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Efficiency frontier and matching process on the labor market: Evidence from Tunisia

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Abstract

The purpose of this paper is to study the determinants of the inefficient functioning of the Tunisian labour market. The study takes advantage of the recent development in the stochastic frontier techniques and estimates, the matching function for Tunisia using disaggregated data. We include control variables as determinants of matching efficiency and regional disparities. We confirm that the persistently high rate of unemployment is the result of not only excess labour supply but is also related to a shortfall between supply and demand (sector, location, qualification).

1. Introduction

Malfunctioning of the labour markets and continuing high levels of unemployment are among the most important challenges faced by many developing countries. Indeed, the problem of finding new job opportunities during this decade is more pressing for many of these countries than at any other time in the past.

Since the adoption of the structural adjustment program in 1987, Tunisia has achieved significant macroeconomic performance, with the average growth rate over the last thirty years around 5%. The economic performance, however, contrasts with an unemployment rate that is persistently high with important regional disparities. Compared to unemployment rates in different regions, Tunisia, the Maghreb and the Middle East region as a whole are in first place with an average level of 14%, followed by Eastern Europe and Saharan Africa with 9.7%, Latin America and the Caribbean with 7.7%, the CODE with 6.7% Asia with 4.7% South and East Asia with 3.8%. A major concern in Tunisia is the fact that the unemployment rate for the age groups of 15 and 24 years is reaching 30%.

The 2006 ILO annual report on employment trends suggests that economic growth will not be adequate to meet the additional need for jobs. The report also indicates that the average world unemployment rate is 6.3%, while in Tunisia it is 13.9% despite its annual growth of 4.2% in 2005. Analysts estimate that Tunisia needs an annual growth rate of more than 7% to reduce unemployment, and would require huge investments to accelerate development.

The relatively high unemployment rate is a real dilemma for the healthy and dynamic Tunisian economy where the fundamentals remain strong. As confirmed by some experts increasing labour costs and the tightness of the domestic market that pressures companies to optimize human resources and therefore reduce their workforce are among the most important causes of Tunisia´s higher unemployment levels. The situation deteriorates further if we include women´s increasing participation in the workforce, which will add more strain on the labour market.

The fact that Tunisia lacks unemployment insurance implies that its social impacts are substantial. Therefore, the high level of unemployment is a major concern and may be a potential source of social disruption and conflict, particularly in view of the growing number of higher education graduates. Indeed, according to the World Bank, a survey in 2005 revealed that nearly half of about 4,800 interviewed graduates with a masters or technician's degree were unemployed.

Unemployment forces many of the students living abroad to delay returning home after graduation, and induces doctors and engineers to leave the country for Europe and the Golf states. The problem is particularly severe for informal sector workers as these activities are not registered with the state's institutions, and workers thus have no social protection. Consequently, as unemployment is often a factor of poverty and social exclusion, specific interventions to facilitate labour market entry are needed.

To cope with this situation, Tunisia has adopted active policies to help first-time job seekers to integrate into the labour market, and spends on average about 0.8 percent of GDP per year on active employment policies. However, since the early 1990s and as a result of the integration of the Tunisian economy into the global markets as well as the development of new technologies, a significant disequilibrium has developed. In the Tunisian labour market this is apparent in the gap between supply and demand, and the mismatch between the needed and the available job skills. Moreover, regional disparity has become very important factor in the 1990s mainly because of the large inflow into the labour market. In 2004, the unemployment rate was recorded at its lowest level in the Central East region (10%) (which benefits from a diversified and dynamic economy) and at its highest in the North-West (18%) (which is an agricultural region) and the Southwest (18%) (mining region).

Despite the many theoretical models analyzing sources of frictions on labour market, empirical literature on the determinants of the efficient functioning of the labour market is still uncommon, particularly for the developing countries. Therefore, one of the major contributions of the paper is to study the performance of the labour market in one such developing country, Tunisia, with the use of a regional database.

This study takes advantage of the recent development in the stochastic frontier techniques[1] and estimates, for the first time, the matching function for Tunisia using disaggregated data. In addition, we include additional variables as determinants of matching efficiency and regional disparities. Our main objective in this paper is to estimate and explain the efficiency changes that may have taken place both over time and across regions.

The paper is organized as follows. In the first section we give a brief description of the labour market in Tunisia. In section two we present the main characteristics of the Tunisian labour market. In section three we present the methodology and describe the

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[1]. We use new econometric techniques more sophisticated than those used by Ilmakunas and Pesola (2003) for Finland or of Ibourk Maillard, Perelman and Sneessens (2001) for France

database. In section four we present the empirical results and discuss different economic conclusions and policy recommendations.

2. Characteristics of labour market in Tunisia

The Tunisian population, which totaled 5.588 million in 1975, rose to 6.975 million in 1984, 8.785 million in 1994 and 9.910 million in 2004[2]. Consequently, the population growth recorded during the period (1976-2004) was the highest in nearly a century. However, the Tunisian population growth rate which had increased until the mid-1980s has recently showed a clear downward trend. Between 1994 and 2004, the annual population growth rate was 1.2%, compared to 2.5% between 1975 and 1984 and 2.38% for the period between 1984 and 1994. Moreover, population growth has been accompanied with changes in the age structure, with an increasing workforce as its main consequence (figure 1).

