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THE IMPACT OF ARAB SPRING ON HIRING  
AND SEPARATION RATES  
IN THE TUNISIAN LABOR MARKET

Ilham Haouas and Almas Heshmati

Working Paper No. 921

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**Send correspondence to:**

Ilham Haouas

College of Business Administration, Abu Dhabi University

[ilham.haouas@adu.ac.ae](mailto:ilham.haouas@adu.ac.ae)

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## Abstract

This paper analyses the hiring and separation rates in Tunisia before and after the Arab Spring of 2011. Several models are specified to study employment decisions based on quarterly administrative firm level data over the period of 2007 to 2012. The data provides information about important firm characteristics, such as industry sector, number of hiring and separation, total employment effects and composition of labor force by gender, managerial level and age cohorts. Six models are estimated to investigate hiring, separation, hiring rate, separation rate, mobility, and net-employment. The results indicate presence of continued risk factors in Tunisia's labor market resulting from the global financial crisis in 2008 and the Arab Spring in 2011. Hiring was little changed during this time period, and the results suggest that factors that impact separation decisions remained present in Tunisia's labor market. In addition, the paper looks at various social issues such as youth unemployment and infer on how more efficient policy actions that further engage the private sector could result in more sustainable positive net-employment and increased labor mobility.

**JEL Classification:** E24;J23; J63

**Keywords:** hiring; separation; labor mobility; net-employment; informal sector; Tunisia; Arab Spring; global financial crisis

## ملخص

تحلل هذه الورقة معدلات التوظيف والفصل في تونس قبل وبعد الربيع العربي من عام 2011. تم تحديد العديد من النماذج لدراسة قرارات التوظيف استناداً إلى بيانات ربع سنوية على مستوى الشركات الإداري خلال الفترة من عام 2007 إلى عام 2012. وتوفر البيانات والمعلومات عن خصائص هامة عن الشركات في قطاع الصناعة، وعدد من التعيينات والفصل، ومجموع آثار العمل وتكوين قوة العمل حسب النوع، المستوى الإداري والاعمار. وتقدر ستة نماذج للتحقيق في التوظيف، والفصل، ومعدل التوظيف ومعدل الفصل، والتنقل، وصافي التوظيف. وتشير النتائج إلى وجود عوامل خطر للاستمرار في سوق العمل في تونس الناجمة عن الأزمة المالية العالمية في 2008 والربيع العربي في عام 2011. ولم يطرأ تغيير يذكر على التوظيف خلال هذه الفترة الزمنية، وتشير النتائج إلى العوامل التي ظلت لها تأثير على قرارات الفصل الحالية في سوق العمل في تونس. بالإضافة إلى ذلك، تنظر الورقة على مختلف القضايا الاجتماعية مثل البطالة بين الشباب وتستننتج إجراءات السياسة التي تزيد من كفاءة إشراك القطاع الخاص والتي يمكن أن تزيد من استدامة صافي فرص العمل وزيادة حركة اليد العاملة.

## 1. Introduction

The Arab Spring spread rapidly throughout Middle East and North Africa (MENA) in 2011, and although it might seem like mere social unrest to general observers, academics and policymakers view this event as a significant response to structural issues in the MENA region's labor market. The Arab Spring rocked Tunisia in 2011 and not only does it symbolize the power of ordinary people, but it also shed light on the structural economic problems afflicting the region. After all, the Arab Spring has introduced a problem of economic justice, namely the failure to sustain inclusive growth, with Tunisia's educated labor force facing increasingly longer waiting periods for public sector jobs (African Development Bank, 2012).

This paper takes a closer look at Tunisia by analyzing the impact of the Arab Spring on hiring and separation rates *ex post* the severe recession in 2011 that pushed Tunisia's unemployment rate near 17%. The country's real GDP growth rate picked up to about 3.6% in 2012, but the pressure is still on decreasing exports; in addition, high unemployment continues to weigh on the economy. The government responded with a higher wage bill, job creation programs and rising subsidies to manage increasing social demands, but the trade-off of higher government spending swelled its fiscal deficit in 2012. Higher international prices pushed the overall inflation rate above 6%, which only added to the problem, according to the IMF Mission Chief for Tunisia. Chiraz and Frioui (2014) show the impact of inflation on purchasing power of the Tunisian consumer and investment behavior.

