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Abstract

The Middle East region has suffered from major unemployment problems that constituted a chief determinant for the Arab Spring. Even during its best economic years, "jobless growth" was an issue. Thus, creating employment, in the private sector, is always on the top priority of all governments in the region. However, the success of increasing employment in the private sector requires an understanding of the factors and conditions necessary for private firms to create jobs. This paper tries to tackle this issue by shedding lights on some of determinants of job growth within firms across the region. This study is one of few that used firm-level data from the World Enterprise Surveys (WES), conducted by the World Bank, to analyze the labor market demand in the MENA region. As such, the study applies a two-part strategy: 1) a detailed statistical analysis of characteristics of each firm group, and 2) an econometric estimation using multinomial logit regressions to determine the significant drivers of job growth in each group. We then apply the appropriate robustness checks. One of the major study result indicates that governments would benefit from focusing on supporting new and young firms that are medium to large-sized with existing investments in R&D. The results, also, indicates that investment in R&D or NM is positively related to job creation. Finally, the study encourages new research of more factors that may be contributing to job creation such as labor market regulations; political activeness; access to foreign markets; practice of social responsibility and political corruption.

JEL Classification: J01, J08, J21, O40, O53

Keywords: MENA Labor Market; Unemployment; Gazelles; ordered probit; CMP) model

ملخص

عانت منطقة الشرق الأوسط من مشاكل البطالة الكبرى التي شكلت أحد العوامل الرئيسية التي تحدد الربيع العربي. وحتى في أفضل سنواتها الاقتصادية، كان "نمو البطالة" قضية. وبالتالي، فإن خلق فرص العمل، في القطاع الخاص، يكون دائما على رأس أولويات جميع الحكومات في المنطقة. ومع ذلك، فإن نجاح زيادة فرص العمل في القطاع الخاص يتطلب فهم العوامل والظروف اللازمة للشركات الخاصة لخلق فرص العمل. تحاول هذه الورقة معالجة هذه المسألة من خلال إلقاء الضوء على بعض محددات نمو الوظائف داخل الشركات في جميع أنحاء المنطقة. هذه الدراسة هي واحدة من عدد قليل من البيانات التي استخدمت على مستوى الشركات من الدراسات الاستقصائية العالمية للمؤسسات، التي أجراها البنك الدولي، لتحليل الطلب في سوق العمل في منطقة الشرق الأوسط وشمال أفريقيا. وعلى هذا النحو، تطبق الدراسة استراتيجية مكونة من جزئين: 1) تحليل إحصائي مفصل لخصائص كل مجموعة من الشركات، و2) تقدير اقتصادي باستخدام انحدارات لوجيت متعددة الحدود لتحديد الدوافع الهامة لنمو الوظائف في كل مجموعة. وتشير إحدى نتائج الدراسة الرئيسية إلى أن الحكومات ستستفيد من التركيز على دعم الشركات الجديدة والشابة المتوسطة إلى الكبيرة الحجم مع الاستثمارات القائمة في البحث والتطوير. وتشير النتائج أيضا إلى أن الاستثمار في البحث والتطوير أو التمويل الوطني يرتبط ارتباطا إيجابيا بإيجاد فرص العمل. وأخيرا، تشجع الدراسة البحث الجديد على المزيد من العوامل التي قد تسهم في خلق فرص العمل مثل أنظمة سوق العمل؛ السياسية؛ الوصول إلى الأسواق الخارجية؛ وممارسة المسؤولية الاجتماعية.

1. Introduction

Labor markets in MENA have been in disequilibrium for a long time. When GDP growth rate for MENA was respectably above 5% on average (as for the period 2002-2007), the corresponding unemployment rate, for the same period, was above 10% and much higher for youth.[1] Thus, the high unemployment rate has led to the exclusion of large segments of the population from sharing the fruits of growth and accordingly this "jobless growth"[2] been claimed by many researchers and policy analysts to being one of the important contributing factors to the social and political upheaval of the past five years.[3]

Facing high unemployment rates, declining female labor force participation rates, and persistently high fiscal deficits, governments in the MENA region pursued job creation in the private sector as a primary economic policy objective. However, the success of increasing employment in the private sector requires an understanding of the factors and conditions necessary for private firms to create jobs. This paper tries to shed some lights on some of determinants of job growth within firms across the region.

Recent research[4] on demand for labor has identified the disproportionate role of a handful of fast-growing and young firms in creating new jobs. Such fast growing firms or "Gazelles" are identified as firms with high employment growth rates and increasing contribution to employment creation.[5] The gazelles dominate job creation in countries like Egypt, Tunisia, and Lebanon and account for up to 92 percent of job creation in some cases. These high performing 'Gazelle' firms are few in number compared to the total number of firms operating in the private sector. In other words, the private sector in the MENA region is dominated by a large number of what we call "turtles" or firms with sluggish (if any) growth and little or no contribution to job creation.

This study addresses the knowledge gap on the turtle-gazelle issue using firm-level data from the World Enterprise Surveys (WES) conducted by the World Bank. We try to identify the determinants of firms' job creation capability[6] and how they contribute to a firm being either a gazelle or a turtle. The paper examines the characteristics and conditions that are most responsible for making a firm either a gazelle or a turtle with a particular focus on the least performing or 'turtle' group of firms.

The study applies a two-part strategy: 1) a detailed statistical analysis of characteristics of each firm group, and 2) an econometric estimation using multinomial logit regressions to determine the significant drivers of job growth in each group. We then apply the appropriate robustness checks.

Our results paint a picture of MENA economies where job growth is on the one hand hindered by a dominance of 'turtle' firms that experience little job growth and yet form much of the private sector's firms. These turtles tend to be older in age, less innovative, less financially constrained and to some degree smaller in size than their over performing counterparts. On the other hand, gazelle firms tend to be a determining factor in raising overall employment rates in those economies although they represent a minority of firms in the region. *These gazelles tend to be on average younger, more innovative, although more financially constrained, and to some degree bigger than turtles. Put differently, job creation is driven by younger, larger firms that*

[1] African Development Bank platform data, 2009 and 2010, The IMF World Economic Outlook Database, October 2010

[2] For a clear explanation and global comparison of this problem, see Larry Summers (2015).

[3] For example: Costello, et al, (2014); Nabli (2012); Amin et. al., (2012); Drukan, R. (2011); among others.

[4] See Henrekson, Magnus and Johansson, Dan (2010), and the World Bank (2011a, 2011b, 2014a and 2014b)

[5] The adjective "Gazelles" is used here for those firms who were able to increase their employment by at least 50% in the last three preceding years.

[6] Although our emphasis is on employment growth categories, endogeneity could be a potential source of bias of the estimates. Our estimation strategy takes that into consideration while examining the robustness of the estimates.

invest in research and development as opposed to aging firms that produce sluggish job growth even when differences in sales growth are controlled for. These results can have strong implications on employment and investment policy design. If reducing the unemployment rate is a key policy objective in the MENA, then the impact of policy incentives will improve if they target firms that are younger, bigger, better invested in R&D, led by highly educated managers. Interestingly, sales growth as such does not seem to be a key determinant of a firm's job creating ability which means that policy incentives focused on firms that grew their sales substantially can be misguided if job creation is the ultimate objective.

This study is divided into six main sections. After this introduction, Section 2 provides a literature review, Section 3 covers the methodology, Section 4 discusses the data, Section 5 provides a breakdown of the results and a robustness check, and Section 6 presents the conclusions, policy implications and proposes some future research agenda.

2. Literature Review

The literature on labor markets in the MENA region is dominated by studies of the supply side of the market[7] as opposed to demand, which is understudied. This bias is predominantly a result of the lacking data on labor demand at the firm level. A number of Labor Force Market Surveys in MENA countries (most notably Egypt, Jordan, Palestine and Tunisia) have been conducted to study the labor force or the supply side of market, but the same cannot be said about data exploring the firms or the demand side of the market. The persistence of high unemployment rates in the region despite rising educational attainment indicators could imply that labor demand bottlenecks are to blame. Thus, there is an urgent need to shed some lights on the dynamics governing the demand for labor to guide the formation of governmental employment creation policies.

There are a few studies of labor demand in the MENA region. A notable recent study is the work by Shiffbauer et al. (2014) that uses establishment census data in seven MENA countries (Egypt, Tunisia, Morocco, Jordan, Lebanon, West Bank and Gaza, and Turkey). Turkey was used as a benchmark country. Their data strongly suggests that job growth is driven by a few fast-growing firms (the gazelles) that account for a high share of job creation in MENA. The authors define gazelles as "firms that double their employment over a four-year period" and tend to be younger with high productivity than other 'non-gazelle' firms. Interestingly, gazelles are not found to be limited to any specific sector but spread across sectors especially in textiles, construction, and real estate.

The use of the term 'gazelles' to describe fast growing young firms that drive job growth in the private sector was coined by David Birch (1979). Birch suggested that a major share of new jobs is created in highly inventive SME (Small and Medium Enterprises). He along with co-authors empirically tested this hypothesis for the US[8]. He concluded that, on average two thirds of all jobs are created by SMEs. His results were also confirmed in many studies for Europe[9]. These studies indicate that the percentage of Gazelles in Europe varies between 2% and 15%, depending on the study. These results confirm our results in this study except when it comes to firm size. The gazelles in the MENA are not necessarily small, in fact the bigger the firm in the MENA region, the more likely it is to be a gazelle. This difference could be related to the type of business environment that prevails in developing countries which tend to favor bigger firms with better resources and political connections.

[8] See, for example, Birch and Parsons (1998).

[9] See: Kirchhoff (1994); Siebert (1999); OECD (1998); Schreyer (2000).

However, these studies have received little attention (and even critique[10]) until it was revived by several studies in organizational literature over the past decade. One of the earliest examples of such revival is the study by Janczak and Barres (2010) which starts off by criticizing the lack of attention in business organization literature to high growth firms (as opposed for example to large firms). Their study examines the growth dynamics of 12 gazelle companies in France. They identify the variables that determine the emergence and growth of gazelles. Most notably, they found that gazelles are characterized by a high degree of responsiveness to their customers' needs, clear operating procedures, flexibility, a structured human resource management, and are able to efficiently utilize resources available in their locales.

