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Employment Growth, Productivity and Jobs reallocations in Tunisia:

A Microdata Analysis

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Employment Growth, Productivity and Jobs reallocations in Tunisia:

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Abstract

Using a micro database of Tunisian firms, the paper investigates the dynamics of productivity growth, employment and jobs reallocation. The methodology is based on data analysis and regressions. The main findings are that there is a trade-off between employment growth and productivity as it appears that the sectors (services) and firms (the biggest) that create the most jobs are not those characterized by the highest productivity growth. Moreover, we find evidence of a week contribution of structural change to productivity growth. We also show that trade liberalization did not have an impact on jobs reallocation or employment growth.

Keywords: Productivity; employment; jobs reallocations; structural change; Tunisia;

Résumé

En utilisant une base de données issue d'enquêtes entreprises, le papier analyse la dynamique de croissance de la productivité, de l'emploi et de la réallocation en Tunisie. La méthodologie est basée sur l'analyse de données et des régressions. Les principales conclusions sont qu'il y a un trade-off entre la création d'emplois et la productivité car les secteurs (services) et les entreprises (les plus grandes) qui créent le plus d'emplois ne sont pas ceux qui sont caractérisés par la croissance de la productivité la plus élevée. En outre, nous mettons en évidence la faible contribution du changement structurel à la croissance de la productivité. Nous montrons également que la libéralisation du commerce n'a pas eu d'impact sur la réallocation ou la croissance de l'emploi.

Mots-clés: Productivité; emploi; réallocation; changement structurel; Tunisie.

JEL classifications: C12 D22 D24 F16 J23 L16

I. Introduction

The interactions between productivity growth and job creation are multiple. Productivity growth is often considered as the main engine of job creation through lower labour costs. However, it can have a moderate or even negative impact on employment if overall growth is driven by capital intensive sectors or if it results in a substitution of labour by capital. On the other hand, jobs reallocations can contribute significantly to productivity growth through substituting low productivity jobs by high

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[2] ISCAE, Université La Manouba, LEFA IHEC Carthage et ERF ; mouelhi_rim@voila.fr, adresse: 1 rue Ali ben Khalifa, Menzah 9, Tunisie. [3] One possible explanation for this result is that the finance sector was saturated; it did not grow after 2002 in terms of size. There were no new entrants.

productivity jobs at the intra and inter-sectoral levels. Given the high productivity gap characterizing developing countries, there is a high potential of increasing productivity through labour reallocations.

In developing countries, even if the political priority is to create jobs quickly for the growing number of youth unemployed, the sustainability of these jobs must be questioned. The other long term issue is to create high productivity jobs which suit more the growing number of highly educated entrants on the labour market. Thus, it seems central in the policy debate to understand the potential of job creations and productivity growth that could be achieved through jobs reallocations. The objective of this paper is to investigate the links between job creations and destructions, jobs reallocations, employment growth and productivity.

Among the issues we raise are: which sectors and firms create more jobs? Are there reallocations from low productivity to high productivity sectors? In which industries are jobs reallocations higher? Do these reallocations foster productivity growth? What is the impact of public policies and mainly trade reforms on these outcomes?

The OECD (2009) has recently performed a cross-country analysis for OECD countries and the main conclusions are that labour reallocations are higher in expanding industries and contribute to productivity growth and industries that create more jobs also destroy more jobs. At the firm level, those that invest in new capital and young ones create more jobs while older firms destroy more jobs.

Using a micro-database on Tunisian establishments observed from 1997 to 2007, we rely on a gross job flows methodology, based on the computation of a number of key indices developed by Davis and Haltiwanger (1992, 1999) to analyse the sources of net employment changes and take account of heterogeneity in individual firm behaviour.

Tunisia is a relevant case for studying the dynamics of jobs and productivity due to its very high unemployment rate despite the various reforms implemented since the Mid-Eighties. These consisted mainly in a program of liberalization aiming at stabilizing the macro framework and boosting growth and jobs creation.

Accession to the GATT, to the WTO and the free-trade agreement with the European Union helped enforcing the trade opening initiated unilaterally within the Structural Adjustment Program. However, the analysis of the technological sophistication of Tunisian exports shows that Tunisia has specialised in products that exhibit less spill over and potential for productivity growth. The share of high-tech products is low in Tunisia in comparison to emerging countries (Diop and Ghali, 2012). Tunisia also implemented reforms of the labour code, with the aim of increasing labour market flexibility. According to various international institutions' reports, the effectiveness of these reforms is however very limited. A competition law and a new investment code were established, but the practice of cronyism and rent seeking, leads to unequal access to business opportunities and unfair competition (Rijkers, Freund and Nucifora, 2014).

The rest of the paper is organised as follows: we first analyse employment structure and growth then turn to a more detailed analysis considering the extent of job creation and job destruction as well as job reallocation. The next section analyses the evolution of productivity growth and its intra-sectoral and structural change components. The following section considers the relationship between productivity and jobs flows. Finally, we conclude.

II. Employment Growth and jobs reallocation

Data

The data used is taken from the national annual survey report on firms (NASRF) carried out by the Tunisian National Institute of Statistics (TNIS). The data covers firms from different sectors over the period 1997-2007. The empirical analysis is based on an unbalanced panel consisting of a sample of about 8087 firms from 19 sectors over 11 years (about 2500 firms in average observed by year). Table 1a in the annex presents the distribution of firms by sector and by year. NASRF can be considered as a survey of formal Tunisian firms.

Table 2a in the annex shows the employment share of our sample by sector and year (relative to total employment in a sector); public utilities (50%), transport and telecoms (40%), manufacturing (35%) and tourism (25%) are well represented in our sample, and to a lower extent construction and commerce (about 10%). However, this is not the case for agriculture and finance (about 2%) which are badly represented in our sample.

The dataset includes: value added (y) deflated by a four digit sector specific price deflator, employment (L) defined as the number of officially employed full- and part-time workers.

Employment and employment growth

The growth rate of employment for a plant i at time t is defined as:

$$g_{it} = \frac{L_{it} - L_{it-1}}{n_{it}}$$

where employment at plant *i* in year *t* is given by L and average employment at plant level is given by:

$$n_{it} = \frac{L_{it} + L_{it-1}}{2}$$

Table 1: Mean Employment and employment growth by year

Year	Firms	Employment
1997	2,788	120
1998	2,687	126
1999	2,593	139
2000	2,891	133
2001	2,948	137
2002	2,29	163

Year	Firms	Employment
2003	1,968	183
2004	2,233	176
2005	2,281	185
2006	2,492	155
2007	2,585	147

Table 2: Mean employment by sector

Sectors	Employment
Agriculture	262
Commerce	67
Construction	187
Extractive	275
Finance	42
Hotels	154
Agro-food	102
Chemicals	127
Other industries	79
Building material	116

Sectors	Employment
Mechanical and electrical	135
Textile and clothing	141
Housing	103
Public Utilities	4716
Health	138
Other services	182
Transport	354
Telecoms	2593
Education	116

From table 1 we can see that the employment average by firm increased almost monotonically from 1997 to 2005 and then fell at the end of the observed period (2006 and 2007). Table 2 shows that firms in the public utilities and telecoms sectors are the largest ones on average (with the highest employment average).