Figure 1: Population by age group
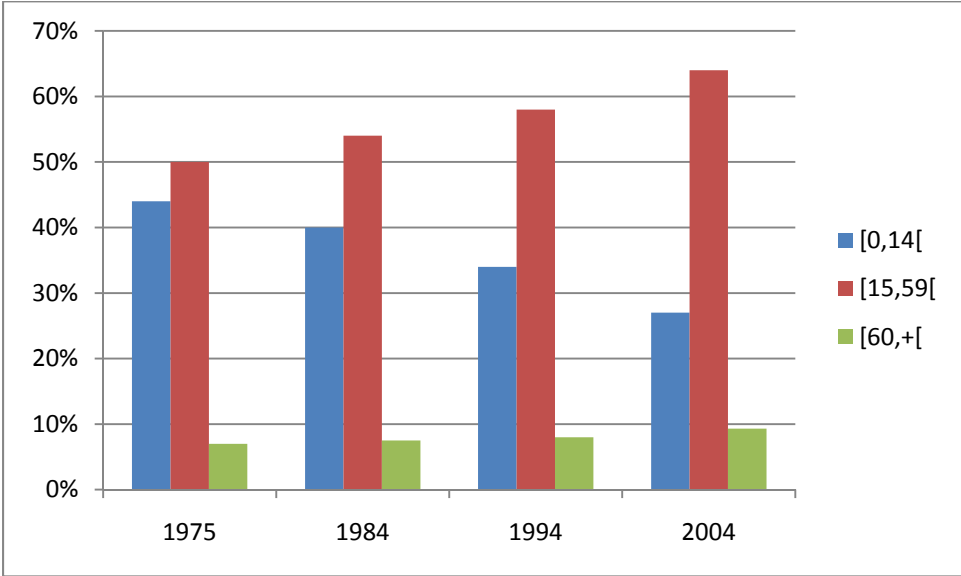
We note in particular a steady decline in the share of 0-14 age group compared to the total population. Indeed, the age group of 15 years and under, representing nearly half

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[2] The population in 1921 was about 2.093 million and 3.783 million in 1956.

the population in the early 1960s, has experienced continuous decline and accounted for only 27% of the population by 2004.

Figure 2: Labour Force by gender
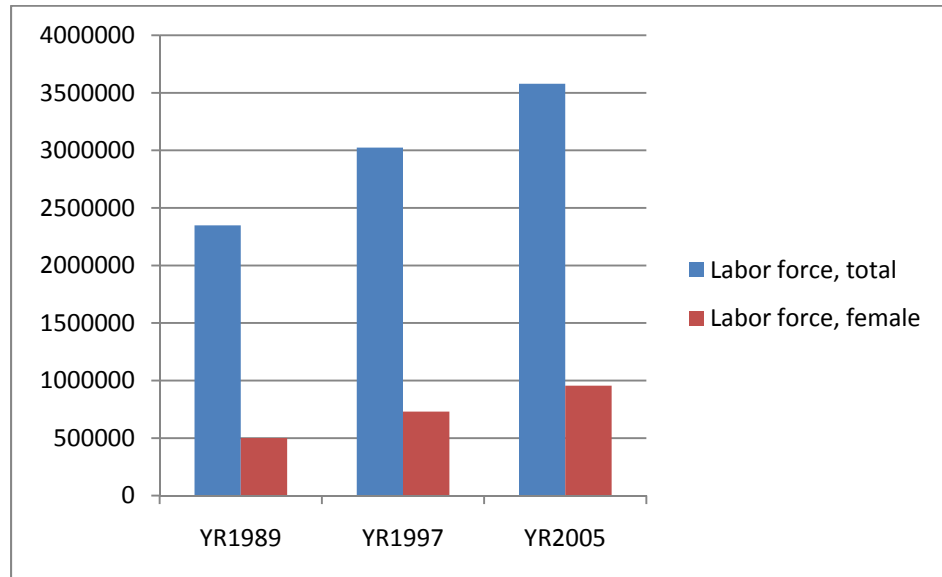
Increase of the working age population of (15 years and over) has added to the size of the labour force by nearly 1.62 million people in 1975, 2.13 million in 1984 and 3.32 million in 2004. Moreover, as shown by figure 3, the labour force is heavily male-dominated because of the low participation rate of females.

However, as we know, the working age population (15-59 years) is not fully active. Part of this population group is not working nor are they among the job seekers because of schooling, national service, or other reasons. The rate of activity (ratio of the working population to those classified as being of working age) varies by age, gender and place of residence. According to the 2004 general population census, the rate was 45.8%, down from its 1994 level (48.4%). This regression has been evident since the mid-1980s in response to increased enrollment in secondary and especially higher education. In addition to entering the labour market later and later, the workforce is also characterized by an increased level of education. In 1975, only 14.2% of the population had completed secondary schooling, whereas in 2004, nearly half (or 47.2%) had completed secondary school or graduated from university. Obviously both factors are

related: greater enrollment numbers and longer study times account for the delayed entry into the employment market.

Unemployment rate in Tunisia is about 14%, making it among the highest in the world. The persistence of unemployment during three successive decades confirms its structural dimension.

Table 1: Unemployment by gender

	1975	1984	1994	2004
Gross unemployment rate	15,7%	16,4%	16,2%	14,2%
Male	16,4%	17%	15,2%	12,9%
Female	13,4%	13,7%	17,4%	16,7%

The unemployment rate in 2005 for women was higher than men, 17.33% versus 13.11%. This difference, however, was smaller in 1997, when the unemployment rate among women was 17.33% compared to 15.78% for men. Thus, the reduction in the unemployment rate recorded during the decade 1997-2005 has benefited the men.

Table 2: Unemployment by age group

	1975	1984	1994	2004
Less than 25 years	26,3%	25%	26,5%	30,3%
Between 25-49 years	7,4%	8,1%	12,5%	
More than 50 years	7,1%	7,1%	5,6%	

Unemployment essentially concerns the youth and is linked more to the problem of insertion into the labour market (World Bank, 2004). In 2004, the unemployment rate for ages below 30 years was approximately 30%. This situation is typical of countries where

the education and training system is not properly linked to the economic environment. Indeed, graduates, misinformed about the country's working conditions and requirements, have educational profiles that are inconsistent with reality, a fact which makes their first attempt at labour market entry difficult.

Table 3: Unemployment by education

	1975	1984	1994	2004
Illiterate	9,9%	10,3%	17,6%	13,8%
Primary	19,2%	19,2%	18,3%	15,1%
Secondary	10,6%	12,2%	13,1%	14,1%
Tertiary	1,5%	2,2%	3,8%	10,2%
Total	15,8%	16,4%	15,6%	13,9%

The difficulties are even greater for the better educated labour force. Table 3 shows that unemployment rates among those with secondary or higher education have increased by 6 and 9 percentage points, respectively, between 1975 and 2004. In particular, the unemployment rate for tertiary graduates increased from 1.5% in 1984 to 3.8% in 1994 and 10.2% in 2004, while gross unemployment has tended to stabilize.

