The impact of labor mobility on unemployment: a comparison between Jordan and Tunisia

Anda David[*]   Mohamed Ali Marouani [†]

March 4, 2013

Abstract

Jordan and Tunisia are two non-oil exporting MENA countries characterized by high unemployment rates and significant migrant populations. A comparative analysis of the impact of international mobility in the two countries allows us to shed light on the mechanisms through which emigration affects labor market outcomes and reciprocally. We develop a dynamic general equilibrium framework for each economy, with a full-fledged modeling of migration, labor market and education issues. The results show that the global crisis worsened the unemployment situation by increasing labor supply in both countries. This phenomenon was amplified by a significant decrease in labor demand in the Tunisian case. Developing Mode 4 type of exports improves the labor market situation, mainly for high skilled workers. As a consequence, migration and brain-drain would be reduced. Furthermore, an increase in foreign wages has higher benefits in Jordan despite a higher induced migration increase in Tunisia. When the rise is limited to high-skilled migrants' wages, low and medium skilled workers are positively affected in Tunisia and negatively in Jordan. Finally, Mode 4 and high skilled wages increases have clear positive effects on transition rates to superior education, while the other shocks have variable effects, depending on labor market structural parameters in the two countries.

1 Introduction

There is a dynamism within Arab labor markets that brings both opportunity and challenge for economic development. The Arab world is unusually young, with about one third of the MENA population under the age of fourteen. Due to strong investments in public education, those entering the job market for the first time are more highly educated than a generation ago. These factors combine to create an educated Arab workforce that is growing rapidly. For a variety of reasons, domestic markets have not been able to absorb the availability of talent.

Traditionally, attractive wages in oil-exporting Arab countries, the EU and elsewhere has spurred emigration. Remittances have become an important source of external finance in the MENA region, representing over 2 percent of GDP. While some MENA nations are among the top recipients globally of immigration (Saudi Arabia, UAE) others are significant sending nations.

Bilateral negotiations are taking place between host and sending countries involving an increase in temporary migration quotas as an incentive for the latter to better cooperate with the former on illegal migration (for example the agreement between Tunisia and France and the two labor agreements between Egypt and Italy). Moreover, MENA countries involved in the Euro-Mediterranean process started negotiating services liberalization with the EU and their main objective is to obtain the highest concessions for Mode 4 to increase services exports and also to alleviate high unemployment for skilled workers, which is increasing in the region for new graduates (Marouani, 2010).

Increased labor mobility can have a dual payoff: fighting unemployment and enhancing growth through a more efficient use of the available resources, especially human capital. As some countries are labor abundant and other labor importers, a greater cooperation to smooth labor movements can be beneficial for all (Hoekman & Sekkat, 2009). However, the receptivity of governments to facilitate labor mobility is usually lower than for capital mobility, as witnessed by the much larger number of bilateral investment treaties and by countries' reluctance to include labor mobility provisions in trade agreements (Stephenson & Hufbauer, 2010). This disfavors labor abundant developing countries.

Jordan and Tunisia are both labor abundant, migrant sending countries. They followed almost the same path of economic liberalization in the past two decades and suffer from high unemployment rates despite relatively high and sustained growth paths. Tunisia is characterized by a higher stock of migrants, while Jordan is characterized by higher flows and a higher share of remittances to GDP[1]. Tunisians emigrate mainly to Europe while Jordanians seek jobs mainly in the Gulf.

This article explores the economic issues involved with greater labor mobility in Jordan and Tunisia with a focus on the impact on employment and education. The proposed analysis addresses the following questions. How does a variation in migrant wages affect unemployment, wages and the participation rate in sending countries? The role that foreign remittances play may be well understood. To what extent did migration variables contribute to the observed impact of the global crisis? Will services exports involving temporary labor mobility alleviate migration pressures and brain drain? In return, how do domestic employment imbalances affect migration

---

[1]see Figure 2 in the Appendix

2

behavior?

A general equilibrium framework seems well suited for such an analysis due to second round and feed-back effects which can not be captured through a partial equilibrium model. For example, an increase in exports induces a currency appreciation which can have a negative impact on remittances. Lower transfers can lead to a higher domestic activity rate which can offset the initial positive effect of the shock on labor demand. The model developed is intended to take into account these multiple interactions through the endogenization of emigration flows, duration and the remittance rate as well as the activity rate and human capital accumulation.

The rest of the article is organized as follows. Section 2 introduces the main conceptual issues on the migration-labor market nexus and on the service exports entailing labor mobility. Section 3 offers a detailed description of the model, highlighting the innovative aspects, while section 4 presents the institutional aspects regarding service exports and migration regimes. In section 5 we conduct the counterfactual experiments and section 6 concludes.

2 Conceptual issues

While studies on the impact of migration on host countries are still dominant, interest in the emigration impact on the home country's labor market is increasing (Hanson, 2009). The outflow of workers has various effects, depending on workers' skill composition and their substitutability or complementarity (Hanson, 2010). Most studies on this issue focus on the impact of immigration on the country's wage structure. Adapting the framework proposed by Borjas (2003) to a sending country case, Mishra (2007) estimates that the decrease in the Mexican labor supply between 1970 and 2000 due to emigration increased the wage level by 8%. With a more detailed approach, Aydemir & Borjas (2007) show that due to the skill composition of the Mexican emigration, relative wages increased for the medium skilled and decreased for those at the bottom of the skill distribution. Finally, taking into account both emigration and immigration effects, Bayangos & Jansen (2011) argue that emigration had a negative impact on European wages, thus offsetting the positive effect of immigration. This result is due to a higher skill composition of the European outflows compared to the inflows.

Moreover migration impacts labor markets through remittances and education. The literature on remittances is very extensive, covering all aspects, from their determinants[2] to their macroeconomic impacts[3]. McKenzie & Sasin (2007) draw a complete picture of the relevant questions in migration research and highlight the importance, in terms of policy making, of disentangling the channels through which migration and remittances impact welfare. One of these channels is the labor market, with its various components. Thus, they highlight that the impact of migration can not be studied separately from the impact of remittances and vice versa. A first strand of the literature shows that remittances tend to decrease non-migrants labor supply acting as a disincentive for labor participation and/or worked hours, which are replaced by extra leisure (Funkhouser, 1995; Rodriguez & Tiongson, 2001; Kim, 2007). However, lower labor participation in remittance receiving households can be explained by a higher probability to be involved in self employment or non-wage activities, in order to replace the migrant, or to be involved

---

[2]For a review of the literature on the determinants of remittances see Rapoport & Docquier (2006); Carling (2008)

[3]See Amuedo-Dorantes & Pozo (2004); Acosta *et al.* (2009); Bayangos & Jansen (2011)

in higher education since, due to remittances, households can invest in education (Yang, 2008; Lokshin & Glinskaya, 2009).

Nevertheless, as Dustmann & Mestres (2010) point out, remittances have to be studied in connection to different migration forms since the remitting behavior depends strongly on whether the migration is temporary or permanent. Indeed, the decision to remit (and the amount remitted) and the decision on the migration length are taken jointly. On the one hand, the migrant (and her family) can decide on the optimal amount to be remitted accordingly to the expected time to be spent abroad. For instance Bauer & Sinning (2011), as well as Dustmann & Mestres (2010), confirm that temporary migrants remit more on average than permanent migrants. On the other hand, the length of migration can be decided in order to meet the family needs and the migrant earnings. While this mechanism of remittances determining the optimal migration duration is almost absent in the literature, it has already been shown that savings [4] determine the length of the stay in the host country (Kirdar, 2009; Dustmann & Mestres, 2011).

The temporary nature of migration is far from new in economic debates and the importance of return migration has been often highlighted in the literature (Böhning (1987); Jasso & Rosenzweig (1982); Dustmann *et al.* (1996)). Nevertheless, in macroeconomic models, migration is always considered as permanent (Dessus & Nahas, 2008), except for the recent works on workers' mobility under Mode 4 (Walmsley & Winters, 2005; Commander *et al.*, 2008). However, the latter's shortcoming is the use of a global model that does not allow a detailed analysis of a specific country's labor market.

Finally, another channel through which migration impacts labor supply is education. In addition to higher returns to education being the main driver for skilled migration (Hicks, 1932), the most common mechanism highlighted in the literature is the incentive to pursue higher education.

