More jobs for university graduates: some policy options for Tunisia

Mohamed Ali Marouani

Paris1-Panthéon-Sorbonne University, DIAL and ERF, IEDES, 45 Bis Avenue de la Belle Gabrielle, Nogent Sur Marne, France
E-mail: marouani@univ-paris1.fr

The combination of demographic factors and an increase in education has caused a significant rise of university graduates’ unemployment in the Middle-East and North Africa regions. This article provides a prospective cost-effectiveness analysis of the impact of alternative labour market policies using a dynamic general equilibrium model. The model allows for an endogenous determination of unemployment through a multisectoral efficiency wage setting mechanism. The main finding is that a wage subsidy targeted at highly skilled intensive sectors is more effective than tax reductions or investment subsidies. However, wage subsidies are not enough to reduce unemployment significantly. Other policy options need to be considered.

I. Introduction

As in many Middle-East and North Africa (MENA) countries the persistence of high unemployment rates, especially among the youth, has been the major concern for policymakers in Tunisia in the last decade. The increase in the supply of educated workers will induce a significant shift in the skill composition of the labour force. According to the World Bank (2004) the supply of highly educated workers will increase by about 9% per year in the next decade, which puts a heavy pressure on the creation of skilled jobs.

The improvement of the level of education of the labour force is a chance for Tunisia because it could contribute to a shift in the structure of the economy towards higher Value-Added (VA) activities in the long run. However, if the new cohorts of educated workers find themselves unemployed, households could be less motivated in investing in human capital. Moreover, the society pays a high cost for every young person reaching a university degree. It is thus a waste of public resources to leave a significant share of the stock of human capital unemployed. Finally, given that education is the best way to achieve social mobility, higher unemployment within the highly skilled will disfavour relatively more the less wealthy who cannot rely on physical capital assets to create their own businesses, nor on social capital to get the good jobs because of the rationing that will inevitably grow in the market of skilled labour.

Implementing active labour market policies targeted at this category of workers seems thus a necessity. The question that remains is what kind of policies are the most effective. Ex ante and ex post assessments are thus needed to avoid the waste of public funds. The objective of the research presented in this article is to simulate alternative labour market policies to quantify their effects on skilled unemployment and their costs for the government budget in the medium run (the next 5 years).

Given the issue at stake a dynamic multisectoral general equilibrium model seems a well-suited tool since it permits to deal with the direct and indirect effects of a shock on the different components of the economy. In addition, disaggregating the economy into industries allows for targeting some shocks on specific sectors.

Because we focus on the effects of the labour market policies on unemployment, a significant part of the modelling effort is devoted to the labour market. Thus, intersectoral wage differentials are endogenously determined, and explained by efficiency considerations. We propose a multisectoral model of efficiency wages based on imperfect monitoring considerations.
This model is developed in detail in the work of Marouani (2000), and follows the work of Shapiro and Stiglitz (1984) and Walsh (1999). Two sectors receive a different treatment: the government sector, where wages are set by the government, and the agricultural sector where the rural/urban migration process is modelled through an extended Harris/Todaro function.

The article is organized as follows: Section II presents the general equilibrium model and the database, Section III presents the simulations, the results and some policy options and Section IV concludes.

II. A Dynamic General Equilibrium Framework

In presenting the model we will first describe its dynamic dimension, which is intended to capture the evolution of jumping variables (capital, labour force, productivity, etc.), and then the intraperiod dimension, which is equivalent to a 1-year static Computable General Equilibrium (CGE) model.

The dynamic setting

The main features of the dynamic setting are described hereafter:

Capital accumulation is sectoral. Each year the stock of capital of each sector corresponds to the sum of the stock of last year and new investment minus the depreciation of capital. Following Behir et al. (2002), sectoral investment ($\text{INV}_i$) has been modelled as a function of the sectoral stocks of capital ($\text{KD}_i$), sectoral rates of return to capital ($\text{r}_i$) and capital acquisition costs ($\text{PK}$):

$$\text{INV}_i = \text{gamma}_i \times \text{KD}_i \times \text{e}^{\lambda \text{KD}_i - b \text{KD}_i}$$  

where gamma is a scale parameter (calibrated), lambda the elasticity of investment to the rate of return to capital and $\text{sub}_i$ are sectoral subsidies to investment.

