ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2013

working paper series

INTERNATIONAL LABOR MOBILITY AND EMPLOYMENT INTERACTIONS IN TUNISIA

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Working Paper No. 804

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November 2013

We gratefully acknowledge the financial support provided by the Economic Research Forum. We would also like to thank Denise Konan and Chahir Zaki for fruitful discussions. This paper has also benefited from comments of Ahmed Ghoneim and Björn Nilsson, participants in the ERF Workshop on "Capital and Labor Mobility within the ERF Region" and participants in the DIAL-Dauphine research seminar. Finally, we would like to thank all the policy makers met at the different stages of the research project.

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First published in 2013 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This paper analyzes the international labor mobility-employment nexus in Tunisia in a dynamic general equilibrium framework. The main innovations of the model consist in endogenizing the migration decision, its duration and the remittance rate. Labor demand is disaggregated by sector, skill and age. The production of skills and labor supply are also endogenous. A retrospective simulation shows that the high increase in the unemployment rate induced by the global crisis and the Tunisian revolution can be decomposed in labor demand and labor supply effects. Moreover, an increase of service exports intensive in Mode 4 activities could have a positive impact, particularly on the high skilled and thus reduce brain drain. However it benefits more to the non youth than to young workers. Finally, policies meant to attract skilled emigrants will also benefit low skilled domestic workers.

JEL Classifications: J6, F2

Keywords: Labor Mobility, Migration Decisions, Tunisia

ملخص

تحلل هذه الورقة العلاقة بين تنقل العمـال للتوظيف الدولي في تونس في إطار التوازن العام الديناميكي. تتكون الابتكارات الرئيسية للنموذج في قرار الهجرة، ومدته ونسبة التحويلات. مصنفة الطلب على اليد العاملة حسب القطاع والمهارة والعمر. وتعتبر ايضا إنتاج المهارات والمعروض من العمالة المحلية. وتظهر المحاكاة بأثر رجعي أن الزيادة الكبيرة في معدل البطالة الناجمة عن الأزمة العالمية والثورة التونسية يمكن أن تتحلل الى الطلب على اليد العاملة و آثار المعروض من العمالة. علاوة على ذلك، زيادة أنشطة صادرات الخدمات المكثفة في الوضع 4 يمكن أن يكون لها تأثير إيجابي، وخاصة على ذوي المهارات العالية، وبالتالي الحد من هجرة الأدمغة. ومع ذلك فإنها تفيد العمال الأكبر سنا أكثر من العمال الشباب. وأخيرا، تهدف السياسات الى جذب المهاجرين المهرة لتفيد أيضا العمال المحلية منخفضة المهرة.

1. Introduction

In Tunisia the number of graduates increased at a very high pace in the last decade but was not followed by a similar increase of high skilled job opportunities. This resulted in high unemployment rates for educated youth which were among the main reasons of the Tunisian revolution in December 2010. Labor mobility through migration or mode 4 trade in services is often presented as a way to relieve the burden on sending countries' labor markets.

In 2008, the European Council acknowledged that the needs of the labor market and the shortage of skilled labor could be met by economic migration. Therefore, the European Pact on Immigration and Asylum translated this consensus, although not legally binding, and emphasized the need to encourage "temporary and circular" migration. But, with the economic crisis, migration concerns changed course, with the public opinion growing more and more hostile towards immigration and free movement in the Euro-Meditereanean area looking less and less feasible. Despite this setback, the European need for skilled labor and the excess skilled labor in MENA countries are realities that go beyond the economic crisis.

The objective of this article is to assess the interactions between labor mobility and employment outcomes in Tunisia. The first and most obvious link is through the evolution of receiving countries' demand for foreign workers, which has a direct impact on Tunisia's labor market. For instance, the global crisis reduced the demand of foreign workers and thus reduced the opportunities of mobility. The evolution of receiving countries' wages also has an impact on the decision to migrate and may affect the supply of migrants in terms of volume and duration (Stark et al., 1997). Remittances can also have an impact on labor market outcomes in sending countries. If we assume following Rapoport and Docquier (2006) that the remittance rate increases with migrants' incomes and decreases with their families' incomes, an asymmetric variation of economic conditions will affect labor participation in Tunisia. A differentiated evolution of exchange rates and inflation can have a similar impact (Yang, 2008). Thus, a relative decrease of foreign wages can affect unemployment in Tunisia through a lower labor demand and a higher labor supply.

Moreover, there is a recent tendency of developed countries to attract skilled migrants rather than unskilled ones (Katseli et al., 2006). Beyond the brain drain effects discussed widely in Beine et al. (2001) and Clemens (2009) we raise here the issue of the impact on the sending country's labor market. What will be the effect of such a policy on skilled labor demand and supply, on unskilled labor and on aggregate labor market outcomes? The increase in the demand for skilled workers could result in higher relative wages and thus in a substitution of skilled workers by unskilled ones (Glytsos and Katseli, 2005).

Finally the last issue raised in this article is the effects of labor mobility on education through its impact on relative wages between skilled and unskilled workers (Stark et al., 1997).

Our aim is to develop a framework allowing for such an assessment on the effects of labor mobility on employment levels by skill, sector and age. The framework is simulated using data on the Tunisian economy. Tunisia is an interesting case because of its high unemployment rates, mainly for graduates, and also because of its significant migrant population.