Brain-drain remains the most debated issue regarding the topic "'migration and education"' (Bhagwati & Hamada, 1973; Docquier & Rapoport, 2009). As Mountford (1997) and Stark *et al.* (1997) argue, the outflow of skilled migrants will have a positive externality on non-migrants, by increasing their skill premium and thus encouraging them to invest in education. Of course, the magnitude of this effect will depend on the probability to migrate and is conditioned on stayers not fulfilling their expectations. Stark & Wang (2002) even argue that this effect can replace education subsidies if the Government allows an optimal level of skilled migration. Pointing out the endogeneity of education subsidies, Docquier *et al.* (2008) emphasize the increase in inequality entailed by the replacement of education subsidies with a prospect to migrate.

Dessus & Nahas (2008) introduce the education and migration aspects in a general equilibrium model and find that higher migration rates do not always entail higher investment in education, the migration-education nexus being strongly influenced by structural parameters.

Using a general equilibrium model with altruistic households, Baas & Melzer (2012) analyze the macroeconomic impact of remittances through three main channels, namely the exchange rate, savings decisions and labor supply. They show that the increase of migrant outflows of transfers from Germany has a positive effect on the German economy through a converse dutch disease effect. The manufacturing sector which exports a significant part of its production is the main beneficiary, while the effects on the service sector are less favorable.

---

[4]Savings can be treated as remittances, such as in Bauer & Sinning (2011)

Bussolo & Medvedev (2008) analyze the interactions between remittances and labor supply in Jamaica using a general equilibrium model. They find that an increase in remittances generates a reduction of labor supply and a wage increase. This induces an appreciation of the real exchange rate and thus reduces the country's competitiveness.

The two main shortcomings of the general equilibrium analyses presented above are the absence of unemployment modeling as well as a modeling of the emigration decision for the latter paper.

Temporary migration has been seen as a means to limit illegal migration (Amin & Mattoo, 2005) and, using a theoretical model, Bchir (2008) shows how, more than temporary migration, labor mobility under Mode 4 agreements is a better solution for fighting illegal migration. Nevertheless, literature on mode 4 mobility remains scarce and mostly based on GTAP[5] simulations. Hence, Walmsley & Winters (2005) and Winters *et al.* (2003) find significant welfare gains associated with the increase of mobility through Mode 4 agreements. Their conclusion is supported by Collyer (2004) in his review of the existing labor mobility schemes for Morocco and Egypt. After putting into perspective the relative advantages of temporary migration compared to permanent migration, Hoekman & Özden (2010) highlight the relevance of temporary mobility for the MENA context and develop the idea of using Mode 4 as a partial substitute to migration. Indeed, they argue that the temporary nature of the demographic 'bulge'[6], the magnitude of the brain-drain phenomenon and the 'reciprocity' conditions of trade agreements place the temporary movement of natural persons as one of the best means to strengthen economic ties within the European Neighborhood Policy. Yet, the same is true not only for the EU-MENA ties, but also for the intra-MENA integration, as argued by Hoekman & Sekkat (2009) and Hoekman & Sekkat (2010).

3 Description of the model

The analysis is based on a general equilibrium model with a focus on migration and labor market issues. The model formalizes the emigration decision, its duration and the evolution of the remittances rate. It includes an endogenous labor supply function which depends among other factors on migrants remittances. Labor demand is disaggregated by sector, skill and age following Marouani & Robalino (2012). Finally the production of skills is modeled with an endogenization of transition rates between cycles.

3.1 **Migration, local labor supply and education**

Migration decision

Each participant decides if she stays at home or migrate depending on relative wages, following a constant elasticity of transformation function:

---

[5]General equilibrium model developed under the Global Trade Analysis Project by the Center for Global Trade Analysis, Department of Agricultural Economics, Purdue University.
[6]Fargues (2009)

$$LST_{f,a} = \left(al_{f,a} \cdot LSL_{f,a}^{1+\frac{1}{sig1}} + am_{f,a} \cdot EMIG_{f,a}^{1+\frac{1}{sig1}} \right)^{\frac{1}{1+\frac{1}{sig1}}} \quad (1)$$

$$EMIG_{f,a} = al_{f,a} \cdot LS_{f,a} \left(\frac{W_{EMIGf,a}}{W_{LSf,a}} \right)^{sig1} \quad (2)$$

Local labor supply

To endogenize the labor force participation rate we introduce a consumption-leisure trade-off in a Stone-Geary utility function following Barzel & McDonald (1973) and Bussolo & Medvedev (2008). After taking into account the household's budget constraint, labor supply is determined by the following equation:

$$LS_{f,a} = (1 - \mu_0)LSpot_{f,a} - \frac{\mu_0}{W_{lf,a}}(HC - \sum_{i=1}^{N} p_i c_i) \quad (3)$$

where LS is the labor force participation, $LSpot$ is the working age population, μ_0 is the share of leasure in total consumption, W_l is the local wage, HC is total household consumption and c_i is the consumption of good i with price p_i.

The implication of this equation is that a decrease in HC due to lower remittances will induce an increase in labor force participation.

Migration duration and remittances

We introduce the idea of temporary migration in a CGE model using the theoretical models developed by Dustmann (2003) and Kirdar (2010), along the lines of (Stark *et al.*, 1997).

Since consumption and migration duration are intertwined, the model is based on a joint decision framework where the migrant maximizes her consumption in the host and home country according to her preferences under three constraints. The first one is a usual budget constraint that takes into account wages in the home country, wages in the host country less remittances and purchasing power parity between the host and home country. We add two other constraints : the existence of a minimum consumption level and a migration duration that has to be higher than zero and lower than the duration of the remaining worklife. If the chosen utility function is the following:

$$u(c) = \begin{cases} \frac{c^\alpha}{\alpha}, \alpha < 1 \text{ and } \alpha \neq 0 \\ \ln(c) \end{cases} \quad (4)$$

and $1/(1-\alpha)$ is the elasticity of intertemporal substitution of consumption, then the solution will be:

$$t_f^* = \frac{\tau_f(1-\alpha)p^{\alpha/(\alpha-1)}[WL_f/(W_{EMIGf}-RR_f)] + \tau_f\{\alpha p - [WL_f/(W_{EMIGf}-RR_f)]\}}{(1-p^{\alpha/(\alpha-1)})\{p - [WL_f/(W_{EMIGf}-RR_f)]\}}$$

(5)

where t^* is the optimal migration duration, τ is the total lifetime, w_o and w_d the wage level in origin and destination country and p the purchasing power parity between the two countries.

Following Rapoport & Docquier (2006), we consider that a migrant's utility function depends not only on her income, but also on the welfare of her family in the home country and her degree of altruism. The household's welfare is proxied by its disposable income. By deriving this utility function, we compute the remittance rate per migrant as follows:

$$RR_{lf} = gamma_{mlf} * W_{EMIGlf} + (1 - gamma_{mlf}) * YD$$

(6)

with $gamma_m$ being the altruism coefficient.

Education and supply of skills

The evolution of the total labor force by skill is driven by the population growth rate, by the current stocks of students in each cycle and by the performances of the education system at each level (pass, repetition and drop-out rates by cycle and transition rates from each cycle to the next one).

We use a model developed by Fredriksson (1997) in order to link migration and education incentives and endogenize the transition rates from primary to secondary and from secondary to tertiary. Fredriksson (1997) shows that an increase in the university wage premium has a positive effect on enrollment decisions. He argues that, when faced with the decision to follow their education to the university level, individuals make their choice depending on their schooling abilities and the relative wage premium. Our approach is similar in the sense that individuals will choose to pursue their education according to the relative skill wage premium, which also depends on foreign skilled wages. The equation for the transition rate from primary to secondary will be the following:

$$\log\frac{PERF_{trans,edus}}{(1 - PERF_{trans,edus})} = \alpha_{perf} * \log\frac{wmoy_{MSK} * (1 - U_f)}{wmoy_{LSK} * (1 - U_f)}$$

(7)

and the equation for the transition rate from secondary to tertiary:

$$\log\frac{PERF_{trans,edut}}{(1 - PERF_{trans,edut})} = \alpha_{perf} * \log\frac{wmoy_{HSK} * (1 - U_f)}{wmoy_{MSK} * (1 - U_f)}$$

(8)

3.2 Production, labor demand and wages

The production function

Production factors are subdivided in 4 items, capital plus three labor categories: unskilled (primary and less, LSL), skilled (secondary, MSL) and highly skilled workers (tertiary education, HSL).