A previously conducted, related research found that before the Arab Spring the financial crisis had a negative impact on the country's economy, causing a GDP decrease from 6.3% in 2007 to 4.5% in 2008 (Haouas, Yagoubi, Salvino, 2012). Additionally, labor market characteristics, such as gender and age, make certain people more vulnerable to recession because of obstacles faced in the labor market (Tzannatos, 2010; Brosius, 2011). Hassine (2015) assesses the levels and determinants of economic inequality in 12 Arab countries using harmonized household survey micro-data. This research focuses on the sources of the moderate inequality levels between the countries. Differences in households' endowments such as demographic composition, human capital, and community characteristics appear as the main sources. We relied on the research conducted by Malik and Awadallah (2013) for a more recent perspective on the economics of the Arab Spring. Malik and Awadallah state that although the Arab world is becoming younger and educated, it is still lacking employment opportunities. Haern (2014) study the political institutional and firm governance determinants of various liquidity measures. Evidence from North Africa and the Arab Spring show that the greatest changes in political risks associated with aggregate liquidity are democratic accountability, military in politics, and law and order.

The results of this paper, which are based on updated data, increase the pressure on the state to more actively address the existing structural problems. Our research credits the point and highlights that age is a factor in the hiring and separation decision; however, the Tunisian youth find entry to the labor market mainly through small firms. Employment mobility is still greater within smaller firms, but youth have a better chance of sustaining net-employment within larger firms, which suggests that there is an opportunity to mitigate labor constraints early by tailoring education to the needs of the private sector rather than the public sector.

Addressing the concerns of the Arab Spring is a great challenge. The Middle East Monitor (2012) stated that there is scope for greater reform in states such as Egypt, Tunisia, and Syria, but it will only come about out of economic necessity. We believe the necessity should not come at a high cost, but the voice of many scholars and frustrated job seekers should be enough to place focus on research. Although this paper is one of many studies that point to continued

struggles in Tunisia's labor market, we took a slightly different approach to understand the nature of the problem.

Firm level data consisting of 503 businesses with five workers or more operating in five sectors (construction, finance, manufacturing, services, and trade) over the period of January 2007 to December 2012 was used for a general look at the impact on hiring and separation in Tunisia. We combined this data with additional information, such as employee age, employment category (top, middle, and lower management), and industrial sectors. The panel data was fitted to explain the quarterly relation between the hiring and separation rates before and after the Arab Spring. We strongly believe that our model results provide valuable insights that should be used to continue research and further engage policymakers in understanding demographic trends and the challenges faced in Tunisia's labor market. This paper narrows in on key variables and helps expose the factors that contribute to sustained job growth for segments of the country's vast population.

This paper examines the dynamics of Tunisia's labor market and quantifies hiring and separation rates *ex ante* and *ex post* the Arab Spring. Most of the results of our specified models confirmed viewpoints from previous academic papers, but also several interesting trends helped explain more about the impacts on hiring and separation based on the estimates and correlation of various variables. For example, we found that age is generally a negative factor in hiring, which is consistent with the high level of youth unemployment. However, the underlying results in our models suggested that employees in lower age groups (18-27) are more mobile in small firms within the informal sector, but net-employment is greatest in larger firms in the formal sector. This highlights that although Tunisia's youth have a better chance of joining smaller firms; better training and development could possibly help with upward mobility and sustained net-employment in the labor market. Our views were shaped during a thorough analysis of model results, and in addition, we utilized scholarly research to form conclusions and recommendations for labor market policymakers.

We also relied on previous research to show that there is some improvement in the national labor market. It is known that even though employment at exportable sectors mainly rises when employment at importable sectors falls, the supply of labor still increased dramatically in Tunisia as women entered the labor market (Haouas, Yagoubi, Heshmati; 2005). Our previous papers highlight signs of strength, albeit very gradually. The growth in female labor force participation places further emphasis on ensuring equal opportunity and room for sustainable net-employment and upward mobility based on skill set and labor market dynamics. This paper shows that gender is less of a factor in hiring and separation, which is good, but age and level in the organization continues to have an impact on hiring and separation. This means that greater involvement in all areas of employment population combined with the right education and efficient policies should result in positive gains for all.

A more efficient policy that incentivizes training and development geared towards the private sector should provide greater opportunity for Tunisia's youth. Ours results indicate that sluggish hiring and greater separation could discourage many labor market participants. We also believe that the potential for another Arab Spring is greater without significant reform as a precautionary measure to reduce its potential negative impacts.

