



Dissemination and Outputs from the Statistical Business Registers Firm dynamics and job creation in Tunisia

Hassen Arouri

National Institute of Statistics, Tunisia – hassen.arouri@ins.tn

Bob Rijkers

World Bank, USA – brijkers@worldbank.org

1. Introduction

Using a unique firm-level dataset covering all private sector enterprises, including one-person firms (i.e. the registered self-employed), in Tunisia over the period 1996-2010 this paper examines why favorable pre-revolution growth performance was not accompanied by more job creation. The aim of the paper is to unveil the mechanisms by which low aggregate employment growth materializes. We focus in particular on which firms create the most jobs and the role of firm size, an issue that is at the heart of the debate about how to tackle unemployment, one of the most important policy challenges.

2. Data

The main dataset used for this paper is the Tunisian Statistical Business Register, the Répertoire National des Entreprises (RNE) 1996-2010 collected by the Tunisian “Institut National de la Statistique (INS)”. The RNE contains information on inter alia the employment, age and main activity of all registered private non-agricultural firms. A major and unique advantage of the Répertoire is that it has no floor in terms of size and records information on firms without paid employees, i.e. the registered self-employed. This renders it feasible to examine the dynamics of these firms.

Another key strength of the Répertoire is that it is comprehensive in terms of covering all non-agricultural sectors, and spans a relatively long time period. The database also allows us to track and entry and exit over time, and thus to avoid survival bias. To assess the role of productivity and profitability, the RNE was merged with profit and turnover data from the Tunisian Ministry of Finance spanning the universe of private firm tax records for the period 2000 through 2010.

3. Econometric Strategy

Our goal is to examine the drivers of job creation, focusing in particular on the role of size, age, productivity and profitability. To this end, we estimate employment-weighted firm-level regressions of net employment growth, using as our measure of firm-level employment growth, g_{ist} the change in employment from year $t-1$ to year t , divided by average size: $g_{ist} = 2 \frac{E_{ist} - E_{ist-1}}{(E_{ist} + E_{ist-1})}$ where E_{ist} denotes employment in firm i of type s at year t (following Davis et al., 1996, and Haltiwanger et al., forthcoming). Our most general specification thus takes the form;

$$g_{ist} = \beta_S \text{Size} + \beta_A \text{Age} + \beta_P \text{Productivity} + \beta_\pi \text{Profitability} + \beta_\tau \tau + \beta_I I + e_{it}$$

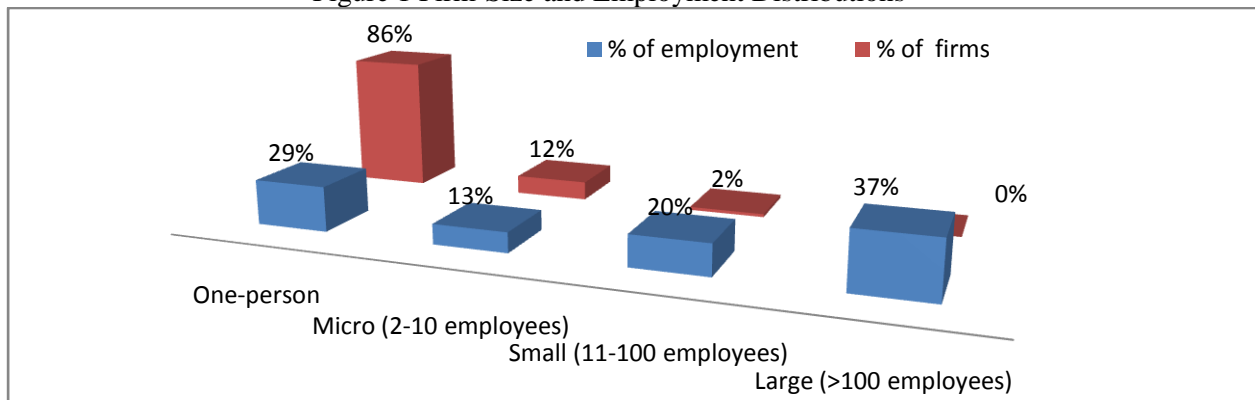
Where Size is a vector size dummies, Age is a vector of age dummies, τ is a vector of time dummies and I a vector of industry dummies, and Productivity and Profitability are proxies for these concepts. How these proxies are defined depends on which size classification is used; for the base-year classification we use last period's log output per worker and rank in the profits per worker distribution respectively, except for entrants for which we use contemporaneous values since lagged values are not available.