Labour force growth is differentiated by skills and varies according to exogenous rates estimated by the World Bank (2004). Total productivity grows according to an exogenous rate determined through the dynamic calibration process.

Public spending and civil servants’ wages grow also according to exogenous rates fixed by the government. The evolution of exchange rate has been set so as to reflect the actual management of the exchange rate in Tunisia. Finally, transfers between the different agents (households, government, firms and rest of the world) grow at the same rate as the Gross Domestic Product (GDP).

Structure of the static framework

The Tunisian economy is disaggregated into 20 sectors. The model distinguishes four inputs: three categories of labour and capital, and four types of agents: a representative household, firms, the government and the rest of the world. We develop only the blocks that are relevant for this article.

The production and factor demand block. The production function is a nested one which permits to capture the substitution and complement relations among the various inputs. VA is a nested Constant Elasticity of Substitution (CES) function. VA is a CES of two composite bundles: the first bundle is a CES function of unskilled and skilled labour; whereas the second bundle is a CES of capital and highly skilled labour, which are supposed to be highly complementary. Concerning the government sector, capital and the three labour categories are set in fixed proportions.

The three categories of workers are supposed to be mobile across sectors, but workers are not allowed to look for a job requiring more or less qualifications than they have. In the urban private sector, wages and unemployment are determined through a multisectoral efficiency wages setting mechanism (Marouani, 2000).

$$\text{w}_{ij}^* = (1 + \frac{b_i e_i}{q_{ij}}) e_{ij} + \sum_{f=1}^{n} \frac{b_i e_i}{q_{ij}} e_{jf}$$  

where $r$ is the discount rate, $i$ the sector, $f$ the level of qualification, $w$ the wage, $e$ the disutility of effort, $b$ the exogenous separation rate, $q$ the probability of being caught shirking and, $L$ the labour demand by sector and skill and $U$ the unemployment rate by skill.

The advantage of such a specification is that it permits to avoid modelling wages as completely flexible or completely fixed.\footnote{See, for example, Llop and Manresa (2004) who examined both cases for each simulation, which allowed them in reality to analyse the extreme results of the interval, whereas our specification captures a continuous link between wages and unemployment.}

In the agricultural sector, the wage is linked to the average urban wage through an extended Harris–Todaro function\footnote{The extension in the Harris–Todaro function consists in adding an elasticity of mobility for rural workers calibrated from the base year values.} capturing the difficulty of getting an urban job for a rural worker. Concerning civil servants, we suppose that the government sets

$$\text{w}_{ij}^* = (1 + \frac{b_i e_i}{q_{ij}}) e_{ij} + \sum_{f=1}^{n} \frac{b_i e_i}{q_{ij}} e_{jf}$$
their wages as a fixed proportion of the urban average wage. Physical capital is sector specific in the short run.

**Income and expenditure block.** Households earn their income from wages, returns to capital and transfers. Their expenditures are composed of interest payments and consumption of goods and services. The government earns income from various taxes (income taxes, corporate taxes, tariffs, production taxes and VA taxes) and from transfers. Its expenditures consist in government consumption (mainly civil servants wages), transfers and public investment. The government closure chosen is to allow public spending to grow at the GDP growth rate. Taxes are endogenized to ensure the stability of the ratio of public deficit to GDP.

**The equilibrium conditions and macroeconomic closure.** As previously established, the labour market is cleared through a joint determination of (efficiency) wages and the level of unemployment. By Walras’ Law, commodities and labour market clearing plus the restriction on government budget (defined above) also imply equilibrium on the capital market.

The model is investment driven which means that households’ savings (or debt) increase to ensure the equality between saving and investment.

**The Database**

The model is calibrated from a 2001 database for the Tunisian economy. The advantage of using 2001 data is to be able to perform a dynamic calibration of the model by comparing the path of evolution of the main variables produced by the model with the actual path observed in the national accounts (2001–2005). The Social Accounting Matrix (SAM) has been built on the basis of the Input–Output table provided by the Tunisian National Institute of Statistics. Aggregate investment by sector is provided in the national accounts (on the INS website). The data on employment and labour supply are from the population and employment census.

Calibration of the model involves selecting certain parameters from external sources (from the literature or fixed *a priori*) and deriving the remainder from identifying restrictions.

The interest rates are those practiced by the Tunisian Central Bank.