A similar study of the USA by the U.S. Small Business Administration's Office of Advocacy was published in 2008, the study which was entitled "High-Impact Firms: Gazelles", confirmed the phenomenon that a small class of firms was responsible for generating the majority of net new jobs from 1994 to 2006 (ACS 2011).

Henrekson and Johansson (2010) reconfirm earlier findings that a few rapidly growing gazelles are indeed responsible for the largest share of job creation. Moreover, using a meta-analysis of twenty studies that focus on high performing firms, they conclude that gazelles seem to be overrepresented in the services sector rather than in high-tech industries.

Application of the 'gazelle firm' concept to the MENA region was initiated by Rijkers et al. (2014) who examined private sector job creation in Tunisia over the period 1996-2010 using a unique database containing information on all registered private enterprises, including self-employment. Their work was further expanded to six MENA countries by Shiffbauer et al. (2014) in their study discussed earlier in this section.

An essential ingredient for the examination of firm size and performance is the availability of firm-level data. Enterprise surveys provide such reliable source of micro-level data that lends itself neatly to our analysis. And indeed, there are a number of examples in the literature where enterprise survey data were used to investigate labor market dynamics[11.]

In sum, our study builds on a small but growing tradition of focusing on a subset of firms that grew higher than average. The key difference here is that we apply our analysis lens to both the fast growers (gazelles) and the slow growers (turtles). The use of enterprise surveys is also relatively new to the region and deserves more attention while keeping in mind some of its shortcomings (mainly inaccurate or erroneous reporting based on perceptions and not records).

3. Methodology

In a recent report by the World Bank - "Jobs or Privileges" - gazelle firms contribute significantly to employment growth in the MENA region. However, in this study, we focus our attention to the large proportion of 'turtle' firms that contribute little to employment growth. The pervasiveness of 'turtle' firms in MENA countries warrants a deeper investigation of the determinants of such large differentials in employment growth.

Using the detailed firm-level data from the World Bank Enterprises Survey (WES) in 2013, covering seven countries in the region where the survey contains information about the number of full-time permanent workers at the end of 2012 and 2009 for each firm, we calculate the firm-employment growth. Subsequently, we group firms into three categories:

[10] See for example Brown et al. (1990); Davis et al. (1996a, 1996b) and Haltiwanger and Krizan (1999) for some of the earlier critiques of Birch's 'gazelles' idea.

[11] For example: Bigsten and Soderbom (2006) use enterprise surveys to labor markets in Africa; Hudson et al. (2012) use the World Enterprise Survey to examine the impacts of the informal economy in South East Europe; the GIZ (2011) use enterprise survey to understand labor markets in Laos; Sajith et. Al (2013) examine labor market transitions for women in Liberia, and the European Center for Vocational training (2013) develops a 'Labor Demand Enterprise Survey (LDES)' that is specifically geared towards investigating labor demand.

(Group 1) Gazelle firms; these are the fast-growing firms that increased the number of workers by more than 50 percent during the period 2009-2012;

(Group 2) Turtle firms; firms that have achieved a reasonable employment growth (1-49 percent) during 2009-2012, and

(Group 3) Burden (downsizing) firms; firms with zero or negative employment growth (group 0).

In order to answer the question what are the main factors that affect the probability of a firm being a gazelle, a turtle, or a downsizing firm? We use the following specification:

$$Group_{isc} = f(X_{isc}) + \delta_c + \gamma_s + u_{isc}, \quad (1)$$

where $Group_{isc} = \{0, 1, 2\}$ denotes the group in which firm i in sector s and country c belongs to, X_{isc} are the set of firm-covariates of interest that are expected to affect the probability of belonging to a group, δ and γ denote the country and sector fixed effects, respectively; and U_{isc} is the stochastic disturbance.[12] The set of predictors X includes firm sales, firm productivity,[13] a binary indicator of foreign activities, the ratio of skilled to unskilled workers, R&D, firm age, firm size, financial constraints, top manager education, etc. It is worth emphasizing that all variables in the set X are firm-level not country-sector level. Country and sector specific variables such as GDP per capita, unemployment rate, and sector factor-intensity, are captured by the country and sector fixed effects and cannot be included in Equation (1).

Equation (1) is estimated by using the Multinomial Conditional Logit Regression technique[14] (McFadden 1973). More specifically, we estimate the following equation:

$$Group_{isc} = \beta X_{isc} + \delta_c + \gamma_s + u_{isc}. \quad (2)$$

The goal is to get an estimate of the vector β, highlighting the main factors in the set X that affect firms' labor demand. We include country-sector fixed effect to make sure the estimate of β is not be driven by country-sector specific factors and remains robust even when controlling for them.

4. Data

We used data from the World Bank's World Enterprise Survey (WES).[15] The WES is a stratified sample based on ISIC Revision 3.1 which excludes state owned enterprises (as the focus is on the private sector) and establishments with fewer than five employees as well as agricultural economic activity. The stratification considers three levels; the size of the economy, economic activity, and geographic location. This has important implications for the estimation of the model. First, it is very likely that firm employment growth is clustered either over country or economic activity. Second, since employment growth occurs over a three-year span (2009-2012), measurement is only possible for surviving firms which may raise issues of selection. To this end, the results section will address in detail the diagnostics of these issues.[16]

[12] In general, u_{isc} is heteroskedastic and varies across sectors; therefore, we use robust standard errors clustered by sectors.

[13] Firm productivity is measured by Total Factor Productivity (TFP) using a Cobb-Douglass specification where the dependent variable is VA/worker rather than sales/worker. In 2012; the data on raw material cost is available for 2012 only, thus we use sales/worker instead for both years. See Daoud and Sekkat (2016) for more detail.

[14] The multinomial logit specification serves the purpose of comparing turtle and gazelle firms to burden firms (downsizers). As a robustness check, we also use an ordered probit specification as the dependent variable outcomes are clearly ordered thus correcting for possible endogeneity of output growth and access to finance.

[15] For more information about data collection methodology please visit "http://www.enterprisesurveys.org/Methodology"

[16] For the sampling framework see (http://www.enterprisesurveys.org/~/media/GIAWB/EnterpriseSurveys/Documents/Methodology/Sampling_Note.pdf)

The survey was performed for a number of MENA countries over a number of years. We included economies that had data for 2013 as this was the most recent year with the largest number of countries possible.

The collected data is rich containing information about firm's main characteristics, such as, the number of workers, sales, age, capital, land, export status, ownership structure, legal status, ratio of skilled to unskilled workers, workers by gender, etc. The data also provides information about country-industry-firm characteristics such as infrastructure, including firm access to water, electricity and telecommunication. In addition, the WES includes questions about firm's perception of the level of corruption, contract enforcement, and the rule of law. The data also contains some important information about firms' characteristics in the year 2009 and firm's year of establishment (first year) such as sales and the number of workers. This feature is imperative for our analysis, enabling us to calculate firm's employment growth between 2009 and 2012.

The data was carefully coded and occurrences of illogical observations that are suspected to reflect measurement errors were removed. Data recorded in local currency were converted to the equivalent dollar values. In addition, nominal values in 2013 were adjusted for the average inflation rate between 2009 and 2013 to facilitate comparison across countries and years. All firms with employment growth between 2009 and 2012 larger than 500 percent and lower than -90 are dropped from the dataset as outliers, resulting in elimination of 31 observation.[17] Further, we drop firms with sales growth above 5000 percent, resulting in the elimination of 12 observations.[18] We dropped some observations with odd statistics where the growth sales in the period 2009 and 2012 is 320 percent (smaller) larger than the employment growth in the same period.[19] Table 1 provides a summary statistics for the main variables after the coding and cleaning processes.

To eliminate the concerns over data representation and reliability, we conducted several validation diagnoses examining the distribution of firm activities over country-sector pair. Since the results and analysis of this study hang on the reliability and robustness of the World Bank survey data, which is rarely tested in the MENA region. .[20]

In addition, in this section, we use a multinomial regression model to identify the main factors behind job creation and the association to the gazelle versus turtle framework. The multinomial regression assumes independence of the choices of the dependent variable and requires that the outcome variable not be separated by predictors (Cameron and Miller, 2015). It is also

[17] It is important to note that -72 and 300 percent corresponds to the 1 and 99 percentiles of employment growth distribution.

[18] We believe that these numbers, as outliers, reflect data collection error not actual observations. In addition, large employment growth within a very short period might result from merger and acquisition rather than actual growth. Unfortunately, we cannot rule out this possibility given the data at hand, but we believe that the methodology mentioned above helps, to some degree, mitigating this problem. Moreover, we expect this issue to be of insignificant importance for the paper's results for two reasons: (1) Gazelles (firms grow by more than 50%) are young and medium aged firms which are less likely to merge than old and established firm. (2) we expect the number of mergers to be small in the studied countries.

[19] The formula used to calculate the difference between growth in sales and employment is given by the absolute value of (sales growth-employment growth)/employment growth. The 320% cutoff corresponds to the 99th percentile of the observations.

[20] We discuss in Appendix I the details of the diagnoses procedures that we employed and the results to establish the robustness of the WES data and consequently our results. Another problem with the WES data is that of attrition. Unfortunately, this problem cannot be captured with the existing data but it has no implications on our results since we use cross-sectional data. However, it is worth mentioning that the diagnoses conducted to examine distribution of firms' activities hold. For example, the Zipfs' law is a feature of stochastic growth process that is independent of firm size and shall not be affected by entry/exit process and differential survival rates between young and old firms. An additional concern is related to young firms that are economically insignificant as the survival rate for these firms is low relative to old firms. This concern is invalid, because it is the process of firm entry and exit (creative destruction) that produces young firms with high employment growth. We suspect that dying young firms and newly created firms will be responsible for the lion shares of job destruction and job creation, respectively. Nonetheless, a handful of young firms show strong performance; survive longer; and experience a stronger employment growth in the short-medium run.

important that there are enough observations. Schwab (2002) suggests at least 10 observations per independent variable. Since the sampling for this data is done by country and sector, then we assume the possibility of employment growth clustering around those two factors.