To illustrate the framework, we first simulate what would have been the migration and employment outcomes in the absence of the global crisis and the Tunisian revolution to highlight their effects on the Tunisian labor market. In the second experiment we simulate the impact of an increase of the demand of exports of services intensive in mode 4 sectors. The third scenario consists in simulating the impact of an increase of migrants' wages in host countries relatively to local wages. Finally the fourth simulation consists in implementing the previous simulation but only for skilled workers.

Section 2 discusses migration and labor market issues in Tunisia. Section 3 presents a general description of the model as well as the database. In section 4 we conduct the counterfactual experiments. The final section summarizes the main messages from the analysis.

2. The Tunisian Context

The working age population represents 75% of the population in Tunisia and its growth rate is the double of the total population's growth rate (Mahjoub, 2010). The labor participation rate was estimated to be 47% in 2010, but important disparities are to be found concerning women (whose participation rate is 25%) and youth. Indeed, for those aged between 15 and 29 years, the participation rate falls to 34% and this can be partly explained by the high enrolment rates and the lack of job opportunities. Tunisians are becoming more and more qualified and this is reflected by the share of the highly educated labor force that went from 6.5% of the total labor force in 1994 to 20% of the total labor force in 2011.

The unemployment rate slightly decreased, from 15.6% in 1994 to 13.9% in 2010. However, the share of medium and highly-educated unemployed increased significantly during the same period with the noticeable rise of highly-educated which went from 2% in 1994 to 32% in 2011. In other words, unemployed individuals with a university diploma represent one third of total unemployment. In 2011, the unemployment rate among graduates was 30.5% while it is 9.3% for those who have no education. Furthermore, there seems to be a correlation between age and unemployment, with high unemployment rates for the young (28.7% for those between 15-19 years old and 29.7% for those being 20 to 24 years old) that decline with age, reaching 3% for those aged 45 years and above.

Venturini et. Al. (2009) point out that job creation in Tunisia does not manage to keep up with the increase in labor supply. In a survey on the Tunisian youth's willingness to migrate, Fourati (2008) stresses the importance of this phenomenon and how it evolved between 1996 and 2005, as a result of both economic and political factors. If only one quarter of the skilled youth wanted to migrate in the mid nineties, they were more than three quarters willing to leave their home country in 2005.

Along the same lines, a joint ETF (European Training Foundation) and World Bank survey shows that Tunisian have high expectancies to migrate, higher than the potential migrants in the other surveyed countries.

Moreover, the intentions to migrate are high not only for the unemployed (81%) and the casual workers (75%), but also for those who have a stable job (56%) (Sabadie et. al. 2010). Even though these intentions do not reflect the reality of migration flows, they highlight the problems and the frustration encountered by the Tunisian youth.

In Tunisia, the emigration policy, developed by the Ministry of Social Affairs and Solidarity, has different social, cultural, economic and information aspects. These policies are implemented by the Office of Tunisians Abroad and the National Social Security Fund. Furthermore, there are two institutions that govern controlled emigration: the National Employment and Self-Employment Agency (Agence Nationale de l'Emploi et du Travail Indépendant - ANETI) and the Tunisian Agency for Technical Cooperation (Agence Tunisienne de la Coopération Technique - ATCT). The former organizes and ensures placement of the Tunisian labor force abroad, mainly in France (62.2%), while the latter deals mainly with promoting Tunisian skills and favors the placement in Arab countries. On average, these two agencies ensure the placement abroad of 3000 Tunisian workers per year.

In terms of stock, the number of Tunisians residing outside their home country amounts to slightly more than 1 million, with the majority (almost 83%) living in Europe. The most popular destination is France, receiving around 40% of all Tunisian migrants, followed by

Italy with 25%. Tunisian migration to France goes a long way back, with the first labor agreements signed in the sixties.

As Table 5 shows, the net migrations flows (immigration minus emigration) have been negative for Tunisia in the last decade.

The most important share of Tunisian migrants (48.1%) has a secondary education, while university graduates represent 14.1% of migrants.

A FEMISE study (FEMISE, 2012) using the GTAP model shows that an increase in skilled migration from MENA will increase skilled wages, while decreasing the revenues of primary factors such as unskilled labor and land. They also show that the positive gain obtained by the increased migration comes at the expense of the MENA countries.

Finally, remittances play an important role in the Tunisian economy. In 2010, they amounted to 1.970 million US$, representing 4.4% of GDP and 30 to 40% of the trade deficit.

Trade in services grew rapidly between 2004 and 2008, with an average annual growth rate of 13.8% according to the Tunisian Central Bank (BCT), but slowed down after 2008 as a result of the decrease in tourism services, which is partly due to the economic crisis in the European Union, but also to structural problems faced by the Tunisian tourism industry.

Nevertheless, export of services related to public works, technical services and communication services grew steadily with an average annual growth rate of 23.9% between 2008 and 2010.

2.1 Trade and migration agreements

Tunisia has a Free Trade Agreement with the EU (implemented progressively between 1996 and 2008). However, this FTA does not yet include services. Negotiations started in 2006 but are still ongoing. Tunisia is also member of the Pan Arab Free Trade Agreement[1] , which was created in 1997 and foreseen a dismantling of custom duties and other fees by 2005 and the elimination of non-tariff barriers, whether they are administrative, monetary, financial or technical. Despite mentioning trade in services, no negotiations have been launched up until now. Tunisia is a member of the Agadir Agreement, a FTA that includes Egypt, Morocco and Jordan, that was signed in 2004 and was finally implemented in 2007.