The structure of the paper is as follows. Section 2 briefly summarizes the relevant literature. Section 3 provides a description of the data used in the estimation. Section 4 explains the background of the models and mathematical equations. Section 5 analyses whether certain groups of employees are more exposed to difficulties caused by the Arab Spring and global economic crisis. The analysis will be distinguished by sector of activity, age of employees,

their gender, and employment category. Lastly, Section 6 summarizes this study and provides policy recommendations.

## **2. Literature Review**

According to a World Development Report entitled “The Economics of the Arab Spring,” the single failure of the Arab world is the absence of a private sector that is independent, competitive, and integrated with global markets (Malik and Awadallah, 2013). The forces of private and public enterprises before and after the Arab Spring are central to our study of the ultimate effect on hiring and separation rates in Tunisia. We used information provided in the World Development Report due to its use of current data and relevant policy implications. The Arab Spring came amidst what was hailed by few as the Arab renaissance, where the policy makers had taken steps to ensure economic stability in the region by shifting towards a much more active private sector, promoting privatization and increased private investments. These reforms had been in place by the 1990s and led to economic growth that had not been witnessed before. However, despite these positive efforts the growth rates achieved were the lowest relative to other regions.

Private sector development is a challenge in the Arab world, yet it generates incomes independent of rent streams controlled by the state. This is an important reason why the region must overcome economic barriers that contributed to the rise of the Arab Spring (Malik and Awadallah, 2013). The Arab Spring revolutions were fuelled by poverty, unemployment, and lack of economic democracy and opportunity. Schraeder (2012) looks at the role of the international community in democracy promotion efforts abroad, including in MENA, which was once thought to be impervious to democratic change. Karshenas et al. (2014) examine prospects for the shift from an authoritarian corporatist social policy regime to a democratic and developmental one. Trabelsi (2014) also examine the impact of political transitions on democracy, corruption and growth in the Arab Spring countries. The Arab governments had failed to recognize the lack of social protection, and the nonexistence of efficient institutions for a social dialogue among representatives of public and private partners in the market. The governments’ policies had a positive impact upon a certain rich class but they did not prove to be benefiting the middle class and the poor. The youth bulge dramatically changed the demographic profile of the Middle East (Malik and Awadallah, 2013). The unemployment rates though had fallen since the 1990s, it was the women in the region who had now become more educated and were unable to find jobs that resulted in high unemployment. Adding to the frustration of the people was the fact that the production was still stuck in the phase of low productivity, thus the job opportunities were not high-skilled and low paid. The young and skilled people in the region were faced with inadequate job opportunities.

The unemployment problem is also deeply rooted in the rigid local economic barriers. According to the World Development Report, 58% of exports of Gulf Cooperation Countries (GCC) are with other GCC member countries, and is particularly limited between North Africa and the remaining parts of the Arab World. Tunisia’s total exports are the second highest to Jordan in the resource-poor group, but intra-MENA exports are far below the group average. Tunisia suffers from chronic regional socioeconomic imbalance brought upon by promoting larger cities on the eastern coast, whereas central and western regions with unemployment as high as 20% are clearly forsaken by previous governments (Berhouma, 2013). The International Labor Organization also points to the volatile and low economic growth following the Arab Spring, which prevents improved labor market outcomes, and has considerable implications, in particular, for the youth employment outlook. World Economic Forum (2012) and United Nations Department of Economics and Social Affairs (2011) sees addressing the 100 million youth and perspective on their employment a challenge.

From 1980's to 2010, per capita income growth had slowed down to only 0.5% per year on average. According to a report from the African Development Bank, ranging between 9 and 15%, the Arab region had the highest rate of unemployment in the world. This can be attributed to the job market in the region, which lacks growth. Both the governments and industry exhibit low job creation. To understand these impacts requires a deeper understanding of the job market. Previous research has shown that job finding and separation rates both contribute to unemployment. However, it is job finding ability that has larger influence over the fluctuations in unemployment as it is found that the separation rate does not alter much (Hall, 2006). Contrary to the general belief that it is the workers being laid off during recession that contribute to high unemployment, it is actually the inability of the unemployed to find work or the employed to find better work opportunities that explains fluctuations in unemployment. Using US data, the job to job transitions are shown to be pro-cyclical in nature justified by a cyclical job finding rate and a-cyclical separation rate (Shimer, 2005).

