7)	.137	.005	-.091	-.033	-.04	-.023	1		
<i>ΔGDPpc</i>	(8)	.154	-.04	-.167	-.21	.033	-.02	.72	1	
<i>ΔInstitutional quality</i>	(9)	.081	-.093	-.054	-.126	-.279	-.37	.93	.68	1

Source: UNIDO (2012)

Table A2.5 Variables employed in the empirical analysis

<i>Variables</i>	<i>Definition</i>			<i>Source</i>
<i>Dependent variables</i>				
$\ln Foreign_{nij}$	Logarithm of number of foreign workers			African Investment Survey (AIS 2010)
$\ln ForeignHS_{nij}$	Logarithm of number of high skill foreign workers			- -
		<i>Mean</i>	<i>SD</i>	
<i>Firm-level covariates</i>				
<i>ICT Intensity</i>	ICT assets per employee (one-year -lagged).	5,448\$	64,000\$	- -
<i>IP Intensity</i>	Intellectual property per employee (patents, software, copyrights) one-year -lagged.	1,029\$	17,307\$	- -
<i>Age</i>	Number of years since creation.	17.1	16	- -
<i>Age squared</i>	<i>Age</i> squared.	543	1177	- -
<i>Vertical Integration</i>	Dummy=1 if the firm has import - export exchanges with the parent firm, 0 otherwise.	31%	46%	- -
<i>Linkages</i>	% of inputs acquired from local firms.	20%	31%	- -
<i>Local Partner</i>	Dummy=1 if the firm has a local partner, 0 otherwise.	22%	41%	- -
<i>Host-market Importance</i>	Production sold domestically to total sales.	82%	32%	- -
<i>Greenfield</i>	Dummy=1 if the firm is a greenfield investment, 0 otherwise.	86%	34%	- -
<i>Subsidiary</i>	Dummy=1 if the firm is a subsidiary of a MNC, 0 otherwise.	32%	47%	- -
<i>Size</i>	Logarithm of the number of full time employees.	4.21	1.34	- -
<i>South</i>	Dummy=1 if the firm comes from the southern region, 0 otherwise.	52%	50%	- -
<i>Sector</i>	Sector dummy (19 sectors with reference agriculture and fishery).			- -
<i>Macro-level covariates</i>				
<i>Human Capital</i>	(<i>5th pillar</i>): level of higher education and training, in 2009. Composite indicator assessed using: (a) Secondary enrolment, (b) Tertiary enrolment, (c) Quality of educational system, (d) internet access in schools. The index ranges from 1 to 7.	2.97	0.37	Global Competitiveness Report (2009-2010)
<i>Institutional quality</i>	Composite index of efficiency of the public and legal institutions (<i>1st pillar</i>) in destination countries. Better institutions have higher index. The index ranges from 1 to 7.	3.47	0.27	- -
<i>Institutions quality (origin countries)</i>	<i>Institutional quality</i> in origin countries. (1 to 7).	4.55	0.72	- -
<i>ΔInstitutional quality</i>	Difference in institution index between origin and destination	1.08	0.78	- -
<i>Human Capital (origin countries)</i>	<i>Human Capital</i> level in origin countries. (1 to 7).	4.59	0.77	- -
<i>Freedom of mobility</i>	Index based on % of countries with no visa restrictions. See method by Lawson and Lemke (2012). Ranges 0 to 10.	2.5	1.78	Economic Freedom of the World (2009)

Table A5 (continued)				
<i>Corruption</i>	Extra payments/bribes/favouritism: based on the Global Competitiveness Report question: "In your industry, how commonly would you estimate that firms make undocumented extra payments or bribes. Countries with a higher corruption degree are given lower rates. The index ranges from 0 to 10.	3.48	0.66	-\\-
<i>Migrant Stock</i>	% of immigrants on the total population in the destination country in 2005.	1.05	0.46	World Development Indicators (WB)
<i>GDPpc</i>	Logarithm of GDP per capita in 2009	7.42	0.43	-\\-
<i>ΔGDPpc</i>	Difference between GDPpc between origin and destination Country 2009 (in logarithm).	2.38	1.43	-\\-
<i>Common language</i>	Dummy=1 if origin and destination country share the same official language, 0 otherwise.	63%	48%	CEPII

3. Is there complementarity between FDI and migration of skilled workers? A firm-level analysis.

3.1 Introduction

Increasing global interaction between developed and developing economies has spurred a large number of studies on the links between international factor flows. In particular, many studies have investigated the complementarity/substitutability between incoming FDI from developed to developing countries and outgoing migration flows in the reverse direction. Yet, FDI toward southern countries do also generate inflows of foreign skilled workers, a potentially crucial ingredient for future economic performance. In 2010, North–South migration represented 3% of international migration³⁸; about 7 million of people from developed countries were living in developing countries (Laczko and Brian 2013). Although they represent a marginal part of international migration, these migrants are mainly skilled workers and play a key role in the economic and business development of their host country.

To the best of our knowledge, only one theoretical paper shows that FDI can flow toward developing economies along with skilled workers. Jayet and Marchal (2015) show that when capital flows from northern to southern countries in search of a higher remuneration, it generates north-south skilled migration when the recipient country of the investment lacks skilled labour. Thus, capital flows and skilled migration may be complements.

³⁸ North-South migration represented 3% of international migration in 2010, following the definition of the North and the South given by the World Bank, which classify countries according to their income level (GNI/capita)

The mechanism underlying this relation of complementarity is twofold. First, capital intensive companies implement technologies making use of capital and both unskilled and skilled labour. Therefore, when foreign enterprises establish in a country which lacks skilled labour, they strengthen the demand for skilled workers on the local labour market. The increase in demand may cause the return of skilled migrants from abroad or attract young professionals from developed countries in search of new opportunities (Laczko and Brian 2013). This mechanism has the premises to explain the context of our study quite well. UNCTAD (2014) reports that, in 2013, FDI toward the African continent rose by 4% over the previous year, reaching 57 billion \$. This trend is expected to generate an additional demand for skilled workers by foreign investors. In addition, the SSA countries have a low level of skills endowment due to limited educational opportunities and a very high emigration rate of skilled workers (Ratha et al. 2011). Second, as analyzed in the previous paper, foreign firms, especially MNEs, use skilled worker transfers to control and coordinate the headquarter operations with the subsidiary operations and ensure tacit knowledge transfers. Thus, MNEs may generate skilled worker transfers using the intra-firm channel. Finally, it is worth noting that the migration of skilled workers toward SSA countries can be caused, under some circumstances, by a combination of both mechanisms. Firms may address specific needs by using expatriates and, at the same time, demand foreign qualified staff that is not available locally.

In the present study, we aim to better understand the complementarity between capital flows and skilled labour flows. To this end, we empirically investigate the determinants of the employment of foreign skilled workers by firms operating in less developed countries where skilled workers are likely to be a scarce resource. We use firm-level data collected through the Africa Investor Survey 2010 of the United Nations Industrial Development Organization (UNIDO 2012), across 19 Sub-Saharan African countries. This database presents a set of domestic and foreign firms. We find support for complementarity between FDI and skilled migration toward SSA countries. It im-

plies that foreign firms increase the flow of human capital toward the investment destination countries by attracting foreign skilled workers. Our results also indicate that the lack of skilled labour in the destination country induce firms to employ more foreign workers. We find that, over time, foreign firms tend to favour native over foreign skilled workers, in countries more abundant with skilled labour. This result suggests that a replacement of foreigners by natives takes place only when foreign firms find the appropriate skills on the local labour market. In addition, firms aiming to serve the export market, demand less native skilled workers. It suggests that export-oriented firms use foreign qualified staff who have a better knowledge of international markets as compared to native staff. We also find a lower usage of foreign skilled workers by foreign firms engaged in joint-venture partnerships with local firms, as compared to majority owned foreign firms. This result suggests that partner firms share the right to appoint their own key personnel in high managerial and control positions. Though, in joint-ventures, foreign firms have less discretion to appoint their own staff in top positions. Finally, destination country characteristics can determine the easiness and willingness of foreign workers to migrate toward less developed countries. In particular, we find that an efficient working regulation and a loosen immigration policy regime have a positive effect on foreign skilled worker transfers.

The contribution to the literature of this paper is twofold. Firstly, we provide evidence on the determinants of skilled migration toward less developed countries, contrarily to the bulk of existing literature which has focused on the opposite south-north direction. Secondly, we shed light on the complementarity between FDI and migration using a firm-level analysis in an area of the world, SSA countries, on which only few contributions exist. Our firm-level approach is quite unique in the literature and allows us to exploit the high degree of heterogeneity of firm's employment decisions.

The rest of the paper is organized as follows. In *section 3.2*, we present the model of Jayet and Marchal (2015) which is also the theoretical background of this paper. In *section 3.3* we present the data and some descriptive statistics. In *section 3.4* we present our

econometric model and the variables of interest. In *sections 3.5* and *3.6* we present our main results and some robustness checks. *Section 3.7* concludes.

3.2 Theoretical background

The main purpose of this section is to review the relevant literature on the migration–FDI nexus. In particular, it discusses the main theoretical and empirical contributions that focus on the complementarity between FDI and skilled workers migration. Finally, we present a short outline of Jayet and Marchal (2015) which represent the main theoretical foundation of the present empirical exercise.

3.2.1 Theory and empirics

The literature on the FDI-migration nexus has been growing in the last years, although the number of contributions is still relatively limited. Most of the studies investigate whether these two factors of production are substitutes or complements with one another³⁹.