Accordingly, we will be estimating the multinomial regression for a basic model as implied by theory and cost minimization (Babecký, Galuščák, and Lízal, 2011). We use employment growth (with the group of downsizing firms as the base group) as a function of average wage,[21] average rent, and sales growth.

5. Results

Before we report on the results of the model estimation and its robustness check, a close analysis of the data (through cross-tabulation, deriving proportions, percentages, and other statistical tools) reveals some very interesting patterns that are of significance to our investigation and support the findings of the econometric model.

5.1 Analysis results

Countries with a higher gazelle-turtle ratio experienced higher rates of overall job growth. The share of Gazelle firms plays an important role in explaining the disparity in job creation across MENA countries. This fact is illustrated in Figure 1. Countries with high ratio of gazelle firms experienced higher percentage of total jobs added in each country.[22]

Gazelle firms constitute a small fraction of total firms and yet they contribute significantly to job creation in MENA region. Figure 2 plots the total jobs added for each country by all firms (gazelles and turtles) and the total job added by gazelles. The contribution of gazelles to total job creation ranges from staggering 61 and 60 percent in the case of Palestine and Tunisia to 37 and 32 percent in Lebanon and Jordan. It is worth emphasizing that gazelles' contribution to job creation is significantly higher than the share of gazelles to total firms with positive job creation. For example, in Egypt, the contribution of gazelles to job creation exceeds 50% while they only represent 23% of all the firms with positive job creating. Jordan and Lebanon are the two countries where the percentage contribution of gazelle firm to job creation (32% and 37% respectively) is modestly higher than the ratio of gazelles to job creators (21% and 34% respectively).

Young firms grow much faster than old firms. This holds across countries and sectors (Figures 3and 4). Taking the whole sample for all countries, the average employment growth between 2009 and 2012 for young firms (age 0-5) is 6 times higher than average employment growth for old firms (age > 11). Considered separately, this fact holds in all countries and sectors, except in Yemen where young firms still demonstrate higher growth rates that old firms but are slower than medium aged firms (6-10 years old). Please note that the relationship between firm age and average employment growth is not driven by firm size.

Gazelle firms are younger relative to other firms. Figure 5 shows the distribution of firm employment growth for three different firm age categories. The frequency of gazelle firms declines as firm age increases, complementing our previous analysis with regard to firm employment growth and firm age.

Average employment growth is affected, though weakly, by firm size. Once age is controlled for, firm size and job growth do not seem[23] to be related. (See Table 2 and Figure 6). A couple of notes are necessary here: 1) While being a micro firm (less than 5 workers)

[21] The average wage was calculated as the ratio of labor cost to the number of workers in 2012 due to lack of data on labor cost in 2009. The 2012 average exchange rate was used to convert all national currencies to U S $.

[22] Calculated as the sum of job creation by firms between 2009 and 2012 divided by the total number of workers in 2009 for the same set of firms.

[23] The coefficient on firm size dummies is positive and significant for turtles but not for gazelles. This implies controlling for other covariates, bigger firms are more likely to fit into the turtle's category. This is not true for gazelles.

seems to hurt employment growth, the small number of micro firms in the sample could be responsible for this result; 2) While medium sized firms had higher average employment growth compared to small firms in all age groups, only large firms that are 6 years old or more grew faster than medium sized ones. This preliminary examination of the relationship between firm size and employment growth is consistent with the empirical literature in this vein. Previous studies have been inconclusive with some papers finding negative impact of size on growth (Neumark, Wall, and Zhange 2010) and others finding positive relationship between size and growth (Haltiwanger, Jarmin, and Miranda, 2013).

Growth in employment can only be partially explained by growth in sales. The simple correlation between the two variables is 0.22, and the R-square in a simple linear regression between employment growth and sales growth is around 0.05.[24] The tabulation of employment growth and sales growth in Table 3 affirms the weak connection between employment growth and sales growth. Typically, the diagonal cells in Table 4 should be close to one indicating a strong correlation between job and sales growth, which only holds from the case for downsizing firms. This result contradicts the theoretical expectation that the correlation between the growth rates of demand for labor and sales should be near unity (assuming constant factor pricing). The weak correlation between sales growth and employment growth is an interesting feature of the data that points to the existence of a deeper dynamic and fundamental process governing employment growth beyond sales growth. Possible explanations range from directed technological change and capital-skill (Acemoglu, 2002) to labor market frictions and regulations (Almeida and Carneiro, 2009).

Labor market regulations cannot explain the weakness of the relation between job and sales growth. Firms that are burdened by labor regulations are reluctant to proportionally increase the number of worker in response to a transitory positive shock in sales, fearing future inability to lay off workers in response to future negative shocks. Therefore, the mismatch between sales growth and employment growth is expected to increase for firms who consider labor regulations as a major obstacle. Table 4 shows a little support for this hypothesis. We studied the impact of the perceived rigidity of labor regulations by firms to try to further explore the underlying factors behind the weak correlation between sales growth and employment growth.[25] Unexpectedly, gazelle, turtle and downsizing firms share similar views about the labor regulations. Statistically speaking, the probability of being gazelle conditional on labor regulations is almost identical to the unconditional probability of being gazelle in the sample. Firms with matched sales-employment growth (sales growth is 2.5 smaller/bigger than employment growth) express similar views about the labor regulations compared to firms with mismatched sales-employment growth. The results hold when the exercise is repeated for downsizing firms and gazelles separately.[26]

Investment in Research and Development (R&D) and New Methods (NM) for production do not contribute to the mismatch between sales and job creation. Under the technological-biased proposition, instead of increasing the number of workers by one-to-one to meet the growing sales demand, a firm invests in labor-saving technology, resulting in a higher labor productivity and moderate employment growth.[27] An inspection of the conditional distribution of sales-

[24] When the same regression is conducted for observations with employment growth and sales growth bounded by -90 and +500, the R-square increases to 0.1.

[25] We first confirmed that firm size and age distributions are invariant to conditioning on labor regulations (measured by the answers to the questions in the survey on: the total number of obstacles, number of minor obstacles, and number of major obstacles).

[26] It is also robust to different grouping of matched and mismatched sales-growth firms.

[27] Unfortunately, we cannot test the skilled-biased technological change directly since we don't observe the ratio of skilled labor to total labor in 2009, thus we use R&D and whether a firm has developed a new method of production as a proxy for technological biased.

employment growth reveals that Research and Development (R&D) or whether a firm has developed a new method of production (NM) is not a contributing factor to the sales-employment growth mismatch. To formally address this issue, we run a logit regression where the dependent variable equals one if sales growth doesn't match employment growth and zero otherwise. Again, the results show that R&D cannot be blamed for this puzzle. Nonetheless, if only firms with positive sales growth considered, the conditional probability of being turtle and gazelle given positive R&D is slightly higher than the unconditional sample probability, very weakly indicating to the presence of labor-saving technologies (Table 5).[28]

Our findings have important implications for the role of R&D in employment growth as shown in the empirical findings of the multinomial logit model. We have shown that R&D are not necessarily directed to labor-saving technologies, in the contrary it might be biased toward labor intensive technologies, shedding some lights on the underlying mechanisms that lead to the positive relationship between employment growth and R&D controlling for sales growth and many other covariates.

Small firms are more financially constrained than large firms. Financially constrained firms are not younger than financially unconstrained firms. The age distribution of firms with no perceived financial constraints, stochastically second order, dominates the age distribution of firms with minor and major financial constraints (Figure 7). In other words, the mean of firm age across distributions is similar, yet older firms are more uniformed in their perception about the obstacles of financial constraints. On the other hand, firm sales distribution of financially unconstrained firms is to the right of constrained firms indicating that large firms are less financially constrained. This result confirms the empirical finding where firms with overdraft facilities have positive relative log-odd (i.e., higher probability to be turtles and/or gazelles) across all firm age/size groups.

5.2 Model estimation and results

The results of the estimation (Table A3) point to a number of key firm-level job growth determinants. First, sales growth matters. It increases the log odds of being a turtle and a gazelle relative to downsizing firms. Second, the age of the firm is a significant determinant. Younger more creative firms tend to generate more jobs than older firms and this is supported by our results. In fact, this is the most robust finding that holds in all the specifications we ran and for different measures of firm age. Third, the firm's size does matter. The larger the firm the larger the chances of belonging to turtles (but not gazelles) are.

Fourth, we find that top management education matters for employment growth. Less education (relative to university degree or higher) results in lower probability of belonging to gazelles. On the other hands, the experience of management does not seem to play an important role in enhancing the probability of belonging to either turtles or gazelles. One possible explanation of this results is the lack of variability of management experience across groups.

Fifth, the availability of finance increases the odds of employment growth. As firms grow their sales, they need more resources to facilitate production. This is indeed what we find in the dataset. Firms without overdraft facilities are less likely to belong to either turtles or gazelles, however, the effect is only significant for turtles. In other words, having an overdraft facility can help a firm escape the trap of downsizing but does not necessarily contribute to turning it into a gazelle. A second variable related to finance is the overall finance question in the survey which requires respondents to evaluate the severity of access to finance as an obstacle to business. Surprisingly, this variable does not seem to affirmatively point in one direction or the other. One would expect that relative to those who do not view it as an obstacle, the more severe the respondents think it is, the less likely they are to belong to turtles and more so

[28] We repeat the logit regression only including the subsample, the coefficient of R&D is still insignificant.

gazelles. Apparently, manager's perceptions of the severity of obtaining finance is not related to the job growth performance of their firms. We also find that Involvement in export activity affects employment growth, for both gazelles and turtles. And finally, spending on Research and Development (R&D) (a binary variable taking the value of 1 if the firm does not spend on R&D), is another important determinant of whether a firm is a turtle or a gazelle. The coefficient is negative and significant for gazelles and the same for turtles only when clustering is done at the industry level. This implies that firms which do not spend on R&D are less likely to belong to turtles or gazelles.