Worker productivity, interest rates and wage stickiness are found to be affecting the job finding rate (Hall, 2006). In the Arab region the lack of substantial growth in wages directly contributes to the unemployment as workers are forced to work in low paying and low skilled jobs, which also affects their productivity. Treating job creation and separation as endogenous variables and considering that labor productivity varies randomly, it has been concluded that the prospect of a cyclical change or shock brings about a fall in the cyclical nature of job creation and these shocks on the other hand upsurge the cyclical nature of job destruction (Mortensen and Pissarides, 1994).

Unemployment is growing rapidly, but it is certainly not exclusive to women and youth; as our study shows that age is more likely a factor in separation decisions rather than hiring, and has a positive influence on labor mobility. In another study of OECD countries, age, education and gender are found to be the main factors affecting worker hiring and separation rates. With age the hiring rates fall and in line with the Arab situation, among a few countries high separation rates are observed for youth as compared to adults (Bassanini and Marianna, 2009). The male youth unemployment rate in Tunisia was last recorded at 18.5% and it is more than three times the male adult rate of 5.7% in North Africa (ILO, 2012a and 2012b). Hasim et al (2013) looks at the role of media of Arab Spring by presenting a gender perspective of the upheaval.

In the long run employment demands respond greatest to output, followed by changes in capital stock, and least by wages (Haouas, Yagoubi, and Heshmati; 2003). We noticed that manufacturing is a leading industry in Tunisia based on its share of employment, but it is also sensitive to seasonal factors, and when connecting previous research to our latest studies, we can conclude that micro factors such as output, capital stock, and wages are considered in the hiring and separation decisions. Manufacturing increases as production becomes more skill and technology intensive, which means that business and economic growth should positively affect labor market trends.

The Arab Spring has by no means disappeared, but will continue to affect the region for many months, if not years, to come (Middle East Monitor, 2012). Unlike several other Arab countries, Egypt and Tunisia underwent relatively mild political transitions and only experienced temporary recessions, despite the collapse of the key components of foreign investment and tourism. However, the Middle East Monitor suggests that there is reason to be optimistic about Tunisia as smooth elections and a modest return to growth is underway; but we should remain cautious of the external environment with risks of conflict on the Libyan border. Furthermore, economic necessity suggests measures as to expand the scope for reform and to introduce greater privatization (Middle East Monitor, 2012).



Reform should also include trade liberalization which has long-run effects on employment and wages. Our previous research (Haouas, Yagoubi, Heshmati; 2005) shows that there were two different phases of employment evolution in exportable and importable sectors: weak growth until 1974, and stronger growth between 1975 and 1976. The private sector will benefit from trade liberalization which could bode well for employment. One problem is that Tunisia is not well integrated with global markets as private sector development remains a challenge. The region must overcome economic barriers especially as the demographic profile of the Middle East skews more to the growing youth bulge. There is a struggle for inclusion as physical mobility is restricted across borders. From 1996 to 2006, the labor force in MENA grew three times as much annually as in the rest of the developing world (Malik, Awadallah; 2013).

A broader look at Tunisia's labor market starts with identifying the process of adjustment in employment. This paper analyses employment mobility and the factors that contribute to hiring and separation based on firm size. We noticed that the lower age groups are more mobile across the spectrum, but have a greater chance of sustaining net-employment with larger firms. Our previous study (Haouas, Yagoubi, and Heshmati, 2003; Heshmati and Haouas, 2011), which uses industry and time specific data to determine factors affecting adjustment in employment and labor use efficiency, provides a strong background to this analysis.

### **3. The Data**

The data used in this study was collected from the Social Security Fund (CNSS) of Tunisia on a large sample of 503 firms with five workers and more, totaling 12,072 observations between January 2007 and December 2012 on a quarterly basis. The focus has been on the employment status in different sectors, such as Construction, Finance, Manufacturing, Services and Trade. The main indicators consist of the number of hirings, number of separations and total employment effects. In addition, the analysis includes the top, middle, and lower manager employment categories; gender; age cohorts (from 18-24 up to 55-64), formal and informal industries, labor mobility, and net-employment and time trend. Age, gender, age cohort and managerial levels are expressed in shares of total, while mobility is defined as sum of hiring and separation and net-employment is the difference between hiring and separation. An employee who will find a job in the firm at time  $t$  is counted in the total number of hiring variable, while those leaving the firm at time  $t$ , will be included in the total number of separation (Haouas et al., 2012 and Brosius, 2011). For the workers who are not included in the hiring or separation categories we identified three situations: they work in another firm; they start their own business, or leave the workforce as unemployed. However, the information regarding these three options is not available in the CNSS of Tunisia. Ultimately, the data was used to explain the measurable impact of the Arab Spring on hiring and separation rates.