From a theoretical perspective, the relation between FDI and labour migration is grounded in the standard trade–theoretical framework. In a neoclassical framework à la Heckscher–Ohlin (1919, 1933) the relationship between trade and production factors as well as between international migration and international capital mobility is one of substitutability. According to this model, the factor content of trade pushes toward international factors' (labour and capital) price equalization, neutralizing incentives for factor

³⁹ It is worth to note that in this study, we define substitutability between FDI and migration when these factors, referring to given location, move in the reverse direction with one another.

mobility. However, when trade impediments are present, countries' factor endowment determine differences in the price of factors, inducing factors to flow where they are better remunerated (Mundell 1957). Since labour better remunerated in the country which is abundant in capital, and viceversa, the capital better remunerated in the labour-abundant country, we should observe factors to flow in opposite directions.

Extending the standard trade-theoretical approach, several studies show that MNCs play an active role in determining the substitution between capital and migration. For example, Helpman (1984) and Helpman and Krugman (1985) argue that vertical FDI by MNCs aimed at exploiting the labour cost differential between countries has a positive impact on the wage of unskilled workers at destination, contributing to wages' convergence. Hence, reducing the incentive for labour to cross international borders. In addition, foreign firms will also create jobs at destination, reducing the willingness to move of economic migrants. Indeed, Aroca and Maloney (2005) in their empirical study on Mexico find that substitution between FDI and emigration is caused mainly by the labour market effects, such as employment and wages. Moreover, the availability of unskilled migrants in developed countries may reduce the propensity of firms to offshore their production to low wage countries. Murat and Paba (2004) and Barba Navaretti et al. (2008), focusing on the Italian manufacturing sector, conclude that the cheap labour supplied by immigrants offers an alternative to offshoring. The additional supply of labour by immigrants, pressures downwards the wage of production workers also due to lower reservation wages immigrants have as compared to natives. Clearly, from the firms' perspective, one may consider the substitution between FDI and migration as alternative "ways to match workers and employers located in different countries" (Kugler and Rapoport 2005).

However, evidence suggests that factors flowing in the opposite direction is more an exception than the rule. Indeed, in 2007⁴⁰ the FDI flows toward developing countries

⁴⁰ I preferred to show the pre crisis statistics. In the following years there is a sharper decline of FDI in the developed countries as compared to the developing countries.

account for only 27% of the world total (UNCTAD 2008); as in the past decades, international capital continues to flow from countries where it is relatively scarce to those countries where capital is abundant. At the same time, a large share of migration flows take the South-North corridor. The percentage of immigrants living in developed countries rose from 9% in year 2000, to 11% in 2013 while in the developing world the share remained stable at 2% (UN-DESA and OECD 2013).

On the basis of a crude analysis of international statistics, production factors seems to complement one another and flow in the same direction. The existing theoretical and empirical works identify at least three reasons leading to a complementarity relationship between FDI and migration.

The first one is related to differences in technology across countries, leading to differences in factors productivity. Davis and Weinstein (2002) observe a joint inflow of immigrants (skilled and unskilled) and capital in the U.S. over the last decades⁴¹. They argue that a complementarity relationship between skilled labour migration and capital flows may arise when a productivity advantage exists in a given location. Using a Ricardian framework, they model unskilled workers, skilled workers and capital as a composite factor of production and assume they have an incentive to enter the country with technological superiority. The high productivity in the U.S. ensures higher wages for workers and a more efficient employment of the capital as compared to the origin country of investors.

A second theoretical reason for a complementarity in factors' flows is rooted in the existence of pecuniary externalities. The so-called new economic geography (see Krugman and Venables 1995, 1996) has emphasized the role of agglomeration economies as a centripetal force of attraction of mobile factors of production – both labour and capital. The theoretical prediction of this family of models is one of strong complementarity be-

⁴¹ The joint flow of immigrants and capital is studied by Wilson (2003) for Canada in the period 1899-1911. Using a dynamic general equilibrium model he concludes that that up to 3/4 of the capital inflow could be attributed to the immigrants inflow.

tween capital and labour. Focusing on the effect of ethnic migration networks on perpetuating migration, Gross and Schmitt (2003) find that ethnic employers have an incentive to employ migrants with the same cultural background and language. Similarly, ethnic firms investing in a given country may attract ethnic employees from their country of origin. Moreover, it is reasonable to assume that large migrant communities convey relevant information to both firms (Aubry et al. 2012; Docquier and Lodigiani 2010) and migrants on the business and working possibilities in their place of residence. Therefore, FDI and migration may flow in the same direction since they share the same determinant. Buch et al. (2006) use gravity models to test the relationship between inward migration and FDI using German state-level data. They find evidence that agglomeration effects are at play especially for high income countries (OECD countries), i.e. important FDI stocks are present in federal states where the stock of immigrants from the same origin country of FDI is important. Furthermore, they find evidence of agglomeration effects among foreign factors from different countries of origin. In particular, they confirm that cultural linkages are relevant in shaping the joint movement of factors in specific countries. Similarly, Foad (2012) investigates the relationship between immigrant stocks and the number of foreign affiliates from the same country of origin of immigrants in the fifty U.S. States. The author concludes that immigration leads to FDI and that this effect is stronger for the skilled immigrants.

Third, FDI and migrants may flow in the same direction simply because capital and skilled labour are complements in the production process (Papageorgiou and Chmelarova 2005). Hence, the skill composition of migration is relevant and may be one reason why the standard trade models assuming homogeneous labour do not capture the positive relationship existing between FDI and migration. There is literature suggesting that emigration of skilled workers from a given country has a negative impact on the inflow of knowledge intensive FDI in that country (Baldwin and Venables 1994; Kugler and Rapoport 2007). The outmigration of skilled workers decreases the country's capacity to adopt new technologies and, therefore, to attract technology - based FDI. Baldwin and

Venables (1994) develop a framework where foreign capital is complementary to the skilled workers stock within a country. They argue that interventions aimed at reducing the "brain drain" from Central and Eastern Europe countries (CEEC), may affect positively FDI inflows toward these countries.

At the firm level, complementarity between FDI and migration may be explained by the not perfect substitutability between foreign and native workers and/or by the higher productivity of foreign workers coming from the same country of MNCs (Wang 2014). The assumption of not perfect substitutability between foreign and native workers within a skill group is underlined by (Borjas 2003). With respect to the skilled workers, foreign firms may face difficulties in finding the required skills locally (see Chapter 2 of this thesis). Consequently, these firms use foreign staff to cover qualified positions at destination. More importantly, a certain degree of complementarity is suggested by the expatriation literature which emphasizes that expatriates are endowed with specific skills and cover specific tasks within the firm (Edstrom and Galbraith 1977).

3.2.2 A summary of Jayet and Marchal (2015)'s predictions

The Jayet and Marchal (2015) model is theoretically based on a standard Heckscher–Ohlin framework with heterogeneous labour. The model considers three internationally mobile factors (capital, skilled and unskilled labour) and two tradable goods. There are two countries with differences in factors endowment. The developing economy (South), amply endowed with unskilled labour and poorly endowed with skilled labour; and a developed economy (North) amply endowed with skilled labour and capital, and poorly endowed with unskilled labour. The capital has the incentive to flow South when its remuneration is higher than in the North, i.e. investors ask a risk premium as compared to the alternative of investing in the North. Skilled workers instead

must cover at least the migration costs in order to move South (see Appendix 3.1 for a more detailed presentation of the model).

Shortly, the mechanism explaining the impact of capital flows on high skilled migration between a Northern and a Southern country is the following: when capital flows from the North to the South in search of a higher remuneration, the capital stock of the recipient country (South) increases. This increase in capital, in turn, strengthens the demand for foreign skilled labour. Thus, skilled workers flow from the North to the South, as the investment recipient country lacks skilled workforce. The mechanism suggests a positive correlation between capital and skilled migrants toward a given location. Moreover, referring to the effect of skills endowment, locations better endowed with skilled workforce will experience lower inflows of skilled migrants.

To test these predictions empirically, this study uses a firm-level approach. The predictions of the model have two simple implications at the firm level:

- (i) capital intensive firms should hire more foreign skilled workers, i.e. there is a positive correlation between capital intensity and foreign skilled workers.
- (ii) firms should employ more foreign skilled workers when localized in countries with lower levels of skills endowment.

As compared to an aggregate analysis, the use of disaggregated data at the firm level presents several advantages. Importantly, it allows to exploit the high degree of heterogeneity in firms' characteristics and employment decisions. Moreover, as noted by Kerr et al. (2014), although firms are the ultimate source of employment for labour immigrants their role is left in the shadow and not explicitly considered. Consequently, an analysis using foreign firm-level data is highly informative on the relationship between FDI and labour migration.

The stylized representation of reality that Jayet and Marchal (2015) model offers, is quite close to the situation existing in the countries under investigation. With respect to the principal assumptions of the model, indeed, SSA countries have a much lower capi-

tal endowment and a predominant amount of unskilled workers as compared to the origin countries of foreign investors⁴².