Figure 1 gives the empirical density of employment growth rates for all firms. What emerges from this figure is that the majority of firms had small growth rates during the sample period. The density of growth rate is concentrated around zero.

Figure 1: Density of employment growth rate

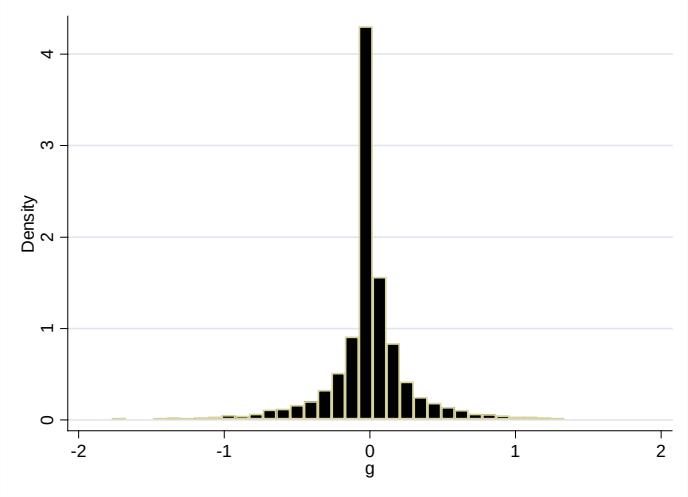
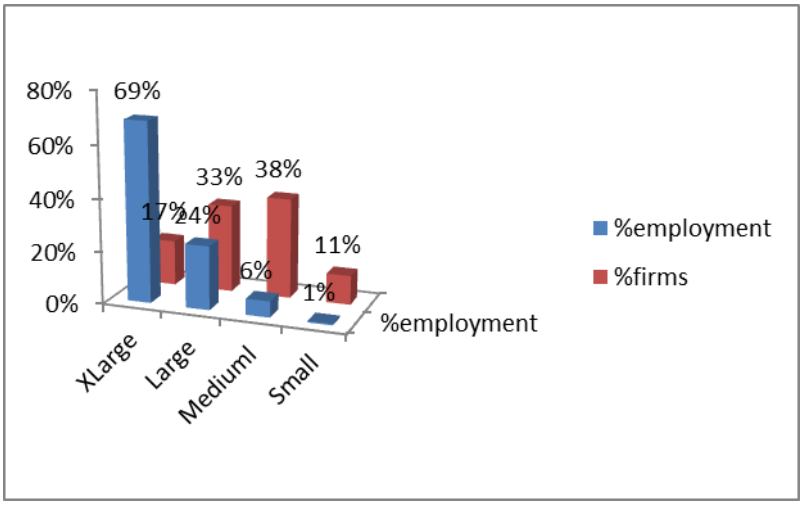


Figure 2: Employment and firm size distributions in the sample (2007)



Firms were divided into quintiles depending on their average employment. Firms employing between 6 and 9 persons are small firms. Those employing between 10 and 49 are medium. Those employing between 50 and 199 are large firms and those employing more than 200 persons are extra-large firms.

Figure 2 presents employment and firm size distributions. There are about 17 per cent "extra-large" firms in our sample but they account for 69 per cent of employment. Small and medium firms represent about 50 per cent and account for 7 per cent of employment. Large and extra-large firms represent about 50 per cent and account for 93 per cent of employment, an important share of employment.

Table3: Mean employment and employment growth by size

Size	Employment	employment growth (g)
XLarge	635	1.1%
Large	105	0.7%
Medium	24	-0.6%
Small	8	-3.4%

Table 3 reports average job growth rates by firm size. The main message of Table 3 concerns the importance of firm size in the distribution of employment growth. Employment growth rates vary with plant size. Smaller firms have lower employment growth rates than larger firms. Small and medium size firms experienced negative employment growth on average (-3.4% and -0.6%) over the studied period; large and extra-large firms experienced modest employment growth.

To check this finding more formally we use the standard non-parametric Wilcoxon test to test the hypothesis that two samples (small and large firms) are drawn from populations with the same median in terms of employment growth. The population was divided into two groups depending on whether average firm size was above or below the median firm size. Table 3a (appendix) presents the results of the test. The null hypothesis is rejected; employment growth in large firms was significantly higher than that in small firms.

To investigate the relationship between jobs growth and firm size we use a simple regression model in which job growth rates by firm and year are regressed on firm size dummies, industry fixed effects to control for industries heterogeneity and year effects to control for macroeconomic shocks. Firm's size is defined by the average employment over the observation period. Table 4 presents the regression results.

Table 4: Dependent variable is job growth rate

Dummies variable	Coefficient	Coefficient
Medium	0.086***	0.09***
Large	0.17***	.19***
Xlarge	0.26***	.29***
1999	-0.009	-.009
2000	-0.014	-.015
2001	-0.0038	-.003
2002	-0.06***	-.058***
2003	-0.031***	-.031***
2004	-0.055***	-.055***
2005	-0.044***	-.044***
2006	***-0.096*****	***-.096*****
2007	***-0.063*****	***-.064*****
Sectors dummies	***no***	***YES***

1998 is the excluded year, small firms are the excluded size group.

Large firms systematically have higher growth rates than smaller ones. The estimated coefficients are increasing significantly in size. According to the results of Student comparison tests, the differences between coefficients associated to size dummies are significant. Estimates of the size dummies are consistent with the thesis that big firms create more jobs. This parametric evidence is consistent with the previous nonparametric evidence (Wilcoxon test). On the other hand, time dummies coefficients are negative and often significant, which is consistent with the fact that job growth rate declined over the studied period.

Hence, while on average it might appear that there is little change in employment and that employment growth rates are low in different sectors and periods, there could be churning, so that jobs are being reallocated even when net job changes at the sectoral level are modest.

4.3 Jobs reallocation

In what follows we investigate how patterns of job creation and destruction compare across periods, sectors and firm size. To express gross job flows as rates, we follow Davis and Haltiwanger (1992) and define gross job creation and destruction rates in sector s at time t as following:

$$JC_{st} = \sum_{g>0} \frac{n_{it}}{N_{st}} * g_{it} \qquad \text{and} \qquad JD_{st} = \sum_{g<0} \frac{n_{it}}{N_{st}} * |g_{it}|$$

N_{st} is a measure of the size of sector s at time t. $N_{st} = \sum_{i \in s} n_{it}$

The index of job creation (JC) is defined as the weighted sum of the new places available through expansion of existing firms and creation of new establishments within the sector. The index of job destruction (JD) is defined as the weighted sum of employment losses over shrinking and dying establishments within a sector. Adding up job creation and job destruction produces a measure of the

gross job reallocation rate in sector s between t-1 and t (JR). Subtraction of job destruction from job creation produces net jobs creation (JNet).

$$JR_{st} = JC_{st} + JD_{st} \qquad \text{and} \qquad JNet_{st} = JC_{st} - JD_{st}$$