Finally, Tunisia is also a member of the Maghreb Arab Union, a political and economical organization involving Algeria, Libya, Morocco and Mauritania. Its aim was to establish a deeper interregional integration through trade agreements, but it has been inactive since 1994. The EU is the main destination of Tunisia's exports and its intra-Arab share of non-oil exports reaches less than 5% of the total (Hoekman and Sekkat, 2010).

In terms of migration to Europe, Tunisia has two main migration agreements, one with France and one with Italy. They both allow work related migration of Tunisians within quotas of 9000 workers per year for France and 4000 for Italy. Nevertheless, only a limited list of jobs is concerned (for Italy, mainly engineers, doctors and paramedical staff are allowed) and the requirements in terms of qualification are quite high, resulting in unattained quotas in both countries. Due to historical ties, Tunisia hosts an office of the French Agency for Immigration and Integration (Office Français d'immigration et d'intégration) that aims at facilitating and regulating migration flows. Despite the bilateral agreement[2] on concerted

[1]PAFTA members are the following: Egypt, United Arab Emirates (UAE), Bahrain, Jordan, Tunisia, Saudi Arabia, Sudan, Syria, Iraq, Oman, Palestine, Qatar, Kuwait, Lebanon, Libya, Morocco, Yemen

[2]The agreement also includes financial aid for development programs in areas such as vocational training and support for young entrepreneurs

management of migratory flows, signed in 2008, only 25% of demanded visas have been issued in 2009.

3. The Model and Database

3.1 The applied general equilibrium 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. Finally the production of skills is modeled with an endogenization of transition rates between cycles.

At the macro-economic level, formal wages by skill are set following an extended wage curve which allows a trade-off between wages and unemployment and takes into account the impact of public wage variation on private wages. This means that formal wages are not adjusted to "clear" the formal labor market. Sectoral wages are linked to macro-economic wages by exogenous wage differentials which reflect different productivity levels.

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 increase. The government closure chosen consists in fixing government expenditures as a constant share of GDP and tax rates and leaving the government budget balance endogenous. The social security account is modeled separately from the Government budget. It earns its income from employers' pay-roll taxes and pays benefits that are distributed to households. The social security balance is exogenous. The foreign balance closure consists of fixing the current account balance at its observed level and the leave the exchange rate endogenous. The formal labor market closure consists of a joint determination of unemployment and average formal wages through the wage curve described above.

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. 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 Tunisia (pass, repetition 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.

3.2 The data

The Social Accounting Matrix was built based on an Input-Output table for 2005 from the *Institut National des Statistiques* (INS) and complementary data from the Central Bank and the Ministry of Finance. GDP Growth rates projections are from the IMF and World Bank sources. Data on investment, debts and foreign savings comes from the INS and the Central Bank.

Employment and wage data by sector, skill and age category was build using the 2010 Labor Force Survey, as well as the 2004 Population Census and 2005 data on employment, wages and revenues.

Data on migration rates and wage differentials was computed from CARIM databases, INSEE and various reports (EU 2010). In order to compute migrant stocks by category and by skill, we used data from DIOC-E, the data set built by Docquier and Marfouk on skilled migration to OECD countries[3], as well as Ozden et. al. (2011) database on migrants stocks and DIOC-E data set (Dumont et al., 2010) and "Bilateral Migration and Remittances 2010" from the World Bank, an update of the data set provided by Ratha and Shaw (2007).

Education data, specifically the number of enrolled by cycle and efficiency rates, were compiled with the help of the ITCEQ (*Institut Tunisien de Compétitivité et d'Etudes Quantitatives*), as well as data from the Education Ministry, UNESCO and the World Bank.

4. Experiments

This section discusses the impact of various shocks on labor supply and demand, unemployment, emigration, 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 would have been the situation without the global crisis and the Tunisian revolution? Simulation (B): What would be the effect of a Mode 4 agreement? Simulation (C): What are the effects of an increase in all foreign wages? Simulation (D): What happens if the increase in foreign wages only concerns the skilled workers?

4.1 The impact of the global crisis

The objective of this experiment is to try to identify the impact of the global crisis and the Tunisian revolution on our main variables of interest. For that purpose we rely on a counterfactual scenario where the economic growth rates characterizing Tunisia and its main partners would have been those forecasted by the IMF before the subprime crisis exploded and the social uprising in Tunisia.

The main results at the macroeconomic level are summarized in Table 6, show clearly a differentiated impact before and after the Tunisian revolution. In the 2008-2010 period we notice a decrease in investment (-4.7% on average), in labor demand (-0.4%) and a reduction of Tunisian migrant remittances (-11.5%) which has a positive effect on the labor force participation rate (0.4%). The combined effect of lower labor demand and higher labor supply results in higher unemployment (1.1 percentage points). However emigration decreases (-3.3%) since the shock is more severe on Tunisia's partners (mainly the EU) than on Tunisia.