The summary statistics of the data was obtained through univariate procedures and is reported in Table 1. The mean for both indicators, number of hiring and number of separation is similar-3.513, respectively 3.510, which means that on average, the number of employees who would find a job in the firm at time  $t$  is equal with the number of workers that would leave the firm at time  $t$ . The average firm level employment is 118, with most part of the employment forces in lower management (77.7%, on average), occupied by males and female (73.8%, respectively 44.6%, on average) with the highest concentration within the 45-54 age cohort (36.5, on average). The finance, manufacturing, and trade sectors averaged the highest employee count.

The summary statistics of the data show large variations in hiring and separation of firms across different industrial sectors, sizes and over time and seasons. The different rates' shares by gender and managerial categories greatly differ as well. Analyzing the value of Pearson correlation coefficients among the variables reported in Table 2 shows consistent results, as follows: the hiring rate is negatively correlated with the separation rate (-0.065): the top

management has a negative correlation with the hiring-rate (-0.046), while both middle and low management are positively correlated with the same indicator (0.0046, respectively 0.046). We identified a positive correlation between the separation rate and the management at all levels. Female employment is negatively correlated with the hiring-rate (-0.009), while there is a strong negative correlation (-0.084, -0.087 and -0.082) among the 18-24, 35-44, 45-54 age cohorts and net-employment.

We concluded that, perhaps, top management employees keep their position for a longer period, thus, given the negative correlation with the hiring rate it is an interesting contrast to the strong correlation between males and mobility in the 18-24 age cohorts. This evidence supports the fact that both Tunisian youth and the 35-54 age segments face an ongoing struggle to remain in the labor market; in addition, females are less likely to be hired. The statistical results obtained are consistent with the market realities: in 2013, the unemployment rate among youth with a university degree has doubled since 2005, numbers explained by the vulnerable political and economic situation.

#### **4. Models and Estimation Procedure**

The labor market outcome (Y) is determined by individual (X), industry (Z), labor market (M) characteristics and the state of technology (T). This theoretical model is written as:

$$Y = f(X, Z, M, T)$$

We constructed an integrated database in order to offer a better comparison of the factors contributing to hiring and separation rates in Tunisia before and after the Arab Spring. We worked with six main models including outcomes of hiring and separation levels, hiring and separation rates, mobility, and net-employment. Each model was estimated five times using pooled data, small firms (less than 55 employees, which is the median of the data), large firms (55 and more employees), formal firms (manufacturing, trade, and finance), and informal firms (construction and services assuming they can absorb informal activities easier). This means a total of 30 models based on the fixed effects estimation method with robust standard errors controlling for all possible firm, industry and labor market heterogeneity effects. The 6 basic models with different dependent variables are not nested, but for each model the pooled and those size and formal related are nested and can be tested to establish possible response heterogeneity. The result from the comprehensive sensitivity analysis is expected to shed light on actual labor market conditions in Tunisia and its evolution during the global economic recession and Arab Spring events.

Since there were too many model combinations, we decided to drop several and focus on the remaining important ones with the best fit considering the trade-off between  $R^2$  and the number of estimated parameters. The trade-off is a richer model specification that produces a higher  $R^2$  value; however, many parameters can also reduce the usefulness of the model as a result of over-parameterization and multicollinearity. The tables included in this paper display the main results of our study.

We specified and estimated level models of hiring and separation, but then changed the specification to hiring and separation rates (shares) in order to emphasize the best way to model hiring and separation rates. In specifying the mobility and net-employment models, we looked at level and shares of the total hiring and separation or their difference. We continued to explore the firm size and formality of sectors. The size classification is based on number of employees: for the threshold, we use median, while for the formal informal we have no direct information. We treat sectors with less tied regulations as informal sectors. Several models are non-nested but jointly provide useful information about the Tunisian labor market and on how to improve the employment conditions in particular for the youth.

#### 4.1 Hiring and separation level models

As previously explained, an employee is included in the total number of hirings if he/she will find a job in the firm at time  $t$ . For those leaving the firm at time  $t$ , they will be counted in the total number of separation (Haouas et al., 2012 and Brosius, 2011).