3.3 Data and descriptive statistics

In this study, we use the data of AIS 2010. The data set we use contains 4,298 observations collected in 16 SSA countries⁴³; among them 1,690 are foreign firms. The survey collects information on firms' characteristics such as the value of assets, financial indicators, and the market orientation. It also contains characteristics specific to foreign firms such as the origin country of the investor, the organizational structure, and the market entry modality. This database is suitable for our investigation as it contains detailed information on the number of skilled workers employed within foreign and domestic firms. As in the previous paper, I limited the analysis to those firms the variables of interest where available. In more details, observations having missing values on the dependent variable and baseline variables such as capital intensity, age of the firm, subsidiary, size, sector, mode of entry and export intensity are not considered.

Regarding foreign firms, most of them come from Western European countries (641 firms), countries of east Asia (307 firms, excluding China) and SSA neighbouring countries (235 firms); see *Table A3.1* in Appendix. In this database, investors from the north i.e. high-income countries represent almost 48% of the foreign investors. The most attractive countries for foreign firms are Uganda (105 northern and 242 southern firms), Kenya (156 and 112 respectively) and Ghana (64 and 79 respectively).

⁴² This is true for foreign investors coming from outside Africa, which represent the majority of observations.

⁴³ As in the previous study of this chapter, we exclude Cape Verde, Niger and Rwanda from our analysis, since these countries lack information on skills availability.

Table 3.1 Characteristics of domestic and foreign firms

VARIABLES	Domestic		Foreign	
	Mean	S.D	Mean	S.D
<i>Total assets (millions \$)</i>	4.657	51.1	81.6	2,730
<i>Capital intensity (value fixed assets /employee)</i>	53,976	1,109,776	804,406	30,300,000
<i>Export intensity (exports/sales)</i>	0.06	19.84	0.185	32.51
<i>Age in years</i>	17.3	14.31	17.3	15.92
<i>Size (number of full time employees)</i>	87.8	283	195.8	630
<i>Foreign employees (% full time workforce)</i>	1.43	5.16	9.1	11.02
<i>Foreign low skilled workers</i>	0.31	2.25	2.24	5.69
<i>Foreign medium skilled workers</i>	0.34	1.82	1.67	3.52
<i>Foreign high skilled workers</i>	0.77	2.94	5.02	6.4
<i>For. low skilled workers (% low skilled)</i>	0.6	5.08	4.31	11.61
<i>For. medium skilled workers(% medium skilled)</i>	2.62	10.96	13.48	26.52
<i>For. medium skilled workers (% high skilled)</i>	5.23	17.89	32.45	51.54
<i>Primary sector (%)</i>	3.6	19.15	7.57	26.08
<i>Light manufacturing (%)</i>	31.74	46.2	25.73	44.36
<i>Hard manufacturing (%)</i>	20.93	41.88	27.33	45.28
<i>Construction sector (%)</i>	7.63	26.47	7.45	26.32
<i>Services sector (%)</i>	36.08	46.67	31.89	43.74

Source: UNIDO (2012)

Among the 16 SSA countries of the sample, Kenya and Ghana are the countries with the highest endowment of skilled workers, and medium to high domestic market size (approximated by their populations) and market potential (approximated by the GDP per capita and the GDP growth). Despite no clear difference between these two countries and other SSA countries in terms of labour market regulation, they are the two most attractive SSA countries for foreign investments; see *Table A3.4* in Appendix. *Table 3.1* shows that domestic firms employ in average less foreign workers (1.43% of their total workforce) as compared to foreign firms (9.1%). This is the case for low, medium and high skilled workers. Note that domestic and foreign firms are similar in term of age, while foreign firms are in average larger than domestic ones in term of size measured by the total full-time workforce (respectively 87 and 195 employees). There exist, as expected, huge differences in capital intensity between domestic and foreign firms. The latter have, on average, an asset/employee ratio almost 15 times larger than

domestic firms. Moreover, foreign firms are more export-oriented than domestic firms. Sales of foreign firm in foreign markets, on average, amount to almost 18% of the overall sales, while for domestic firms this share is only 6%. Regarding the sectoral repartition, there is not a big difference between domestic and foreign firms. As compared to domestic firms, foreign firms are more engaged in the primary and hard manufacturing sectors. Domestic firms instead, have higher shares in light manufacturing and service sectors.

3.4 Methodology and variables of interest

Our empirical analysis aims to shed light on the employment of foreign skilled workers by firms established in SSA countries. Hence, as Jayet and Marchal (2015), we assume that foreign skilled workers are likely coming from economies where the stock of high skilled workers is relatively more important than in SSA countries. Regarding foreign firms, especially subsidiaries and joint-ventures, part of their foreign skilled employees may be expatriates coming from the country of their headquarter. This hypothesis is in line with the literature on intra-firm transfers of high skilled workers (Peixoto 2001). Also, skilled workers less likely come from neighbouring African countries. The literature on south-south migration shows that concerned migrants are mainly low skilled workers (Ratha et al. 2011; Shaw 2007).

As in the previous paper, the econometric model used for the analysis is the negative binomial. The formulation of the model is:

$$\begin{aligned} \ln \text{ForeignHS}_{nij} = & \beta_0 + \beta_1 \ln K_{nij} + \beta_2 \text{Human Capital}_j + \beta_3 \text{Firm}'_{nij} \\ & + \beta_4 \text{CountryControls}'_{ij} + \varepsilon_{nij} \end{aligned}$$

where $Firm'_{nij}$ represents a vector of firm's characteristics, and $CountryControls'_{ij}$ is a set of covariates related to the investor's origin country and the operating country of the firm. β_0 is the constant term, β_1, β_2 are the coefficients of the explanatory variable and skills variable, respectively while β_3 and β_4 are vectors of parameters to be estimated and ε_{nij} is the error term. The next paragraphs define the variables composing these vectors while in *Table A3.4.* in the appendix, I summarize variables' definition.

(a) The dependent variable

$lnForeignHS_{nij}$ refers to the number of foreign high skilled workers employed by the firm n which originates from country i and operates in country j . We refer to foreign skilled workers as full-time foreign workers employed in managerial, technical or supervisory positions. This dependent variable is a discrete count variable, directly measured by the questionnaires of the UNIDO Africa Investor Survey 2010⁴⁴. Note that a large number of firms do not employ foreign workers. It implies a high number of zeros on the left hand side of our equation. In the sample, about 54.31% of firms do not hire foreign workers, about 61.89% do not employ foreign high skilled workers. Yet the decision of some firms to not employ foreign skilled workers is not assumed to be qualitatively different from the decision to employ foreign workers. Thereby, using a negative binomial model allows us to include the zeros in our analysis, and to account for the over-dispersion of the dependent variable. Notice that a preliminary analysis showed that with respect to the likelihood-ratio test, the negative binomial distribution gives a better result than the Poisson distribution.

⁴⁴ The question asked to the firm in the UNIDO questionnaires was the following: How many of the total permanent full-time employees were: Production/manual/sales workers, Technical/supervisory/ managerial staff , Clerical/administrative staff. For each skill category, the firm was asked to report the total number of workers and the number of foreigners.

(b) Explanatory and control variables

Our main explanatory variable is the capital intensity of the firm ($\ln K_{nij}$). It denotes the logarithm of the value of fixed assets per employee in the last financial year. Our main control variable is the endowment of skilled labour in the firm's operating country (*Human Capital_j*). It is approximated by the level of higher education and training (5th pillar), from the World Economic Forum (2010). This proxy measures both the enrolment ratios and the quality of education. It also takes into account vocational and on-the-job training which is relevant for the business community. We expect firms localized in a country having a relatively low index, to employ more foreign skilled workers in order to compensate this skilled labour shortage.

The vector of firm characteristics ($Firm'_{nij}$) includes a large set of micro control variables that might affect the employment of foreign skilled workers. In particular, for foreign firms we include variables that could influence the intra-firm transfer of skilled workers.

$$Firm'_{nij} = (Size_{nij}; \ln Age_{nij}; Export\ intensity_{nij}; Multi\ Product_{nij}; \\ Greenfield_{nij}; Subsidiary_{nij}; Joint\ Venture_{nij})$$

$Size_{nij}$ denotes the logarithm of the size of the firm. The size is measured as the average number of full-time employees in the firm. $\ln Age_{nij}$ denotes the logarithm of the age. It is measured by the lapse of time between the year of the investment or the firm's creation and the year of the survey (2009). We expect older firms to employ more local employees, as they should be more integrated into their local environment. Over time, firms are expected to gain knowledge on their institutional and business context (Wilkinson et al. 2008). $Multi\ Product_{nij}$ is a dummy variable taking the value of 1 when the firm produces at least four products. $Export\ intensity_{nij}$ represents the logarithm

of the export intensity of the firm, which is measured by the value of exports with respect to total sales. The management literature supports the idea that multi-product firms and export oriented firms may employ more foreign expatriates to deal with the complexity of the production and distribution process (Peixoto 2001). Thus we expect these types of firm to employ more foreign high skilled workers. Finally, we include 18 industry dummies to control for the sector of activity of the firm. We may also include country dummies controlling for the operating country of the firm. Among other things, these dummies capture possible country-specific restrictions regarding the employment of foreigners. $Greenfield_{nij}$ is a dummy variable relating the entry mode of the foreign firm, which takes the value of 1 in case of a greenfield investment, 0 in case of an acquisition of an existing firm. $Subsidiary_{nij}$ and $Joint\ Venture_{nij}$ dummies represent subsidiaries and joint-venture firms, respectively. Though, by definition, both firms may have a mixed ownership composed by foreign and domestic investors, joint ventures have specific characteristics that might influence differently the usage of foreign skilled workers. Finally, we include dummies controlling for the origin country or the origin region of the foreign investor⁴⁵. We also consider a set of macro variables such as demographic and economic characteristics of the firm's operating country.