The production function is a nested one[7]. At the highest level we assume that production is a Leontief function of value added and total intermediate consumption. The demand for capital and the 3 skills levels is modelled through a nested CES (Constant Elasticity of Substitution) function at 2 levels, which allows for differentiated elasticities of substitution between the different factors(see equations 10, 11, 12 and 13).

Capital and highly skilled labor have been modeled as relatively complementary(see equation 14), following the Fallon-Layard hypothesis which has been confirmed by various empirical studies (Fallon & Layard, 1975). The third level describes the allocation of labor demand between youth and non youth(see equation 15).

Wage setting

At the macro-economic level, formal wages by skill are set following a wage curve which allows a trade-off between wages and unemployment. This means that formal wages are not adjusted to "clear" the formal labor market(see equation 16). Sectoral wages are linked to macro-economic wages by exogenous wage differentials which reflect different productivity levels (see equation 17).

3.3 Closures and dynamics

The closures of the model

The model has five closures: a macro closure, a government closure, an external balance closure, a labor market closure and a closure of the social security accounts. Concerning the macro closure, it is savings driven (households' marginal propensity to save is exogenous), which means that the level of investment is determined by the level of total available savings in the economy (including foreign savings). Hence as savings increase, the stock of capital and output increases. The government closure chosen consists in fixing government expenditure as a constant share of GDP and tax rates and leaving the government budget balance endogenous. The foreign balance closure consists in fixing the current account balance at its observed level. The formal labor market closure consists of a joint determination of unemployment and average formal wages through the wage curve described above.

The dynamics of the model

Model dynamics are of the sequential type. Capital accumulation is sectoral. Each year the stock of capital in each sector corresponds to last year's stock plus new investment, minus the depreciation of capital. Sectoral investment has been modeled as a function of the sectoral stocks of capital, sectoral rates of return to capital and capital acquisition costs. As previously mentioned, the evolution of the active population by skill is modeled within the education block, which relies on the actual performance rates of the education system in Jordan (pass, repetition

---

[7]See figure 1

and drop-out rates by cycle and transition rates between cycles). Government and foreign debts increase (decrease) with the yearly level of the net deficit (surplus) of Government and foreign savings.

4 Mode 4 and migration regimes

4.1 Mode 4

As a response to the increase in services trade, the 'General Agreement on Trade in Services' (GATS) emerged from the Uruguay Round, entering into force in 1995. It covers all types of trade in services except for public services and those related to traffic rights in air transport services. GATS defines four modes of supply :

- *Mode 1* : Cross-border supply

- *Mode 2* : Consumption abroad

- *Mode 3* : Commercial presence

- *Mode 4* : Movement of natural persons

Under Mode 4 movements of service suppliers are contract-based while under temporary migration there is an employer-employee relationship.

Despite a low integration in terms of merchandise trade, the Arab region is better integrated regarding trade in services and this expansion of services might prove to be a significant opportunity in terms of employment (Hoekman & Sekkat, 2010). Nevertheless, services tradability is often limited by nationality or qualification requirements and Borchert *et al.* (2012) show that mobility under Mode 4 is the most heavily regulated, with the Gulf countries having the most restrictive trade policies regarding services.

Hoekman & Özden (2010) developed the idea of using Mode 4 as a partial substitute to migration within the European Neighborhood Policy framework. Indeed, despite the demographic and economic complementarities arguing strongly for an increase of migration flows from MENA countries, political obstacles remain strong in the EU and could be reinforced by the current economic crisis. Moreover, there is a growing concern about brain drain in the MENA region, mainly when the education of graduates has been financed by sending countries. Developing Mode 4 temporary movement of workers can be mutually desirable for sending and receiving countries. It has less political and socio-cultural costs in host countries and it could reduce brain drain while giving new opportunities to MENA graduates. This potentially appealing scheme has yet to be modeled and its impact quantified.

Barriers to services trade are understood to differ from traditional border barriers in that the service generally involves direct contact or proximity between the client and the provider. In a study involving modes 1 and 3, Konan & Maskus (2006) find that Tunisia services liberalization expands border trade and increases market competitiveness in domestic services sectors. Thus services liberalization creates expanded opportunities for gains from trade that outpace that of goods market liberalization.

Figure 1: Service Trade Restriction Index (STRI) in professional services by region and sub-sector (Modes 1, 3 and 4)
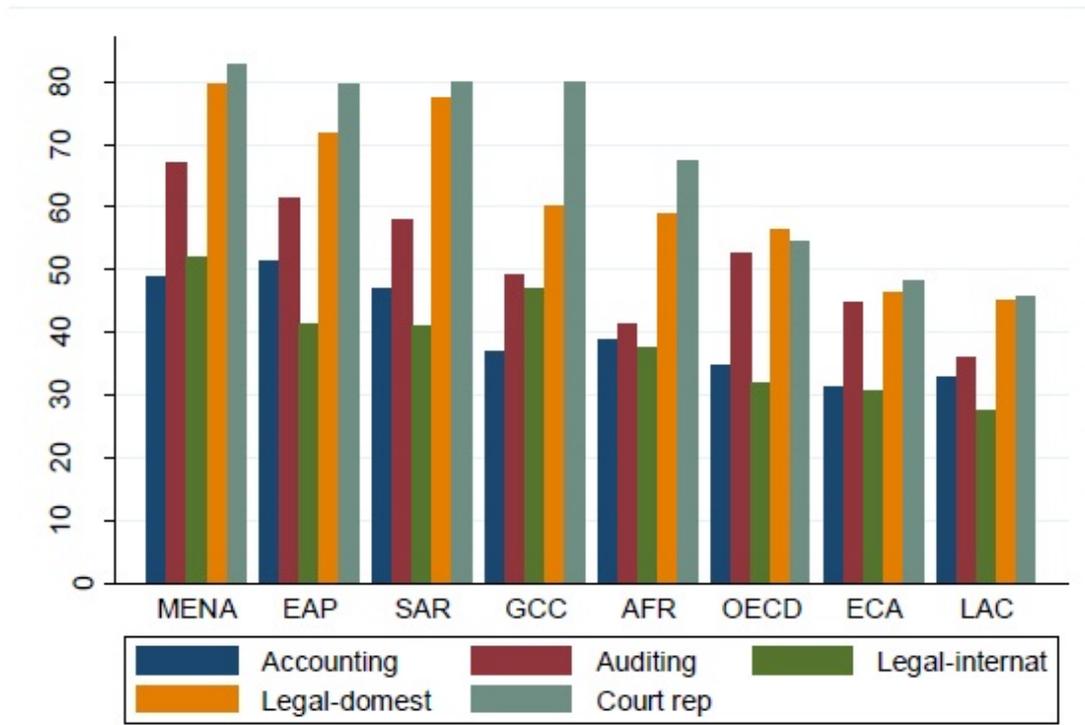
Source: Borchert et al. (2012)

Note: 'Legal-internat' denotes the sector providing legal advice on international law; 'Legal-domest' denotes the sector providing legal advice on domestic law; 'Court rep' denotes the sector providing legal representation before a domestic court. STRI of accounting, auditing, legal advisory services for international and domestic law covers modes 1, 3, and 4. The STRI of court representation covers modes 3 and 4.

Bchir (2008) develops a theoretical model to study the links between Mode 4 and illegal migration. His conclusion is that developed countries can define an optimal Mode 4 quota which minimizes illegal migration. If the level of the quota is too low it does not constitute a sufficient incentive and if it is too high it can encourage illegal overstaying for Mode 4 workers. The remaining literature on Mode 4 deals mainly with the impact of further liberalization within the GATS multilateral framework (Walmsley & Winters, 2005; Winters et al., 2003). The authors use the GTAP model and simulate the liberalization of mode 4 through an increase of labor supply in receiving countries and a decrease in sending countries. They find that the costs of barriers to temporary movement of people are around 150 billion US$. As the authors themselves notice, modeling "the movement of natural persons" as a simple variation in labor supply overlooks a

series of institutional issues linked to trade in services barriers.

During the last three decades, many economic agreements have been signed in the MENA region at the bilateral, regional and international levels. Most of them aimed at liberalizing trade of goods and commodities and only some of these agreements attributed some importance to services liberalization. The objective of this section is to provide an analysis based on the text of different trade agreements in order to see to what extent services liberalization generally and labor mobility particularly are taken into account.