In 2001, for example, the net rate was near zero but job creation and job destruction were equal to 7.5 per cent. In 2006, the net rate fell to -6 per cent while there was job creation of about 7 per cent and 21 per cent of jobs were reallocated. In sum, there is a significant movement although slightly biased towards job creation as suggested by the positive value for net employment growth in the majority of years. The expansion and contraction dynamics of employment seems to be more important since 2005 (see table 5)

Table 5: Job creation, job destruction and job reallocation by year (percent)

Year	JC	JD	JR	Net
1998	8,5%	5,1%	13,6%	3,3%
1999	8,0%	10,1%	18,1%	-2,1%
2000	8,5%	6,7%	15,3%	1,8%
2001	7,5%	7,8%	15,3%	-0,3%
2002	5,8%	6,5%	12,2%	-0,7%
2003	5,9%	5,3%	11,2%	0,6%
2004	11,7%	5,3%	17,0%	6,3%
2005	9,4%	5,7%	15,1%	3,7%
2006	7,4%	13,4%	20,8%	-6,1%
2007	10,5%	8,5%	19,0%	2,0%
All period	**8,3%**	**7,7%**	**16,0%**	**0,6%**

Table 6: Job creation, job destruction and job reallocation by sector (percent)

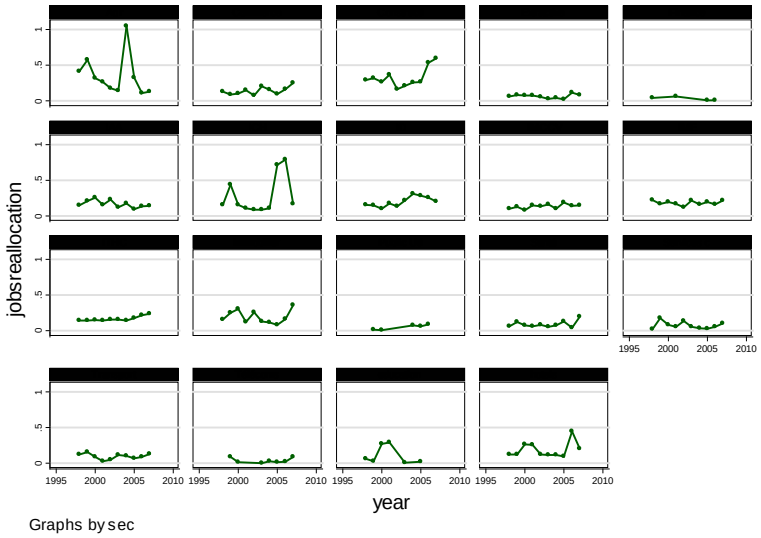
Sector	(JC)	(JD)	(JR)	(Net)
Agriculture	21.9%	**13.4%**	35,30%	8,50%
Commerce	8.2%	**6.1%**	14,30%	2,10%
Construction	17.3%	**15.6%**	32,90%	1,70%
Extractive	1.6%	**5.0%**	6,60%	-3,40%
Finance	1.3%	**2.2%**	3,50%	-0,90%
Hotels	8.2%	**10.2%**	18,40%	-2,00%
Agro-food	8.3%	**8.3%**	16,60%	0,00%
Chemicals	12.8%	**15.2%**	28,00%	-2,40%
Other industries	10.7%	**9.2%**	19,90%	1,50%
Building material	6.5%	**6.8%**	13,30%	-0,30%
Mechanical and electrical	11.0%	**7.2%**	18,20%	3,80%
Textile and clothing	9.1%	**7.7%**	16,80%	1,40%
Housing	11.9%	**7.7%**	19,60%	4,20%
Public Utilities	2.9%	**2.0%**	4,90%	0,90%

Health	5.7%	**3.4%**	9,10%	2,30%
Other services	4.4%	**3.2%**	7,60%	1,20%
Transport	4.3%	**5.0%**	9,30%	-0,70%
Telecoms	3.5%	**0.6%**	4,10%	2,90%
Education	6.5%	**7.3%**	13,80%	-0,80%

As shown in table 6, the net job growth rates indicate losses in extractive, transport, finance, education and hotels sectors and gains in agriculture, housing, electrical and mechanical engineering, health, construction and telecom. Over the studied period, the change to a services-based economy that accompanies the development process is not very pronounced as reflected in the average yearly net employment growth rate (negative for a number of services and positive for agriculture and Manufacturing). Agriculture, construction, housing and manufacturing experienced the highest jobs creation rates. Agriculture, construction and manufacturing (chemicals, agro-food and others) experienced also high jobs destruction rates. Jobs reallocations are relatively high in agriculture, construction, manufacturing, housing and tourism (traditional sectors).

Figure 3 shows a relative stability in the evolution of the jobs reallocation over the studied period. The jobs reallocation rate was stable over the studied period in about 12 sectors among the 19 considered in our study. We do not see an impact of a more openness on employment dynamics in Tunisia.

Figure 3: evolution of jobs reallocation between 1997 and 2007 by sector



To compare our results with the available evidence we focus our attention on the manufacturing sectors in Tunisia because the vast majority of previous studies on jobs reallocation and in other countries are on manufacturing sectors.

Table7: Job creation, job destruction and job reallocation in manufacturing (percent)

Sector	mean(JC)	mean(JD)	mean(JR)	mean(Net)
Agro-food	8.3%	8.3%	16.6%	0.0%
Chemicals	12.8%	15.2%	28.0%	-2.3%
Other manuf	10.7%	9.2%	19.8%	1.5%
Construction materials	6.5%	6.8%	13.3%	-0.3%
Electrical and mechanical	11.0%	7.2%	18.2%	3.8%
Textile and clothing	9.1%	7.7%	16.8%	1.4%
Total	9.7%	9.1%	18.7%	0.7%

Job reallocation is on average 18 per cent in the manufacturing sectors (see table 7) and higher than the average of all sectors (about 16%). The net jobs growth indicates very low employment gain in Tunisian manufacturing sectors (0.7%). Figure 4 presents a job reallocation comparison between some developed and developing countries manufacturing sector. First, we note that such comparison is limited by sample coverage differences (period coverage). Job reallocation in the US and Austria is around 19 per cent and slightly lower than the value for developing countries. Job reallocation is equal to 25.2 per cent in Chile, 26.7 per cent in Latin America and 30 per cent in Brazil. These results suggest that there is more reallocation in developing countries than in developed countries and this is not surprising since we would expect more reallocation in those countries that are growing faster and are changing their specialization pattern (Bottini and Gasiorek 2009). This seems not be the case for the Tunisian manufacturing sector where we can see from our results that job reallocation is low (18%) compared to developing countries. One of the explanations could be the low flexibility of the labour market.

Indeed, Tunisia was ranked 132 on 148 countries by the Global Competitiveness report 2013-2014 (Schwab and Sala I Martin, 2013), based on the rigidity of employment index, an aggregate of three sub-indexes: difficulty of hiring, rigidity of hours and difficulty of hiring. Wages are set by a centralised bargaining process and not up to within companies negotiations. The non-wage labour costs are high. Labour market institutions are crucial for quicker adjustments. However, enforcement of the regulations is low and the share of temporary contracts has increased significantly. The real constraints facing job creations have to be assessed yet. We have to identify the institutions that have a real impact on employment and economic growth Nickell and Layard (1999).