The last observation concerns the dispersion of unemployment rates across regions. In 2004, recorded unemployment was at its lowest in the central east region (10%) (with a diversified and dynamic economy) and at its worst in the agricultural region of the north-west (18%) and the mining region of the south-west (18%). Low mobility and lack of inter-regional migration are among the reasons for this regional disparity.

We conclude that the unemployment problem in Tunisia is more pronounced among the educated youth than the unskilled middle age workers, is more acute among women, and is more serious in the north-west and south-west regions.

3. Matching in the Tunisian labour market: Model and data

Analysis of the labour markets can be addressed through two distinct approaches. The first approach is macroeconomic, and refers to the global interdependencies between the general level of economic activity and employment to explain the development of cyclical unemployment. However, as confirmed by Blanchard and Diamond (1989) even if the aggregate level of labour supply were to equal the aggregate level of labour demand, there would be always some individuals in search of a job and some firms in search of the appropriate workers.

The second approach is microeconomic, and explains the disequilibrium on the labour market by assuming frictions in the matching process. The joint behavior of unemployment and vacancies plays a key role in the functioning of the labour market. According to this approach, better information on the functioning of the labour market is provided by mechanisms related to demographic changes, changes in behavior in terms of supply and demand for labour, changing structures of production, and technology.

In our paper we adopt a microeconomic approach to assess the matching process in the Tunisian labour market.

3.1. The matching function

Like the production function, the function relating the number of hirings with the number of unemployed job seekers and the number of vacancies plays a central role in theories of equilibrium unemployment. The matching function is often used to model frictions in the labour market. Since the work of Blanchard and Diamond (1989), the first empirical studies on the matching function were conducted on aggregate data; this is partly due to the fact that the equilibrium unemployment theories intend to describe the behavior of the unemployed, but also due to the non-availability of disaggregated data. However, aggregate data impose the strong assumption of homogeneity of friction effects between the different sub labour markets.

Cole and Smith (1996) estimate the matching function for England on cross-sectional data and confirm the positive effect of population density on the matching process efficiency. In order to control for the observable and unobservable heterogeneity between regions and to correct for the aggregation bias, several authors have used panel data to analyze the matching function: Anderson and Burgess (2000) for 20 U.S. industries, Burgess and Profit (2001) for 303 English regions, Burda and Profit (1996) and Boeri and Profit (2001) for 76 Czech regions. Their results, using aggregated data,

show the existence of significant differences in the nature of returns to scale with estimates of the matching function.

According to theoretical literature, a matching function, usually Cobb-Douglas function, linking the level of hirings to the number of unemployed job seekers and job vacancies is used to study frictions on labour market.

The matching process is generally represented by the following function:

$$H_{it} = A_i U^{\alpha}_{i,t-1} V^{\beta}_{i,t-1} \xi_{it} \quad (1)$$

where H, U, and V denote new hiring, unemployment, and vacancies, respectively.

The flow of hirings is represented by a positive function of the initial total stocks of job vacancies, V_{it-1}, and of job seekers, U_{it-1}. Variables may be structured as time series, cross section, or both. In empirical analysis, issues have been analyzed in particular as the measures of returns to scale $(\alpha+\beta)$ in the matching process. While the standard theories rely on the assumption of constant returns (e.g. Pissarides, 2000), increasing returns (Anderson and Brugess, 2000, Boeri and Burda 1996; Van Ours, 1995) or decreasing returns (Hynnien 2005; Kano and Ohta 2004) can be explained by more matches in large markets, for example. Increasing returns imply that there can be multiple unemployment equilibria (Blanchard and Diamond, 2001).

This process can be approximated by a functional relationship which is analogous to an aggregate production function where U and V are the inputs and H the output. The constant A shows the 'mismatch parameter', 'scale parameter', 'overall productivity factor', 'efficiency parameter', etc.

3.2. Data analysis

The data are yearly and concern 23 regional labour offices over the period 1984-2004. The data source is the Tunisian Ministry of labour and different local labour offices.

The objective of our study is to identify factors explaining inefficiencies in the matching process. Therefore, we introduce a vector of explanatory variables Zj to estimate the matching frontier. The fundamental contribution of the advocated method is to differentiate among the structural factors (the number of vacancies and the number of job seekers) and other factors that play an indirect role in the matching process. In this paper we consider that variables Z to have no effect on the shape or the position of the

matching function but instead on the effectiveness of the matching process. In other words, it is the distance between each observation (region) and the frontier which depends on factors Z and not the frontier itself[3].

Several studies have concluded that the job seeking intensity (Budd, 1988; Layard and Been, 1989; Pissarides, 1992) and the behavior of firms during the hiring process (Burgess, 1993) Blanchard and Diamond, 1994; Munford, & Smith, 1999 Anderson and Burgess, 2000) are the main determinants of the intensity of matching frictions. Following Fahr and Sunde (2002,2005), Ilmakunnas and Pesola (2003), and Ibourk et al (2001) to explain matching efficiency differences both over time and across regions, we introduce the following control variables to capture the role of frictions in the matching process: age structure, education level, the proportion of jobseekers who have been unemployed for more than two years, the rate of urbanization, and the share of women seeking employment.

The age structure of the job seekers may affect matching as employers may prefer young applicants who are more mobile and better motivated. We include the variable (U35) to measure the proportion of jobseekers under the age of 35 years.

We include the share of jobseekers with a higher education level (UHE) to capture the effect of education. Theoretically the probability of employment increases with the level of education, as it is easier for qualified jobseekers to find a job than those without any qualifications.

The proportion of jobseekers who have been unemployed for more than two years (ULD) is also included and we expect a negative coefficient. Indeed, with long-run unemployment, skills tend to deteriorate, decreasing the probability of finding a job.

Based on the results in earlier empirical studies regarding the nature of returns to scale (most urbanized markets are less efficient), we introduce urbanization for each region (URB) as an additional variable.