Industry and country effects are more dominant than management and finance covariates. For example, relative to manufacturing, construction strongly and significantly lowers the probability of turtles compares to downsizing, but does not seem to matter for gazelles. Put more simply, turtle firms are less prevalent in the construction sector than in the manufacturing sector. On the other hand, Electricity, gas and water has the opposite effect for both turtles and gazelles where there are more turtles and gazelles and less downsizers. Hotels and restaurants, and Transport, storage and communications have negative and significant effect on gazelles relative to downsizing.

Country effects are all positive and significant. Firms in all countries in the sample are more likely to fit in the turtles or gazelles relative to ones in Egypt, Since Egypt is the reference country, then on average, firms in other countries have a higher probability of being a turtle or gazelle. Egypt has gone through a very abrupt and violent political change during in the period preceding the survey (Arab Spring), which might have led firms to downsize and employ less given the high uncertainty environment.

There is also little evidence that perceived political instability and corruption are detrimental to the employment growth issue.[29] Nonetheless, this result does not contradict our previous result with regard to lower job creation in Egypt relative to the rest of countries in the sample. The broader effects of Arab spring are expected to be universal for all firms in the country, in other words, it is a common shock to all firms in Egypt. As a check on the robustness of our results, we re-estimate the models presented in Table A2, removing all covariates which are insignificant at least in two specifications (except the basic model variables) and present the results in Table A4. The results in Table A4 confirm the finding reported in Table A3, none of the remaining variables switched sign and or significance.

5.3 Robustness check

To account for possible endogeneity of output growth and access to finance, we apply an instrumental variable – ordered probit model using Roodman's (2011) Conditional Mixed Process (CMP) model. The CMP assumes the error terms to be jointly normally distributed. Goedhuys, M., et al (2016) use this approach to study the effect of corruption on growth. We use sales in 2009, capital, labor, raw material inputs, capacity utilization, and change in productivity as potential instruments for output growth. Theoretically speaking, an exogenous shock to firm productivity (measured as change is sales per worker) works its effect on employment growth only through its impact on firm sales. A firm with excess capacity may not want to increase their inputs to increase output, hence, a positive demand (productivity) shock impacts firm sales growth but not employment growth for capacity unconstrained firms.

For access to finance (measured as whether the firm has an overdraft facility or not), we use access to government projects. Access to government projects is employed as a proxy to political connectedness. It is well known that politically connected firms enjoy are treated

[29] We do not have a precise explanation for this result, however, we suspect that the difficulty for firms to assess political instability and corruption might be contributing to this unexpected result. In fact, the firm perceived measure of political instability and corruption is a noisy index that seems to be uncorrelated with firm characteristics.

favorably by the banking sector, especially government banks; therefore, we anticipate a significant impact of political connection on access to finance. On the other hand, there is no reason for us to believe that political connectedness is directly linked to employment growth at the firm level.

The results of the Full Information Maximum Likelihood (FIML) (Table A7) are consistent with the baseline model discussed above. The ordered probit coefficients on output growth, exporting status, and overdraft facility are all positive and significant, this indicates that firms with predictor variables are more likely to fall in higher employment growth categories (i.e., increase the probability of Gazelles). We also find that compared with college graduates, lower education managers are more likely to fall in lower employment growth categories. Firm age is significant and consistent with the previous results; so, does research and development.[30]

The results of the FIML are presented in Table A7, the sign and significance of the atanhro are positive and not significant. Which means the error terms between equations are positively correlated, and that the use of separate equations for each dependent variable can be done. The ordered probit coefficients on output growth, exporting status, and overdraft facility are all positive and significant, this indicates that firm with predictor variables are more likely to fall in higher employment growth categories (i.e increase the probability of Gazelles). We also find that compared with college graduates, lower education managers are more likely to fall in lower employment growth categories. The age variable has a negative sign implying that younger firms are more likely to fall in higher employment growth groups. The research and development variable also increases the likelihood of the firm belonging to a higher employment growth group. It is worth noting that (except for electricity and real estate which are not significant), firms in all other industries are less likely to fall in high employment growth categories compared to manufacturing. The only reversal in the direction of the relation with employment growth is in the coefficient of firm size indicating lack of robustness.

7. Conclusions, Policy Implications, and Future Research

This study is one of very few that used firm-level data from the World Enterprise Surveys (WES), conducted by the World Bank, to analyze the labor market demand in the MENA region. However, it distinguishes itself from the rest by carefully examining and cleaning the dataset to mitigate the concerns over data representation and reliability. This study is the only one employing several validation diagnoses to examine the distribution of firm activities over country-sector pair and proving its validity and universalness. As such, this study demonstrated the reliability and robustness of the World Bank survey data, which is rarely tested in the MENA region, and encourages researchers interested in the region to make use of such rich data source.

Thus, to study the factors determining the ability of MENA private firms to create jobs, three groups of firms are constructed. Group 1- Gazelle firms: These are the fast-growing firms that increased the number of workers by more than 50 percent during the period 2009-2012); Group 2- Turtle firms: Firms that have achieved a reasonable employment growth (1-49 percent) during 2009-2012); and finally Group 3- Burden (downsizing) firms: Firms with zero or negative employment growth. The last group is the reference group.

And to answer the question: What are the main factors that affect the probability of a firm being a gazelle, a turtle, or a downsizing firm? We employ two key strategies. First, we analyze the survey data to elaborate on key stylized facts that uncover some of these factors. Second, we confirm these stylized facts using three multinomial logit regression models. Finally, we have addressed issues of endogeneity and robustness of our results to estimation techniques.

[30] The sign and significance of the atanhro are positive and not significant. Which means the error terms between equations are positively correlated, and that the use of separate equations for each dependent variable can be done.

The pervasiveness of turtle firms in the MENA region with little to no contribution to job growth can be a real obstacle to sustainable and inclusive development in the region. These firms do not just represent the majority of firms in the region, but they tend to be the more mature firms with relatively lesser financial constraints. On the other hand, a small number of 'gazelle' firms carry more than their weight when it comes to job creation.

Growth in sales plays a role in determining this genealogy but not to the extent, that one would have expected. In other words, the 'turtle' group is not necessarily facing slower sales growth or lower worker productivity. Moreover, those turtles are the more mature and less financially constrained firms in the economy. There is also evidence that size matters. Bigger firms are more able to create jobs than smaller firms are.

These results paint a very interesting picture of MENA private sector that can provide clues for government policies aimed at stemming job growth. Most significantly for policy, government efforts to reduce unemployment would benefit from focusing on supporting new/young firms that are medium to large-sized with existing investments in R&D. If these firms are to benefit from government support (such as tax breaks, subsidies, credit facilitation and other forms of government support) we should expect a higher policy impact on reducing unemployment. And indeed, these firms are the neediest of government support as they often face more financial constraints and a harder time establishing themselves in the market, yet they are the region's best hope in addressing its chronic youth unemployment problem.

Thus, since the study indicates that investment in R&D or NM is positively related to job creation, any sort of encouragement to R&D or NM spending (may be through capital depreciation acceleration or low interest loans, etc.) might be helpful as job creation policy.

In addition, there is a number of areas that this study did not explore fully (or at all), depending on availability of detailed data. These areas of research include many determinants that could be contributing to job creation such as labor market regulations; political activeness; access to foreign markets; practice of social responsibility; and political corruption.

In addition, the dynamics of becoming a gazelle need to be studied further. Not only the profile of a gazelle firm need to be drawn but also the time span that takes a firm to move to the gazelle rank. Does a firm become a gazelle right after inception? What is the average number of years a firm will take to become a gazelle or a turtle? Is there a typical move from the gazelle rank to the turtle or vice versa? In addition, what is the average number of workers a firm might employ before moving to the Gazelle rank? And can we ever break from the gazelle/turtle dichotomy and see a more evenly distributed (less skewed) job growth across all firms? These are all questions that might help the government target specific firms with its job creation policies.

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Figure 1: Jobs Added from 2009-2012 and the Share of Gazelles in Total Firms by Country