Marchetti & Roy (2009) show that the WTO, where power relationships are not as asymmetrical as in bilateral negotiations, constitutes a better forum for developing countries to obtain concessions in the area of services liberalization and especially mode 4 issues. In the Uruguay Round, under the auspice of the WTO, commitments related to mode 4 were limited to two categories: intra-company transferees (managers and technical staff related to a commercial presence) and business visitors (short-term visitors). In 1995, only six WTO members improved their commitments related to the movement of natural persons (Australia, Canada, Norway, the European Committee, India and Switzerland).

Later on, many countries, including those of the MENA region participated in the Mode 4 negotiations. These talks ended up with very shallow commitments characterized by two things: first, most of the commitments were made on a horizontal basis (applicable without distinctions to all sectors included in the schedule of a member); second, most of the members' commitments were unbound and then they have added some exceptions by granting admission to selected categories of persons such as those who are linked to a commercial presence and highly skilled ones (managers, executives and specialists).

At the MENA region level, all countries except Egypt have unbound commitments with some exceptions for special groups as it will be shown later. In addition, it is worth to mention that there are two particular cases. The first one is Lebanon that is not a member of the WTO, so it has no commitments. Second, while Bahrain has some commitments in Mode 3, it does not have any commitment related to Mode 4.

In order to estimate the potential Mode 4 flows, the literature suggests looking at the balance of payments components such as exports in services and compensation of employees or migration and tourism statistics (Cattaneo & Walkenhorst, 2010; Magdeleine & Maurer, 2008). If we look at the sectoral exports, compensations and remittances as a share of total services exports, we can see that Jordan's exports of business services represents 12.8% of total service exports, while those of Tunisia only represent 5.3%, meaning that Mode 4 exports will potentially be higher in Jordan than in Tunisia. The relatively high share of employees' compensations in the Jordanian case indicates that labor is exported through other modes and its high level of remittances (70.5% of total service exports) highlights the importance of workers' mobility.

4.2 Migration regimes

Visa requirements have clearly been identified as a constraint for labor mobility thus leading to important costs in terms of misallocation of labor across countries (Ng & Whalley, 2008). Some trade agreements such as NAFTA include visa agreements or other mechanisms that smooth the visa processing services. A GATS visa system was proposed, aiming directly towards the facilitation of Mode 4 procedures, but the WTO's legitimacy in managing visas was questioned.

Table 1: Sectoral exports, compensations and remittances as a share of total services exports in 2008

	Construction services	Business services	Compensation of Employees	Remittances
Egypt	5.4%	7.2%	..	34.9%
Jordan	..	12.8%	14.2%	70.5%
Morocco	0.5%	15.0%	..	51.4%
Tunisia	4.9%	5.3%	4.2%	28.7%

Sources: Authors' calculations based on TradeMap (ITC) and International Monetary Fund statistics.

Applying for a visa can be time-consuming and also complicated in terms of bureaucratic and administrative procedures. The uncertainty regarding the delays for obtaining a visa might discourage the imports of mode 4 services as well as having a negative impact on business relationships. The lack of transparency and harmonization of visa systems burdens labor mobility, entailing thus an important opportunity cost, in addition to the financial cost represented by the fees that the visa applicant has to pay. The duration of the visa is another essential element since having to go through the entire complex and costly procedure of requiring a visa more or less frequently can make a considerable difference when considering alternative trade strategies.

The main impediment to the movement of natural persons arises from labor market laws in MENA countries, although those rarely distinguish between temporary and permanent labor mobility. Restrictions in this category include burdensome and costly procedures for work permits, limitations on the length of stay, quantitative limits on work permits and sectoral bans, job nationalization, educational conditions, restrictions on foreign investment and restrictions on the mobility of family members.

The recognition of diplomas and qualifications is a crucial element of employment mobility, as it involves optimal labor placement in terms of individuals' welfare and host country's productivity. The acknowledgment of qualifications allows workers to access jobs that correspond to their skills and avoid negative effects of over-qualification. The establishment of a regional or international system for the recognition of professional qualifications can contribute to the prevention of "brain waste". The Mutual Recognition Agreements proposed by the WTO (OECD, 2003) have only been concluded so far by developed countries and developing countries from South America. In the MENA region, little work has been done on how recognition of diplomas operates and how it is integrated into the labor market.

Lately, the debates have underlined the role of National Qualification Frameworks (NQF) systems and quality assurance (QA) as enablers of sustainable reforms based on learning outcomes in the areas of technical education and vocational training and in higher education. The European Training Foundation developed a project helping Egypt, Jordan, Morocco and Tunisia to develop an NQF that should relate different levels of education and training and ensure the portability of qualifications and skills across countries. Finally, there is a recent example of efforts

toward regional recognition of qualifications. In December 2009 the World Bank, the European Training Foundation and the French Development Agency launched a program called " Regional Harmonization of standards, qualifications and insurance mechanisms in post-primary education", aiming to develop the management capacity of higher education institutions and provide mechanisms for quality assurance to enable them to participate in mutual recognition of qualifications and standards. This program should help higher education institutions and quality assurance agencies in the MENA region to reach European standards. Even though this program is not strictly directed towards promoting greater intra-regional labor mobility, it will improve mutual recognition of qualifications between MENA countries.

5 Experiments

This section discusses the impact of various shocks on labor supply and demand, unemployment, emigration (level and duration), remittances and the other variables mentioned above. The results presented in the tables are in comparison to the baseline or reference scenario. Four experiments are run: Simulation (A): What the situation would have been without the global crisis; Simulation (B): What would be the impact of service exports increase? Simulation (C): What are the effects of an increase in foreign wages? Simulation (D): What happens if the increase in foreign wages is limited to skilled workers?

5.1 The impact of the global crisis

To disentangle the contribution of the different variables to the global crisis' observed outcome, we run a retrospective simulation. In the baseline, which serves as a counterfactual, the model is calibrated using the growth rates projected by the IMF before the economic downturn. In the crisis simulation, the model is re-calibrated with the actual growth rates until 2012 and the most recent IMF forecasts for the 2013-2015 period. The results can thus be interpreted as the variation in outcomes induced by the crisis, including the effects of the revolution for the Tunisian case.

The crisis, having a deeper impact on Europe, hit more severely the Tunisian economy. The consequences were a higher investment and labor demand decreases and thus a higher rise of unemployment as compared to Jordan. Moreover, emigration decreases more for Tunisia in the pre-revolution period because its migrants' main destination countries were more affected than Jordanian migrants' host countries. After 2012, emigration increases at a higher pace in Jordan, thanks to a quicker economic recovery in Gulf countries.

Furthermore, remittances' decline is higher in Tunisia due to two main factors. Firstly, the crisis entailed a significant decrease in migrants' incomes, especially in Europe, thus limiting their ability to remit. Secondly, lower growth also means a lower depreciation of the exchange rate given that the two countries have a structural deficit in their trade balances. This amplifies the negative impact on migrants remittances. This phenomenon is more pronounced in Tunisia.

Despite the higher decrease of remittances in Tunisia, we observe a similar effect on Jordanian activity rates because remittances represent a much higher share of households' revenues in Jordan.

Table 2: Macro results

	Tunisia		Jordan	
	2008-2010	**2011-2015**	**2008-2011**	**2012-2015**
GDP Growth (p.p.)	-2.3%	-3.6%	-1.6%	-2.8%
Emigration	-3.3%	0.9%	-0.5%	2.3%
Total investment	-4.7%	-29.5%	-2.2%	-15.4%
Local labor demand	-0.4%	-3.6%	-0.1%	-0.8%
Total potential active population	0.0%	0.0%	0.0%	0.3%
Total unemployment (p.p.)	1.1%	4.8%	0.6%	3.5%
Total activity rate (p.p.)	0.4%	1.0%	0.3%	1.2%
Remittances	-11.5%	-21.9%	-3.8%	-13.3%
Exchange rate	-1.2%	-9.0%	-0.7%	-6.5%

Table 3: Results by skill

	Tunisia	**Jordan**
Number of unemployed		
Low skilled	24.2%	21.9%
Medium skilled	20.2%	19.2%
High skilled	11.9%	12.4%
Activity rate (p.p.)		
Low skilled	0.4%	0.6%
Medium skilled	1.1%	1.0%
High skilled	1.1%	0.8%
Emigration		
Low skilled	0.4%	1.4%
Medium skilled	-0.9%	1.0%
High skilled	-4.8%	-0.3%
Transition rates		
Secondary education	3.4%	-0.7%
Higher education	1.2%	0.9%

Low and medium skilled workers were the most affected by the crisis in both countries for different reasons. In Tunisia the low skilled unemployment rate is the lowest, which means that an equivalent decrease of labor demand (for the three skill levels) has a higher impact on unskilled unemployment. In Jordan, the low skilled are characterized by the highest increase of their labor supply (given their initial low activity rate), resulting in a higher rise of their unemployment rate.