Flexible labour market policy has been recommended as one solution to unemployment in the developing countries. In late 1995, Tunisia implemented two significant reforms to the Labour Code to improve labour market flexibility. The first concerned dismissal laws, the settlement of individual disputes and collective employee representation in the company and the role of labour inspection. The second reform has essentially introduced regulations governing new forms of employment (fixed-term contracts and

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[3] Another widely used option by the literature is to consider variables Zj as a component in the matching function.

part-time work etc. ...) and changes applying to the right of firms to make employees redundant as well as rules related to hiring, working conditions and wages. As a first attempt to assess the effect of this flexible labour market policy on matching efficiency, we include a dummy variable (D96), taking the value 0 before 1996 and 1 after that date.

In general the economic expansion over the last year has been led by exports and powered by foreign direct investment (FDI). In many recipient countries FDI has provided the capital to bridge the gap between domestic savings and development needs, thus contributing to the creation of new jobs. FDI is not just the means for opening new markets for multinational companies but also generates the opportunity to achieve higher productivity through technology transfers. In return, the recipient country (Tunisia in our case) offers a young, educated, low-cost workforce. In addition, the state guarantees a low corporate-tax rate and modern infrastructure. Consequently, we include an indicator of FDI flows to test whether they have effect on the efficiency of the Tunisian labour market.

As shown in table 1, on average there are 10,174 registered job seekers and 3,572 vacancies giving a hiring level of around 3175 employees.

Table 4: Descriptive Statistiques

	H	U	V	U35	UF	ULD	URB	UHE
Min/max	205/ 16797	1930/46478	236/ 17069	0,09/0,32	0,05/0,39	0.01/ 0.7	0,6/0,79	0,10/0,41
Average	3175	10174	3572	0,23	0,22	0.155	0,77	0,23
Std.Dev	2592	6591	1217	0,05	0,08	0.087	0 ,1	0,06
Number of observations	460	460	460	460	460	460	460	460

Data show that a substantial numbers of job seekers have been unemployed for more than two years (almost 15% on average). An interesting characteristic of the Tunisian economy is that 75% of jobseekers are aged less than 35 years and almost 80% are male. Furthermore, only 12% of the job seekers, on average, have a higher level of education.

Overall, the male activity rate in Tunisia is close to 75% while that of women is still only 25%.Thus, three out of four adult men are working or seeking work, while on the part of females, only one out of four is similarly placed, the rest are outside the employment

market. But female participation rate is growing steadily, and in 2004 nearly 24% of women were active in the labour market compared to only 5.6% in 1966. To assess the effect of female participation in the labour market on the efficiency of matching process, we introduce the variable named UF as a predictor of changes in the participation of women in the Tunisian labour market.

Regional disparity in terms of labour market dynamics has important consequences on the regional matching process and so on the level of unemployment. A part of the difference in regional labour market performance is associated with social, human and physical capital endowment and the lack of policies that increase workers' interregional mobility. Consequently, in trying to assess the contribution of regional mismatch to unemployment, we analyze the characteristics of the local labour markets in Tunisia. Information on job seekers, vacancies and reported matches are provided by the local labour offices in different governorates. The data include the flow of hirings (H), the stock of registered unemployed job seekers (U) and the stock of vacancies (V) for 23 governorates (regions) over the period 1984-2004[4].
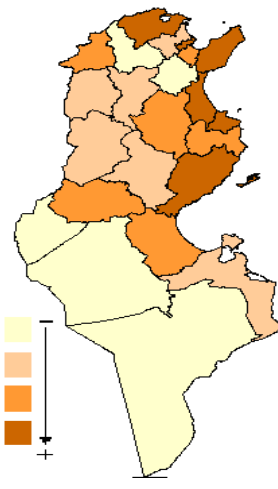
Figure 5: Regional characteristics

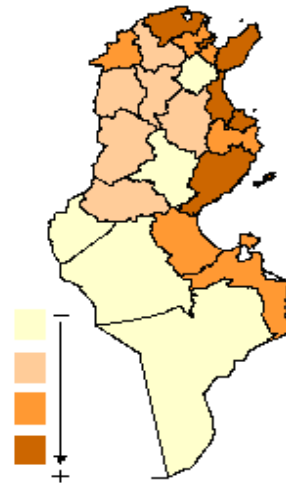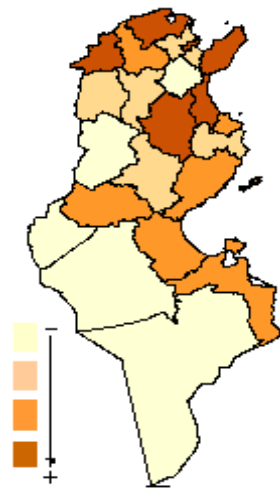[4] See appendix for more information.

Hiring by region
1984
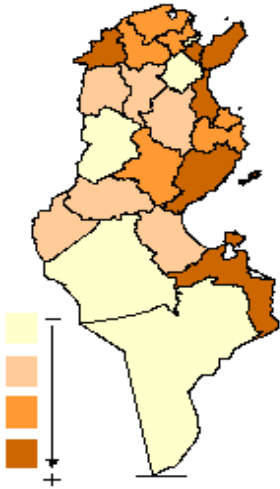
Hiring by region
2004

Hiring by region
Average-period

Number of job seekers by
region
1984

Number of job seekers by
region
2004
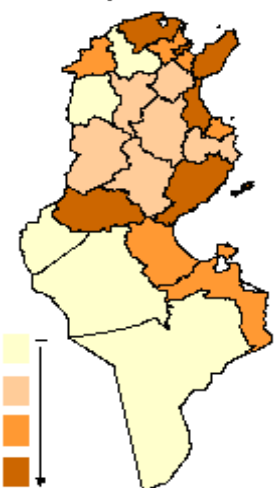
Number of job seekers by
region
Average-period
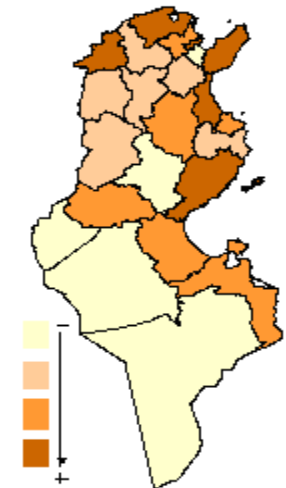
Vacancies by region
1984