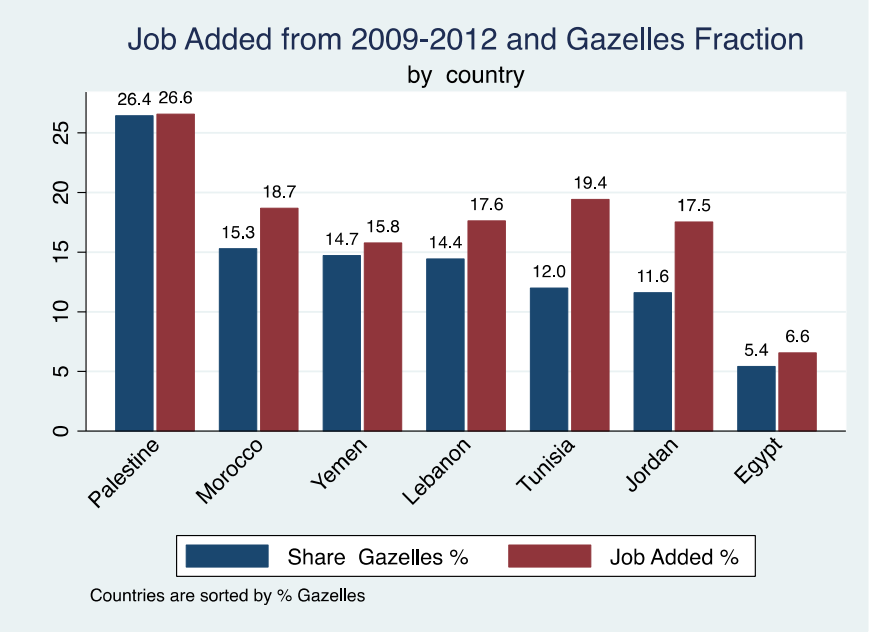


Figure 2: Jobs Added by Country 2009-2012

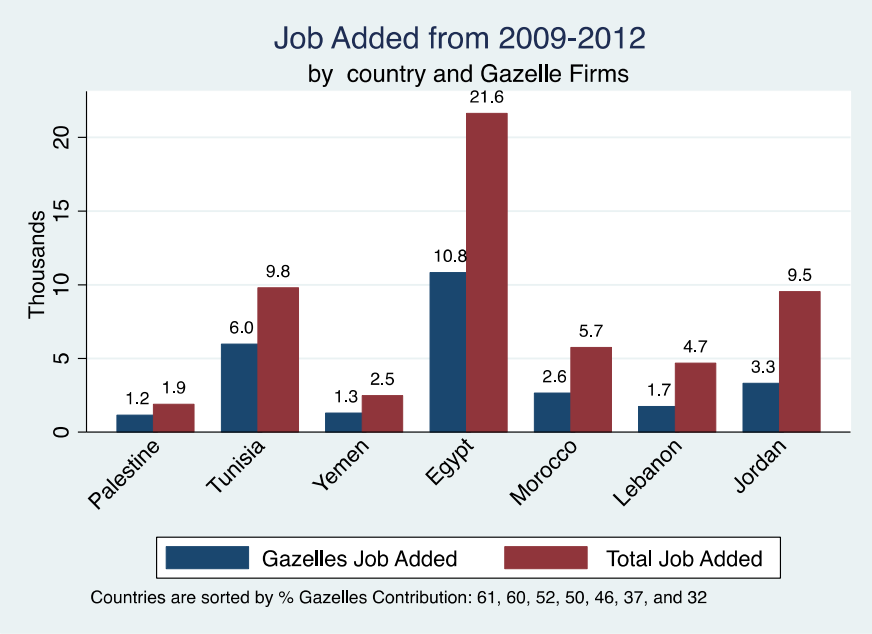
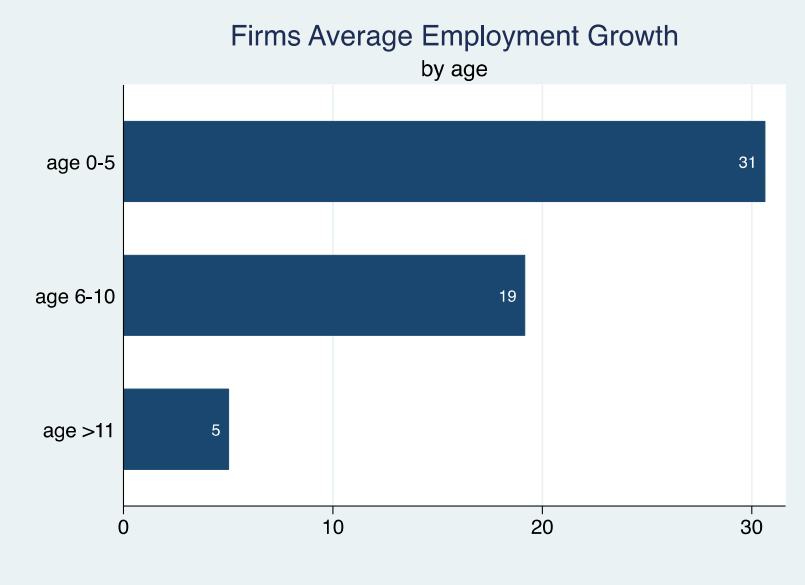


Figure 3: Employment Growth and Firm Age



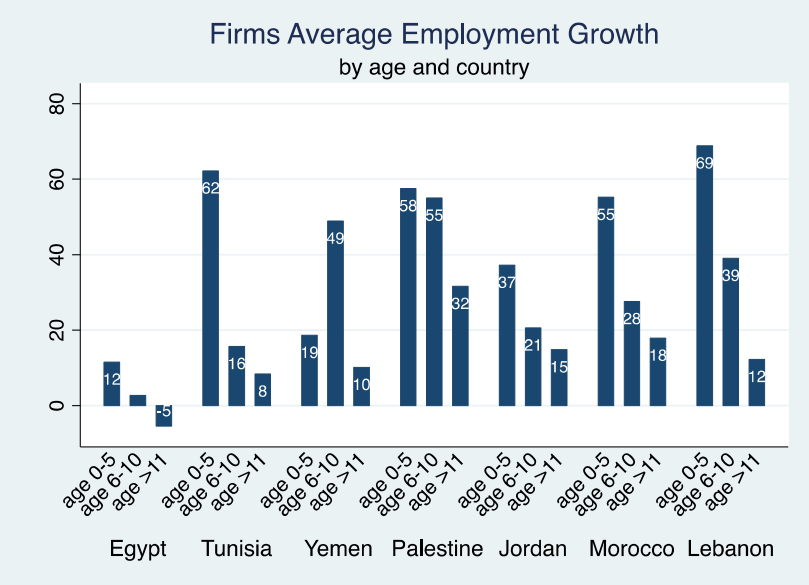
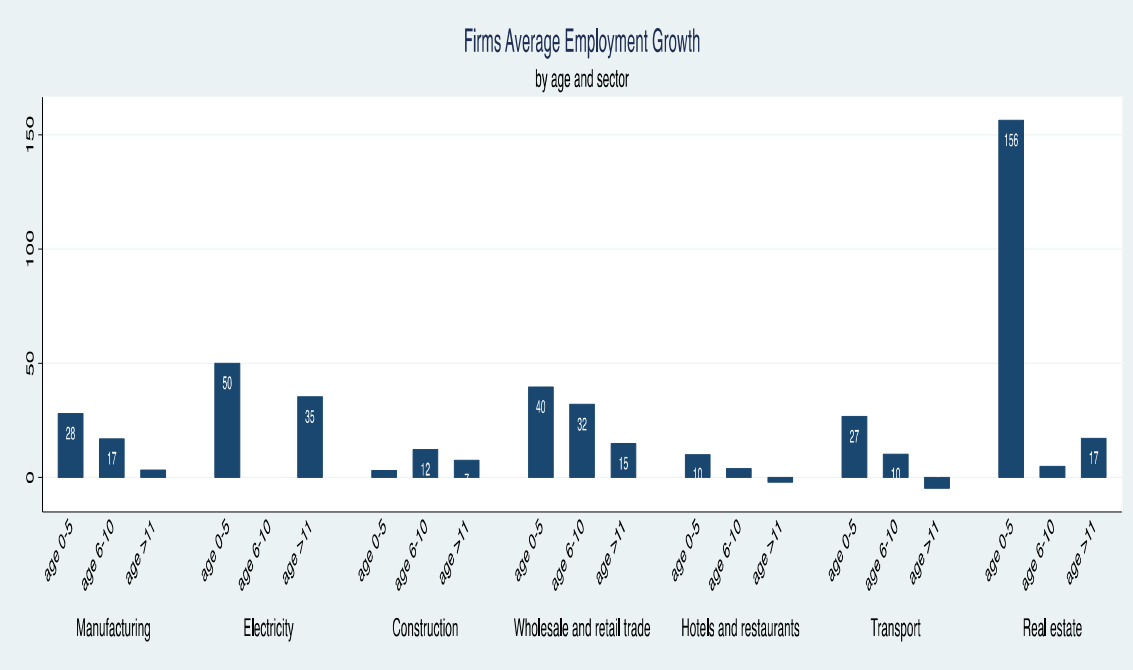
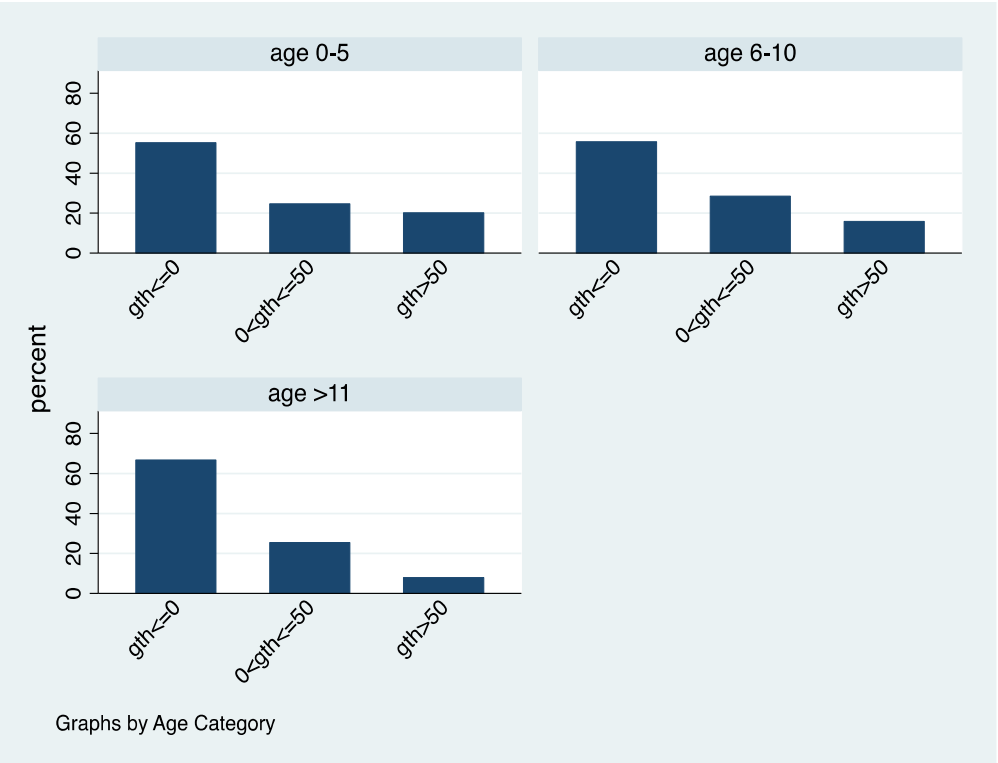


Figure 4: Average Employment Growth by Age and Sector



Note: Young firms (age <= 5) experienced much higher average employment growth in all sectors, where unweight average is calculated as the sum of firm employment growth divided by the number of firms.