$$CountryControls'_{ij} = (GDPpc_j; lnPopulation_j; Freedom\ of\ modality_j; \\ ; Migrant\ Stock_j; Labour\ Regulation_j)$$

$GDPpc_j$ denotes the GDP per capita in purchasing power parity of country j in 2009, in constant international dollars of 2011. It is a proxy for the level of wealth of the country. $lnPopulation_j$ represents the logarithm of the population of country j in 2009, and is a proxy for the market size of the country. We expect these two variables to impact positively both the capital intensity of the firm and its use of foreign workers, as they are

⁴⁵ Eastern Asia (China excluded), China, Eastern Europe and Central Asia, Western Europe, Latin America and Caribbean, North America, Middle East and North Africa, SSA countries (South Africa excluded), South Africa, and Oceania.

known to be pulling factors of both FDI and migration (Buch et al. 2006). *Migrant Stock_j* denotes the logarithm of the stock of international migrants in country *j* in 2005. This variable controls for the possibility that some foreign workers employed by the firm were already part of the population of migrants residing in country *j*. It also controls for the fact that networks of migrants foster new migration. *Freedom of mobility_j* denotes the freedom of foreigners to visit the country in 2009. We expect countries with soft regulations to attract relatively more foreign workers who may easily receive visit or migrate with their relatives. *Labour Regulation_j* denotes the hiring regulations in the country in 2009. The effect of strong hiring regulations on the employment of foreign workers is ambiguous. On the one hand, a country ensuring workers protection may attract foreign workers, but on the other hand regulations may limit the employment flexibility.

3.5 Results

In *Table 3.2*, we report the results of our baseline estimations for the sub-sample of foreign firms. First, we observe a positive and highly significant effect of the capital intensity of the firm on its employment of foreign skilled workers. In specification 2, the marginal effect shows that to every increase in the logarithm of the capital intensity by 1 unit corresponds an increase in the use of foreign skilled workers by 22.2%⁴⁶.

This result suggests a relation of complementarity between the technological content of the investment and the employment of foreign high skilled workers. It also corroborates the tendency of capital intensive firms to protect their know-how using intra-firm transfers of employees (Argote and Ingram 2000). This complementarity result is robust after controlling for the firm's sector of activity, which captures industry differences in the

⁴⁶ Marginal effects are assessed at mean.

usage of high skilled workers. In some specifications, we introduce destination country dummies and origin region dummies in order to control for origin and destination country fixed effects that may influence the complementarity relation. In specification 4, we carry out a more detailed investigation by introducing in the estimation origin country dummies. In all specifications, results on the capital intensity variable do not change significantly.

Then, we find strong support that the availability of skilled workers in the firm's operating country has a negative and highly significant effect on our dependent variable. In countries relatively more endowed with skilled workers, *ceteris paribus*, firms rely more extensively on the native skilled workforce, employing less foreign skilled work

Table 3.2 Determinants of demand for foreign skilled workers. Sub-sample of foreign firms

VARIABLES	(1) Model	(2) Model	(3) Model Margins	(4) Model	(5) Model	(6) Model
LnK	0.0772*** (0.0148)	0.0873*** (0.0147)	0.222*** (0.0377)	0.0949*** (0.0147)	0.0952*** (0.0147)	0.0939*** (0.0148)
Human Capital	-0.369*** (0.0749)	-0.519*** (0.0777)	-1.323*** (0.199)		-0.533*** (0.0790)	0.306 (0.240)
Size	0.563*** (0.0220)	0.587*** (0.0238)	1.496*** (0.0656)	0.586*** (0.0227)	0.586*** (0.0240)	0.585*** (0.0237)
LnAge		-0.0198 (0.0373)	-0.0506 (0.0950)	-0.0725* (0.0371)	-0.0476 (0.0375)	0.922*** (0.261)
Export Intensity		0.457*** (0.138)	1.165*** (0.353)	0.386*** (0.137)	0.467*** (0.138)	0.451*** (0.138)
Joint Venture		-0.462*** (0.0829)	-1.178*** (0.212)	-0.459*** (0.0813)	-0.431*** (0.0833)	-0.427*** (0.0832)
Greenfield		0.110 (0.0761)	0.280 (0.194)	0.113 (0.0732)	0.0824 (0.0760)	0.136* (0.0761)
Migrant Stock		0.443*** (0.0657)	1.128*** (0.168)		0.349*** (0.0672)	0.426*** (0.0655)
Subsidiary		-0.0129 (0.0634)	-0.0328 (0.162)	0.0663 (0.0612)	0.00507 (0.0654)	-0.00318 (0.0632)
Multi Product		0.0950 (0.0944)	0.242 (0.241)	0.165* (0.0902)	0.154 (0.0939)	0.0960 (0.0940)
SSA		0.188** (0.0858)	0.478** (0.219)	0.0850 (0.0859)		0.201** (0.0855)
Eastern Europe		0.256 (0.255)	0.652 (0.649)	0.190 (0.245)		0.281 (0.253)
MENA		-0.241** (0.114)	-0.615** (0.291)	-0.225** (0.112)		-0.225** (0.114)
Asia		0.509*** (0.0769)	1.298*** (0.197)	0.349*** (0.0782)		0.519*** (0.0766)
China		0.682*** (0.111)	1.737*** (0.286)	0.514*** (0.111)		0.680*** (0.111)
North America		0.412*** (0.124)	1.049*** (0.317)	0.248** (0.117)		0.454*** (0.124)
Oceania		-0.323 (0.373)	-0.823 (0.951)	-0.318 (0.355)		-0.336 (0.372)
Latin America		0.380 (0.410)	0.967 (1.046)	0.351 (0.381)		0.385 (0.408)

Table 3.2 (continued)

VARIABLES	(1) Model	(2) Model	(3) Model Margins	(4) Model	(5) Model	(6) Model
South Africa		-0.0762 (0.120)	-0.194 (0.305)	-0.179 (0.121)		-0.0783 (0.119)
Age*Human Capital						-0.308*** (0.0845)
Sector dummies	YES	YES	YES	YES	YES	YES
Destination dummies	NO	NO	NO	YES	NO	NO
Origin fixed effects	NO	NO	NO	NO	YES	NO
Constant	-1.293*** (0.275)	-1.810*** (0.291)		-2.668*** (0.322)	-1.109*** (0.297)	-4.374*** (0.761)
lnalpha	-0.121** (0.0508)	-0.357*** (0.0566)		-0.453*** (0.0573)	-0.482*** (0.0587)	-0.372*** (0.0569)
Observations	1,807	1,690	1,690	1,811	1,690	1,690

Dependent variable: Number of foreign skilled workers in the firm. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

ers. This result is in line with what predicted by Jayet and Marchal (2015). In addition, as stressed by the expatriation literature, the availability of skilled workers in the investment's destination country, reduces the use of costly expatriates by MNEs.

We observe a positive relation between the export intensity of the firm and its use of foreign skilled workers. This result might be due to the fact that exporting firms use foreign qualified staff who have a better knowledge of international markets as compared to native staff. Richards (2001) asserts that expatriates, rather than local managers, are more appropriate to deal with international consumers since they have more international experience. Moreover, the exported product may be, on average, more skill intensive than the product supplied in the domestic market. On the contrary, domestic-market oriented firms extensively employ local skilled workers who have a good knowledge of language, local consumer tastes and customs (Peixoto 2001). Furthermore, foreign investors forming a joint-venture with a local partner use less foreign skilled workers than foreign individual investors. Wang et al. (1998) note that in a joint-venture, the foreign partner has less discretion to appoint home country nationals in control and management positions.

Gong (2003) argues that, over time, foreign firms tend to replace their foreign technical and managerial staff with local employees. For instance, a subsidiary employs a high number of expatriate staff in the early phase of establishment to set up and manage

the production process. Over time, the role of expatriates tend to decline since firms engage in local staffing development, e.g. through training, in order to build the necessary human resource capacities Peng and Beamish (2014). Interestingly, in most of our specifications, we find that the age of the firm has no significant effect on the use of foreign skilled workers. This result could be related to the very low skilled labour endowment in SSA countries which may prevent firms to fill positions with well-qualified local staff. If this intuition is correct, we expect firms operating in countries which are better endowed with skilled workers to employ, over time, more local skilled workers. To test this intuition, we use an interaction term between the age variable and the skilled labour endowment proxy ($Age * Human\ Capital$, specification 5). The result shows a negative and highly significant effect of the interaction on the number of foreign skilled workers. In *Figure 1* in the Appendix, we decompose the average effect measured by the coefficient, highlighting its significance by level of skilled labour endowment in the destination country. We find that the length of operations in the destination country has: (i) a positive effect on the employment of foreign skilled workers when the skilled labour endowment in the operating country is relatively low (around 20% of the observations); and (ii) a negative effect on the employment of foreign skilled workers when the skilled labour endowment in the operating country is relatively high (around 22% of observations). Thereby, over time, the substitution of foreign by native skilled workers is relevant for firms located in SSA countries which are the most abundant in skilled labour, while firms operating in countries with low endowment of skilled labour use extensively foreign skilled workers. Finally, it is worth noting that the dummies controlling for the sectors of activity of the firms show the expected effect on the use of foreign skilled workers. Though not reported in the estimation tables, we find that, as compared to the agricultural and fishery, highly capital intensive sectors use a higher number of foreign skilled workers. Specifically, these sectors include mining and quarrying, machinery and equipment, construction, retail and motor vehicles sales.