The unemployment outcomes are translated in terms of outmigration structure. High skilled migration decreases in both countries but relatively more in Tunisia (-4.8% versus -0.3%) because highly educated workers' wages decline more in host countries than in home countries.

The wage and unemployment variations had a similar positive impact on both countries transition rates from secondary to higher education. Nevertheless, while the impact on secondary enrollments was negative in Jordan, it was significantly positive in Tunisia due to higher losses in terms of wages and unemployment for the low skilled.

5.2 The impact of a Mode 4 agreement

The balance of payments can give us an idea on the value of service exports, but it does not distinguish between Mode 1, Mode 2 and Mode 4 exports. Isolating the value of Mode 4 services in total exports might prove to be difficult, but, as Cattaneo & Walkenhorst (2010) point it out mobility under Mode 4 exports is an important component in service sectors such as accounting, construction, engineering, information technology, or legal services. Therefore, we simulated an increase in exports potentially intensive in mode 4 transactions.

Table 4: Macro results

	Tunisia	Jordan
GDP Growth (p.p.)	0.1%	0.1%
Emigration	-2.9%	-1.1%
Total investment	1.1%	0.5%
Local labor demand	0.3%	0.5%
Total potential active population	-0.5%	0.1%
Total Unemployment (p.p.)	-0.8%	-0.2%
Total activity rate (p.p.)	-0.1%	0.1%
Remittances	-3.1%	-1.6%
Exchange rate	-0.9%	-0.5%

The impact of the shock on GDP is similar in both countries. However, we notice a higher impact on investment (1.1% versus 0.5%) due to higher capital gains in Tunisia. Given that service exports represent a higher share in total exports in Tunisia the currency appreciation is higher (-0.9% versus -0.5%), resulting in lower migration[8] (-2.9% versus -1.1%) and remittances (-3.1% versus -1.6%) than in Jordan. While the activity rate increases slightly (0.1 percentage point) in Jordan due to the remittances reduction, it decreases in Tunisia (-0.1 percentage point)

---

[8]We remind that the migration decision and the remittance rate vary positively with the local currency depreciation.

15

reflecting the higher impact of capital gains on households' income. Thus the unemployment reduction is higher in Tunisia (-0.8 percentage point versus -0.2 in Jordan).

Table 5: Results by skill

	Tunisia	Jordan
Number of unemployed		
Low skilled	-2.5%	-0.7%
Medium skilled	-5.4%	-1.4%
High skilled	-7.3%	-1.9%
Emigration		
Low skilled	-2.0%	-0.8%
Medium skilled	-2.9%	-1.2%
High skilled	-4.2%	-1.6%
Activity rate (p.p.)		
Low skilled	-0.1%	0.1%
Medium skilled	-0.1%	0.2%
High skilled	-0.1%	0.3%
Transition rates		
Secondary education	11.2%	1.7%
Higher education	1.1%	0.5%

We find evidence of a skill bias regarding unemployment reduction for the two countries, slightly higher in Tunisia due higher investment growth, given the capital-skill complementarity. This bias translated in migration by skill, with high skilled migration intentions decreasing the most (-4.2% in Tunisia and -1.6% in Jordan).

Activity rates decrease in the same proportions for all categories in Tunisia, while they increase with the education level in Jordan. As we explained above, the Tunisian outcome is explained by the high increase in capital gains that offsets the positive impact of lower remittances and higher skilled wages on skilled labor supply.

Furthermore, non youth benefit more than youth in terms of wages and unemployment reduction. In Tunisia, highly educated youth reap the same benefits as high skilled non youth, while in Jordan highly educated non youth benefit more in terms of both wages and unemployment. The reason lies in a higher skilled youth intensity of labor demand in service sectors in Tunisia. Thus increasing mode 4 exports would be more efficient in terms of youth inclusiveness in Tunisia.

The skill bias mentioned above entails a significantly higher incentive to pursue secondary education in Tunisia (11.2% versus 1.7% in Jordan). It also has a positive impact on transition rates to tertiary education in both countries (1.1% in Tunisia and 0.5% in Jordan).

5.3 The impact of an increase in foreign wages

This scenario analyzes the impact of an increase in foreign wages (by 3% per year) on domestic labor markets. Symmetrically, it could be to infer the impact of a negative shock affecting host

Table 6: Simulation results by skill and age

	Tunisia	Jordan		Tunisia	Jordan
Number of unemployed			**Equilibrium Formal Wage**		
Low skilled			*Low skilled*		
Youth	-2.2%	-1.0%	Youth	0.4%	0.2%
Non youth	-3.9%	-0.6%	Non youth	0.9%	0.2%
Medium skilled			*Medium skilled*		
Youth	-4.4%	-1.1%	Youth	0.9%	0.3%
Non youth	-5.6%	-1.6%	Non youth	1.1%	0.4%
High skilled			*High skilled*		
Youth	-7.4%	-1.3%	Youth	0.8%	0.4%
Non youth	-7.4%	-4.4%	Non youth	1.5%	1.1%

countries.

Table 7: Macro results

	Tunisia	Jordan
GDP Growth (p.p.)	0.0%	0.2%
Emigration	6.5%	2.7%
Total investment	1.3%	3.5%
Local labor demand	-0.1%	-0.3%
Total potential active population	0.0%	-0.2%
Total unemployment (p.p.)	-0.4%	-1.0%
Total activity rate (p.p.)	-0.3%	-0.5%
Remittances	15.3%	10.4%
Exchange rate	-0.6%	-1.7%

The shock induces a significant increase in remittances (15.3% in Tunisia and 10.4% in Jordan). The rise is lower in Jordan because remittances represent a higher share of GDP, thus affecting relatively more the exchange rate and households revenues, which by feed-back[9] exert a downward pressure on the remittance rate. Another reason for the lower rise of remittances in Jordan is the higher currency appreciation (-1.7% versus -0.6% in Tunisia). Furthermore, given that remittances have a higher impact on the Jordanian economy, they lead to a higher increase in investment (3.5% versus 1.3% in Tunisia) and in GDP (0.2% versus 0% in Tunisia). The rise in remittances and the higher increase in investment result in a higher impact on the activity rate in Jordan (-0.5 percentage point versus -0.3 percentage point in Tunisia).

The higher decrease of the activity rate in Jordan is reflected in a more significant unemployment reduction (-1 percentage point versus 0.4 percentage point in Tunisia). Still, the fall in

---

[9]The domestic household feed-back effect acts through the altruism mechanism

unemployment in Jordan is also due to the decline of the working age population induced by the increase in emigration. Indeed, migrant outflows represent a higher share of the total labor force in Jordan, therefore their increase reduces the working age population, whereas there is no such effect in Tunisia.

In terms of emigration, the initial positive effect induced by the increase in foreign wages is limited in Jordan by the feedback effects resulting from the fall in unemployment and the rise in local wages. Moreover, this increase in wages induces a fall in labor demand, which, coupled with the investment increase, indicates evidence of substitution of labor by capital.

Table 8: Results by skill

	Tunisia	Jordan
Number of unemployed		
Low skilled	-4.3%	-11.8%
Medium skilled	-3.4%	-10.2%
High skilled	-1.2%	-6.9%
Activity rate (p.p.)		
Low skilled	-0.2%	-0.5%
Medium skilled	-0.3%	-0.6%
High skilled	-0.1%	-0.5%

High skilled unemployment decreases the least of all skill categories because their initial unemployment was the highest. In Tunisia, the difference is more important with regard to the other skill levels because the high skill activity rates decrease only slightly thus limiting the unemployment reduction.

5.4 Increase in high skilled wages

The scenario consists in increasing high skilled foreign wages by 6% per year above the baseline scenario. The wages of the other categories continue to grow at the reference scenario rate. The aim of this simulation is to analyze the impact of a high skilled biased shock on the labor market and in particular the indirect effects on the other categories.