Figure 5: Firm Employment Growth Distribution by Age



Note: Firms with negative employment growth constitute the majority of firms for any age category, ranging from 50-65 percent. Gazelle firms are minority for any age category; however, the declining fraction of gazelles in firm age is very notable: declining from 20 percent for young firms to less than 10 percent for old firms.

Figure 6: Firm Size and Employment Growth

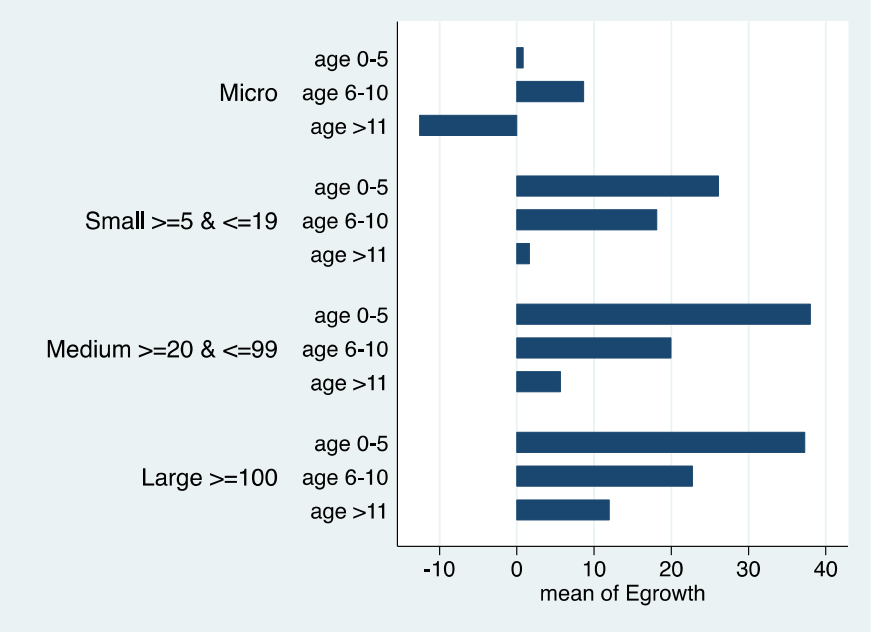
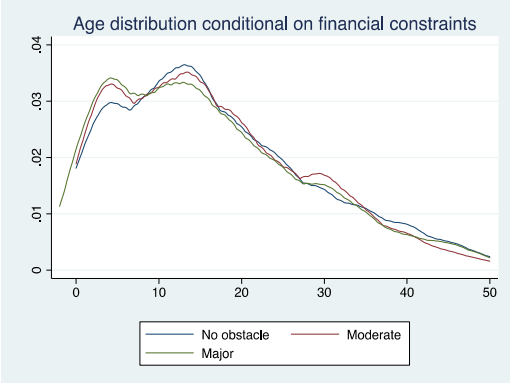


Figure 7: Age and Sales Distribution Conditional on Financial Constraints



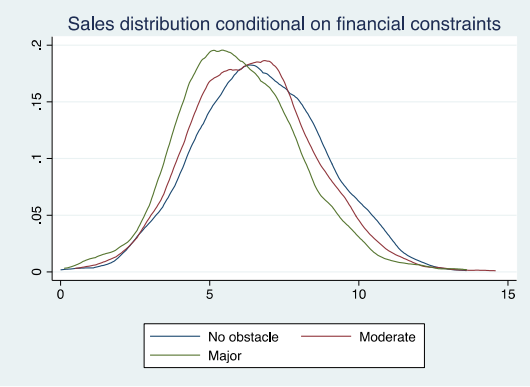


Table 1: Summary Statistics of Firm Size, Age, Sales and Employment Growth

Country	Variable	No. Obs	Mean	Median	Std	Min	Max
Egypt	Sales 2012	2420	4290	326	25324	1	814332
	Workers 2012	2802	124	22	584	1	21000
	Employment Growth	2400	-2.4	0	41	-85	471
	Sales Growth	1996	-17.3	-49	160	-127	3900
	Firm Age	2824	18	14	15	0	132
Tunisia	Sales 2012	577	8534	1427	25829	14	290322
	Workers 2012	588	98	30	215	1	2360
	Employment Growth	567	14	0	54	-80	400
	Sales Growth	555	8	-5.8	90	-106	1141
	Firm Age	586	20	18	14	0	106
Yemen	Sales 2012	269	16458	159	143428	1	2129891
	Workers 2012	343	46	13	96	2	900
	Employment Growth	333	15	0	66	-80	325
	Sales Growth	241	-15	-55	168	-138	1289
	Firm Age	344	21	18	14	0	132
Palestine	Sales 2012	411	2422	270	8832	8	102702
	Workers 2012	424	23	10	43	5	550
	Employment Growth	333	39	15	74	-70	400
	Sales Growth	209	33	9	107	-82	888
	Firm Age	422	17	13	17	0	139
Jordan	Sales 2012	545	12131	986	64000	14	1161972
	Workers 2012	570	115	20	302	2	3500
	Employment Growth	500	19	11	45.5	-77	325
	Sales Growth	462	-2	-4	37	-102	221
	Firm Age	561	16	12	14	0	92
Morocco	Sales 2012	363	11601	1428	53027	12	808904
	Workers 2012	394	102	30	220	1	2120
	Employment Growth	373	22	7	54	-88	433
	Sales Growth	338	49	13	168	-95	1566
	Firm Age	386	21		17	0	88
Lebanon	Sales 2012	478	9868	1278	59606	10	1133333
	Workers 2012	552	55	19	126	1	1800
	Employment Growth	520	21	0	61	-88	400
	Sales Growth	418	19	-11	181	-111	2383
	Firm Age	555	24	19	21	0	155
Total	Sales 2012	5063	7154	570	49691	1	2129891
	Workers 2012	5673	100	20	435	1	21000
	Employment Growth	5026	9.9	0	53	-88	471
	Sales Growth	4219	-0.76	-23	146	-138.5	3900
	Firm Age	5678	19	15	16	0	155

Note: Sales 2012 are in thousands of US Dollars. Firm age is calculated from the year of establishment to 2013.. Employment and sales growths represent the growth in the number of full time workers between 2012 and 2009 and the real growth in sales between the same periods, respectively.

Table 2: Mean Employment Growth by Size and Age

Size	Age							
	0 to 5		6 to 10		> 10		Total	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
Micro	20	0.83	19	8.6	97	-12.6	136	-7.6
Small	266	26	368	18	1433	1.6	2067	7.7
Medium	190	38	245	20	1346	5.6	1781	11
Large	60	37	109	22.7	827	12	996	14
Total	536	30.5	741	19	3703	5	4980	

Table 3: Tabulation of Employment and Sales Growth

Empl. Growht	Sales growth gth <=0		0<gth<=50		gth>50		Total	
	No.	row %	No.	row %	No.	row %	No.	%
gth<=0	80.3	2.1	355	12.25	173	6.46	2680	100
0<gth<=50	535	49.5	382	35.3	164	15.2	1081	100
gth>50	145	36	128	31.7	130	32.2	403	100
Total	2832	68	865	20.8	467	11.2	4164	100

Table 4: Tabulation of Sales-Employment Growth Gap and Labor Obstacles[31]

Sales-to-Empl. growth	How much of an obstacle: labor regulations No obst.		Moderate		Major		Total	
	row %	col %	row %	col%	row%	col%	row%	col%
Matched growth	53.3	62.4	35.2	68.5	11.4	66	100	64.8
Mismatched growth	59.2	37.6	29.8	31.5	10.9	33.9	100	35.2
Total	55.4	100	33.3	100	11.27	100		

Table 5: Tabulation of Sales-Employment Growth Gap and R&D

Sales-to-Empl. growth	R&D in the last three years No		Yes		Total	
	row%	col%	row%	col%	row%	col%
Matched growth	86.9	81.81	13.1	78.29	100	81.33
Mismatched growth	84.18	18.19	15.82	21.71	100	18.67
Total	86.4	100	13.6	100		

[31] Each sell contains the frequency of firms, row percentage and column percentage. If the sales growth is large/smaller than 2.5 times the employment growth, we consider sales-employment growth to be mismatched. The 2.5 threshold is a round the median.

Statistical Appendix 1

Table A1: Tabulation of Employment Growth Categories Over Country and Industry

Country/Industry	Downsizing		Turtles		Gazelles		Total	
	N	%	N	%	N	%	N	%
Egypt	1,850	77.1	420	17.5	130	5.4	2,400	100
Tunisia	326	57.4	174	30.6	68	12.0	568	100
Yemen	197	59.2	87	26.1	49	14.7	333	100
Palestine	144	43.2	101	30.3	88	26.4	333	100
Jordan	225	45.0	217	43.4	58	11.6	500	100
Morocco	174	46.7	142	38.1	57	15.3	373	100
Lebanon	297	57.1	148	28.5	75	14.4	520	100
Total	3,213	63.9	1,289	25.6	525	10.4	5,027	100
section D - Manufacturing	1,891	64.6	746	25.5	292	10.0	2,929	100
section E - Electricity, gas and water	2	40.0	2	40.0	1	20.0	5	100
section F - Construction	142	67.0	47	22.2	23	10.9	212	100
section G - Wholesale and retail trade	642	55.8	349	30.3	160	13.9	1,151	100
section H - Hotels and restaurants	250	74.9	65	19.5	19	5.7	334	100
section I - Transport, storage and comm.	272	75.6	63	17.5	25	6.9	360	100
Section k - Real estate, renting and bus.	14	38.89	17	47.22	5	13.89	36	100
Total	3,213	63.91	1,289	25.64	525	10.44	5,027	100

Notes: The Chi-square test of independence is 461 and 88.5 for country and industry respectively