Table 3.3 Determinants of demand for foreign skilled workers .Sub-sample of domestic firms.

VARIABLES	(1) Model	(2) Model Margins
Human Capital	-0.389** (0.197)	-0.0919** (0.0466)
LnK	0.183*** (0.0390)	0.0433*** (0.00926)
Size	0.902*** (0.0622)	0.213*** (0.0171)
LnAge	-0.0202 (0.0921)	-0.00478 (0.0218)
Export Intensity	1.421*** (0.479)	0.336*** (0.115)
Multi Product	0.0498 (0.234)	0.0118 (0.0553)
Migrant Stock	0.935*** (0.171)	0.221*** (0.0412)
Sector dummies	YES	YES
Constant	-6.262*** (0.768)	
Inalpha	1.771*** (0.0806)	
Observations	2,608	2,608

Dependent variable: Number of foreign skilled workers in the firm.
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In *Table 3.3*, we follow our analysis looking at domestic firms. Our intuition is that both foreign and domestic firms have to cope with the scarcity of skilled workers in their operating country. Indeed, for both types of firms, we find that the capital intensity affects positively the use of foreign skilled workers. The results show that the effect is stronger for foreign firms. A marginal increase of the logarithm of the capital intensity by 1 unit entails an increase in the use of foreign skilled workers by 22.2% for foreign firms; while it only entails an increase by 4.33% for domestic firms (specification 1'). The stronger effect for foreign firms may be related to the larger access to qualified workers these firms have as compared to domestic firms. For instance, a foreign affiliate, as an alternative to recruiting in the international labour market, may also receive qualified worker transfers from the foreign parent company.

In *Table 3.4*, we report the results of specifications including a set of host-country characteristics. In particular, as expected, the stock of international migrants in the destination country is positively associated with the employment of foreign skilled workers.

On the one hand, firms may employ foreign workers already present in the country, on the other hand networks may foster immigration of new workers.

Table 3.4 Macro determinants of demand for foreign skilled workers. Sub-sample of foreign firms

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model
Human Capital	-0.514*** (0.0780)	-0.470*** (0.0845)	-0.626*** (0.0803)	-0.579*** (0.0795)
LnK	0.0835*** (0.0151)	0.0867*** (0.0148)	0.0907*** (0.0147)	0.0901*** (0.0147)
Size	0.586*** (0.0238)	0.589*** (0.0238)	0.594*** (0.0237)	0.588*** (0.0238)
LnAge	-0.0190 (0.0373)	-0.0140 (0.0375)	-0.0233 (0.0369)	-0.0298 (0.0373)
Export Intensity	0.478*** (0.139)	0.436*** (0.139)	0.382*** (0.138)	0.439*** (0.138)
Multi Product	0.0936 (0.0945)	0.0879 (0.0945)	0.121 (0.0935)	0.106 (0.0943)
Subsidiary	-0.00956 (0.0635)	-0.0146 (0.0634)	-0.0143 (0.0629)	0.00286 (0.0635)
Joint Venture	-0.473*** (0.0834)	-0.466*** (0.0829)	-0.466*** (0.0822)	-0.434*** (0.0830)
Greenfield	0.110 (0.0761)	0.108 (0.0761)	0.149** (0.0758)	0.0929 (0.0761)
Migrant Stock	0.445*** (0.0658)	0.438*** (0.0655)	0.377*** (0.0653)	0.408*** (0.0663)
LnPopulation	0.0448 (0.0373)			
GDPpc		-4.88e-05 (3.28e-05)		
Freedom of mobility			0.0837*** (0.0165)	
Labour Regulation				0.0321*** (0.00991)
Sector dummies	YES	YES	YES	YES
Origin dummies	YES	YES	YES	YES
Constant	-2.564*** (0.692)	-1.882*** (0.295)	-1.678*** (0.290)	-1.819*** (0.289)
lnalpha	-0.357*** (0.0565)	-0.358*** (0.0566)	-0.384*** (0.0571)	-0.367*** (0.0568)
Observations	1,690	1,690	1,690	1,690

Dependent variable: Number of foreign skilled workers in the firm. Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The degree of openness of the country in terms of freedom to visit for tourists and business purposes, is positively related to the use of foreign high skilled workers. This variable is a proxy for the easiness of establishment of foreign workers and their families in the destination country. The result corroborates the work of De Smet (2013), who shows that the easiness to employ or transfer foreign skilled workers depends on visa

restrictions and bureaucratic procedures to obtain a work permit. In specification 4, we include a variable capturing the adequacy of the host-country hiring regulations. We find that, a better system of protection of worker's rights affects positively the employment of foreign qualified workers. The result suggests that generating a favourable working environment may be a useful tool in attracting foreign skilled workers.

3.6 Robustness check and endogeneity concerns

(a) Robustness check

We carry out several robustness checks using alternative specifications and alternative empirical models. Results are presented in Appendix, *Table A3.2*. In specifications 1 and 2, we approximate the endowment of skilled labour in country j with two alternative proxies: the gross enrolment ratio in the secondary and tertiary education from the World Development Indicators of the World Bank (2014) (*Human Capital 2_j*), and the Barro and Lee (2013) index that measures the completed secondary and tertiary education over the age of 25 (*Human Capital 3_j*)⁴⁷. We observe that the sign and the significance level of our main variables remain stable, though we find smaller coefficients for the skilled labour endowment proxies. As compared to our initial proxy, these proxies might be more restrictive to approximate the level of human capital of a country. In developing countries, excluding on-the-job training might eliminate a large share of the actual skilled labour stock. Second, we test the sensitivity of our analysis to the type of empirical model chosen. As our model presents a large number of zeros and dyadic independent variables, we estimate our baseline equation using a pseudo Poisson maximum likelihood model (Santos Silva and Tenreyro 2006) (specification 3). In addition,

⁴⁷ Using this index decreases the number of SSA countries considered in the analysis from 19 to 14. The missing countries are Burkina Faso, Cape Verde, Ethiopia, Madagascar and Nigeria.

we estimate our baseline specification using a corner solution Tobit model (specification 4). Although this model is more appropriate to continuous dependent variables, it can be used as a robustness test for count data models (Greene 2012). We find that the sign of the coefficients and the significance level of the main variables are not sensitive to the empirical model chosen.

(b) Endogeneity concerns

One concern related to our estimation strategy is the possible endogeneity between our dependent variable and the size of the firm measured as the total number of full-time employees. In fact, staffing decisions (number of employees and foreign skilled workers) could be simultaneously taken by the firm. Nevertheless, we need to control for the size of the establishment as it affects directly the number of foreign high skilled workers needed in the production process. To address this issue, we adopt a two-step IV technique estimated by an exponential generalized method of moments (GMM) in order to instrument the size of the firm. Results are presented in Appendix, *Table A3.3*.

We first use as instruments the number of full-time low skilled workers employed by the firm, and the operational costs faced by the firm in the last financial year (specification 1). The number of low skill employee is sufficiently correlated with the overall size of the firm (correlation around 86%), and does not include the number of foreign high skilled workers. Functionally, the number of low skilled employees should not depend on the nationality of the firm's managers. Hence, we assume this instrument to be not correlated with the dependent variable. Though the total number of high skilled workers used by the firm could be to some extent functionally correlated with the number low skilled workers (complementarity or substitution in the production process), we claim that this degree of correlation is less serious if we consider only the foreign skilled workers (it is a sub-sample of the whole skilled workers sample). In this respect, en-

dogeneity could be more relevant in extreme cases when the whole skilled workforce of the firm is composed by foreign skilled workers only. Estimations in specification 3 show that coefficients do not change significantly when we consider only this sub-sample of firms. The second instrument assumes that the operational costs such as rent, telecommunication and establishment maintenance are correlated with the size of the firm (correlation in the baseline sample is around 19%), but not with the number of foreign skilled workers in specific. We perform a Hansen J test to test the exogeneity of the instruments. It is not significant ($p = 0.1685$), confirming the orthogonality of at least one instrument.

Additionally, in specification 2 we test a second set of instruments, i.e. the number of mid-skilled workers and the previously used operational costs. The total number of mid-skilled workers (desk clerks and administrative staff) are correlated with firm size but less seriously correlated with our dependent variable. Alternatively to the low skilled workers, in most of the firms they are not part of the production process, since they cover administrative functions within the firm. Again the Hansen J test ($p = 0.2697$) confirms that at least one instrument is exogenous. In all IV estimations, the results on the variables of interest remain robust.

3.7 Conclusions

The attraction of foreign human capital and containment of the "brain drain" phenomenon is of crucial importance for poor countries. In fact, FDI promoting skilled worker transfers increase the human capital base of destination countries, creating pre-conditions for future economic development. In this paper, we aim to better understand the pulling factors of skilled labour migration toward less developed countries. To this end, we investigate the determinants of the employment of foreign high skilled workers

by firms operating in less developed countries, poorly endowed with skilled labour such as Sub-Saharan African countries. In particular, we look at the complementarity between the capital intensity of the firm and its use of foreign qualified workers. We use a cross section data set built from the Africa Investor Survey 2010, including 16 SSA countries. We exploit both firm and country characteristics to analyze the choice of the firm to hire a foreign versus a native skilled worker.