The disutility of effort parameter of the efficiency wages function is calibrated using the base year values of wages, employment, unemployment, the turnover rate and the probability of being detected shirking. The elasticity of mobility of rural workers in the Harris–Todaro function is calibrated from the benchmark data on agricultural and urban (average) wages, on employment in agricultural and nonagricultural sectors, and on urban unemployment.

### III. Simulations and Results

The reference scenario includes the implementation of the gradual free trade agreement with the EU by 2008 and the dismantling of the Multifiber Agreement in 2005. The latter is modelled through an annual decrease of the export demand for Tunisian apparel products by 5% per year.

**The scenarios**

Four scenarios are modelled. The first one consists in removing social security contributions on Highly Skilled Workers (HSW). The second consists in providing a wage subsidy to activities that are the most intensive in HSW (the subsidy is equivalent to half the wage). The third consists in subsidizing investment in the most intensive sectors in HSW (subsidy of 20% of the investment cost). Finally, the fourth simulation consists in removing the production tax on the most intensive sectors in highly skilled labour. The increase in public spending is financed through a uniform increase of all taxes except tariffs.

**The results**

The simulations show clearly that the most efficient way of fighting highly skilled unemployment is to grant wage subsidies to this category of workers. However, despite its effectiveness this measure is not sufficient to reduce significantly highly skilled unemployment. Indeed, due to the high growth rate of highly skilled labour supply and due to the relative rigidity of wages because of the efficiency wage hypothesis, the unemployment rate of this category of workers reaches 39% in the reference scenario in 2012. This means that in the most optimistic scenario, highly educated workers’ unemployment would reach 32% (Table 1, Scenario 2). The first conclusion one can draw from this *ex ante* assessment is that tax incentives or subsidies for educated labour demand hiring will not be sufficient to solve the problem. Policymakers have thus to think

---

1 Excluding agricultural products and services.
2 See Marouani (2009) for an assessment of the impact of these shocks.
3 Rate observed in 2005 after the MFA phase out (World Bank, 2006).
about additional measures. The Tunisian employment strategy for the young educated workers has so far focused on two main axes: wage subsidies for a limited time frame (the *Stage d’insertion à la vie professionnelle (SIVP)*) programme and micro-credit granted by the Banque Tunisienne de Solidarité. The first axis seems efficient according to our quantitative assessment, whereas we cannot assess the second because of the absence of a financial module in our model. These programmes need to be assessed *ex ante* and *ex post* to help policymakers choose which one to strengthen the most. However, other measures would need to be implemented to reduce unemployment of HSW during the transition period where labour supply of educated will continue to increase at such a high level.

We can distinguish two kinds of policy options that could be implemented: measures which enhance labour demand and measures which reduce labour supply.

**Policy options**

**Labour demand.** A first potentially promising option is a massive increase in public research development and incentives for enhancing private research development. This measure could have a double dividend: increasing the demand for highly educated workers (engineers, researchers, etc.) in the short run and increasing productivity in the medium long run which means higher growth and lower highly skilled labour costs and thus higher demand for highly educated workers in the medium long run. The difficulty of an *ex ante* assessment of such a measure resides in our poor knowledge of its cost-effectiveness. In other words, we need to investigate the effects on total productivity of a marginal Dinar spent on research development. Introducing an *ad hoc* assumption of an increase in productivity in the CGE model without evaluating its corresponding cost is totally irrelevant.

The second option is to invest heavily in the promotion of highly skilled labour-intensive services exports.

The recent increase in the exports of medical services in Tunisia is a good example of the high potential of the country. The government could also promote the development of exports of private education services (mainly for Arab and African students), software design, etc. An active trade policy could enhance the export of such kind of services. In its bilateral, regional and multilateral negotiations on services liberalization Tunisia should focus on mode 4 trade liberalization which allows the temporary movement of labour and which could favour the temporary movement of labour and which could favour the increase of highly skilled labour demand in Tunisia.

**Labour supply.** The most well-known way of reducing educated workers labour supply is to keep them studying as long as possible. The recent upsurge of technical degrees of shorter duration than usual university degrees (usually two years and a half) is thus questionable if we take into account the short–medium term problem of unemployment. The rationale behind developing these technical institutes was to improve the matching between the demand of small- and medium-sized firms which cannot afford to hire expensive engineers and which prefer to hire workers with more vocational training. An *ex post* evaluation of this new education/training strategy is needed.