Vacancies by region
2004

**Vacancies by region**
Average-period

13
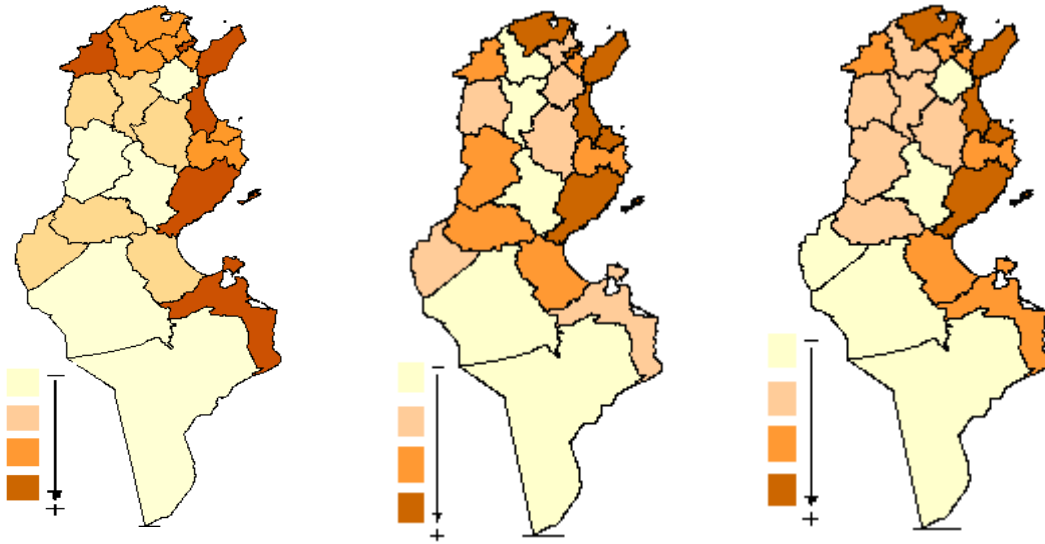
As are shown by the foregoing figures disparities between the regions are substantial and, as we can note, regional labour market characteristics have not changed much in recent years. The coastal and the north regions lead in terms of hiring processes, job vacancies and the number of job seekers; the southern region lags behind in all aspects and for both periods. The inhabitants of the central and southern regions are more disadvantaged, a reflection of the relative concentration of economic activities in the coastal regions. In addition, the difference in unemployment rate across regions suggests that labour market opportunities are associated with specific regional structural characteristics. Therefore, introduction of variables to reflect the characteristics of job seekers may provide useful evidence on the role of frictions in the matching process.

Significant differences in the unemployment rates between regions contribute to the formation of aggregate unemployment. Higher mobility of workers from regions most affected by unemployment to areas where unemployment is the lowest, should lead to a reduction in the average level of joblessness. Henceforth, regional dispersion of the unemployment rates is used as an indication of the degree of geographical immobility of workers that contributes to the formation of underemployment in the economy as a whole.

The most interesting result is that the disequilibrium between labour demand and supply may be explained by the concentration of economic activity in the coastal zone in conjunction with low geographic mobility caused by higher cost of mobility or lack of

information. The regional maladjustment (mismatch) between the labour force and supply leads to a gap between the unemployed and available job opportunities implying that an analysis of the regional mismatch needs to be conducted. The mismatch highlights the impossibility of bridging at the disaggregated level the existing unemployment with available vacancies.

Recently, several studies have attempted to assess the level of regional imbalances to explain the persistence of unemployment at high levels. In what follows, we propose to evaluate the extent of regional imbalances in Tunisia on the basis of the Jackman and Roper (1987) indicator. This indicator is applied to a series of job seekers and job vacancies by region from the year 1976 onward. The chart below shows continuous movement of the regional mismatch index as well as the increasing tendency of the recent period.

Figure 8: Regional mismatch
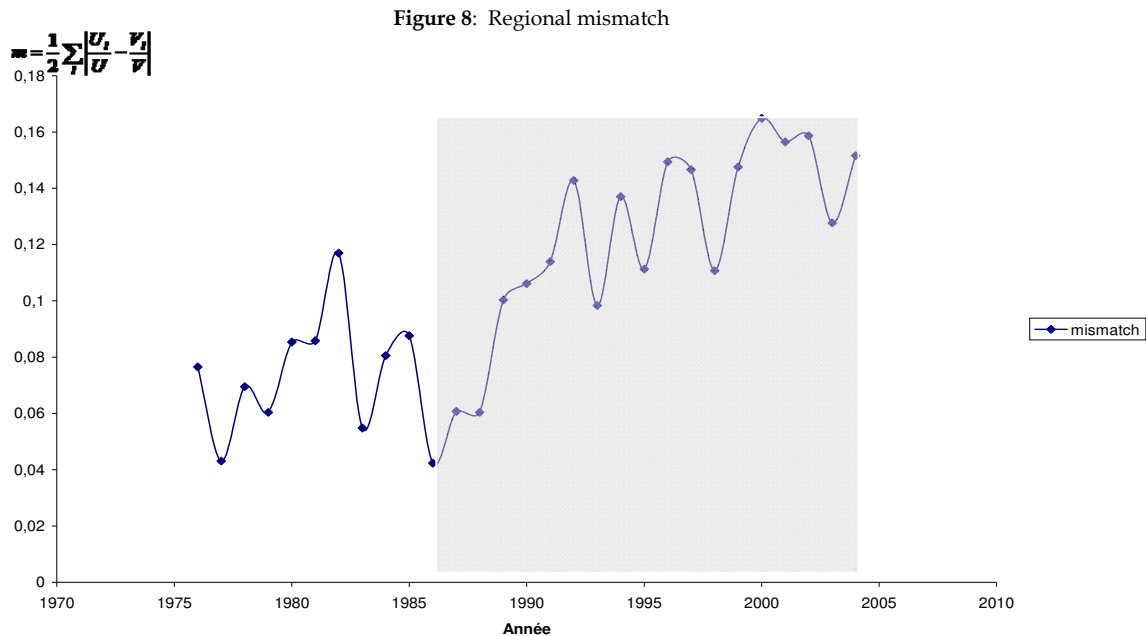
This graph clearly confirms the high dispersion of regional unemployment in Tunisia. We also note that regional labour market inefficiency has become very important in the 1990s mainly because of the large inflow of jobseekers on the labour market. The problems of geographic mobility would, therefore, contribute rather strongly to the persistence of Tunisia's aggregate unemployment rate.