Figure 4: job reallocation comparison

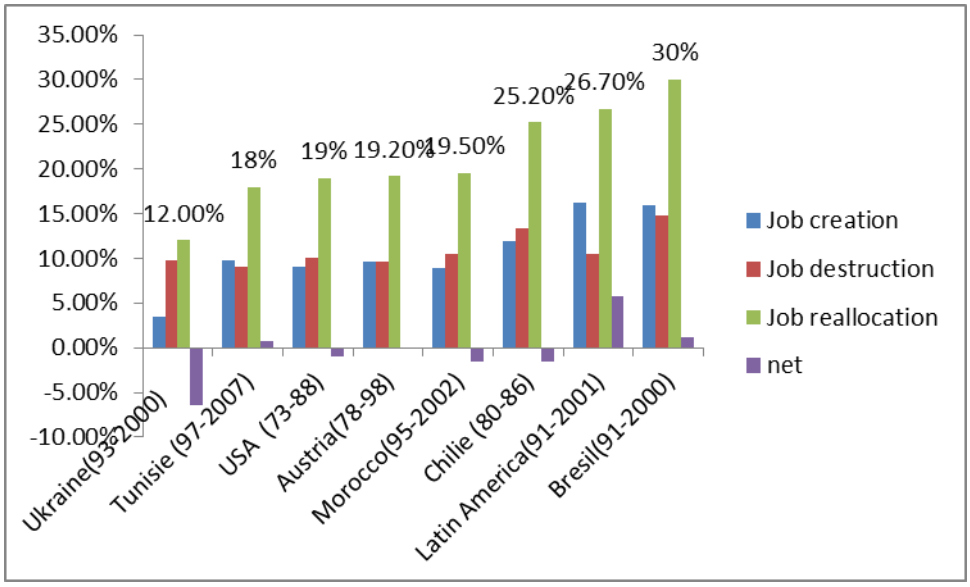
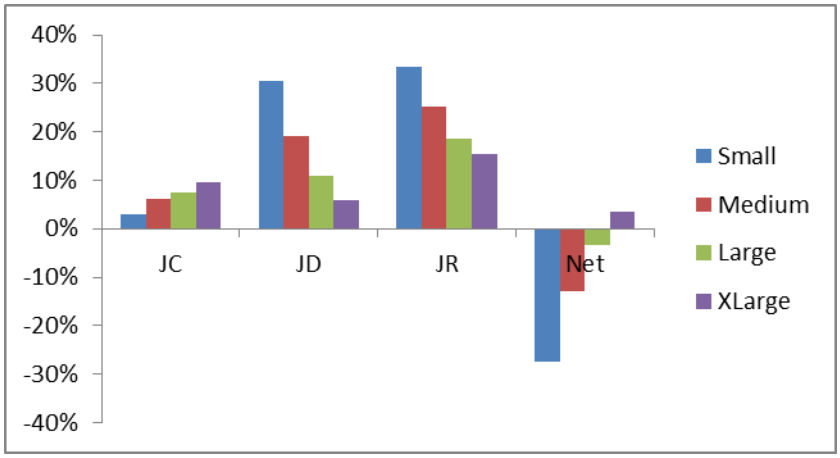


Table 8: Job creation, job destruction and job reallocation by size (percent)

Size	mean(JC)	mean(JD)	mean(JR)	mean(Net)
Small	3.0%	30.5%	33,50%	-27,50%
Medium	6.1%	19.0%	25,10%	-12,90%
Large	7.6%	11.0%	18,60%	-3,40%
XLarge	9.5%	5.9%	15,40%	3,60%

Figure 5: Job dynamics by firm size



As shown in table 8, the jobs growth rates across size classifications vary significantly. The net job growth rates indicate very high losses in the medium and small firms over the studied period. Small and medium firms account for the bulk of jobs destructions. Only the extra large firms (>200 employees) experienced positive rates of net job creation of about 3.6 per cent, on average, over the studied period.

In fact, as firm size increase, job destruction rates decreased, while job creation rates increased monotonically. As stated by Haltiwanger, Jarmin and Miranda (2010), "Firms that have the most jobs create the most jobs". However, jobs reallocations are more important in small firms, which are more volatile. Informality plays perhaps a role in this higher reallocation rate.

Figure 6: Jobs creation and jobs destruction by size

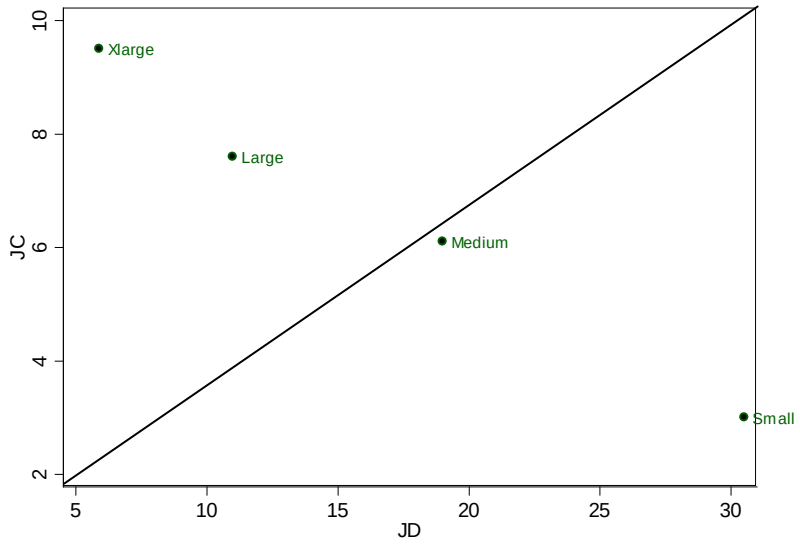


Figure 6 shows that large and extra-large firms lie over the diagonal. They present more jobs creation than jobs destruction; the small and medium firms lie below the diagonal. They are characterised more jobs destruction than jobs creation.

From a policy perspective, our results suggest that if employment growth is the main objective, concentrating job creation incentives on the largest firms where most of the jobs are being created is probably more efficient. But, why do Tunisian firms have so many difficulties to grow?

The unfair competition from firms that do not pay taxes or social security contributions can be a first argument. The small are usually informal firms and the large are companies belonging to politically connected owners. Moreover, protection of property rights is not guaranteed which led some firms' owners to keep their business small to avoid having to lose its control in favour of the ruling families. The most profitable big businesses in Tunisia ended being controlled directly or indirectly by these families as shown by Rijkers et al. (2014). Moreover, the climate of uncertainty due to corruption, and arbitrariness in the links with the public administration does not favour investment. Barriers to entry in some regulated sectors such as transport and telecom or financial services (World Bank, 2007) are additional obstacles for the development of firms in these dynamic sectors. Finally, credit is costly, rationed and subject to favouritism (World Bank, 2010).