We derive three main results from our analysis. First, at firm-level, after controlling for the availability of skilled labour in the firm's operating country, we find that the capital intensity of the firm positively impacts its use of foreign skilled workers. We find similar results for both foreign and domestic firms, although the relation of complementarity between the capital intensity and the employment of foreign skilled workers is stronger for foreign firms than for domestic ones. Foreign firms are typically more capital abundant, hence more likely to develop job opportunities for skilled workers.

Second, we find that the availability of skilled workers in the firm's operating country has a negative and highly significant effect on its use of foreign skilled workers. In countries relatively more endowed with skilled workers, over time, firms rely more extensively on the native workforce, employing less foreign skilled workers. That being said, we find that firms tend to substitute foreign by native workers when they get more integrated into their local environment. Moreover, governments which want to enhance job creation for native workers may want to favour a certain type of FDI. Our results suggest that firm partnerships and especially joint-ventures employ more native workers as compared to other types of firm. The same result is found for domestic-market oriented firms which get more locally embedded and therefore foster the domestic employment. Notice that governments may also consider that immigrants stimulate the economic activity of their host country, by creating trade and investment opportunities between their host and origin countries.

Third, our study sheds light on the degree of substitution between natives and foreigners. The fact that both foreign and domestic capital intensive firms hire foreign

skilled workers suggests that foreign and native workers are not perfect substitutes. Firms aiming access to specific skills are obliged to recruit foreign skilled workers. This is very likely to happen in SSA countries.

Thereby, our study recommends some policy interventions, aimed at increasing the human capital base in less developed countries. Our analysis suggests that governments implementing policies to attract FDI, may adopt appropriate measures to satisfy the increase in demand for skilled workers boosted by foreign capital inflows. In the short run, governments may want to facilitate immigration of skilled workers in order to reduce the skilled labour shortage. For instance, governments could adopt simpler procedures for the free movement of foreign employees, and implement reliable and suitable working regulations. In addition, governments could invest in education and training in order to increase the stock of human capital of their country⁴⁸. Over time, this strategy would, to some extent, stimulate the substitution of foreign by native skilled workers.

Finally, policies attracting FDI in less developed countries could prevent the emigration of qualified workers, or favour the return of those who migrated toward northern economies. Thus, the establishment of foreign firms could reduce the brain drain faced by less developed countries, especially if foreign firms have a preference for native workers. FDI inflows could even induce a brain gain effect if they attract young qualified workers from northern economies.

⁴⁸ See the work of Lincove (2015) on that subject.

APPENDIX 3

Table A3.1 Statistics on the firms' operating countries

COUNTRIES	Eastern Asia (China exc.)	China	Eastern Europe	Western Europe	Latin America	North America	MEN A	SSA countries	South Africa	Oceania
<i>Burkina F.</i>	0	0	0	3	0	0	2	3	0	0
<i>Burundi</i>	1	0	0	12	0	0	1	3	0	0
<i>Cameroon</i>	4	4	1	74	1	3	9	4	1	1
<i>Ethiopia</i>	19	12	4	44	0	19	27	14	2	1
<i>Ghana</i>	32	16	4	47	0	10	26	5	3	0
<i>Kenya</i>	67	19	2	114	1	25	12	14	11	3
<i>Lesotho</i>	3	30	0	3	0	0	0	4	18	0
<i>Madagascar</i>	2	5	0	53	0	1	3	32	1	0
<i>Mali</i>	0	7	0	37	0	3	11	12	6	1
<i>Mozambique</i>	6	1	1	53	3	2	1	5	33	1
<i>Malawi</i>	3	0	0	12	0	0	0	4	6	0
<i>Nigeria</i>	11	8	5	22	0	6	17	5	1	0
<i>Senegal</i>	3	1	0	43	0	3	4	5	0	0
<i>Tanzania</i>	35	7	2	28	0	6	7	21	13	0
<i>Uganda</i>	107	14	1	74	0	20	13	97	20	1
<i>Zambia</i>	14	3	1	22	2	3	7	7	12	1
Total	307	127	21	641	7	101	140	235	127	9

Source: UNIDO (2012)

Table A3.2 Robustness check

VARIABLES	(1) Model WB	(2) Model Barro-Lee	(3) Model PPML	(4) Model TOBIT
Human Capital 2	-0.0150*** (0.00180)			
Human Capital 3		-0.0202*** (0.00634)		
Human Capital			-0.442*** (0.124)	-0.0367*** (0.00636)
LnK	0.108*** (0.0156)	0.0713*** (0.0154)	0.0942*** (0.0238)	0.00386*** (0.00123)
Size	0.571*** (0.0241)	0.591*** (0.0252)	0.588*** (0.0344)	
LnAge	-0.0673* (0.0389)	-0.0534 (0.0415)	-0.153*** (0.0494)	-0.00561* (0.00292)
Export Intensity	0.249* (0.141)	0.316** (0.145)	0.337* (0.180)	0.0153 (0.0111)
Multi Product	0.146	0.0619	0.130	0.00365

Table A3.2 (continued)

VARIABLES	(1) Model WB	(2) Model Barro-Lee	(3) Model PPML	(4) Model TOBIT
Subsidiary	0.0301 (0.0655)	-0.109 (0.0675)	0.0248 (0.0872)	-0.0101* (0.00518)
Joint Venture	-0.443*** (0.0840)	-0.591*** (0.0895)	-0.485*** (0.134)	-0.0239*** (0.00653)
Greenfield	0.0615 (0.0782)	0.0477 (0.0811)	0.122 (0.115)	0.00937 (0.00621)
Migrant Stock	0.578*** (0.0730)	0.224** (0.0886)	0.318*** (0.0914)	0.0334*** (0.00505)
Distance			0.124*** (0.0461)	
Sector dummies	YES	YES	YES	YES
Origin dummies	YES	YES	NO	YES
Origin fixed effects	NO	NO	NO	NO
Constant	-2.665*** (0.246)	-2.561*** (0.256)	-2.583*** (0.488)	0.0576** (0.0232)
Inalpha	-0.385*** (0.0599)	-0.411*** (0.0611)		
sigma				0.0841*** (0.00176)
R-squared			0.374	
Observations	1,600	1,433	1,646	1,690

Dependent variable: Number of foreign skilled workers in the firm. For distance see definition in Table A3.7. Standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table A3.3 Endogeneity

VARIABLES	(1) Model Mid Skill	(2) Model Low Skill	(3) Model Low Skill
Human Capital	-0.411*** (0.128)	-0.442*** (0.122)	-0.448*** (0.132)
LnK	0.0987*** (0.0252)	0.0989*** (0.0258)	0.0986*** (0.0279)
Size	0.506*** (0.0551)	0.561*** (0.0448)	0.557*** (0.0475)
LnAge	-0.0908 (0.0607)	-0.108* (0.0619)	-0.0975 (0.0669)
Export Intensity	0.422** (0.199)	0.351* (0.182)	0.358* (0.192)
Multi Product	0.117 (0.146)	0.0961 (0.148)	0.102 (0.155)
Greenfield	0.0899 (0.111)	0.117 (0.115)	0.119 (0.123)
Subsidiary	0.102 (0.0987)	0.0529 (0.0915)	0.0708 (0.0966)
Joint Venture	-0.459*** (0.118)	-0.499*** (0.116)	-0.488*** (0.119)
Migrant Stock	0.308*** (0.0887)	0.314*** (0.0881)	0.288*** (0.0946)
Sector dummies	YES	YES	YES
Origin dummies	YES	YES	YES
Constant	-1.525*** (0.427)	-1.639*** (0.479)	-1.658*** (0.513)
Hansen test	0.2697	0.1685	0.1376
Observations	1,591	1,591	1,418

Dep. variable: Number of foreign skilled workers in the firm.
Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table A3.4 Statistics on the firms' operating countries

COUNTRIES	GDP per capita PPP (\$ 2011)	ΔGDP 2009 %	Education & training	Population (.000)	Int. migration stock (% pop)	Corruption index	Hiring regulation	Tot. tax rate % profits
<i>Burkina F.</i>	722	4.47	2.51	8,926	1,049	2.6	10	279.7
<i>Burundi</i>	1352	2.97	2.62	15,094	5,757	3.42	6.7	44.9
<i>Cameroon</i>	2447	1.87	2.82	20,103	1,168	3.2	7.2	48.8
<i>Ethiopia</i>	968	8.8	2.67	84,836	0.727	4.32	6.7	30.3
<i>Ghana</i>	2906	3.99	3.2	23,691	7,806	4.17	8.9	32.5
<i>Kenya</i>	1980	2.74	3.69	39,824	2,207	2.75	7.8	49.3
<i>Lesotho</i>	2098	3.36	3.23	1,989	0.324	3.79	7.8	19.9
<i>Madagascar</i>	1419	-4.01	2.88	20,495	0.217	3.38	2.23	38.4
<i>Mali</i>	1625	4.46	2.66	13,559	1,385	2.5	6.7	51.4
<i>Mozambique</i>	848	6.33	2.54	23,361	1,932	4.35	3.3	37.5
<i>Malawi</i>	838	9.04	2.78	14,573	2,157	5.21	5.6	26.3
<i>Nigeria</i>	4906	6.93	3.03	155,381	0.696	3.23	10	32.2
<i>Senegal</i>	2152	2.42	3.41	12,586	1,953	4.35	3.9	45.5
<i>Tanzania</i>	1487	6.02	2.58	43,639	2,054	3.64	1.1	44.4
<i>Uganda</i>	1264	7.25	2.76	32,864	2,271	3.08	10	35
<i>Zambia</i>	2661	6.04	2.97	12,825	2,505	4.55	8.9	15