Table A2: Multinomial Logit Estimates of the Basic Model

		Coefficient[$]
Downsizing	Reference group	
Turtles	Average wage	0.0000271**
		0.00000962
	Average rent	-0.160***
		0.0308
	Sales growth	0.324***
		0.0218
	Constant	-1.171***
		0.121
Gazelles	Average wage	0.0000397***
		0.00000985
	Average rent	0.0128***
		0.00188
	Sales growth	0.466***
		0.0204
	Constant	-2.487***
		0.0539
	N	1850
	Pseudo R^2	0.031
	Log pseudo-likelihood	-1435.894

Notes: $ The model was estimated with three different estimation options: the first uses robust standard errors, the second clusters employment growth over country and the third clusters over industry. We only report the third since coefficient estimates are the same in all three. * Significant at the 0.05, ** at the 0.01, and *** at the 0.001

Table A3: Multinomial Logit Estimates of the Extended Model

Variable		Turtles	Gazelles
	Average wage	1.58E-05***	2.54E-05***
	Average rent	-0.277***	-0.355***
	Sales growth	0.256***	0.484***
	Sales/worker 2009	-3.3E-05*	-0.000590*
	Skilled/non-skilled labor ratio	0.0223	-0.0593***
	Male Top Manager	0.201	0.370**
	Top Manager Experience	-0.00384	-0.0182***
	females amongst the owners	-0.138	0.397***
	Secondary & Vocational	-0.299***	-0.681***
Top Manager Education	Preparatory or some sec.	-0.827***	-0.980***
	Primary	0.0333	-13.25***
	Incomplete Primary or none	-1.288***	0.766
	Involved in export activity	0.353***	0.133
	Firm Age	-0.0160***	-0.0196***
	Small >=5 & <=19	14.97***	-0.0789
Firm Size	Medium >=20 & <=99	14.96***	-0.138
	Large >=100	15.70***	0.856
	Spend on formal R&D activities	-0.428***	-0.930***
	Have Overdraft Facility	-0.605***	-0.187
	Has a line of credit or loan	0.342***	0.404***
	Minor	-0.621***	-0.910***
Is finance an obstacle	Moderate	-0.203***	0.645***
	Major	0.105***	-0.379*
	Very Severe	0.360***	0.55
	Electricity, gas and water	0.972***	27.18***
	Construction	-14.93***	-1.518***
Industry	Wholesale and retail trade	1.417***	0.593***
	Hotels and restaurants	0.734***	-14.62***
	Transport, storage and comm	0.00574	-15.60***
	Real estate, renting		
	Tunisia	0.532***	2.523***
	Yemen	1.827***	2.314***
Country	Palestine	1.362***	3.248***
	Jordan	1.776***	2.195***
	Morocco	1.464*	2.839***
	Lebanon	1.076**	1.369***
	Minor	0.575**	1.525***
Is political instability and obstacle	Moderate	-0.356*	0.138
	Major	-0.366	0.242
	Very Severe	-0.459	0.413
	Minor	-0.196**	-0.506***
	Moderate	0.143***	0.0476
Is corruption an obstacle	Major	0.0425	-0.618***
	Very Severe	0.259*	0.428**
	Constant	-15.03***	-3.19
	N	811	
	Pseudo R^2	0.22	Pseudo R^2
	Log pseudolikelihood	-493.78	Log pseudolikelihood

Notes : $ The model was estimated with three different estimation options: the first uses robust standard errors, the second clusters employment growth over country and the third clusters over industry. We only report the third since coefficient estimates are the same in all three. * Significant at the 0.05, ** at the 0.01, and *** at the 0.001. Ref. groups are female for top management gender, Yes for the gender of top management, University degree or higher for the education of top management, No for involved in export activity, Micro for firm size, Yes for spending on formal R & D in last 3 tears, Yes for having and overdraft facility, Yes for having a credit line or loan, No Obstacle for "is financing an obstacle to your operations, section D - Manufacturing for ISIC Rev 3.1 sector of activity, Egypt for country, No obstacle for political instability obstacle question, and No obstacle for is corruption an obstacle to operations.

Table A4: Multinomial Logit Estimates of The Final Model

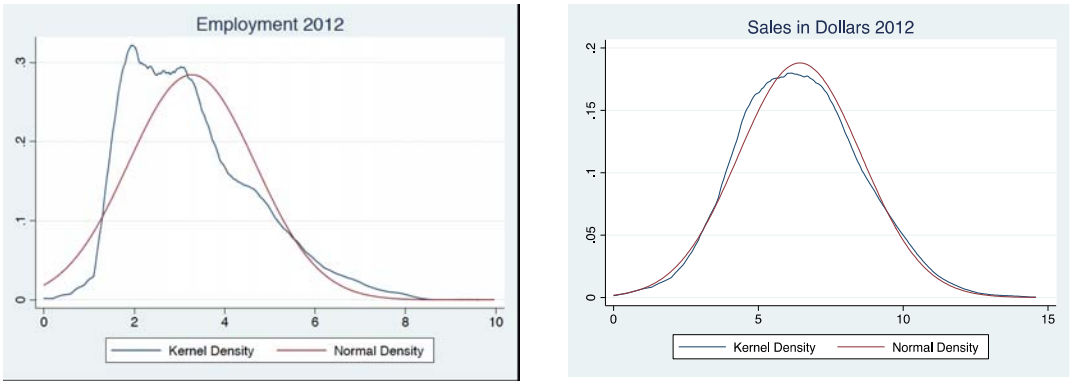
Variable		Turtles	Gazelles
	Average wage	0.0000134*	0.0000155**
	Average rent	-0.242***	-0.154*
	Sales growth	0.308***	0.437***
	Sales/worker 2009	-3.08E-05***	-0.000434**
	Skilled/non-skilled labor ratio	0.0240*	-0.0553***
	females amongst the owners	-0.248***	0.232***
	Involved in export activity	0.325**	0.252***
	Firm Age	-0.0187***	-0.0215***
	Small >=5 & <=19	14.40***	-0.479
Firm Size	Medium >=20 & <=99	14.47***	-0.551
	Large >=100	15.24***	0.368
	Spend on formal R&D activities	-0.585***	-0.951***
	Have Overdraft Facility	-0.648***	-0.185
	Has a line of credit or loan	0.329***	0.279*
	Electricity, gas and water	1.218***	28.96***
	Construction	-14.87***	-1.043***
Industry	Wholesale and retail trade	0.877***	0.0048
	Hotels and restaurants	0.804***	-14.05***
	Transport, storage and communication	0.384*	-15.27***
	Real estate, renting and business	0	0
	Tunisia	0.558***	2.127***
	Yemen	1.806***	2.462***
Country	Palestine	1.363***	2.753***
	Jordan	1.617***	1.587***
	Morocco	1.936***	2.425***
	Lebanon	1.025***	1.472***
	Constant	-13.99***	-1.541
	N	811	
	Pseudo R^2	0.22	
	Log pseudo-likelihood	-493.78	

See notes to Table 4.

Statistical Appendix 2

Since the results and analysis of this study hang on the reliability and robustness of the World Bank survey data, we conducted the multiple procedures. For example, Figure A1 reports the estimated firm size distribution for log employment and sales in 2012. It is evident that the estimated distribution of firm employment departs from the normal distribution, whereas firm sales distribution closely follows normal density. This result is in line with the literature that documents the difference between employment and sales distributions. Sales distribution, for instance, is remarkably comparable to the Spanish firm sales distribution obtained by (Segarra and Teruel, 2012) where the normal density is slightly to the right of the estimated density, and importantly, the estimated distribution is thicker on the right tail, pointing to more larger firms than what a normal density would produce otherwise.

Figure A1: Estimated Firm Size Distribution



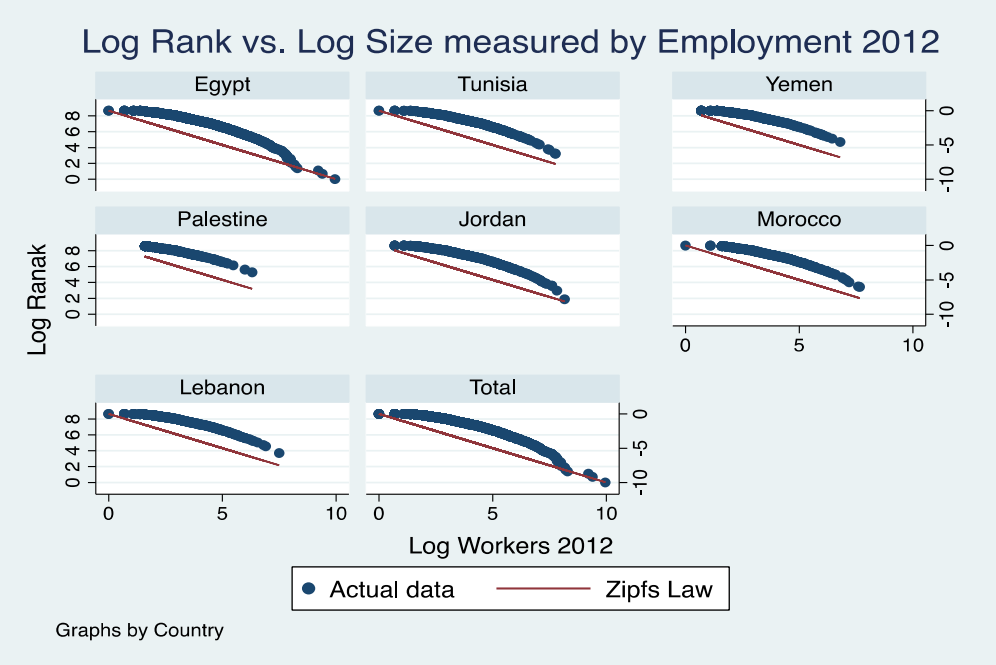
The estimated employment distribution is partially consistent with the statistical features obtained from the previous studies. In particular, it features a very thick right tail and lower than expected density for medium sized firms but more density for small-medium firms. Nonetheless, the estimated density of the left tail is less than the normal distribution, indicating underperforming micro-small firms. In fact, this is expected since micro firms (less than five workers) accounted for only 3 percent of the total sampled firms. Overall, the evidences suggest reasonable sample coverage with large firms being slightly overrepresented, whereas micro firms are underrepresented-which is a common feature in the firm-survey data (see, e.g., Cabral and Mata, 2003).