4.Descriptive Statistics

A first look at the data yields a number of stylized facts. To start with, the Tunisian firm-size distribution, presented in Figure 1, is strikingly skewed. Over the period 1996-2010, one-person firms (i.e. the registered self-employed) account for approximately 86% of all firms, and 29% of employment. The skewness is also manifested in the very limited number of large firms; on average, in each year there were approximately only 51 firms that employed more than a thousand employees. These relatively large firms, which tend to be older on average, account for an important share of employment; for example, even though fewer than 0.2% of all firms employ more than 200 workers, such firms account for more than a quarter of all employment.

Figure 1 Firm-Size and Employment Distributions



A second stylized fact is that employment is disproportionately concentrated in young firms compared to developed countries. Table 1 documents the distribution of employment by firm size age and size over the period 1996-2010, demonstrating that most jobs were concentrated in old large firms and relatively young one-person firms (i.e. self-employment). Overall older firms account for a larger share of employment, reflecting a positive correlation between size and age. New firms only account for 3.9% of all jobs on average, whilst firms of at least 10 years of age account for more than half of all jobs.

Table 1: Employment by Size and Age

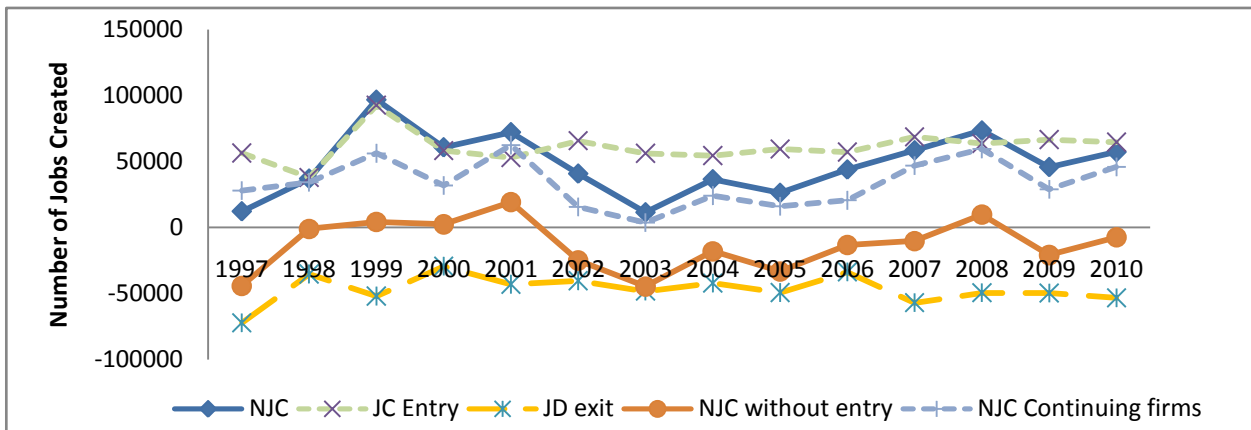
Age	Size										Total	Share
	1	2	[3.4]	[5.9]	[10.49]	[49.50]	[50.99]	[100.199]	[200.999]	>= 1000		
0	35022	2566	1568	1429	1170	1552	1256	944	1666	69	47242	3.90%
1	30602	3508	3182	3548	3181	4670	4055	3902	6723	2177	65548	5.41%
2	27485	3485	3235	3822	3401	5356	4820	5577	8449	3482	69113	5.70%
3	24990	3323	3095	3741	3457	5372	5206	6093	10013	4526	69816	5.76%
4	22857	3138	2880	3641	3236	5071	4715	5805	9129	4390	64863	5.35%
5	21006	2982	2734	3449	3264	4841	4674	5948	8139	2840	59877	4.94%
6	19243	2819	2648	3299	3174	4610	4638	5615	8403	2788	57238	4.72%
[7-9]	48119	7583	7103	8949	8710	12766	13077	17429	23870	6871	154476	12.74%
[10-14]	53337	10202	9583	11652	11477	16475	16270	22315	37119	6132	194564	16.05%
[15-19]	29998	7315	7317	8172	8008	12334	12357	16273	30577	6417	138768	11.45%
[20-29]	25528	6965	7673	8667	8653	14182	14847	21126	47069	25913	180624	14.90%