Source: UNIDO (2012)

Table A3.5 Correlation matrix, sub-sample of domestic firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Human Capital	(1)	1										
lnK	(2)	.07	1									
Size	(3)	.045	.164	1								
lnAge	(4)	.155	.1	.307	1							
Export intensity	(5)	.07	.064	.18	.05	1						
Multi Product	(6)	-.003	.017	.11	.079	.003	1					
Migrant Stock	(7)	.218	-.015	-.06	-.005	-.006	-.032	1				
lnPopulation	(8)	-.06	.13	.21	.059	-.015	.064	-.22	1			
GDPcap	(9)	.40	.089	.02	.137	-.024	-.092	-.05	.34	1		
Freedom of mobility	(10)	.243	-.049	-.19	-.001	-.011	-.034	.033	-.55	-.25	1	
Labour Regulation	(11)	-.18	-.029	.08	.01	-.037	.035	.11	-.05	-.136	.04	1

Source: UNIDO (2012)

Table A3.6 Correlation matrix, sub-sample of foreign firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
Human Capital	(1)	1													
lnK	(2)	.14	1												
Size	(3)	.12	.05	1											
lnAge	(4)	.11	.168	.23	1										
Export intensity	(5)	.18	-.029	.3	-.02	1									
Multi Product	(6)	.13	.086	.093	.064	.043	1								
Subsidiary	(7)	.012	.064	.197	.065	.12	.069	1							
Joint Venture	(8)	.16	.098	.115	.072	-.024	.033	-.28	1						
Greenfield	(9)	.037	-.045	-.133	.053	-.04	-.032	-.09	-.033	1					
Migrant Stock	(10)	.21	.069	-.146	.017	-.089	-.015	-.094	-.009	.018	1				
lnPopulation	(11)	-.02	.19	.008	.018	-.12	.028	-.1	.163	.024	.019	1			
GDPcap	(12)	.4	.052	.074	.1	-.023	-.00	-.024	.061	-.009	.114	.18	1		
Freedom of mobility	(13)	.31	-.014	-.019	.00	.09	-.012	-.005	.007	-.038	.217	-.388	-.173	1	
Labour Regulation	(14)	-.26	-.11	-.031	-.11	-.11	-.091	-.051	-.08	-.017	.144	-.16	-.022	-.04	1

Source: UNIDO (2012)

Table A3.7 Definition of variables

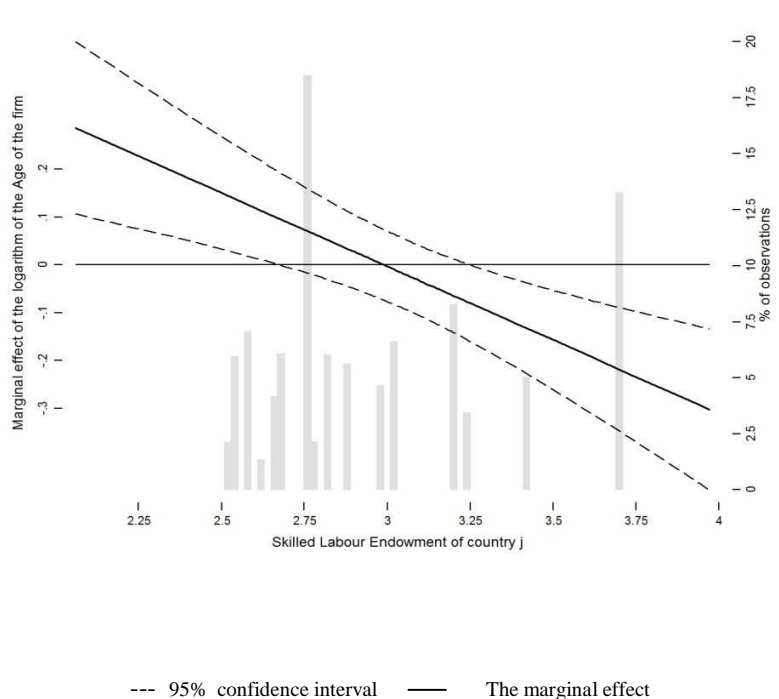
<i>Variables</i>	<i>Definition</i>	<i>Source</i>
<i>Dependent variables</i>		
$lnForeignHS_{nij}$	Logarithm of number of high skill foreign workers	African Investor Survey (AIS)
<i>Firm variables</i>		
lnK_{nij}	Log (value of fixed assets/ nr. of full-time employees).	-\\-
$Size_{nij}$	Log (nr. of full time employee)	-\\-
$lnAge_{nij}$	Log (nr. of years since the creation of the company)	-\\-
$Human\ Capital_j$	<i>5th pillar</i>): level of higher education and training, in 2009. Composite indicator assessed using: (a) Secondary enrolment, (b) Tertiary enrolment, (c) Quality of educational system, (d) internet access in schools. The index ranges from 1 to 7.	Global Competitiveness Report (2009-2010)
$Human\ Capital\ 2_j$	Average of the gross enrolment ratios in the secondary and tertiary education in 2009	World Development Indicators (WB)
$Human\ Capital\ 3_j$	Secondary and tertiary education attainment for population aged 25 and over in 2005	Barro and Lee (2013)
$Export\ intensity_{nij}$	Export intensity: $\log(\text{value of exports}/\text{nr. of full-time employees})$	-\\-
$Multi\ Product_{nij}$	1 if the firm produces at least 4 different products	-\\-
$Greenfield_{nij}$	Dummy= 1 if firm is a greenfield investment. 0 otherwise	-\\-
$Subsidiary_{nij}$	Dummy=1 if the firm is a wholly owned subsidiary of a foreign firm, 0 otherwise	-\\-
$Joint\ Venture_{nij}$	Dummy= 1 if the firm is a joint-venture between a foreign firm and a local firm, 0 otherwise.	-\\-
$Sector$	Sector dummy (19 sectors with reference agriculture and fishery)	-\\-

Table A3.7 (continued)

Macro variables

<i>Freedom of mobility_j</i>	Index based on % of countries with no visa restrictions. See method by Lawson and Lemke (2012). Ranges 0 to 10.	Economic freedom of the World (2009)
<i>Migrant Stock_j</i>	% of immigrants on the total population in the destination country in 2005.	World Development Indicators (WB)
<i>Distance_{ij}</i>	Geographic distance between origin and destination country most populated cities (log kilometres)	CEPII
<i>GDPpc_j</i>	Logarithm GDP per capita in 2009	Mayer and Zignago (2011)
<i>lnPopulation_j</i>	log(total population in 2009)	World Development Indicators (WB)
		- -
<i>Labour Regulation_j</i>	Hiring regulation and minimum wage: based on the World Bank's Doing Business "Difficulty of Hiring Index". Countries with higher difficulty of hiring are given lower rating	Economic Freedom of the World (2009)

Figure 1. The marginal effect of the $\ln Age_{nij} * Human Capital_j$ interaction.



APPENDIX 3.1

An outline of Jayet and Marchal (2015) model.

The model uses a general equilibrium framework with two countries, the South and the North. Both countries combine three factors, capital, skilled labour and unskilled labour to produce two transportable goods which are traded internationally. The first good is produced by a traditional sector that does not use capital. The two factors used in its production are skilled and unskilled workers which are perfect substitutes and return to scale are constant. The production function of this sector is; $Q_1 = A(U_1 + cS_1)$, where Q_1 is the output, U_1 and S_1 are inputs of unskilled labour and skilled labour, respectively, c is a constant greater than unity, and A is a positive constant. In specification (1) it is presented the production function in its intensive form,

$$1 = A(u_1 + cs_1) \quad (1)$$

where u_1 and s_1 are the technical coefficients⁴⁹ of unskilled labour and skilled labour, respectively. The second good is produced by the industrial sector, which use capital in addition to labour. The production function of this sector is a Cobb-Douglas with the following formulation $Q_2 = BK^\beta[\min(U_2, S_2)]^{1-\beta}$, where Q_2 is the output, K , U_2 and S_2 are the capital, unskilled workers and skilled workers respectively, β a constant between 0 and 1, and B is a positive constant. Similarly to the traditional sector, the industrial sector produces with constant returns to scale. On the contrary, in the industrial sector, skilled and unskilled workers are perfect complements, while capital and labour are imperfect substitutes in the production of the final good. The production of one unit of the second good, can be expressed by the equation (2):

⁴⁹ The quantities needed to produce one unit of unskilled ($u_1 = \frac{U_1}{Q_1}$) and skilled ($s_1 = \frac{S_1}{Q_1}$) labour.

$$1 = Bk^\beta l^{1-\beta} \quad (2)$$

where $k = \frac{K}{Q_2}$ and $l = \min(u_2, s_2)$ are the technical coefficients⁵⁰. The authors assume that factors of production are immobile internationally, but move freely between sectors. Therefore, in perfectly competitive markets the remuneration of the factors should equalize their marginal productivity. Taking the price of the traditional sector to unity and the price of the industrial sector p , wages (w_u for the unskilled and w_s for the skilled workers) in both sectors can be expressed as follows.

$$\text{The traditional sector:} \quad w_u = A \quad (3)$$

$$w_s = cA \quad (4)$$

$$\text{The industrial sector:} \quad \rho k = \beta p \quad (5)$$

$$(w_u + w_s)l = (1 - \beta)p \quad (6)$$

where ρ is the remuneration of capital.