In the next section we use the matching functions to assess the importance of labour market friction in Tunisia. Moreover, to better understand the dynamics of the matching process, we then proceed to a regional analysis.

3. Stochastic frontier estimates for the matching process

To the extent that the matching process is compared to a production process and because the emphasis is on matching efficiency estimates, specifying the empirical model as a stochastic production frontier model seems the most natural modeling strategy. The frontier approach will be used to estimate the matching function, where H represents the maximum achievable number of job market matches, given the number of job seekers (U) and vacancies (V).

In many estimations of the stochastic frontier the heterogeneity is confused with technical efficiency. Any time-invariant unobserved heterogeneity is pushed into the inefficiency component. However, unobserved heterogeneity, if not accounted for, may cause biased estimates. Orea et al. (2004) confirm that unobserved differences in technologies may be inappropriately labeled as inefficiency if technology variation is not taken into account. Many techniques are offered in the literature for differentiating heterogeneity from inefficiency. Huang (2004) proposes a stochastic frontier model with random coefficients to distinguish technical efficiency from technological differences across individuals. Kumbhakar (1991) uses a panel data model to estimate production function and technical efficiency. He distinguishes technical inefficiency from individual and time specific effects by allowing the mean of the technical inefficiency to be a function of exogenous variable. Both random and fixed effects are considered in the estimation. In line with Greene (2005), we estimate Random Coefficient models to deal with unobserved heterogeneity.

The stochastic frontier function can be specified as

$$Log(H_{it}) = a_0 + w_i + \beta \ln(U_{it}) + \alpha \ln(V_{it}) + u_{it} + v_{it}$$

where w is a time-invariant, individual-specific random term intended to capture specific heterogeneity. This model is fit by maximum simulated likelihood method.

The subscripts i and t denote individual regions and years, respectively; H represents hirings; U is the stock of job seekers, V the stock of vacancies. The estimation of the stochastic frontier models uses data for 23 for regions over the period 1984-2004.

Table 5 shows the results of two alternative specifications of the matching function: The first column contains the results deduced from the model by Battese and Coelli (1995) without specific effects and where interregional heterogeneity is considered (the proxies for the heterogeneity are included in the average distribution of inefficiency series). The second specification, by introducing the fixed effects specific to each model, combines modeling of Battese and Coelli (1995) with that of Greene (2005), called "true fixed-effects model".

Table 5: Estimations Results[5]

Variables	Stochastic Frontier (Battese et Coelli)	Stochastic Frontier (Greene 2005)
Ln(U$_{t-1}$)	0,08(0,00)	0,12(0,02)
Ln(V$_{t-1}$)	0,89(0,00)	0,80(0,00)
Constant	0,35(0,00)	0,77(0,01)
Long-run unemployment share : ULD		-0,15(0,04)
Unemployed less than 35 years : P35		0,06(0,03)
Urban unemployment : URB		-0,02(0,08)
Female Unemployed : UF		-0,24(0,01)
FDI		0,35(0,01)
D96		-0,12(0,00)
Graduated unemployed (US)		4,3(0,00)
Return to scale	0,97 RDC	0,92 RDD
σ^2	0,10(0,00)	0,40(0,00)
γ	0,58(0,00)	0,57(0,00)
Number of observations	460	460

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[5] Probability into parentheses. σ^2 is the sum of variances of the stochastic error and the inefficiency tem and γ is the ratio of variance of the inefficiency term over the total variance.

The results for the Battese and Coelli (1995) and the Greene (2005) models suggest that the inefficiency component is statistically significant as the coefficient associated to γ is significant. Furthermore, in the case of Greene (2005) the return to scale decreases while in the case of the stochastic frontier specification as specified by Battese and Coelli they are constant. This implies a negative or null impact of density on the matching process efficiency in the Tunisian labour market[6]. The constant or diminishing returns to scale (extreme case) represents a significant constraint for the regions with the largest markets, especially in the vicinity of Tunis.

Matching function coefficients are significant for the two regressions, but different from previous analyses conducted on industrial countries. Indeed, hirings seem to be driven more by the stock of vacancies, with the stock of job seekers having a limited effect[7]. Ibourk and Perelman (2001) find the same result for Morocco ($\alpha = 0,18$ and $\beta=0,81$). This confirms that the matching process in developing countries may be different. One explanation is that professional agencies, which are supposed to promote employment, have not played an important role in disseminating information among job seekers. It seems that there exists a considerable lack of, and access to, information on new job offers. The main causes are the paucity of specific information, limited regional centralization of information, lack of flexibility and diversification of services, and difficulty in accessing information networks.

Figure 6: Efficiency over time

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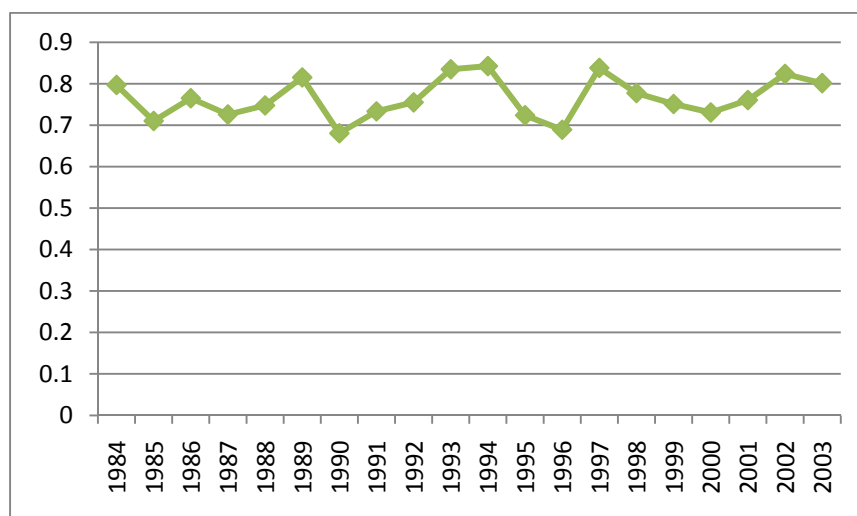
[6] Our results are confirmed by Kano and Ohta (2004) for the Japanese labour market.