>=30	7566	2405	2677	3641	3929	6827	9325	15050	37655	21269	110343	9.10%
Total	345753	56290	53696	64010	61661	94056	95241	126078	228812	86874	1212472	
Share	28.52%	4.64%	4.43%	5.28%	5.09%	7.76%	7.86%	10.40%	18.87%	7.17%		

A third stylized fact is that aggregate job creation has been highly disappointing and driven mostly by entry as is shown in Figure 2, which decomposes net job creation into the contributions of entering firms, exiting firms and continuing firms. With the exception of 2001, most of the net new jobs were in entering firms. In fact, without these entrants, net new job creation over the period would have been negative.

Figure 2: Net Job Creation in Tunisia 1997-2010



Fourthly, mobility is extremely limited. Table 2A presents annual transitions of firms between broad size-classes, whereas Table 2B present a similar matrix for transitions between 1996 and 2010, the longest period available in our database. Most firms do not grow, even in the long-run. Very few firms change size class, even during a fourteen-year period; the self-employed are least likely to expand into a larger size class, perhaps in part reflecting that traversing size classes would effectively amount to a doubling of firm-size for them. But relatively few micro and small firms ever grow large. For example, only 2% of all firms employing between 10 and 50 people in 1996 employed more than 100 workers by 2010. The transition matrices also show that smaller firms are more likely to die.



Table 2: Employment Transitions

EMPLOYMENT TRANSITIONS								
Short-Run: Annual Transitions (1996-2010)								
Size in year t	Size in year t+1							
	Exit	1	[2-5]	[5,9]	[10,49]	[49,99]	[100,999]	>=1000
1	6.51	91.98	1.34	0.10	0.06	0.01	0.01	0.00
[2-5]	8.16	7.82	79.61	3.93	0.44	0.02	0.01	0.00
[5,9]	6.91	1.30	14.18	68.75	8.71	0.10	0.04	0.00
[10,49]	3.79	0.90	1.80	8.76	80.51	3.73	0.49	0.00
[49,99]	2.72	0.61	0.43	0.50	16.04	67.84	11.84	0.01
[100,999]	1.83	0.37	0.21	0.26	1.91	8.31	86.56	0.56
>=1000	1.59	0.00	0.14	0.14	0.14	0.14	11.56	86.27

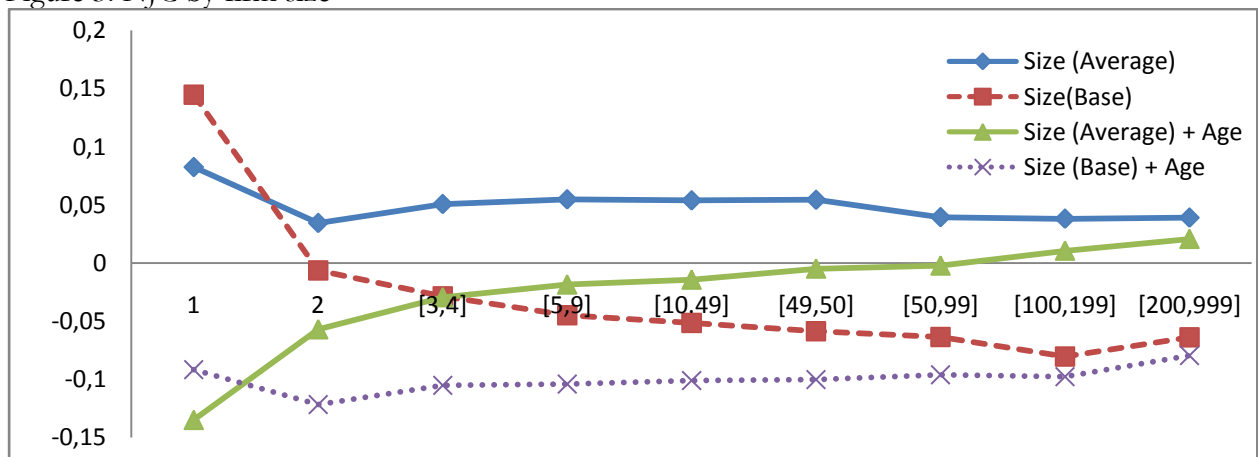
Long-Run: 1996-2010								
Size in 1996	Size in 2010							
	Exit	1	[2-5]	[5,9]	[10,49]	[49,99]	[100,999]	>=1000
1	59.25	37.81	2.45	0.31	0.15	0.01	0.02	0.00
[2-5]	53.36	15.59	25.44	4.29	1.21	0.05	0.07	0.00
[5,9]	53.69	2.59	14.64	18.07	10.21	0.53	0.27	0.01
[10,49]	46.54	2.18	5.71	9.69	28.93	4.92	2.02	0.02
[49,99]	43.42	1.77	2.65	1.87	18.96	19.16	12.18	0.00
[100,999]	38.11	1.17	1.93	1.17	7.37	10.30	38.44	1.51
>=1000	18.75	0.00	0.00	0.00	3.13	0.00	37.50	40.63