After the revolution, Tunisia's economic growth rate plunges (-3.6 percentage points on average) due to much lower investment (-29.5%) and the result is a sharp decrease in labor demand (-3.6%). Lower growth also means a lower depreciation of the exchange rate (-9.0%) given that Tunisia has a structural deficit in its trade balance. This amplifies the negative impact on migrants remittances (-21.9%) which then accelerates the increase of the activity rate (1.0%). It results in an increase of the average unemployment rate by 4.8%. There is also a reversal in migration flows, resulting in an increase of emigration intentions by 0.9% on average since the situation in Tunisia is deteriorating considerably more than in its main partners' economies.

Table 7 shows a decreasing magnitude of unemployment variation with the skill level. The highest increase occurs for unskilled (27.5% on average) because their initial unemployment rate was the lowest, which means that an equivalent decrease of labor demand for the three skill levels has a higher impact on unskilled unemployment. The variation in emigration intentions by skill reflects a trade off between the evolution of local wages adjusted by

[3] for details see Docquier and Marfouk (2006)

unemployment rates and the real exchange rate. It results in an increase in unskilled migration intentions (1.2% on average) because the decrease in local wages is much higher than the currency appreciation. For medium and high skilled the variation is respectively almost nil and negative on average because the wage variation is very close or lower than the exchange rate decrease.

The evolution of the activity rate by skill reveals a higher increase for skilled labor (1.0 and 0.9 %, versus 0.4% for unskilled), due to a higher decrease in the remittance rate of skilled migrants (-22.7 and -22.5% versus -13.8%). This differentiated variation in the remittance rate is due to a higher wage gap between local and foreign wages for the unskilled. Given the assumed altruistic behavior of migrants, a negative shock affecting their families can be offset with a lower increase of remittances.

Finally, on the education side, the crisis has a positive impact on transition rates from primary to secondary education because wage losses are lower for medium skilled workers compared to the unskilled. Transition rates from secondary to tertiary education were also increased, but to a lower extent.

4.2 The impact of a Mode 4 agreement

Given the limited number of Mode 4 agreements and the lack of data (Panizzon, 2010), we simulate a liberalization in the temporary movement of natural persons as an increase in service exports for the sectors potentially intensive in mode 4 activities (such as business services). Indeed, mobility under Mode 4 is not a type of migration, therefore it should not be treated as such.

The main results at the macroeconomic level are a limited positive impact on GDP growth (0.1% increase on average), despite a positive impact on investment (1.1%) and on labor demand (0.3%). Emigration decreases (-2.9%) due to the positive impact of the shock on employment and wages, illustrating the hypothesis of substitution between mode 4 exports and migration. The exchange rate appreciation, induced by the increase of exports, and the decrease in migration flows have a negative impact on remittances, that decrease by 3.1% on average per year. The fall in remittances and the rise in investment, thus in capital income, have two opposite effects on the activity rates, but the capital effect prevails and the activity rate slightly decreases (-0.1 percentage points on average).

An increase in Mode 4 exports has a positive effect on unemployment, that decreases by 0.8 percentage points on average per year. The decrease is most significant for high skilled workers, because the selected service sectors are skill intensive. Moreover, the increase in investment has a positive effect on high skilled labor demand due to the high complementarity between capital accumulation and skill demand. Emigration by skill follows the same evolution as unemployment, with high skilled migration decreasing more than the other categories, thus reducing brain-drain.

The results also reveal that the non youth benefit more from the shock than the youth. This means that liberalizing mode 4 will increase the gap between the youth and the non youth, both in terms of unemployment and wages.

The impact on education is positive for transition rates from primary to secondary (11.2%) and from secondary to tertiary education (1.1%).

4.3 The impact of an increase in foreign wages

The primary impact of higher foreign wages is an increase in emigration (6.5% on average) and remittances (15.3%). This has a negative impact on the local activity rate (-0.3 percentage point). Higher emigration and lower participation induce lower unemployment (-

0.4 percentage point) and higher local wage expectations (through the wage curve effect). These expectations have a negative impact on labor demand (-0.1%).

The results of unemployment rates by skill show decreases for low and medium skilled (respectively -4.3% and -3.4%) and much lower decrease for high skilled (-1.2% on average). Two factors explain these outcomes: initial unemployment levels (lower for unskilled workers) and the variation in activity rates (higher for medium skilled workers). The medium skilled activity rate decreases more than the two other categories' because medium skilled households receive more than half of the remittances share, while high skilled receive a very low proportion.

Although the shock on migrants' wages is symmetric among skill levels, emigration increases relatively more for high skilled because their wages increase less than the other categories, due to the lower activity rate variation.

The youth benefit more from the shock in terms of wages and unemployment because their activity rates decrease relatively more than the non youth.

The increase in foreign wages acts as a disincentive for both secondary education and higher education (transition rates decreases by respectively 1% and 0.3%) because the average wage of unskilled workers increases relatively more than the average wage of skilled workers.

4.4 The impact of an increase in high skilled foreign wages

The objective of this scenario is to compare the impact of a uniform incentive to migrate and a differentiated one focused on highly skilled workers. This scenario could be considered as equivalent to the selective immigration policies that developed countries are increasingly adopting to attract developing countries talents.