[7] As reported previously, the existence of an informal market operating in Tunisia in addition to the fact that only job seekers registered in employment offices are considered in unemployment figures may lead to an underestimation of the parameter β

As shown in figure 1, over the period of analysis, there was no significant improvement in matching efficiency. Indeed, the level of efficiency in 2003 was the same as it had been in 1984. The relative immovability of the matching process questions the different efforts implemented by the Tunisian authority to improve labour market performance.

**Table 6:** Efficiency scores by region

	Average	St. dev
ARIANA	0.74	0.17
BEJA	0.75	0.07
BEN AROUS	0.76	0.11
BIZERTE	0.79	0.15
EL KEF	0.78	0.09
GABES	0.77	0.12
GAFSA	0.75	0.15
JENDOUBA	0.79	0.08
KAIROUAN	0.74	0.13
KASSERINE	0.75	0.15
KEBILLI	0.76	0.05
MAHDIA	0.79	0.04
MEDNINE	0.75	0.13
MONASTIR	0.79	0.07
NABEUL	0.79	0.09
SFAX	0.83	0.12
SIDI BOUZID	0.73	0.10
SILIANA	0.76	0.09
SOUSSE	0.80	0.11
TATAOUINE	0.74	0.13
TOZEUR	0.75	0.10
TUNIS	0.75	0.09
ZAGHOUAN	0.75	0.07
Average	0.77	0.05

The estimated efficiency measures of all governorates range from a minimum level of 0.74 to a maximum of 0.83, with an average of 0.77. Our results conform to those noted in the existing literature on matching efficiency. Over the period 1984-2004, the level of efficiency varies between 0.14 and 0.95 with a standard deviation of about 0.11. Among the 23 governorates, only 9 stand out with an efficiency level exceeding the national level. The regions of Sfax and Sousse seem to be the more efficient with an average efficiency rate of 0.83 and 0.80, respectively. Sidi Bouzis, Tataouine, Kairouan and

Ariana are the less advanced regions.

Moreover, figure 7 show a very substantial variation in labour market efficiencies scores among the regions. Regions that were more efficient in 1984, as Tataouine, Mednine and Gafsa, have become less proficient in 2004, while the regions like Sousse, Monastir and Gabes that were lacking in efficiency in 1984 have shown improvement in 2004. These results confirm that the changes in workforce structure, as determinants of labour market efficiency, have not been the same for all regions.

Figure 7: Regional efficiency scores
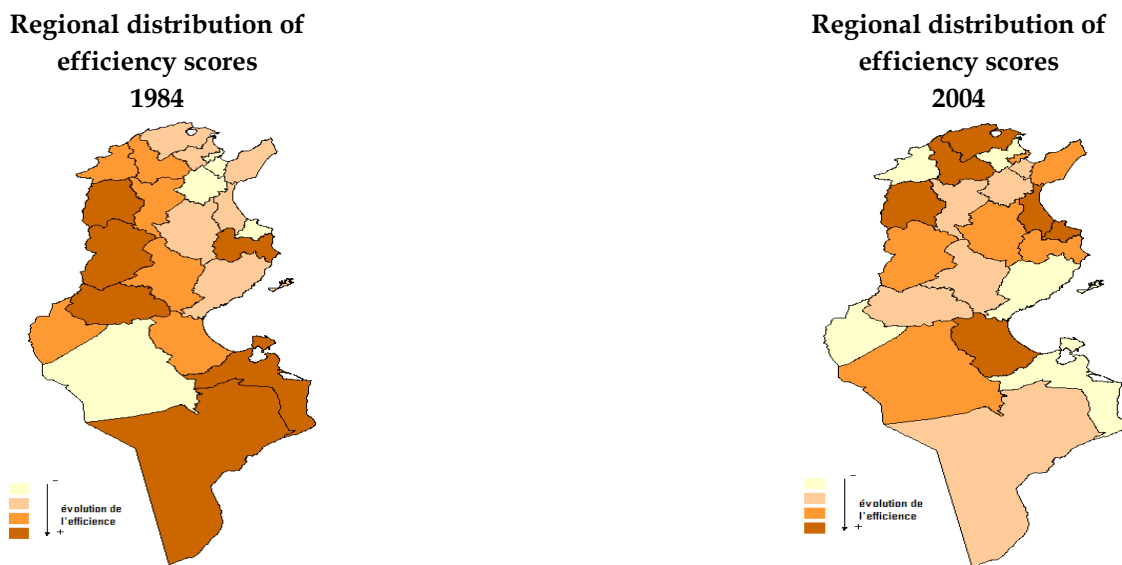
As we can note in table 1, coefficients associated to different sources of friction on the Tunisian labour market are all significant. An increasing share of long-term unemployment negatively and significantly affects the matching process. A 1% increase in the share of long-term unemployment decreases the matching efficiency by 0.15%. This is in contradiction with the results observed by Ilmakunnas and Pesola (2003) who note a positive effect for Finland and those by Blanchard and Diamond (1989) who find a negative but insignificant effect for U.S.

The share of jobseekers aged below 35 years significantly and positively affects the matching process, confirming results found by Fahr and Sunde (2002) for Germany and those of Ilmakunnas and Pesola (2003) for Finland. This result is explained by the fact

that young job seekers are considered as a priority, supplementing their freshness in terms of qualifications and their higher job research intensity.

The effect of the share of women job seekers on the matching efficiency is significantly negative (coefficient equal to -0.24 with a probability of 0.01). The result is somewhat surprising and unexpected and raises many interesting questions on the role of women in the Tunisian labour market. A possible explanation of this negative effect is the low mobility of women. Indeed, Tunisian women job seekers are often limited to local markets.