5. Regression Results

a) NJC by firm size

Figure 3 presents the results regressions of net job creation on firm-size and age dummies. Given the large number of observations, the estimated coefficients are always statistically significant at the 1% level. The solid lines denote regressions where we use as size category last year's size and the dotted lines size categories which are based on last year's size. Note that the omitted category is that of firms with more than 1000 employees. The coefficients are thus relative to this group of firms.

Figure 3: NJC by firm size



The graph yields a number of interesting findings. To start with, the contribution of self-employment to net job creation stands out, as is evidenced by the fact that job creation rates are highest for one-person firms; The coefficient estimates suggest that job creation by one-person firms is 14.5% higher than that of firms which employ more than 1000 employees when using the base size classification, but only 8.2% when using instead a size classification based on average size. The difference between these classification methods is suggestive of substantial measurement error. While both graphs are crudely consistent with an inverse relationship between firm-size and net job creation,

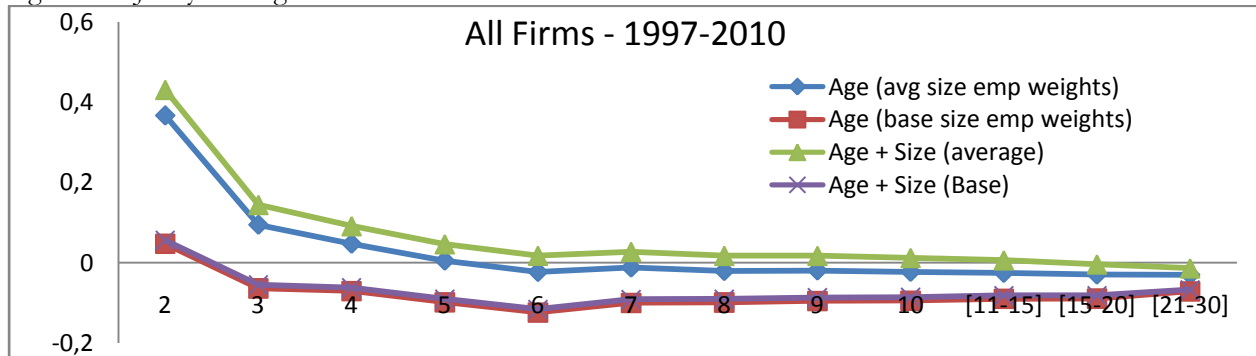


this association is rather weak when the average size classification is applied. For example, the net job creation rate of firms employing between 10 and 50 worker is approximately 5.4% higher than that of the very largest firms, whereas the corresponding percentage for firms with between 200 and a thousand workers is 3.8%.

b) NJC by firm age

That young firms contribute the most to job creation is shown in Figure 4, which depicts the association between firm age and growth, demonstrating that it is strongly downward sloping. Controlling for firm-size only strengthens the association between age and growth. The reason is that smaller firms, which tend to be younger, grow less quickly than large firms post-entry, as we shall demonstrate in the next section.