The macroeconomic results are similar to the ones mentioned in the previous scenario, although characterized by a lower intensity. For instance, emigration increases by 2.3% on average per year, whilst its increase in the previous scenario was 6.5%. The same is true for unemployement, but in lower proportions - it decreases by 0.1 percentage points on average against 0.4 percentage points before. The situation is different when looking at the disaggraged level and, as expected, those that benefit the most in terms of unemployment reduction are the high skilled workers (2.1% on average). Moreover, migration intentions increase for high skilled workers (16.9%), while they decrease for unskilled and medium skilled in similar proportions (respectively -0.5% and -0.5%).

The increase of high skilled migrants' wages by 10% per year induces a significant increase of the high skilled remittance rate and a moderate decrease in the other categories' remittance rates, resulting in an increase of total remittances. This induces a decrease of the activity rate which has a positive impact on unemployment and wages.

The decrease of the low and medium skilled remittance rates is due to the improvement of the families' income in the home country through a combined effect of lower unemployment, higher wages and higher total remittances. The appreciation of the real exchange rate amplifies this income effect.

Although high skilled youth are the main beneficiaries of the shock in terms of wage increase and unemployment reduction, the other categories are also characterized by a reduction of their unemployment rates. Indeed, the highest decrease of the activity rate occurs for high skilled youth, because they depend relatively more on high skilled remittances.

Finally the impact on transition rates from primary to secondary education is similar to the previous scenario (-0.6% on average), whereas it is the opposite for the transition from secondary to higher education that increases by 0.4% on average, which is consistent with the evolution of relative wages and unemployment rates.

5. Conclusion

This article highlights the multiple interactions between workers' international mobility and labor market outcomes. We develop a novel general equilibrium framework formalizing the emigration decision and the evolution of the remittances rate. It includes an endogenous labor supply function which depends among other factors on migrant remittances. Labor demand is disaggregated by sector, skill and age. Finally the production of skills is modeled with an endogenization of transition rates between cycles.

The first experiment showed that we can clearly distinguish a difference in the results before and after the Tunisian uprising. In the first period, despite an increase in unemployment, migration intentions decrease because the Tunisian economy slowdown is moderate compared to the recession observed in its main trading partners. Starting from 2011, Tunisia's economic growth plunges and this worsens the negative effects on the labor market. There is a reversal in migration flows, with an upsurge in 2011. The simultaneity of the crisis in Tunisia and its partners worsened the employment situation through the labor supply channel. The long-term impact of the crisis will be a higher incentive to invest in secondary education and a relatively lower incentive in pursuing higher education.

The second experiment shows that an increase in services exports has a positive impact on aggregate unemployment reduction since it increases labor demand and decreases labor supply. The exchange rate appreciation, induced by the increase of exports, and the decrease in migration flows have a negative impact on remittances. The fall in remittances and the rise in investment, thus in capital income, have opposite effects on the activity rates, but the capital effect prevails and the activity rate slightly decreases. The decrease in unemployment is most significant for high skilled workers, due to high skill intensity of the considered service sectors and high capital-skill complementarity.

Moreover, we show that emigration decreases due to the positive impact of the shock on employment and wages, illustrating the hypothesis of substitution between mode 4 exports and migration. Emigration by skill follows the same evolution as unemployment, with high skilled migration decreasing more than the other categories, thus reducing brain-drain. The results also reveal that the non youth benefit more from the shock than the youth. This means that liberalizing mode 4 will increase the gap between the youth and the non youth, both in terms of unemployment and wages.

As expected, the increase of receiving countries' wages has a positive impact on unemployment reduction and wages in sending countries. The effects are channeled through increased migration incentives and higher remittances which reduces the pressure on the local labor market, mainly through a lower labor participation rate. We note higher gains in terms of unemployment reduction for the youth since their activity rates decrease more than those of the non youth due to their higher dependence on transfers.

When the wage increases are limited to highly skilled workers, the benefits are lower than those of the previous scenario, including for the high skilled. Migration intentions increase for the high skilled, while they decrease for unskilled and medium skilled. Although high skilled youth are the main beneficiaries of the shock in terms of wage increase and unemployment reduction, the other categories are also characterized by a reduction of their unemployment rates due to lower participation. In terms of education, the increase of foreign wages induce slightly higher incentives to pursue tertiary education and lower incentives to pursue secondary education.

To sum up, we find that, given the high stock and limited flows of Tunisian emigrants, the effects of migration on labor market seem to operate more via the remittances-activity rate

nexus than via an outflow of job-seekers. Exports of Mode 4 intensive services seem to be an efficient tool to improve labor market outcomes and reduce brain-drain.

Among the limits of our current research, we can cite the absence of data on the mapping between migrants' remittances by skill and the receivers. We thus had to rely on hypotheses which could impact the final results on the outcomes by skill. A survey with matched data on migrants and their origin households could improve the quality of the model's results. It could also allow adding the inequality dimension to the employment-migration interactions analysis.

Moreover, the absence of data on Mode 4 trade did not allow us to tackle Mode 4 as such, but to approximate it through services potentially intensive in Mode 4.