Between and within Job Reallocation

The results in the previous subsection show a significant amount of simultaneous job creation and destruction that induce considerable job reallocation as well as a lot of variation across sectors. Which fraction of this reallocation is due to within sector employment shifts and which fraction is due to

between sector shifts? Answering this question allow us to understand the stage of the transformation process of the Tunisian economy. A further decomposition then allows us to capture the within-sector and between-sector job movements (Levinsohn and Petrin, 1999):

$$Between_t = \sum_s |net_s| - \left| \sum_s net_s \right| \qquad within_t = \sum_s JR_s - \sum_s |net_s|$$

Excess= Between + within

Table 9: Employment Shift between and within Sectors (all sectors)

Year	Excess	Between	Within	Between/excess in %
1998	1.8	0.2	1.6	11.7
1999	2.9	0.9	2.0	29.9
2000	2.6	1.0	1.5	40.8
2001	2.5	0.8	1.7	32.3
2002	1.9	0.5	1.4	25.7
2003	1.8	0.3	1.5	16.4
2004	1.8	0.7	1.1	37.4
2005	2.2	0.9	1.2	43.0
2006	2.2	0.7	1.5	32.3
2007	2.7	0.5	2.2	20.0
Total period	2.2	0.7	1.6	28.9

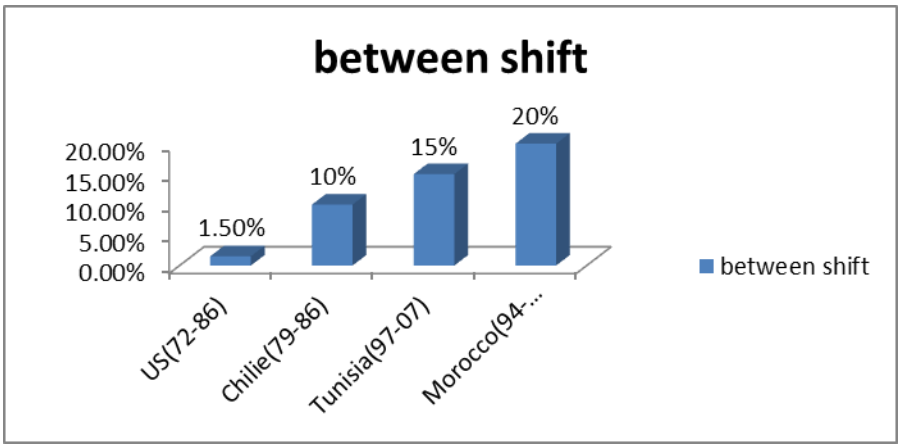
From table 9 we can see that a vast majority of the excess job reallocation is within sectors (about 72%). About 28 per cent of excess job reallocation is accounted for by employment shifts between sectors.

On the other hand, when we compare the between component in Tunisian manufacturing sector with the available evidence, our results reveal that the between component is about 15 per cent in Tunisian manufacturing over the studied period. It is higher than the results found by Davis and Haltiwanger (1992) for the US (between 1972 and 1986). They found that between sectors job reallocation in US manufacturing accounts for no more than 1.5 per cent of excess job reallocation at the 2-digit sector and no more than 12 per cent when sectors where classified in 450 groups. Levinsohn (1999) reports that in Chile the between sector reallocation at the 2-digit sector was on average 7.14 per cent (10%) between 1979 and 1986. Bottini and Gasiorek (2009) report that in Morocco manufacturing the between sector reallocation was on average 20 per cent between 1994 and 2002. Results for other developing countries show that the "between" contribution to excess job reallocation is generally higher than in industrialised countries. The low between sector reallocation in developed countries suggests that these countries have already defined their specialization pattern (Bottini and Gasiorek 2009).

Table 10: Employment Shift between and within Manufacturing Sectors

Year	Excess	Between	Between/Excess
1998	62.0%	0.0%	0.0
1999	94.6%	8.2%	8.7%
2000	77.4%	9.4%	12.2%
2001	72.5%	6.8%	9.4%
2002	73.5%	1.4%	1.9%
2003	74.1%	9.4%	12.7%
2004	72.1%	13.8%	19.2%
2005	97.7%	39.9%	40.9%
2006	113.0%	36.2%	32.1%
2007	101.6%	20.4%	20.1%
Total	83.8%	14.6%	15.7%

Figure 7: fraction of between shift comparison (manufacturing)



III. Productivity

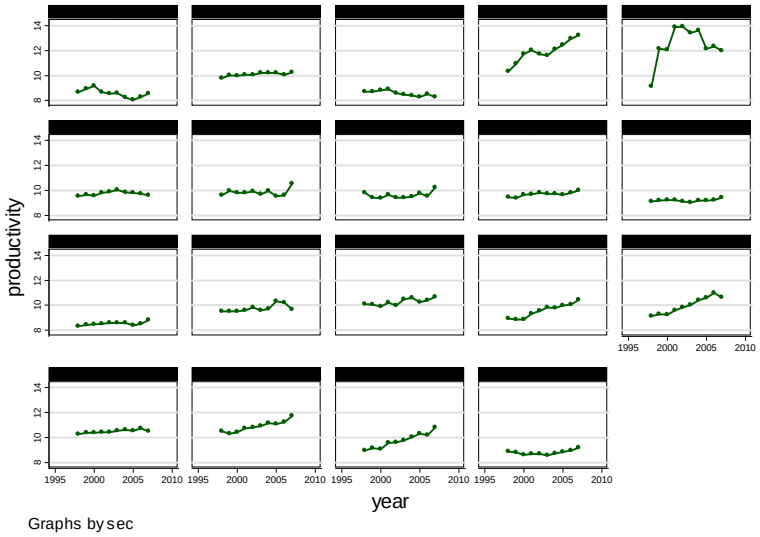
We now turn to analysing the productivity trend, the usual driver of growth. As shown in table 11 the sectors with the highest productivity on average are in the tertiary sector: finance, telecoms, transport, public utilities and other services. The sectors with the lowest productivity on average are clothing, construction, agriculture, tourism and other manufacturing sectors (Tunisian traditional sectors). Figure 8 presents the evolution of productivity over time.

Table 11: Weighted average productivity by sector 1997-2007 (value added per worker in log)

Sectors	mean	sd	Min	max
Finance	12.4	1.3	9.1	13.9
Extractive	11.9	0.9	10.3	13.2

Telecoms	11.0	0.4	10.3	11.7
Transport	10.5	0.1	10.3	10.7
Public Utilities	10.3	0.3	9.9	10.7
Commerce	10.1	0.1	9.8	10.2
Other services	9.9	0.6	9.1	11.0
Chemicals	9.8	0.3	9.5	10.6
Education	9.8	0.6	8.9	10.8
Housing	9.8	0.3	9.5	10.3
Agro-food	9.7	0.1	9.6	10.0
Construction materials	9.7	0.2	9.4	10.0
Health	9.7	0.5	8.8	10.5
Other manufacturing	9.6	0.2	9.4	10.2
Mechanical and electrical	9.2	0.1	9.0	9.4
Hotels	8.8	0.2	8.6	9.2
Agriculture	8.7	0.3	8.1	9.2
Construction	8.6	0.2	8.3	8.9
Textile and clothing	8.5	0.1	8.3	8.8

Figure 8: Evolution of productivity by sector



It also appears from this figure that the productivity has stagnated or grown at a very slow rate in at least 12 sectors among 19 sectors. It has increased in some tertiary sectors like: telecoms, education, health and other services. Finance sector experienced a significant productivity growth until 2002 and then declined. Table 12 show that on average Small, medium, large and Xlarge firms seem to have comparable productivity. The observed poor performance in term of productivity growth may due in part to a lack of investment due to credit and demand constraints faced by the private sector. This finding is in line with our previous result on the lack of firm size growth.