Figure 4: NJC by firm age

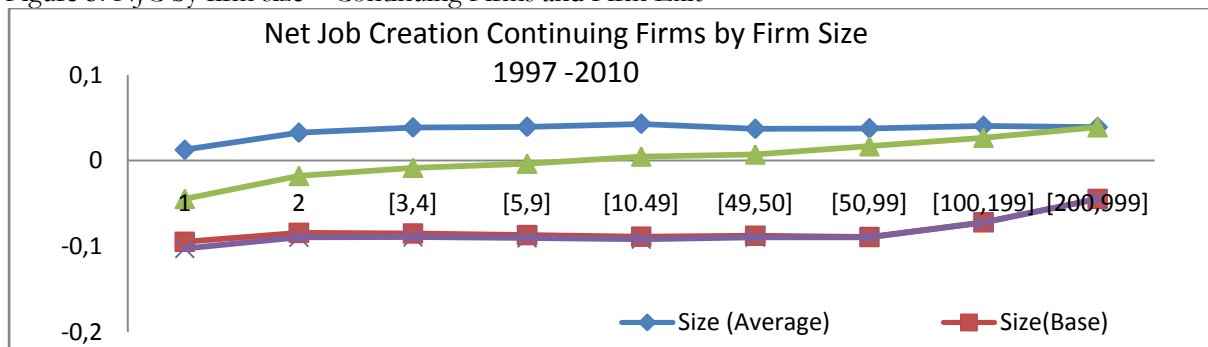


Notes: The figure plots weighted regression coefficients of net job creation, measured by the Davis-Haltiwanger-Schuh growth rate, on firm size and age dummies, controlling for sector and year.

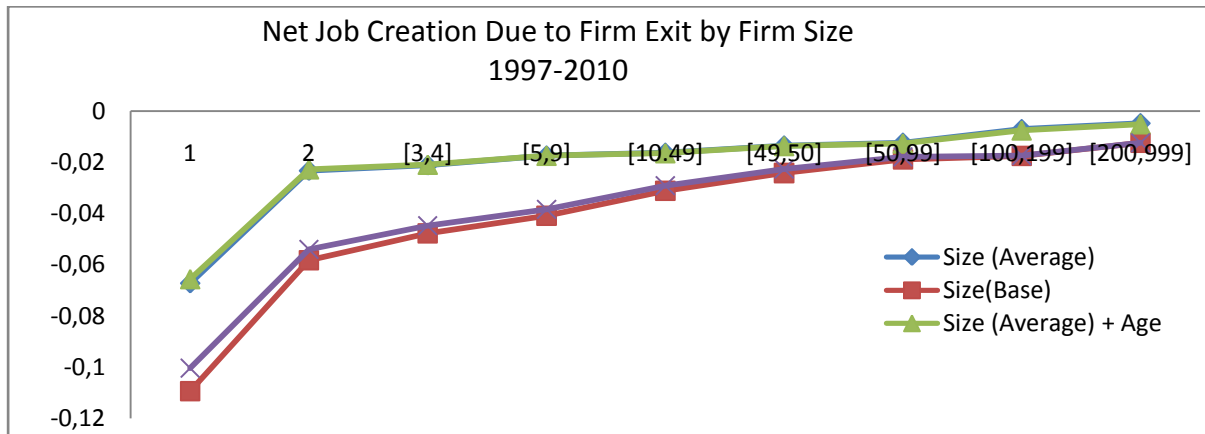
c) NJC by events

Figure 5 depicts the relationships between net job creation by firm size and separately for continuing firms and firms that exit. The relationship between firm-size and net job creation is now generally positive for both continuing and exiting firms, as is evidenced by the mildly upward sloping graph for continuing firms and the strongly upward sloping graph for firms that exit. The former result is surprising for it shows that even amongst firms that survive, large firms outperform small firms in terms of job creation.

Figure 5: NJC by firm size – Continuing Firms and Firm Exit

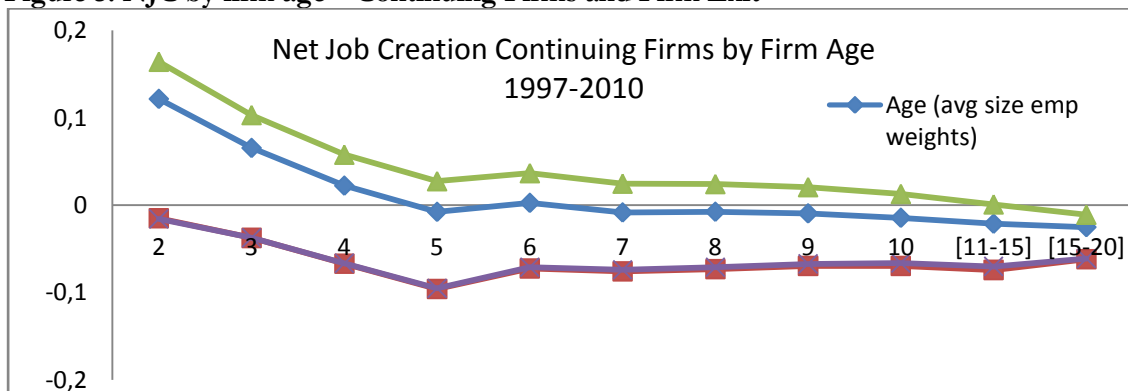


Notes: The figure plots weighted regression coefficients of net job creation, measured by the Davis-Haltiwanger-Schuh growth rate, on firm size and age dummies, controlling for sector and year.