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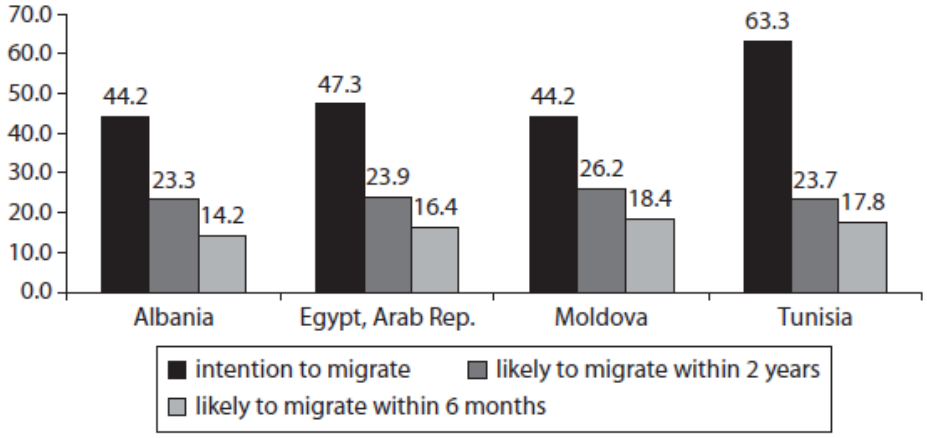
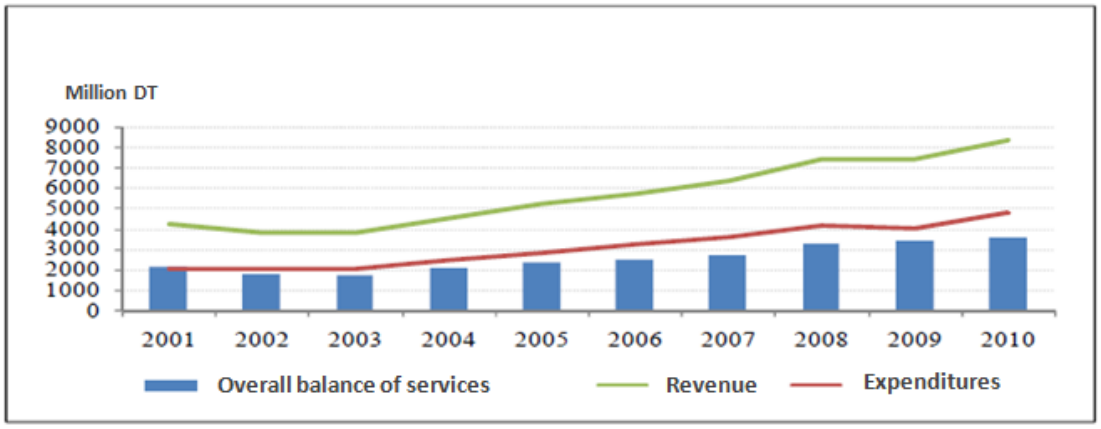
Figure 1: Potential Migrants: Intention to Migrate and Likelihood of Migration (%)



Source: Sabadie et. al. (2010)

Figure 2: Evolution of Foreign Trade in Services



Source: BCT

Table 1: Labor Force by Education Level

	2005		2007		2009		2011	
	Thousands	**%**	**Thousands**	**%**	**Thousands**	**%**	**Thousands**	**%**
Illiterate	427.2	12.7	410.7	11.7	391.7	10.6	364	9.5
Primary	1272.7	37.9	1284.7	36.5	1268.2	34.4	1271.5	33.1
Secondary	1211.9	36.1	1288	36.6	1386.3	37.8	1457.7	37.9
Higher	443.9	13.3	533.8	15.2	636.2	17.2	746.9	19.5
Unknown	3.4	-	4.5	-	6.8	-	4.5	-
Total	3359.1	100	3521.7	100	3689.2	100	3844.6	100
Growth rate (%)	-		2.4		2.4		2.1	

Source: INS

Table 2: Unemployment Rates by Education Level

	2005	**2007**	**2009**	**2011**
Illiterate	6.3	4.4	6.1	9.3
Primary	14.3	11.5	10.4	13
Secondary	13.3	13.5	14	19.9
Vocational training and university	14	18.7	21.9	30.5
Total	12.9	12.4	13.3	18.9

Source: INS

Table 3: Evolution of the Willingness to Emigrate by Level of Education

Education level	**1996 (%)**	**2000 (%)**	**2005 (%)**
No education	5.8	2.6	66.0
Primary	19.3	44.9	77.0
Secondary	25.6	48.5	77.2
Higher education	24.3	45.9	73.0
Total	22.0	45.2	75.9

Source: Fourati2008

Table 4: Migrant Stocks by Region

	Europe	**MENA**	**Other**	**Total**
Tunisian migrants by region of residence (2005)	779200	128900	25800	933333

Source: UN Expert Group Meeting on Migration in the Arab Region, 2006

Table 5: Migration Flows

	1999-2004	**2005-2006**	**2006-2007**
Net migration	-46 517	-35 174	-40 709
each year	-7 753	-17 587	-20 354

Source: Mahjoub2010, INS

Table 6: Average Yearly Variation as Compared to the Reference Scenario

	2008-2010 %	2011-2015 %
GDP Growth differential p.p.	-2.3	-3.6
Emigration	-3.3	0.9
Total investment	-4.7	-29.5
Loc. labor demand var	-0.4	-3.6
Total Unemployment p.p.	1.1	4.8
Total activity rate	0.4	1.0
Remittances	-11.5	-21.9
Exchange rate	-1.2	-9.0