The results at the macro level are similar to the ones observed in the previous scenario, but of lower intensity. The main differences are that remittances variations in both countries are much closer in this simulation. Despite this similarity, the impact on investment and the exchange rate is higher in Jordan due to a larger share of remittances in GDP. Moreover, the total activity rate does not vary anymore in Tunisia, while it slightly decreases in Jordan (-0.1%).

The shock benefits high skilled workers in terms of unemployment reduction in both countries, but the magnitude is very different (-2.1% in Tunisia versus -14.1% in Jordan). The unemployment outcomes of the other categories are also dissimilar with an increase of unemployment for low and medium skilled in Jordan and a decrease in Tunisia. The higher decrease of unemployment in Jordan is due to a higher decline of activity rates (-0.9% versus -0.2% in Tunisia) despite a lower increase in emigration (8.2% versus 16.9% in Tunisia). The negative impact on

Table 9: Macro results

	Tunisia	Jordan
GDP Growth (p.p.)	0.0%	0.1%
Emigration	2.3%	1.2%
Total investment	0.6%	1.9%
Local labor demand	0.1%	0.0%
Total potential active population	0.0%	-0.2%
Total unemployment (p.p.)	-0.1%	-0.3%
Total activity rate (p.p.)	0.0%	-0.1%
Remittances	6.4%	5.6%
Exchange rate	-0.2%	-1.0%

Table 10: Unemployment by skill and education

	Tunisia	Jordan
Number of unemployed		
Low skilled	-0.6%	1.1%
Medium skilled	-0.4%	0.1%
High skilled	-2.1%	-14.1%
Activity rate (p.p.)		
Low skilled	0.0%	0.2%
Medium skilled	0.0%	0.2%
High skilled	-0.2%	-0.9%
Emigration		
Low skilled	-0.5%	-0.8%
Medium skilled	-0.5%	-1.2%
High skilled	16.9%	8.2%
Transition rates		
Secondary education	-0.6%	0.7%
Higher education	0.4%	5.3%

low and medium skilled workers is due to an increase of their activity rates in Jordan, while these rates do not vary in Tunisia. These two results reflect the significant impact of remittances on households' incomes in Jordan.

The outcomes observed in terms of unemployment are also reflected in terms of wage variations with a significant increase of high skilled wages in Jordan (2% for the youth and 4.9% for the non youth), versus a limited rise for Tunisian high skilled workers (0.3 and 0.4%). The increase for the non youth is higher than for the youth in Jordan because their unemployment rate is initially much lower, thus putting additional upward pressure on their wages when unemployment decrease. The consequences of these wage variations are a slightly stable labor demand in

Tunisia versus a decrease in Jordan, more marked for elderly workers.

Wage distribution effects are limited in Tunisia with a slight increase of high skilled wages vis a vis low and medium skilled ones. In Jordan wage inequality increases across skills and among age categories. High skilled see their wages increase significantly vis a vis the two other skill levels. If we consider the age dimension across skills, the low and medium skilled non youth are more affected, while the high skilled non youth are the main beneficiaries of the shock.

Higher skilled migrants' wages are a very strong incentive for tertiary education in Jordan (the transition rate increases by 5.3%) but have a limited impact on transitions to secondary education (0.7%). In Tunisia the positive effects on higher education are much lower (0.4%) and the effect on secondary education are negative (-0.6%).

Table 11: Simulation results by skill and age

	Tunisia	Jordan		Tunisia	Jordan
Number of unemployed			**Equilibrium Formal Wage**		
Low skilled			*Low skilled*		
Youth	-0.4%	0.6%	Youth	0.1%	0.0%
Non youth	-1.0%	1.2%	Non youth	0.3%	-0.2%
Medium skilled			*Medium skilled*		
Youth	-0.4%	-1.0%	Youth	0.1%	0.3%
Non youth	-0.4%	0.9%	Non youth	0.1%	-0.1%
High skilled			*High skilled*		
Youth	-2.7%	-12.5%	Youth	0.3%	2.0%
Non youth	-1.9%	-22.0%	Non youth	0.4%	4.9%

6 Conclusion

This article develops a framework allowing an in-depth analysis of the circular linkages between workers' international mobility and labor market outcomes in home countries. We built upon the recent microeconomic literature dealing with the migration decision, its duration and the remittance behavior and develop a dynamic general equilibrium model integrating these mechanisms as well as a detailed treatment of labor supply, demand and education. The model is applied to two MENA countries, Jordan and Tunisia, sharing many similarities, but with different migration profiles.

The retrospective scenario dealing with the global crisis shows that labor supply effects were similar, despite lower remittances' and investment decline in Jordan. Labor demand losses were higher in Tunisia, especially since the revolution, thus resulting in a higher increase in unemployment. The crisis has also had a negative impact on migration in both countries, but our simulations show that the faster recovery of Gulf countries acted as a significant pull factor for Jordanian migrants. These results shed light on the need for designing bilateral or regional management schemes of migration flows, taking into account both origin and destination countries' economic climates. It would allow a better risk-sharing between origin and destination countries.

The simulation of the increase of services exports potentially involving professionals mobility has a positive impact on economic and labor outcomes in both countries. As suggested in the literature we find evidence of substitution of migration by services' exports, particularly for high skilled workers. Higher Mode 4 exports opportunities could thus reduce brain drain. However, we notice a substitution of labor by capital in both countries, which given the capital-skill complementarity induces higher wage inequality among skills. Furthermore, the scenario benefits more the youth in Tunisia, being potentially more youth inclusive than in Jordan.

Furthermore, an increase in foreign wages has higher benefits in Jordan despite a higher induced migration increase in Tunisia. The simulation results show a lower impact on high skilled employment outcomes, due to labor market structural patterns. When the increase in foreign wages only concerns high skilled emigrants, the effects are positive on local highly educated workers, particularly in Jordan. However, the impact on low and medium skilled local workers, ambiguous at first sight, depends on the weight of migrants flows in the working age population. In Jordan where migrants flows represent a higher share, the effects on low and medium skilled workers are negative, while the impact is positive in Tunisia on the same categories.

Mode 4 and high skilled wage increases have clear positive effects on transition rates to tertiary education, while the other shocks have variable effects, depending on labor market structural parameters in the two countries.

Among the limits of the current research we can cite the reliance on the altruism hypothesis as the sole determinant of transfers, while there could be other reasons such as investment, savings or reimbursement. Moreover, we did not have data on the mapping by skill between senders and recipients of remittances. Finally the absence of data on Mode 4 transactions is a limitation to the analysis of its economic implications.

An extension of this research could consist in setting surveys allowing to capture the determinants of migration and remittance behavior. These surveys would allow us to improve the accuracy of the macroeconomic analysis, but also to a perform microsimulations in a general equilibrium framework. Another step would be taking into account migrants' skill acquisition during their time abroad, therefore adding another dimension to the human capital accumulation modeling.

Bibliography

Acosta, P. A., Lartey, E. K., & Mandelman, F. S.: Remittances and the dutch disease, *Journal of International Economics*, 79(1), (2009), 102–116.

Amin, M., & Mattoo, A.: Does temporary migration have to be permanent?, Policy Research Working Paper Series 3582, The World Bank, 2005.

Amuedo-Dorantes, C., & Pozo, S.: Workers' remittances and the real exchange rate: A paradox of gifts, *World Development*, 32(8), (2004), 1407–1417.

Aydemir, A., & Borjas, G. J.: Cross-country variation in the impact of international migration: Canada, mexico, and the united states, *Journal of the European Economic Association*, 5(4), (2007), 663–708.

Baas, T., & Melzer, S.: The macroeconomic impact of remittances: A sending country perspective, Norface Discussion Paper Series 2012021, Norface Research Programme on Migration, Department of Economics, University College London, 2012.

Barzel, Y., & McDonald, R. J.: Assets, subsistence, and the supply curve of labor, *American Economic Review*, 63(4), (1973), 621–33.

Bauer, T., & Sinning, M.: The savings behavior of temporary and permanent migrants in germany, *Journal of Population Economics*, 24(2), (2011), 421–449.

Bayangos, V., & Jansen, K.: Remittances and competitiveness: The case of the philippines, *World Development*, 39(10), (2011), 1834–1846.

Bchir, M. H.: The effect of mode 4 liberalization on illegal immigration, *Economic Modelling*, 25(5), (2008), 1051–1063.