Controlling for firm age reduces the strength of the correlation between firm size and exit, because younger firms are more likely to die, as is shown in Figure 5, and because small firm tend to younger than old firms. Interestingly, controlling for firm age appears to strengthen the correlation between firm size and growth amongst continuing firms. The explanation for this finding is that young firms tend to grow faster, as is demonstrated in Figure 5, and that small firms are on average younger. Conversely, controlling for firm size mutes the correlation between firm age and net job creation due to firm exit, and net job creation by continuing firms.

Figure 5: NJC by firm age – Continuing Firms and Firm Exit



Notes: The figure plots weighted regression coefficients of net job creation, measured by the Davis-Haltiwanger-Schuh growth rate, on firm size and age dummies, controlling for sector and year.

Controlling for age, we now find a negative relationship between firm size and growth irrespective of which size-class methodology we use. This reflects the fact that post-entry firms stagnate and that small firms are more likely to exit and less likely to grow, such that they on destroy more jobs than large firms. Instead of there being an “up or out” dynamic there appears to be an “stagnate or out” pattern of growth. The overall picture of job creation is thus extremely bleak; incumbent firms do not grow on average and ultimately disappear.

d) Productivity and Profitability

The specifications presented in columns 1, 2, and 3 demonstrate that on average firms that are more productive and more profitable generate more jobs. Note, however, that the explanatory power of these variables is low, as is evidenced by the low R2’s. Moreover, although strongly statistically significant, the relationship between employment creation, productivity and profitability is weak. For example, ceteris paribus, a doubling of the amount of output per worker is associated with a 3.9%



increase in employment growth. Similarly, moving a decile upwards in the profitability distribution is associated with a 1.2% increase in job creation. While these weak relationships may in part reflect measurement error (perhaps due to misreporting) in the productivity and profitability variables resulting in attenuation bias, taken at face value they suggest the reallocative process is not efficient in (re-)allocating labor to its most productive and profitable uses. This is consistent with the weak firm dynamics portrayed above.

Table 3: NJC and performance

NJC 2007-2010					
All firms employing wage workers only					
Average Size Classification					
	1	2	3	4	5
Productivity and Profitability					
Productivity	0.0057		0.0288		0.0154
Profitability		0.0009		0.0015	0.0013
Size and age dummies	No	No	Yes	Yes	Yes
Activity Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
N	129516	129516	129516	129516	129516
R2	0.0068	0.0092	0.3395	0.3432	0.3440

6. Conclusion

Using a unique confidential database containing information on all registered private sector employment in Tunisia, we have observe inertia and the firm size distribution becoming increasingly skewed towards small firms. 2 of every 5 net new job are created over the period 1997-2010 are in self-employment.

Although our results are consistent with the notion that small firms generate the most jobs, this relationship is entirely driven by firm entry, and the fact that most entrants start small. Post-entry, small firms are the worst performers in terms of net job creation even if they survive, in spite of being much more likely to exit than large firms. Mobility is extremely limited, with very few firms managing to grow, even if we consider a very long time horizon. This inertia, in conjunction with entrants starting small, helps explain why the firm-size distribution has become increasingly skewed towards small-scale employment in relatively young firms.

Our results are nonetheless consistent with Haltiwanger et al.'s (2011) finding that firm age is a far better predictor of firm growth than firm size, as young firms consistently create the most new jobs. Once firm age is conditioned on, the relationship between firm-size and age fully reverses.

Moreover, our results suggest that the process of creative destruction is severely attenuated in Tunisia. Allocative efficiency appears quite low, in the sense that the relationship between size and firm performance in terms of productivity and profitability is not very pronounced. While both profitability and productivity are positively correlated with net job creation, this correlation is weak. Consistent with the idea that the best firms have difficulties expanding and gaining market share, we observe that average productivity does not rise rapidly with firm age, and, if anything, reduces for firms that have been in existence for more than four years, even though average profitability appears to rise with firm age.