Table 7: Unemployment and Remittances by Skill

	2008 %	2009 %	2010 %	2011 %	2012 %	2013 %	2014 %	2015 %
Number of unemployed by skill								
Low skilled	3.2	12.0	17.0	35.6	33.7	37.2	40.1	41.5
Medium skilled	2.8	10.0	14.3	28.2	27.9	31.2	34.1	35.8
High skilled	1.5	5.2	7.8	15.5	16.4	18.8	21.0	22.7
Emigration by skill								
Low skilled	-0.6	-4.1	-3.5	3.6	1.3	3.0	4.4	5.4
Medium skilled	-0.8	-4.6	-4.1	0.8	-0.5	1.0	2.3	3.3
High skilled	-1.2	-6.5	-6.8	-6.0	-6.0	-5.1	-4.0	-2.8
Activity rate by skill								
Low skilled	0.1	0.5	0.5	1.1	0.6	0.4	0.2	-0.1
Medium skilled	0.1	0.6	0.8	1.8	1.4	1.4	1.4	1.2
High skilled	0.1	0.4	0.6	1.5	1.4	1.5	1.6	1.6
Remittances per migrant								
Low skilled	-2.1	-10.9	-12.9	-15.7	-17.1	-17.4	-17.4	-17.0
Medium skilled	-3.5	-19.2	-23.0	-25.3	-27.7	-27.9	-27.7	-27.2
High skilled	-3.4	-18.3	-21.9	-27.0	-27.4	-27.6	-27.5	-26.7
Transition rates								
Secondary education	0.0	0.4	0.9	6.4	4.4	6.0	7.2	7.4
Higher education	0.1	0.6	0.9	2.1	1.7	1.8	1.9	1.8

Table 8: Macro Results

	2012 %	2013 %	2014 %	2015 %
GDP Growth	0.0	0.1	0.1	0.1
Emigration	-1.0	-2.1	-3.4	-5.0
Total investment	0.3	0.8	1.4	1.9
Loc. labor demand var	0.1	0.2	0.4	0.6
Total potential active population	-0.2	-0.4	-0.6	-0.8
Total Unemployment	-0.3	-0.6	-1.0	-1.4
Total activity rate	-0.1	-0.1	-0.1	-0.2
Remittances	-1.0	-2.3	-3.7	-5.4
Exchange rate	-0.3	-0.7	-1.1	-1.5

Table 9: Unemployment and Remittance Results

	2012 %	2013 %	2014 %	2015 %
Number of unemployed by skill				
Low skilled	-0.9	-1.8	-3.0	-4.2
Medium skilled	-1.9	-4.1	-6.5	-9.2
High skilled	-2.3	-5.1	-8.6	-13.3
Emigration by skill				
Low skilled	-0.7	-1.6	-2.4	-3.4
Medium skilled	-1.0	-2.2	-3.4	-4.8
High skilled	-1.4	-3.1	-4.9	-7.4
Remittances per migrant				
Low skilled	-0.6	-1.4	-2.2	-3.2
Medium skilled	-1.5	-3.2	-5.1	-7.4
High skilled	-1.4	-2.9	-4.6	-6.6

Table 10: Simulation Results by Skill and Age

	2012 %	2013 %	2014 %	2015 %
Number of unemployed by skill and age				
Low skilled				
Youth	-0.7	-1.6	-2.6	-3.7
Non youth	-1.4	-2.9	-4.7	-6.7
Medium skilled				
Youth	-1.6	-3.5	-5.4	-7.1
Non youth	-2.0	-4.2	-6.6	-9.5
High skilled				
Youth	-1.9	-4.5	-8.3	-14.8
Non youth	-2.6	-5.6	-8.8	-12.5
Local labor demand aggregated				
Low skilled				
Youth	0.0	0.0	-0.1	-0.1
Non youth	0.0	0.0	0.0	0.1
Medium skilled				
Youth	0.0	0.1	0.1	0.3
Non youth	0.2	0.4	0.6	0.8
High skilled				
Youth	0.5	1.1	1.8	2.6
Non youth	0.2	0.6	0.9	1.3
Equilibrium Formal Wage				
Low skilled				
Youth	0.2	0.3	0.5	0.7
Non youth	0.3	0.7	1.1	1.6
Medium skilled				
Youth	0.3	0.6	1.1	1.5
Non youth	0.4	0.8	1.3	1.8
High skilled				
Youth	0.2	0.3	0.8	1.7
Non youth	0.5	1.1	1.7	2.5
Transition rates				
Secondary education	2.6	7.2	13.6	21.4
Higher education	0.3	0.8	1.3	1.8

Table 11: Macro Results

	2012 %	2013 %	2014 %	2015 %
GDP Growth	0.0	0.0	0.0	0.1
Emigration	2.5	5.2	7.8	10.5
Total investment	0.5	0.9	1.6	2.2
Local labor demand	0.0	-0.1	-0.1	-0.2
Total potential active population	0.0	0.0	0.0	-0.1
Total Unemployment	-0.1	-0.3	-0.5	-0.6
Total activity rate	-0.1	-0.2	-0.3	-0.4
Remittances	5.7	11.8	18.4	25.3
Exchange rate	-0.2	-0.5	-0.7	-0.9