Promoting longer studies has also costs and risks. The costs are obvious since education is almost free in Tunisia, whereas the risks depend on the potential transformation of the structure of the economy and of the evolution of the average size and the management culture of Tunisian firms. If the Tunisian economy becomes able to absorb more workers from the highest category of superior education (students holding masters, doctorates or engineering degrees), the strategy could be sustainable. The effectiveness of this strategy depends also on the demographic evolution in the medium run. If there is a slowdown in the pace of increase of labour supply, this strategy could mitigate the unemployment problems in the short run without presenting high risks in the long run.

| Table 1. Evolution of the main variables of interest by 2012 (comparison with the reference scenario) |
|--------------------------------------------------------------------------------------------------|
| Scenario 1 (removing social security contributions) | Scenario 2 (wage subsidies to HSW) | Scenario 3 (investment subsidies) | Scenario 4 (production tax incentives) |
|------------------------------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Total unemployment (percentage point) | −0.3 | −1.2 | −0.09 | −0.27 |
| Highly skilled labour unemployment (percentage point) | −1.7 | −6.9 | −0.3 | −0.6 |
| Taxes (%) | +7.5 | +18.8 | +21.2 | +16.4 |
| Investment (%) | +1.7 | +4.8 | +6.7 | +3.2 |
The second possibility to reduce labour supply is to promote migration of highly educated workers. This option poses some problems. The main problem is that only the best among HSW are sought by foreign firms. These people usually do not have problems in finding a job in the local market. The second problem is that the national education system, financed by taxpayers, produces an elite that is sent to countries where the private returns to education are the highest. The microeconomic impact is positive, while the macroeconomic effects are uncertain. The interactions between labour market policies and migration certainly need to be studied more thoroughly on the basis of empirical data, which are unfortunately scarce.

VI. Conclusions

According to our simulation exercise, the current Tunisian employment strategy focused on wage subsidies seems to be in the right direction. It seems at least more effective than investment subsidies (which favour more capital accumulation) or tax reductions for the most intensive sectors in highly skilled labour. However, because of the very high pace of growth of highly educated labour supply additional strategies need to be implemented in the short and medium run.

Given the sensitivity of this issue all the options must be considered. Among these, we propose mainly a massive investment in research development and higher incentives for the promotion of skilled intensive services exports. Thorough ex ante and ex post evaluations of all the options need to be realized to select the most effective measures and avoid the waste of public funds. The prerequisite for ex post evaluations of the different programmes of the Tunisian employment strategy is the availability of surveys covering beneficiaries and nonbeneficiaries of the employment promotion measures.

On the methodological side, the main originality of the model is its efficiency wage setting. Even if wage inequality decreases because of the differentiated evolution of labour supply, the efficiency wage mechanism prevents the decrease of nominal wages of skilled workers. A model with perfect labour markets would have been helpless to address the issue at stake: highly skilled wages would have decreased significantly and everyone would have found a job.

One of the main limits of the model is that it does not allow us to address credit issues. The introduction of a financial block in the model would allow the analysis of the effects of a better access to credit on economic activity and employment.

Acknowledgement

I would like to thank Christophe Nordman for his comments on an earlier draft of this article. The remaining errors are mine.

References

Behir, M. H., Decreuse, Y., Guerin, J. L. and Jean, S. (2002) MIRAGE, a computable general equilibrium model for trade policy analysis, CEPII Working Paper No. 17, CEPII, Paris.
Llop, M. and Manresa, A. (2004) The general equilibrium effects of social security contributions under alternative incidence assumptions, Applied Economics Letters, 11, 847–50.
Marouani, M. A. (2000) Ouverture commerciale et emploi: un modèle d’équilibre général avec salaires d’efficience appliqué à la Tunisie, Revue Economique, 51, 557–69.
Marouani, M. A. (2009) Is the end of the MFA a threat?, Review of Development Economics, forthcoming.
Shapiro, C. and Stiglitz, J. E. (1984) Equilibrium unemployment as a worker discipline device, American Economic Review, 74, 433–44.
Walsh, F. (1999) A multisector model of efficiency wages, Journal of Labor Economics, 17, 351–76.
World Bank (2004) Tunisia-employment strategy, Report No. 25456, MNSHD, Washington, DC.
World Bank (2006) Morocco, Tunisia, Egypt and Jordan after the end of the multi-fiber agreement: impact, challenges and prospects, Report No. 35376, MNA, the World Bank.