Bhagwati, J., & Hamada: The brain drain, international integration of k. markets for professionals and unemployment: A theoretical analysis, Working papers 102, Massachusetts Institute of Technology (MIT), Department of Economics, 1973.

Böhning, W.: *Studies in International Migration*, St. Martin's Press, 1987.

Borchert, I., Gootiiz, B., & Mattoo, A.: Policy barriers to international trade in services : evidence from a new database, Policy Research Working Paper Series 6109, The World Bank, 2012.

Borjas, G. J.: The labor demand curve is downward sloping: Reexamining the impact of immigration on the labor market, *The Quarterly Journal of Economics*, 118(4), (2003), 1335–1374.

Bussolo, M., & Medvedev, D.: Do remittances have a flip side? a general equilibrium analysis of remittances, labor supply responses and policy options for jamaica, *Journal of Economic Integration*, 23, (2008), 734–764.

Carling, J.: The determinants of migrant remittances, *Oxford Review of Economic Policy*, 24(3), (2008), 582–599.

Cattaneo, O., & Walkenhorst, P.: *International Trade in Services: New Trends and Opportunities for Developing Countries*, chap. Legal Services: Does More Trade Rhyme with Better Justice, (pp. 67–98), World Bank Publications, 2010.

Collyer, M.: The development impact of temporary international labour migration on southern mediterranean sending countries : Contrasting examples of morocco and egypt, *Sussex Centre for Migration Research - Development Research Centre on Migration, Globalisation and Poverty*, T6.

Commander, S., Chanda, R., Kangasniemi, M., & Winters, L. A.: The consequences of globalisation: India's software industry and cross-border labour mobility, *The World Economy*, 31(2), (2008), 187–211.

Dessus, S., & Nahas, C.: Migration and education decisions in a dynamic general equilibrium framework, Policy Research Working Paper Series 4775, The World Bank, 2008.

Docquier, F., Faye, O., & Pestieau, P.: Is migration a good substitute for education subsidies?, *Journal of Development Economics*, 86(2), (2008), 263–276.

Docquier, F., & Rapoport, H.: Documenting the brain drain of "la crème de la crème", *Journal of Economics and Statistics (Jahrbuecher fuer Nationaloekonomie und Statistik)*, 229(6), (2009), 679–705.

Dustmann, C.: Return migration, wage differentials, and the optimal migration duration, *European Economic Review*, 47(2), (2003), 353–369.

Dustmann, C., Bentolila, S., & Faini, R.: Return migration: The european experience, *Economic Policy*, 11(22), (1996), 213–250.

Dustmann, C., & Mestres, J.: Remittances and temporary migration, *Journal of Development Economics*, 92(1), (2010), 62–70.

Dustmann, C., & Mestres, J.: Savings, asset holdings, and temporary migration, IZA Discussion Papers 5498, Institute for the Study of Labor (IZA), 2011.

Fallon, P. R., & Layard, P. R. G.: Capital-skill complementarity, income distribution, and output accounting, *Journal of Political Economy*, 83(2), (1975), pp. 279–302.

Fargues, P.: *Talent, Competitiveness and Migration*, chap. Emerging Demographic Patterns across the Mediterranean and their Implications for Migration through 2030, (pp. 129–162), The Transatlantic Council on Migration, Verlag Bertelsmann Stiftung & Migration Policy Institute, 2009.

Fredriksson, P.: Economic incentives and the demand for higher education, *Scandinavian Journal of Economics*, 99(1), (1997), 129–42.

Funkhouser, E.: Remittances from international migration: A comparison of el salvador and nicaragua, *The Review of Economics and Statistics*, 77(1), (1995), 137–46.

Hanson, G. H.: The economic consequences of the international migration of labor, *Annual Review of Economics*, 1(1), (2009), 179–208.

Hanson, G. H.: *Handbook of Development Economics*, vol. 5, chap. International Migration and the Developing World, (pp. 4363–4414), Elsevier, 2010.

Hicks, J. R.: *The Theory of Wages*, London McMillan, 1932.

Hoekman, B., & Sekkat, K.: Deeper integration of goods, services, capital and labor markets: A broad research agenda for the mena region, Policy research report, ERF, 2009.

Hoekman, B., & Sekkat, K.: Arab economic integration: Missing links, CEPR Discussion Papers 7807, C.E.P.R. Discussion Papers, 2010.

Hoekman, B., & Özden, .: The euro-mediterranean partnership: Trade in services as an alternative to migration?, *Journal of Common Market Studies*, 48, (2010), 835–857.

Jasso, G., & Rosenzweig, M.: Estimating the emigration rates of legal immigrants using administrative and survey data: The 1971 cohort of immigrants to the united states, *Demography*, 19(3), (1982), 279–290.

Kim, N.: The impact of remittances on labor supply : the case of jamaica, Policy Research Working Paper Series 4120, The World Bank, 2007.

Kirdar, M. G.: Labor market outcomes, savings accumulation, and return migration, *Labour Economics*, 16(4), (2009), 418–428.

Kirdar, M. G.: Source country characteristics and immigrants' migration duration and saving decisions, IZA Discussion Papers 4899, Institute for the Study of Labor (IZA), 2010.

Konan, D. E., & Maskus, K. E.: Quantifying the impact of services liberalization in a developing country, *Journal of Development Economics*, 81(1), (2006), 142–162.

Lokshin, M., & Glinskaya, E.: The effect of male migration on employment patterns of women in nepal, *World Bank Economic Review*, 23(3), (2009), 481–507.

Magdeleine, J., & Maurer, A.: Measuring gats mode 4 trade flows, Staff Working Paper ERSD-2008-05, World Trade Organization, 2008.

Marchetti, J. A., & Roy, M.: *Services liberalization in the WTO and in PTAs*, Cambridge University Press, 2009.

Marouani, M. A.: More jobs for university graduates: some policy options for tunisia, *Applied Economics Letters*, 17(10), (2010), 933–937.

Marouani, M. A., & Robalino, D. A.: Assessing interactions among education, social insurance and labour market policies in morocco, *Applied Economics*, 44(24), (2012), 3149–3167.

McKenzie, D., & Sasin, M. J.: Migration, remittances, poverty, and human capital : conceptual and empirical challenges, Policy Research Working Paper Series 4272, The World Bank, 2007.

Mishra, P.: Emigration and wages in source countries: Evidence from mexico, *Journal of Development Economics*, 82(1), (2007), 180–199.

Mountford, A.: Can a brain drain be good for growth in the source economy?, *Journal of Development Economics*, 53(2), (1997), 287–303.

Ng, E., & Whalley, J.: Visas and work permits: Possible global negotiating initiatives, *The Review of International Organizations*, 3(3), (2008), 259–285.

OECD: Service providers on the move: Mutual recognition agreements, Working Paper TD/TC/WP(2002)48/FINAL, OECD, 2003.

Rapoport, H., & Docquier, F.: *The Economics of Migrants' Remittances*, vol. 1 of *Handbook on the Economics of Giving, Reciprocity and Altruism*, chap. 17, (pp. 1135–1198), Elsevier, 2006.

Rodriguez, E. R., & Tiongson, E. R.: Temporary migration overseas and household labor supply: Evidence from urban philippines., *International Migration Review*, 35(3), (2001), 709 – 725.

Stark, O., Helmenstein, C., & Yegorov, Y.: Migrants' savings, purchasing power parity, and the optimal duration of migration, Economics Series 44, Institute for Advanced Studies, 1997.

Stark, O., & Wang, Y.: Inducing human capital formation: migration as a substitute for subsidies, *Journal of Public Economics*, 86(1), (2002), 29–46.

Stephenson, S., & Hufbauer, G.: *International Trade in Services: New Trends and Opportunities for Developing Countries*, chap. Increasing Labor Mobility: Options for Developing Countries, (pp. 29–66), World Bank Publications, 2010.

Walmsley, T. L., & Winters, L. A.: Relaxing the restrictions on the temporary movement of natural persons: A simulation analysis, *Journal of Economic Integration*, 20, (2005), 688–726.

Winters, L. A., Walmsley, T. L., Wang, Z. K., & Grynberg, R.: Liberalising temporary movement of natural persons: An agenda for the development round, *The World Economy*, 26(8), (2003), 1137–1161.

Yang, D.: International migration, remittances and household investment: Evidence from philippine migrants' exchange rate shocks, *Economic Journal*, 118(528), (2008), 591–630.