Table 12: Effects on Unemployment and Remittances

	2012 %	2013 %	2014 %	2015 %
Activity rate by skill				
Low skilled	-0.1	-0.2	-0.2	-0.3
Medium skilled	-0.2	-0.3	-0.3	-0.5
High skilled	-0.1	-0.1	-0.2	-0.1
Number of unemployed by skill				
Low skilled	-1.6	-3.4	-5.1	-7.0
Medium skilled	-1.3	-2.6	-4.0	-5.6
High skilled	-0.4	-0.8	-1.5	-2.1
Emigration by skill				
Low skilled	2.4	4.9	7.5	10.0
Medium skilled	2.5	5.1	7.7	10.3
High skilled	2.9	5.8	8.8	11.7

Table 13: Simulation Result by Skill and Age

	2012 %	2013 %	2014 %	2015 %
Number of unemployed by skill and age				
Low skilled				
Youth	-1.2	-2.5	-3.9	-5.6
Non youth	-2.7	-5.4	-8.3	-11.3
Medium skilled				
Youth	-1.6	-3.4	-5.5	-8.0
Non youth	-1.0	-2.2	-3.4	-4.8
High skilled				
Youth	-0.9	-1.8	-2.9	-4.3
Non youth	-0.3	-0.6	-0.9	-1.4
Equilibrium Formal Wage				
Low skilled				
Youth	0.2	0.4	0.7	1.0
Non youth	0.6	1.2	1.9	2.6
Medium skilled				
Youth	0.2	0.5	0.9	1.4
Non youth	0.2	0.4	0.6	0.8
High skilled				
Youth	0.1	0.2	0.3	0.5
Non youth	0.0	0.1	0.2	0.2
Activity rate (p.p.)				
Low skilled				
Youth	-0.1	-0.3	-0.4	-0.6
Non youth	-0.1	-0.2	-0.2	-0.3
Medium skilled				
Youth	-0.1	-0.3	-0.4	-0.5
Non youth	-0.1	-0.2	-0.4	-0.5
High skilled				
Youth	-0.1	-0.2	-0.3	-0.5
Non youth	0.0	0.0	-0.1	-0.1
Transition rates				
Secondary education	-0.4	-0.9	-1.3	-1.4
Higher education	-0.1	-0.3	-0.4	-0.5

Table 14: Macro Results

	2012 %	2013 %	2014 %	2015 %
GDP Growth	0.0	0.0	0.0	0.0
Emigration	0.8	1.7	2.8	3.8
Total investment	0.2	0.4	0.7	1.0
Local labor demand	0.0	0.1	0.1	0.2
Total Unemployment	0.0	0.0	-0.1	-0.3
Total activity rate	0.0	0.0	0.0	0.0
Remittances	2.2	4.7	7.6	10.9
Exchange rate	-0.1	-0.2	-0.2	-0.3

Table 15: Simulation Impact on Unemployment and Remittances

	2012 %	2013 %	2014 %	2015 %
Number of unemployed				
Low skilled	-0.1	-0.4	-0.7	-1.0
Medium skilled	-0.1	-0.2	-0.5	-0.7
High skilled	-0.7	-1.4	-2.5	-3.8
Activity rate (p.p.)				
Low skilled	0.0	0.0	0.0	0.0
Medium skilled	0.0	0.0	0.0	0.0
High skilled	-0.1	-0.1	-0.3	-0.4
Emigration				
Low skilled	-0.2	-0.4	-0.6	-0.9
Medium skilled	-0.2	-0.4	-0.6	-0.8
High skilled	6.5	13.2	20.2	27.5
Remittances per migrant				
Low skilled	-0.1	-0.3	-0.5	-0.7
Medium skilled	-0.4	-0.8	-1.2	-1.6
High skilled	14.8	30.6	47.3	65.2

Table 16: Simulation Results by Skill and Age

	2012 %	2013 %	2014 %	2015 %
Number of unemployed by skill and age				
Low skilled				
Youth	-0.2	-0.3	-0.4	-0.6
Non youth	-0.3	-0.7	-1.2	-1.8
Medium skilled				
Youth	-0.1	-0.2	0.4	-0.7
Non youth	-0.1	-0.3	-0.4	-0.6
High skilled				
Youth	-0.9	-1.9	-3.2	-4.8
Non youth	-0.6	-1.3	-2.3	-3.5
Equilibrium Formal Wage				
Low skilled				
Youth	0.0	0.0	0.1	0.1
Non youth	0.1	0.2	0.3	0.4
Medium skilled				
Youth	0.0	0.1	0.1	0.1
Non youth	0.1	0.1	0.1	0.2
High skilled				
Youth	0.0	0.2	0.3	0.6
Non youth	0.1	0.3	0.4	0.6
Activity rate (p.p.)				
Low skilled				
Youth	0.0	0.0	0.0	0.0
Non youth	0.0	0.0	0.0	0.0
Medium skilled				
Youth	0.0	0.0	0.0	0.0
Non youth	0.0	0.0	0.0	0.0
High skilled				
Youth	-0.1	-0.2	-0.3	-0.4
Non youth	-0.1	-0.2	-0.3	-0.4
Transition rates				
Secondary education	-0.1	-0.4	-0.7	-1.0
Higher education	0.1	0.3	0.5	0.8