Table 12: Productivity and size:

Size	Productivity
XLarge	10.21
Large	9.85
Medium	10.34
Small	10.24

Small, medium, large and Xlarge firms seems to have comparable productivity (see table 12).

To make this point more formally we use standard non-parametric Wilcoxon test to test the hypothesis that two samples (small and large firms) are drawn from populations with the same median in terms of productivity. We divide observations into two groups: small firms (small and medium) and large ones (large and extra large), the result of non parametric test accept the null hypothesis, productivity was not significantly different between large and small firms, Z=-1.11, pvalue=0.26.

Productivity decomposition: within and between components by sector

To quantify the productivity gains from the reallocation of resources among firms, we decompose the industry productivity using the Olley and Pakes methodology (1996). In a given year, the aggregate industry productivity measure (P_t) is a sum of the unweighted average of firm productivity and a weighted average of the firms' individual productivities TFP_{it} with an individual firm's weight *pmit* corresponding to its output's share in total industry output.

$$P_t = \overline{TFP}_{it} + \sum_i \Delta pm_{it} \Delta TFP_{it} \quad = \quad \text{within effect} \quad + \text{between effect}$$

$\overline{TFP}_{it}$ is the unweighted average of firm-level productivity,

pm_{it} is the share of firm i in the given sector at time t,

TFP_{it} is the total factor productivity measure of an individual firm i at time t.

The change in weighted productivity P_t depends on the change in any given firm's productivity (within effect) and on changes in aggregate productivity arising from the entry and the exit of firms (the turnover effect). If there is a reallocation of resources from less to more productive plants, the latter measure should be positive and increasing over time.

Figure 9: productivity decomposition (between and within) by sector

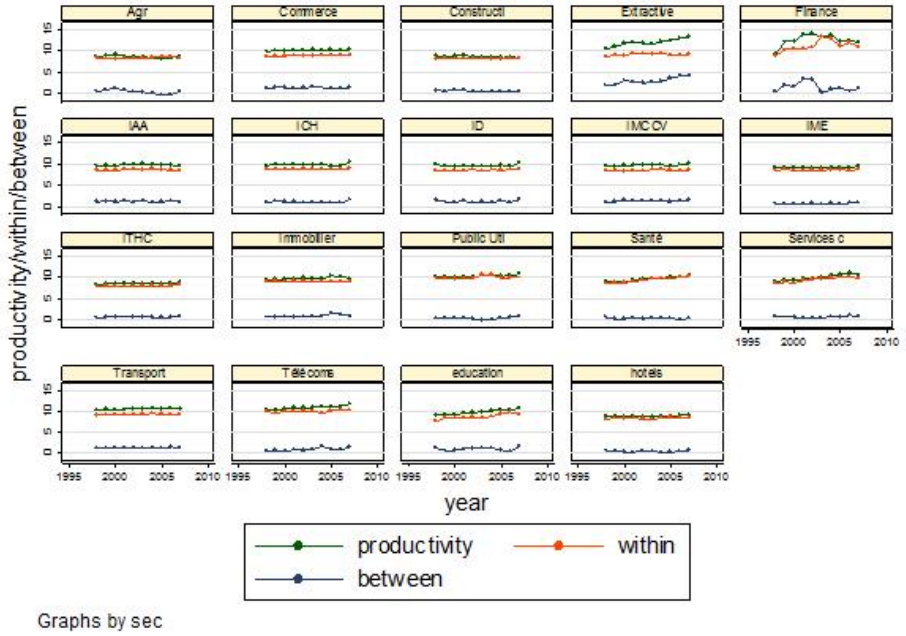


Figure 9 presents the evolution over the period 1997-2007 of the within and between components of productivity. It shows that the within effect is very close to the weighted productivity in all sectors. The within component, driven by the internal restructuring and organisational change, was the most important source of productivity growth in Tunisian firms. However, the reallocation component has stagnated in the majority of sectors, except for two sectors: extractive and finance sectors. The restructuring process was important in finance until 2002 and declined thereafter[3]. In the rest of sectors, the restructuring process was not important and not sufficient to lead to a more significant increase in the overall productivity. The results also suggest that the weighted average productivity (the between component) has relatively stagnated over the studied period. The reallocation of output from less productive firms to more productive firms was very limited due to obstacles to factor mobility, free entry and exit.

The firms upgrading program ("*Programme de mise à niveau*"), intended to help Tunisian firms compete with European firms after the implementation of the FTA with the EU may have contributed to the low level of structural change. Its sectoral distribution was dominated by three sectors, textiles and clothing (THC), the food industry and mechanical and electrical industry. THC alone represented 48 per cent of the accepted applications (ITCEQ, 2010). This high level of support granted to a sector suffering from an increased competition at the global and the exclusion of services do not favour productivity enhancing reallocations.

[3] One possible explanation for this result is that the finance sector was saturated; it did not grow after 2002 in terms of size. There were no new entrants.

IV. Jobs dynamic and productivity

Data analysis

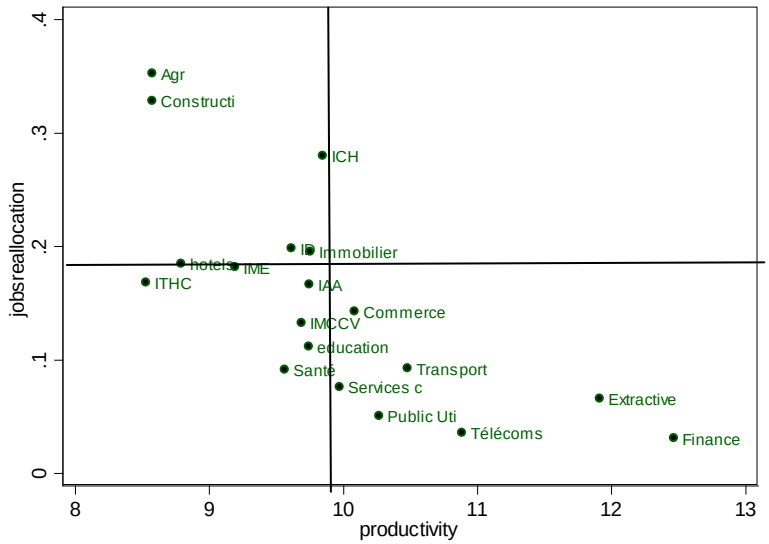
Table 13: Jobs reallocation, net job creation and productivity