In equilibrium, the inputs are fully employed and the total endowment of each factor equalizes the demand by the two sectors of the economy:

$$U = u_1 Q_1 + l Q_2 \quad (7)$$

$$S = s_1 Q_1 + l Q_2 \quad (8)$$

$$K = k Q_2 \quad (9)$$

The solution of this system of equations gives the equilibrium in each country. In addition, within each country, the model shows that the traditional sector is constrained to

⁵⁰ $u_2 = \frac{U_2}{Q_2}$ and $s_2 = \frac{S_2}{Q_2}$

employ the relatively more abundant workforce (skilled or unskilled) only, while the scarce workforce is drained by the capitalist sector. In the case when skilled workers are scarce enough, the traditional sector will use only unskilled workers in the production process. On the contrary, the capitalist sector will employ both skilled and unskilled workers. The following inequality holds:

$$S < K(BL)^{\frac{1}{\beta}} = K \left[\frac{(1 - \beta)Bp}{(1 + c)A} \right]^{\frac{1}{\beta}} < U \quad (10)$$

As a consequence, the wage of skilled workers⁵¹ is higher than the wage presented in equation (4). To summarize, given the capital endowment within the country, the skilled workers will be employed in the sector where this input is crucial in the production process (complementarity with the unskilled workers) and the wage of the scarce resource will rise⁵².

3.2.2.1 Global income and consumption levels

To distinguish the northern country from the southern country, we mark with an asterisk, each indicator measuring the endowments of the northern country. The world endowment for each factor are given by the sum of the northern and southern countries as follows: $\bar{U} = U^* + U$, $\bar{S} = S^* + S$ and $\bar{K} = K^* + K$. The crucial assumption of this model is related to the factor endowments of the countries. The southern country is assumed to be well endowed with unskilled workers, but poorly endowed with skilled workers. On the contrary, the northern country is well endowed with skilled workers and poorly endowed with unskilled workers. Moreover, the model assumes that the capital is owned

⁵¹ For more a detailed formulation see Jayet and Marchal (2015).

⁵² The model also presents another corner solution when unskilled workers are the scarce resource.

only by the northern country, but potentially invested in the south if its remuneration is higher than in the north.

All workers have Cobb–Douglas utility function in the consumption of both goods, $v(q_1, q_2) = q_1^\varepsilon q_2^{1-\varepsilon}$, where q_1 is the consumption of the traditional good, q_2 is the consumption of the capitalist good and ε is a constant between zero and unity ($\varepsilon \in]0, 1[$) measuring the share of the income devoted to the demand for the traditional good and the remaining $1-\varepsilon$ for the capitalist good. Hence, assuming no transaction costs, countries' price levels equal world price levels of both goods. The world demand equals the world supply as follows:

$$Q_1^* + Q_1 = \varepsilon \bar{I} \quad (11)$$

$$p(Q_2^* + Q_2) = (1 - \varepsilon) \bar{I} \quad (12)$$

where p is the price of the capitalist good⁵³ and $\bar{I} = I + I^*$ is the world income⁵⁴. In equilibrium, the world production in value must equal the world income measured as the remuneration of inputs used in the production process. Hence, solving (11) and (12) for the world income, the equilibrium is given by equation (13)⁵⁵,

$$p\varepsilon(Q_2^* + Q_2) = (1 - \varepsilon)Q_1^* + Q_1 \quad (13)$$

The result implies that, the part of income generated by the capitalist sector used in the consumption of the traditional good must equal the part of income generated by the traditional sector used in the consumption of the capitalist good.

⁵³ As in the last section, it is assumed that the price of the traditional good is a numeraire.

⁵⁴ For the southern country, $I = w_u Q_1 + w_s Q_2 + \rho K$, while for the northern country $I^* = w_u^* Q_1^* + w_s^* Q_2^* + \rho K^*$.

3.2.2.2 Large investments in the South when capital is worldly abundant.

The next step of the model considers the possibility of exogenous capital transfers from the north to the south. Capital to the south becomes $K > 0$, while in the north it is $K^* = \bar{K} - K$. The model presents different scenarios in this respect, which depend on the amount of capital transferred and the unskilled and skilled labour endowments of the respective countries. In this short overview of the model, we present the scenario which is closer to our context, i.e. there is a large capital transfer from the north to the south, leaving both countries with an important capital endowment⁵⁶. The capitalist sector becomes large enough to drain the scarce resources in each country, unskilled works in the north and skilled workers in the south. Hence, the traditional sector employs only the abundant resource. This situation can be expressed by the following inequalities. The first inequality corresponds to the southern country:

$$K > \left[\frac{(1+c)A}{(1-\beta)Bp} \right]^{\frac{1}{\beta}} \min(U, S) = \left[\frac{(1+c)A}{(1-\beta)Bp} \right]^{\frac{1}{\beta}} S$$

The second one corresponds to the northern country,

$$\bar{K} - K > \left[\frac{(1+c)A}{(1-\beta)Bp} \right]^{\frac{1}{\beta}} \min(U^*, S^*) = \left[\frac{(1+c)A}{(1-\beta)Bp} \right]^{\frac{1}{\beta}} U^*$$

combining both inequalities:

$$\left[\frac{(1+c)A}{(1-\beta)Bp} \right]^{\frac{1}{\beta}} S < K < \bar{K} - \left[\frac{(1+c)A}{(1-\beta)Bp} \right]^{\frac{1}{\beta}} U^* \quad (14)$$

⁵⁶ The alternative scenarios are: (i) small exogeneous transfer of capital to the south; (ii) large exogenous investment to the south when capital is worldly scarce. The first scenario does not produce significant results, since the small capital transfer in the south is not enough to alter significantly the demand for skilled workers by the capitalist sector (wage of skilled workers does not change). In the context of our study, given the very low skills endowment in the SSA countries and the high rate of emigration among the skilled workers, a relevant inflow of FDI from the north is likely to displace a relevant part of the skilled workers from the traditional sector toward the capitalist sector. The second scenario, does not predict a relevant change in factors remuneration and prices. Therefore it produces only a relocation of production. The production of the industrial good is transferred from the north to the south while the reverse happens with the production of the traditional good.

When condition (14) is met, the equilibrium in equation (13) becomes:

$$p\varepsilon B[K^\beta S^{1-\beta} + (\bar{K} - K)^\beta (U^*)^{1-\beta}] = (1 - \varepsilon)A(U - S + cS^* - cU^*) \quad (15)$$

where the output of the traditional sector and the output of the capitalist sector in the south are respectively; $Q_1 = A(U - S)$ and $Q_2 = BK^\beta S^{1-\beta}$, while for the north the outputs are; $Q_1^* = Ac(S^* - U^*)$ and $Q_2^* = B(\bar{K} - K)^\beta (U^*)^{1-\beta}$. In equilibrium, a marginal increase in the capital flowing south, increases the production of the capitalist sector ($dQ_2/dK > 0$). Hence, the increase in production, increases the demand for skilled workers within the country, which leads to an increase in the wages of skilled workers in the south ($dw_s/dK > 0$). The quantities of the good produced in the traditional sector (Q_1 ; Q_1^*) and wages of the abundant factors are not affected by the marginal increase in the capital stock.

3.2.2.3 Factors mobility

As a last step, the model analyses the impact of capital flows on workers' migration when labour is internationally mobile. Capitalists in the north accept to invest in the south if the remuneration of their capital is higher in the south as compared to the north. This higher return may be interpreted as an exogenous risk premium capitalists require for investing in the south, as compared to investing in the north, $\tau > 0$. Thus:

$$K > 0 \Rightarrow \rho = \tau + \rho^* \quad (16)$$

The same logic applies to the skilled workers who intend to move south. Their wages in the south must be higher than the wage they can earn in the north, net of the migration costs of the movement, $\mu_s > 0$. Thus:

$$S > S_0 \Rightarrow w_s = \mu_s + w_s^* \quad (17)$$

where S_0 is the initial population of skilled workers in the south. Similarly, unskilled workers who intend to move north have, to compensate the migration costs $\mu_u > 0$ in order to migrate north. Thus:

$$U^* > U_0^* \Rightarrow w_u^* = \mu_u + w_u \quad (18)$$

where U_0^* is the initial population of unskilled workers in the north.

The new equilibrium, where the factors have no incentives to move, is determined by the set of equations (15), (16), (17) and (18)⁵⁷.

Hence, it is possible to analyze the repartition of factors between countries when the risk premium and migration costs change. At equilibrium, a marginal decrease in the risk premium means that investors expect a higher return in the south as compared to the north, $\tau < \rho - \rho^*$. The capitalist sector expands in the south ($dK/K > 0$) demanding increasing quantities of skilled workers from the north ($dS/S > 0$). Thus, capital flowing in the south attracts skilled migrants from the north.

A marginal decrease in migration costs μ_s , $\mu_s < w_s - w_s^*$, induce skilled workers to move south. The stock of skilled workers in the south increase, allowing an expansion of

⁵⁷ The solution of the equilibrium is not presented here. For more info on the calculus, the paper can be accessed directly in the following link: http://equippe.univ-lille1.fr/digitalAssets/40/40678__2015_-_47__DT.pdf

the industrial sector since the investment is no more compelled by skills scarcity. Hence, the demand for capital increases in the south.

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