7 Appendix

7.1 Figures

Figure 2: Inflow of remittances as a share of GDP
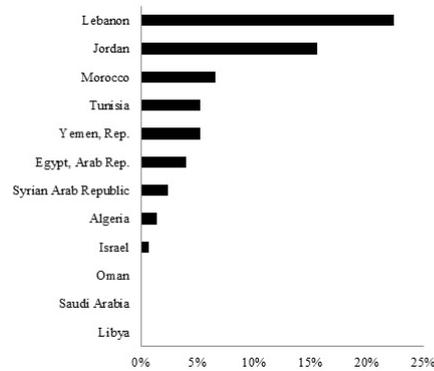
Source: Borchert *et al.* (2012)
World Bank staff estimates based on the IMF's Balance of Payments Statistics Yearbook 2008.

7.2 The model

The production and factor demand block

$$VA_i = A_1[a_{KHS} \cdot KHS_i^{(\frac{\sigma_1-1}{\sigma_1})} + a_{MSL} \cdot MSL_i^{(\frac{\sigma_1-1}{\sigma_1})} + a_{LSL} \cdot LSL_i^{(\frac{\sigma_1-1}{\sigma_1})}]^{(\frac{\sigma_1-1}{\sigma_1})}$$

$$(9)$$

$$KHS_i = A_1^{(\sigma_1-1)} \cdot VA_i \cdot (a_{KHS} \cdot \frac{PVA_i}{PKHS_i})^{\sigma_1} \tag{10}$$

$$MSL_i = A_1^{(\sigma_1-1)} \cdot VA_i \cdot (a_{MSL} \cdot \frac{PVA_i}{PMS_i})^{\sigma_1} \tag{11}$$

$$LSL_i = A_1^{(\sigma_1-1)} \cdot VA_i \cdot (a_{LSL} \cdot \frac{PVA_i}{PLS_i})^{\sigma_1} \tag{12}$$

$$KHS_i = A_2[a_K \cdot K_i^{(\frac{\sigma_2-1}{\sigma_2})} + a_{HSL} \cdot HSL_i^{(\frac{\sigma_2-1}{\sigma_2})}]^{(\frac{\sigma_2-1}{\sigma_2})} \tag{13}$$

$$LD_{i,f} = \left[\sum_a a_a(a) \cdot LDA_{i,f,a}^{(\frac{\sigma_3-1}{\sigma_3})}\right]^{(\frac{\sigma_3-1}{\sigma_3})} \tag{14}$$

$$LDA_{i,f,a} = [\sum_s a_s(s) \cdot LDS_{i,f,a,s}^{(\frac{\sigma_4-1}{\sigma_4})}]^{(\frac{\sigma_4-1}{\sigma_4})} \tag{15}$$

wage curve

$$ln(WL_f) = \beta_1 + \beta_2 \cdot U_f \tag{16}$$

sectoral wage

$$W_{i,f,a} = WL_{f,a} wdiff_{i,f,a} \tag{17}$$

Capital accumulation

$$K_{i,t} = K_{i,t-1}(1 - \delta) + I_{i,t} \tag{18}$$

Investment

$$INV_i = \gamma \cdot KD_i \cdot e \cdot \frac{\lambda_i \cdot RK_i}{PK_i - subv_i} \tag{19}$$

Parameters

a_{KHS}	Share parameter capital and high skilled labor bundle
a_{MSL}	Share parameter medium skilled labor
a_{LSL}	Share parameter low skilled labor
a_K	Share parameter capital in KHS agregate
a_{HSL}	Share parameter high skilled labor force in KHS agregate
a_a	Share parameter labor demand by age
a_s	Share parameter labor demand by status
A_1	Productivity parameter
A_2	Productivity parameter
σ_1	Elasticity of substitution first nest
σ_2	Elasticity of substitution between capital and high skilled labor
σ_3	Elasticity of substitution between youth and non-younth
σ_4	Elasticity of substitution between formal and informal labor
af	Share parameter formal labor supply
ai	Share parameter informal labor supply
al	Share parameter local labor supply
$alsd$	Share parameter downgraded
$alnsd$	Share parameter non downgraded
am	Share parameter international migrants
$sig1$	Elasticity of transformation total labor supply
$sig3$	Elasticity of transformation between downgraded and non downgraded
$sig4$	Elasticity of transformation between formal and informal labor supply
β_1	Intercept of wage curve
β_2	Wage curve coffiecient
δ	capital depreciation
γ	Share parameter Capital demand
λ	Share parameter return of capital

Variables

L^S	Total labour supply
KHS_i	Capital and High Skilled labor bundle
LSL_i	Low skilled labour bundle

MSL_i	Medium skilled labour bundle
$LD_{i,f}$	Labor Demand by skill
$LDA_{i,f,a}$	Labor Demand by skill and age
$LDS_{i,f,a,s}$	Labor Demand by skill, age and status
PVA_i	Value Added Price
$PKHS_i$	Capital and High Skilled labor price
PMS_i	Medium Skilled labor price
PLS_i	Low labour supply price
K_i	Capital
W_f	Wages by skill
LS	Total labour supply by skill and age
$EMIG$	Emigration by skill and age
LSL	Local labour supply by skill and age
$LSLT$	Local labour supply by skill and age including downgraded
LSD	Local downgraded by skill and age
$LSND$	Local non downgraded by skill and age
LSF	Formal labour supply by skill and age
LSI	Informal labour supply by skill and age
W	Wages by labour category and age
KD_i	Capital demand
PK_i	Capital price
RK_i	Return of capital
$subv_i$	Investment Subsidies

Production function and labor supply figures

Figure 1: The production function

---
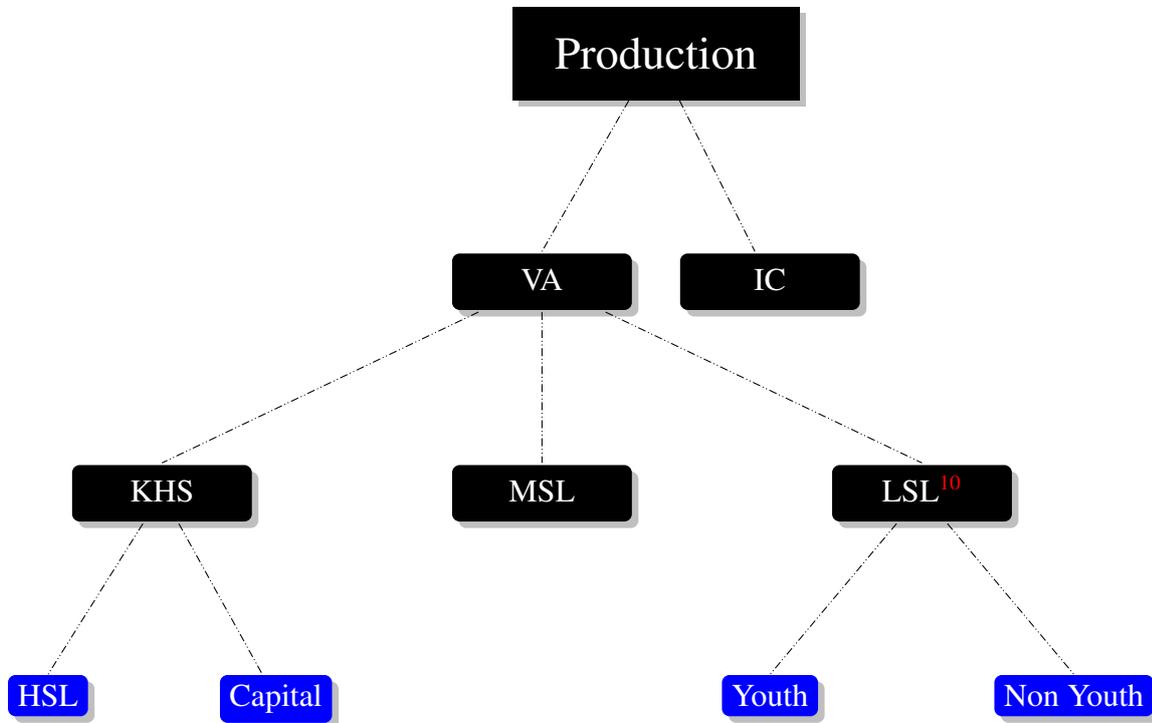
[10]HSL and MSL are declined as LSL, but the formal/informal and youth/non youth branches have been omitted to keep the illustration simple