Sector	JR	Net	Productivity
Finance	3,50%	-0,90%	12,3
Extractive	6,60%	-3,40%	11,94
Telecoms	4,10%	2,90%	10,95
Transport	9,30%	-0,70%	10,56
Public Utilities	4,90%	0,90%	10,37
Commerce	14,30%	2,10%	10,36
Other services	7,60%	1,20%	10,06
Chemicals	28,00%	-2,40%	10,02
Education	13,80%	-0,80%	9,97
Housing	19,60%	4,20%	9,94
Agro-food	16,60%	0,00%	9,93
Building material	13,30%	-0,30%	9,85
Health	9,10%	2,30%	9,75
Other manufacturing	19,90%	1,50%	9,63
Mechanical and electrical	18,20%	3,80%	9,41
Hotels	18,40%	-2,00%	8,92
Agriculture	35,30%	8,50%	8,8
Construction	32,90%	1,70%	8,78
Textile and clothing	16,80%	1,40%	8,71

Some sectors as shown in table 13 with high productivity such as finance, transport and other services experienced small and even negative net jobs creation while some sectors with small productivity such as agriculture, mechanical industries, construction and textiles experienced positive net jobs creation.

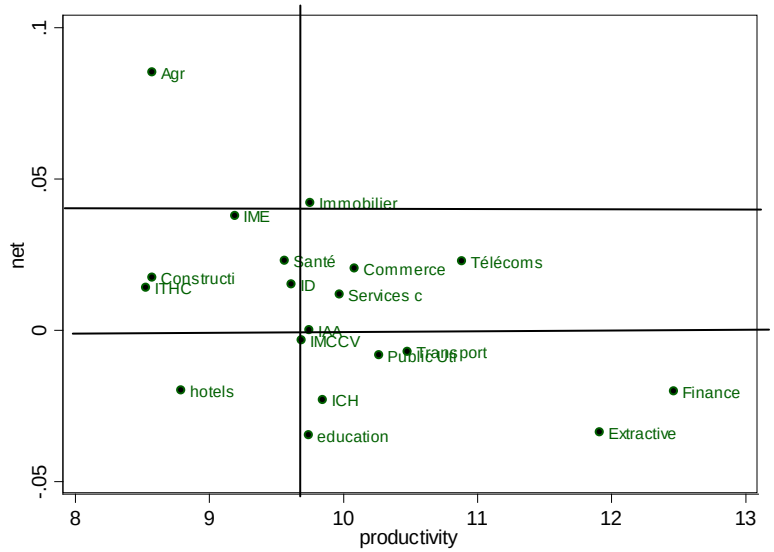
A simple correlation analysis between productivity and jobs flows (table 4a) shows that jobs creation, jobs destruction and jobs reallocation are significantly and negatively correlated with productivity; this mean that jobs reallocation and dynamics are more important in sectors with low productivity. Figure 10 confirms that jobs reallocation was low in the majority of the sectors (below the median) except for few sectors with low productivity such as construction and agriculture. Figure 10 also shows that the most productive sectors such as finance, telecoms and other services experienced low jobs reallocation. On the other hand, agriculture, construction, some manufacturing sectors and tourism, which are among the least productive, experienced relatively high jobs reallocation.

Figure 10: Jobs reallocation and productivity by sector



In terms of net jobs creation, figure 11 shows that the least productive sectors such as agriculture and construction are the ones that create the most net jobs. The most productive sectors such as finance transport and telecoms destruct jobs or create very few jobs (as much as manufacturing and others, which are among the least productive). The most productive are not the most dynamics in terms of jobs reallocation; they do not do well or better than the least productive in terms of net jobs creation.

Figure 11: Net Jobs creation and productivity by sector



Regression analysis

To investigate the relationship between job flows (Jobs creation, jobs destruction, jobs reallocation and net creation) and productivity, we also use regression-based methods. Following Melitz (2003), we expect that an increase in productivity would enhance output and employment growth in the long run.

A brief literature review

Some previous contributions to the literature on productivity and job flows in developing countries addressed similar issues to the ones we raise. Aw, Chen and Roberts (2001) article on Taiwan find that output growth in the manufacturing sector was accompanied by high rates of firm entry and exit. Given the low productivity of exiting firms, they found that this turnover played a significant role in productivity growth (reaching half of the increase in some sectors).

Haltiwanger, Scarpetta and Schweiger (2010) who perform cross-country regressions including developing countries find that firm size effects are dominant in explain job flows across countries and industries. However, after controlling for these effects they show that hiring and firing regulations have a negative impact on job flows.

Several papers analysed the impact of trade liberalization in developing countries using firm's data, focusing on productivity, job flows or both.

Ribeiro et al. (2004) find that trade openness has a negative impact on employment through an increase in job destruction and no effects on job creation in Brazil. They also find that exchange rate depreciations enhance job creation and have no effects on job destructions in the manufacturing sector.

Fernandes (2007) focuses on the impact of trade liberalization on employment and does not address the issue of job flows. She finds a positive effect of trade openness on productivity, an effect that increases with the size of the firm. The less competitive industries seem to be the main beneficiaries of plant productivity growth.

Bottini and Gasiorek (2009) find a positive impact of trade openness on job creations in exporting sectors in Morocco, but no effects on importing sectors. Job destructions do not seem to be affected by trade liberalization in both sectors. They also show a positive effect of trade openness on productivity. However, this increase in productivity has a negative impact on job creations and job destructions, which they explain by the government incentives to invest in capital intensive sectors.

Estimations and results

In a first stage, job flows by sector and year are separately regressed on sectoral productivity, sectoral effects (to control for sectoral heterogeneity) and year effects (to control for macroeconomic shocks). As estimations are made on panel data (sectors and years), the Hausman specification test is used for every model to determine whether a fixed-effects or a random-effects model is appropriate to estimate the impact of productivity on jobs flows.

Table 14: The effect of productivity on job flows in Tunisia, 1997-2007

Variables	JC	JD	JR	Net
Productivity	-0.034***	-0.023***	-0.034	-0.034
Year dummies	Yes	Yes	Yes	Yes
Sectoral effects	Yes	Yes	Yes	Yes

The results in table 14 suggest that the relationship between productivity and net jobs creation was not significant. Productivity has negative and significant effects on jobs creation and on jobs destruction. The most productive sectors create less jobs than the least productive but they destruct less jobs. In sum, there is a compensation of the effects of productivity on jobs creation and jobs destruction. The regression analysis confirms our previous finding that the most productive sectors are not the ones which create most jobs.

In a second stage, we introduce some trade and openness measures as independent variables: effective protection rate (EPR), customs duties (DD), export share and import share (in addition to the productivity variable). The regressions concern only manufacturing and agriculture sectors; in fact the openness measures are only available for these sectors (services are still excluded from the trade liberalization process). According to the literature, we expect that more openness would create more dynamics in the labour market, by increasing reallocation (Davis and Haltiwanger, 1992; Klein et al. 2003).