The effect of variation in the educational structure of job seekers is also significant and positive; a 1% increase in the group of qualified job seekers increases the efficiency by 4%. This confirms the results found by Lahtonen (2006) for Finland and by Fahr and Sunde (2002) for Germany. Indeed, job seekers with a higher level of education have higher research intensity and better qualified to target their search, which increases matching efficiency.

As expected, a significant and negative coefficient of the urbanization effect confirms the nature of diminishing returns to scale and the negative effect of density on the efficiency of matching process.

We find a positive and significant effect of foreign direct investment (FDI) on the efficiency of matching[8]. This result confirms that the promotion of capital flows plays a key role in the improvement of the labour market matching process.

Contrary to what was expected, the flexibility of the Tunisian labour market has a negative and significant effect on the matching efficiency. Although this policy is beneficial for firms and encourages them to offer more vacancies, short-term employment is still shunned by job seekers interested in more permanent jobs. This result contradicts the findings by Taline Koranchelian and Domenico Fanizza (2005) who conclude that increasing labour market flexibility reduces unemployment.

Conclusion

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[8] The relationship between FDI and efficiency can be analyzed further and may provide more information as well as investigate the economy if we have regional data for this variable.

What have we learned about the Tunisian labour market performances from the empirical analysis?

Throughout our work, we tried to highlight the role of market characteristics in the matching process and to emphasize the importance of adopting a regional labour market analysis to understand the role of regional disparities in the persistently high unemployment rates. The extremely diverse unemployment levels between regions and the profound changes in the process of job creation confirm that the persistently high rate of unemployment is the result of not only excess labour supply but is also related to a shortfall between supply and demand (sector, location, qualification).
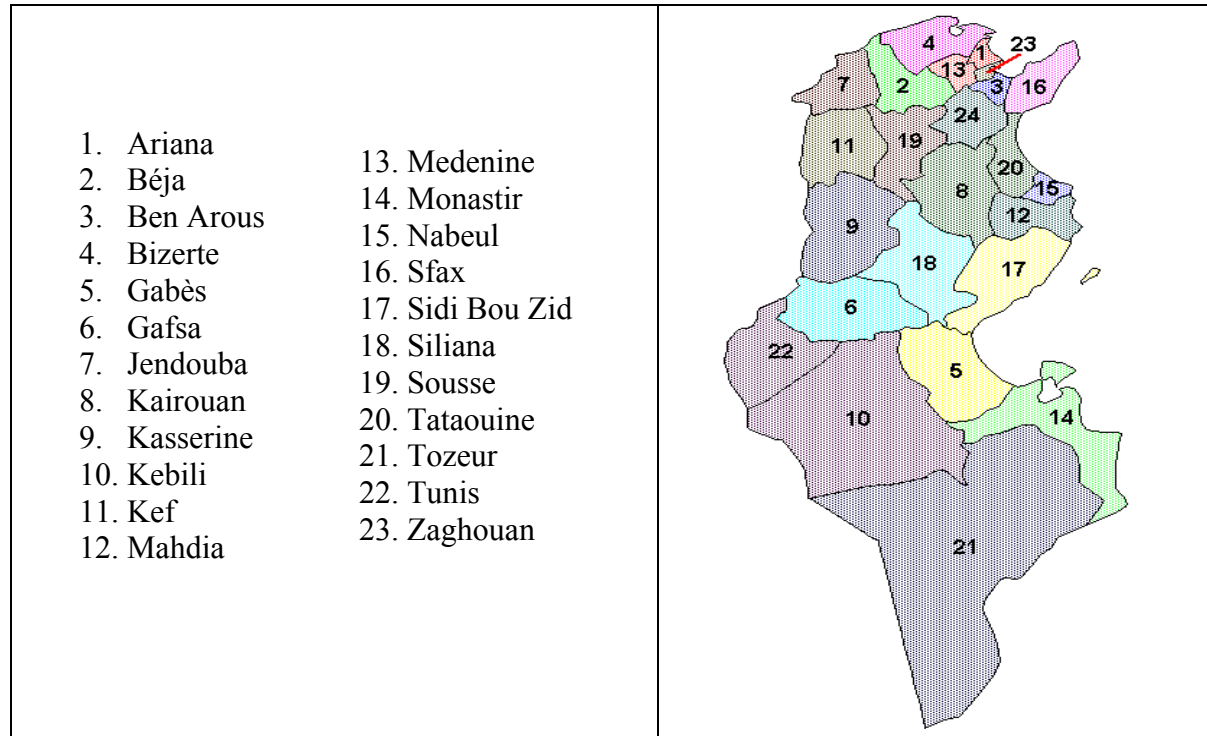
Consequently, rising and persistence unemployment may be interpreted as the inefficiency of the matching process and differences in structural factors across regions. Therefore, a microeconomic approach that focuses on frictions on the labour market such as imperfect information, mobility of workers, professional or geographical constraints, or more generally, an approach that targets on inefficiency of the matching process between unemployed job seekers and job vacancies, is more appropriate in understanding unemployment in Tunisia.

A matching function is adopted in our study to capture the influence of frictions on the level of efficiency on the labour market. The nature of returns to scale in the matching process suggests the existence of a negative externality related to the number of market participants, and therefore market size. A decreasing returns to scale means that higher density will have a negative impact on the matching probability. Concentration in the urban areas would, therefore, increase unemployment.

We also confirm that changes in the composition of the stock of job seekers such as age and educational structure, structure by gender, and level of urbanization, contribute significantly to explaining regional efficiency disparities. We found a positive effect of foreign direct investment and a negative effect of the policy that aims to promote more flexibility in the Tunisian labour market.

Appendix

Tunisia is subdivided into 23 governorates or regions that are divided into 264 "delegations" or "districts" and further subdivided into municipalities and sectors.

1. Ariana
2. Béja
3. Ben Arous
4. Bizerte
5. Gabès
6. Gafsa
7. Jendouba
8. Kairouan
9. Kasserine
10. Kebili
11. Kef
12. Mahdia
13. Medenine
14. Monastir
15. Nabeul
16. Sfax
17. Sidi Bou Zid
18. Siliana
19. Sousse
20. Tataouine
21. Tozeur
22. Tunis
23. Zaghouan

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