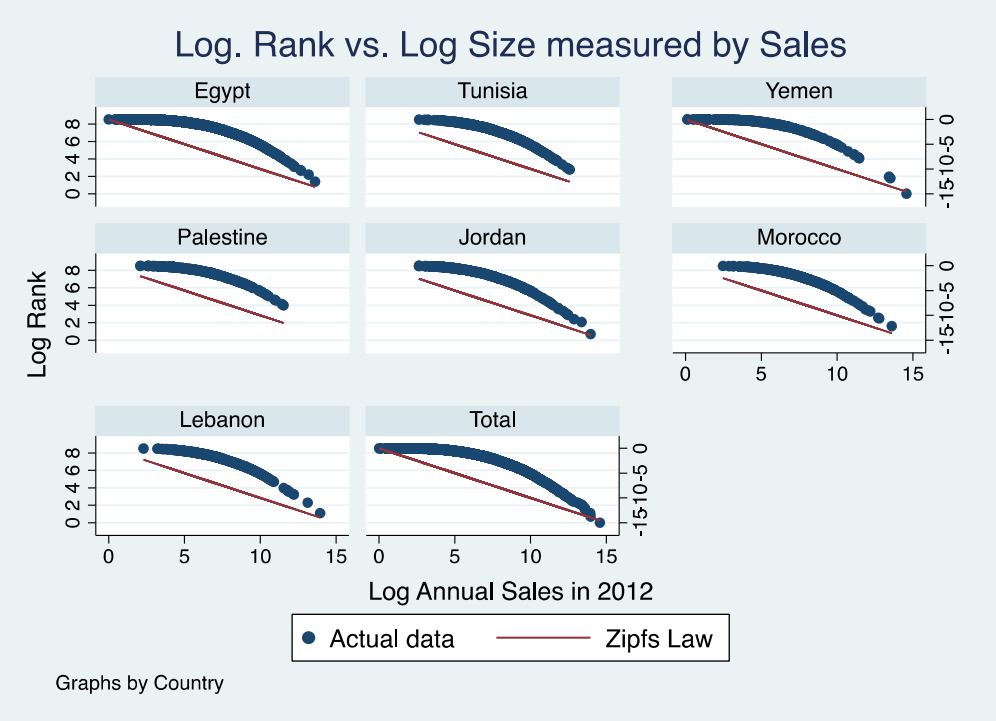
The investigation of firm size distribution indicates to the nonexistent of Zipf's law at the right tail of the firm size distribution. We formally address this issue by examining whether firm size measured by sales and the number of workers follows power law with exponent near unity. In a nontechnical sense, the distribution of firm size has been shown to be much skewed where the market is comprised of large number of small firms and small number of large firms who employ a substantial fraction of the labor force (Axtell 2001). We estimate the power-law coefficients for the sampled countries using different techniques and compare the results with other estimates obtained from other firm-level datasets.

The empirical distribution of firm size is concave (Figure A2) and isn't well approximated by the Zipf's law. The relationship between log rank and log employment/sales is sub linear for both individual countries and the whole sample combined. The estimated exponent's coefficients are reported in Tables 7 and 8. The estimates revealed many important issues. The results confirm those of (Segarra and Teruel, 2012) empirical findings where (1) a substantial difference between firm sales and firm employment distribution is correctly uncovered, and (2) the power coefficient is well below unity. In a rolling regression design, Segarra and Teruel

(2012) show that the estimated power coefficient decreases as the sample size increases and more small firms are included.[32] If only large and medium firms were represented in the survey, the estimated coefficient would be greater than one.

Figure A2: Zipf's Law





[32] Using a U.S. census firm level data of more than 5 million observations, Axtell (2001) obtained a power coefficient of near unity. This result is not expected to be replicated in a much smaller survey data, however.

Table A5: Zipf's Law: Firm size is measured by # of workers in 2012

	Yemen	Morocco	Palestine	Lebanon	Jordan	Tunisia	Egypt	Total
Log workers	-0.750***	-0.894***	-0.669***	-0.775***	-0.892***	-0.888***	-0.928***	-0.886***
	(0.0070)	(0.0098)	(0.0055)	(0.0063)	(0.0099)	(0.0081)	(0.0054)	(0.0034)
Constant	10.25***	10.94***	9.954***	10.37***	10.86***	10.92***	11.01***	10.83***
	(0.0280)	(0.0478)	(0.0188)	(0.0261)	(0.0467)	(0.0391)	(0.0249)	(0.0156)
Observations	170	184	197	276	282	289	1380	2786
Adjusted R^2	0.985	0.978	0.987	0.982	0.967	0.976	0.956	0.96

Notes: Standard errors in parentheses. The coefficients are estimated from the following regression: log (rank-.5) = K - a log (workers) + u where the rank is shifted by .5 to deal with the downward biased of the coefficients and standard deviations as suggested by (Gabaix and Loannides, 2004). Only firms with workers above the median firm are included in the regression. * p < 0.05, ** p < 0.01, *** p < 0.001

Table A6: Zipf's Law: Firs size is measured by sales in 2012[33]

	Yemen	Morocco	Palestine	Lebanon	Jordan	Tunisia	Egypt	Total
Log Sales	-0.679***	-0.828***	-0.574***	-0.795***	-0.786***	-0.792***	-0.627***	-0.716***
	(0.0182)	(0.0102)	(0.0082)	(0.0095)	(0.0091)	(0.0069)	(0.0038)	(0.0029)
Constant	12.13***	13.71***	11.50***	13.41***	13.28***	13.40***	11.89***	12.66***
	(0.1380)	(0.0909)	(0.0603)	(0.0833)	(0.0798)	(0.0614)	(0.0292)	(0.0237)
Observations	135	183	228	239	279	289	1291	2539
Adjusted R^2	0.912	0.973	0.956	0.967	0.964	0.979	0.955	0.961

Notes: Standard errors in parentheses. The coefficients are estimated from the following regression: log(rank-0.5)= K - a log(sales) + u, where the rank is shifted by .5 to deal with the downward biased of the coefficients and standard deviations as suggested by (Gabaix and Loannides, 2004). Only firms above the median number of workers are included in the regression since the Zipf's law holds only up to a certain size cutoff. * p < 0.05, ** p < 0.01, *** p < 0.001

[33] The estimated power coefficients (in absolute values) are significantly lower than those obtained by many other studies in more developed economies. That is, small (large) firms are much smaller (larger) than what Zipf's law produces. This could be interpreted as the lack of medium firms in the MENA region where the economies are characterized by large number of micro firms and few dominant super star firms. Whether this is a true characterization of the MENA economies or it is just a sampling issue is an empirical question that can be only answered using a census type data.

Table A7: CMP Estimates of The Model*

		Employment Growth		Output Growth		Overdraft Facility	
		Coeff.	P-val.	Coeff.	P-val.	Coeff.	P-val.
	Output Growth	0.157	0.000				
	Has Overdraft Facility	0.281	0.000	-0.017	0.867		
	Involved in export activity	0.199	0.000	0.110	0.090	0.111	0.126
Top Manager Education	Completed Secondary school including Vocational	-0.290	0.000	0.019	0.804	-0.363	0.000
	Preparatory or Incomplete Secondary school	-0.375	0.000	-0.024	0.840	-0.695	0.000
	Completed Primary school	-0.294	0.079	-0.199	0.069	-0.843	0.000
	Incomplete Primary school or did not enter school	-0.425	0.037	-0.137	0.322	-0.870	0.034
	age	-0.008	0.000	-0.007	0.000	0.003	0.175
	Research and development	0.325	0.000	0.301	0.012	0.230	0.015
Firm Size	Small (5-19)	-1.091	0.000	-0.560	0.021	0.309	0.168
	Medium (20 - 99)	-1.320	0.000	-0.600	0.015	0.606	0.007
	Large (≥ 100)	-1.304	0.000	-0.599	0.019	1.135	0.000
	Tunisia	0.401	0.000	0.000	0.995	1.495	0.000
Country	Yemen	0.505	0.000	0.070	0.630	0.316	0.110
	Palestine	0.820	0.000	0.368	0.015	1.183	0.000
	Jordan	0.660	0.000	-0.023	0.660	0.225	0.034
	Morocco	0.665	0.000	0.307	0.028	1.640	0.000
	Lebanon	0.397	0.000	0.316	0.003	1.400	0.000
	Electricity	0.861	0.297	-0.639	0.019	-4.020	0.000
	Construction	-0.276	0.008	0.303	0.398	-0.773	0.010
	Wholesale and retail trade	-0.102	0.064	-0.031	0.680	0.289	0.034
Industry	Hotels and restaurants	-0.319	0.002	0.128	0.653	-0.022	0.957
	Transport	-0.343	0.000	-0.049	0.872	0.017	0.982
	Real estate	-0.121	0.496	-0.450	0.017	0.418	0.363
	Change in Productivity			0.000	0.102	0.000	0.653
	Capacity Utilization			0.002	0.044	0.004	0.004
	Government Contract Secured (Or Attempted) In The Last 12 Months?					-0.515	0.000
	Const.			0.587	0.019		
	/cut_1_1	-0.583	0.000				
	/cut_1_2	0.501	0.000				
	/cut_3_1					1.053682	0.001
	/atanhrho_12	0.029	0.613				
	/atanhrho_13	0.013	0.829				
	/atanhrho_23	0.048	0.201				
	N			3958.000			
	Wald chi2(74)			3106.030			
	Prob > chi2			0.000			

Notes: * Estimation is done by CMP, base categories are: No R&D, downsizing for employment growth, no overdraft overdraft facility for overdraft, University degree or higher for top manager education, micro (<5) for firm size, Egypt for coountry, and manufacturing for industry. Ordered probit was used for employment growth and overdraft, but contineous for output grwoth. Std. errors are robust.