Following Bottini and Gasiorek (2009), we add sector skill share to the independent variables to analyse the direction of the Tunisian economy's transformation. Following the classical trade theory, we would expect that after trade liberalization, Tunisia would specialise in unskilled intensive sectors. Hence, sectors with a higher skill share would experience negative consequences on job creation and job destruction (particularly less creation).

Tables 15 and 16 present the estimation results for jobs creation and jobs destruction respectively.

The openness and trade variables are never significant. Trade openness does not seem to have a direct effect on jobs flows given the statistically insignificant coefficients on customs duties (DD), effective protection rate (tpe), export share (Xshare) and import share (Mshare) respectively. Skill share had also no effect on jobs flows. Only productivity is significant and has negative effects on jobs creation and jobs destruction as indicated previously.

Table 15: JOBS creation (dependent variable)

Independent Variables						
Productivity	-0.034***	-0.083*		-0.045	-0.037***	-0.027*
Productivity lagged			-0.018			
DD		0.16	-0.048			
EPR				0.0005		
Mshare					0.015	0.023
Xshare					-0.085	0.06
Skill share						-0.073
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sectoral effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	186	70	70	70	100	100
Number of sectors	19	7(manufacturing And agriculture)	7	7	10	10
R2	0.16	0.18	0.14	0.19	0.2	0.2

* Significant at 10%; ** significant at 5%; *** significant at 1%

Table 16 : JOBS destruction (dependent variable)

Variables						
Productivity	-0.023***	0.011		0.017	-0.018**	-0.016*
Productivity lagged			-0.006			
DD		0.018	0.05			
EPR				-0.00035		
Mshare					-0.015	-0.014
Xshare					-0.015	-0.012
Skill share						-0.01
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sectoral effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	176	70	70	70	100	100
Number of sectors	19	7(manufacturing And agriculture)	7	7	10	10
R2	0.17	**0.18**	0.14	0.15	0.17	0.17

* Significant at 10%; ** significant at 5%; *** significant at 1%

Conclusions

The main conclusion of this article is that the most productive firms and sectors are not those that are the most effective in terms of job creation. This means that Tunisia faces a trade-off between its main objective of job creation given its high unemployment rate and productivity growth, one of the main drivers of sustainable economic growth. For instance, big firms create more jobs but they are not more productive than small ones. At the sectoral level, service sectors are the most productive, but create few jobs while agriculture and some manufacturing industries have a low productivity but are dynamic in terms of employment growth.

The second conclusion is that productivity growth is mainly driven by within sectors growth while structural change remains relatively modest. A lower share of the informal sector and the increase of the sophistication of Tunisian exports are among the factors that accompanied this increase in productivity at the sectoral level. Barriers to entry in some highly protected sectors are probably the main reason for the weak movement of intersectoral reallocation of resources from the least productive to the most productive sectors. The low size of the Tunisian market and the limited opportunities for service sectors abroad may also explain the weakness of structural change.

Moreover, trade liberalization did not seem to have had an impact on jobs reallocations. The impact on jobs creation may be more easily understandable because Tunisia had already a preferential access to the market of the EU, its main trading partner, before the implementation of the free trade agreement. However, we would have expected an impact on jobs destruction in the sectors affected by a greater foreign competition. This may be explained by the non-tariff barriers used by Tunisia (such as the control of the foreign exchange or higher consumption taxes on some products) and by the existence of employment protection measures which impede jobs destructions.

Finally, the firms upgrading program implemented to enhance the productivity of Tunisian manufacturing firms has not been rigorously assessed yet. However, in any case this program has to take into account the trade-off between jobs and productivity and must not exclude services.

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Appendix

Table 1a: Number of firms by sector and year

Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Agriculture	61	54	53	43	41	25	9	37	14	11	8
Commerce	507	469	415	422	411	242	195	231	234	261	361
Construction	177	154	154	161	191	156	134	159	167	154	190
Extractive	45	47	37	36	37	34	30	39	42	31	44
Finance	5	4	6	6	5	4	1	4	3	2	9
Agro food (IAA)	241	218	223	222	207	165	123	138	141	235	163
Chemicals (ICH)	141	142	148	159	150	133	90	117	114	107	116
Other manufacturing (ID)	187	191	170	185	189	149	154	127	137	151	158
Ceramic (IMCCV)	148	124	118	132	137	108	97	100	105	93	100
Mecanical electrical (IME)	260	262	250	262	263	219	231	221	239	286	259
Textile (ITHC)	606	635	598	817	859	650	507	650	627	627	588
Housing	128	122	124	152	153	122	150	161	151	204	228
Public Utilities	3	2	3	3	3	3	5	5	3	3	7
Health	34	36	39	34	39	37	49	48	48	51	62
Services	49	38	40	45	44	36	29	30	32	43	40
Transport	111	111	104	126	121	106	94	87	96	160	140
Telecoms	4	3	5	5	5	7	8	7	7	6	8
Education	11	11	10	15	11	7	17	9	10	13	25
Hotels	162	150	145	151	173	148	96	98	146	122	177
Total	2880	2773	2642	2976	3039	2351	2019	2268	2316	2560	2683

Table 2a: Sample representativeness: employment share by sector and year

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Agriculture	2,04%	1,65%	1,67%	1,58%	1,36%	1,39%	0,89%	3,27%	1,88%	1,84%	0,52%
manufacturing	33,92%	35,65%	35,34%	36,22%	38,05%	34,49%	32,15%	34,72%	37,86%	33,85%	31,67%
public utilities	50,32%	50,92%	50,91%	50,38%	49,59%	51,88%	51,49%	47,01%	51,45%	49,90%	51,59%
transport telecoms	38,04%	38,98%	43,37%	40,49%	38,57%	37,15%	33,84%	33,50%	32,90%	34,37%	26,31%
Tourisme	21,26%	17,34%	22,61%	30,20%	26,42%	22,15%	18,82%	17,43%	24,15%	18,27%	21,42%
Construction	7,74%	7,97%	7,61%	8,90%	10,79%	10,24%	10,17%	8,42%	9,97%	6,40%	7,12%
Finance	0,63%	0,59%	0,79%	0,80%	0,61%	0,48%	0,66%	0,77%	1,12%	0,50%	1,23%
Commerce	11.5%	8.8%	10.49%	9.11%	8.32%	5.83%	5.45%	7.06%	6.23%	6%	6.66%

Table 3a: Two-sample Wilcoxon rank-sum (Mann-Whitney) test

groupe obs rank sum expected

small 6824 56170674 57441020
large 10010 85529522 84259175

combined 16834 1.417e+08 1.417e+08

unadjusted variance 9.583e+10
adjustment for ties -1.555e+09
---
adjusted variance 9.428e+10

Ho: g(groupe==1) = g(groupe==2)
z = -4.137
Prob > z = 0.0000

Table 4a: correlation between productivity and jobs flows

	Pty	JC	JD	JR	Net
Pty	1.0000				
JC	-0.3484*	1.0000			
JD	-0.2563*	0.0507	1.0000		
JR	-0.4134*	0.7948*	0.6464*	1.0000	
Net	-0.1197	0.7703*	-0.5977*	0.2253*	1.0000