The number of generic firm's hired employees ( $H_{it}$ ) is estimated by the subsequent regression Model 1:

$$\begin{aligned} H_{it} = & \alpha + \beta E_{it} + \gamma_2 MM_{it} + \gamma_3 TM_{it} + \delta_1 M_{it} + \zeta_2 A2_{it} + \zeta_3 A3_{it} + \zeta_4 A4_{it} + \zeta_5 A5_{it} \\ & + \varphi_2 S2_i + \varphi_3 S3_i + \varphi_4 S4_i + \varphi_5 S5_i + \tau_2 Y2_t + \tau_3 Y3_t + \tau_4 Y4_t + \tau_5 Y5_t + \tau_6 Y6_t \\ & + v_2 Q2_t + v_3 Q3_t + v_4 Q4_t + \psi AS_t + \varepsilon_{it}, \end{aligned} \quad (1)$$

where  $E$  is number of employees representing the firm size;  $I$  and  $t$  refer to firm and quarter time periods;  $MM$  and  $TM$  are numbers of medium and top-level managers at time;  $M$  represents the number of male employees;  $A2$ - $A5$  refer to the number of employees aged cohorts 25-34, 35-44, 45-54 and 55-64;  $S2$  to  $S5$  are dummy variables identifying the sectors where firms belong to;  $Y2$  to  $Y6$  are a series of year-related dummies;  $Q2$  to  $Q4$  are a series of quarter-related dummies;  $AS$  is a dummy related to period included in the first three quarters of 2011 capturing the Arab Spring effect; and finally  $\varepsilon$  is a random error term, assumed to be normally distributed, with mean zero and constant variance showing no autocorrelation and no heteroskedasticity. The variables  $TM$ ,  $F$ ,  $A1$ ,  $S1$ ,  $Y1$  and  $Q1$  are omitted to serve as reference for remaining categories in the groups.

A similar model with the same regressors, is applied for the number of generic firm  $i$ 's separation employees at time  $t$  ( $F_{it}$ ) labeled as Model 2:

$$\begin{aligned} F_{it} = & \alpha + \beta E_{it} + \gamma_2 MM_{it} + \gamma_3 TM_{it} + \delta_1 M_{it} + \zeta_2 A2_{it} + \zeta_3 A3_{it} + \zeta_4 A4_{it} + \zeta_5 A5_{it} \\ & + \varphi_2 S2_i + \varphi_3 S3_i + \varphi_4 S4_i + \varphi_5 S5_i + \tau_2 Y2_t + \tau_3 Y3_t + \tau_4 Y4_t + \tau_5 Y5_t + \tau_6 Y6_t \\ & + v_2 Q2_t + v_3 Q3_t + v_4 Q4_t + \psi AS_t + \varepsilon_{it}, \end{aligned} \quad (2)$$

#### 4.2 Hiring and separation rate models

The models above were based on the levels of hiring and separations. The hiring rate as share of employment has been computed by the following formula:

$$HR_{it} = H_{it}/E_{it} \quad (i = 1, \dots, 503); \quad (t = 2007_{q1}, \dots, 2012_{q4})$$

where  $HR_{it}$  is the hiring rate,  $H_{it}$  is the number of hiring and  $E_{it}$  represents the employment size of the firm  $i$  at the time  $t$ , representing quarters,  $q$ .

The number of generic firm  $i$ 's employees hired per total number of employees in a given quarter at time  $t$  is estimated by the subsequent regression Model 3:

$$\begin{aligned} HR_{it} = & \alpha + \beta E_{it} + \gamma_1 MM_{it} + \gamma_2 TM_{it} + \delta_1 M_{it} + \zeta_2 A2_{it} + \zeta_3 A3_{it} + \zeta_4 A4_{it} + \zeta_5 A5_{it} \\ & + \varphi_2 S2_i + \varphi_3 S3_i + \varphi_4 S4_i + \varphi_5 S5_i + \tau_2 Y2_t + \tau_3 Y3_t + \tau_4 Y4_t + \tau_5 Y5_t + \tau_6 Y6_t \\ & + v_2 Q2_t + v_3 Q3_t + v_4 Q4_t + \psi AS_t + \varepsilon_{it} \end{aligned} \quad (3)$$

where the already introduced variables have the same construction and meaning as those described above. Managerial, age cohorts and male variables are defined as shares total. A similar model is also used to estimate the number of generic firm  $i$ 's employee separation rate per total number of employee ( $FR_{it} = F_{it}/E_{it}$ ) specified as Model 4:

$$\begin{aligned} FR_{it} = & \alpha + \beta E_{it} + \gamma_1 MM_{it} + \gamma_2 TM_{it} + \delta_1 M_{it} + \zeta_2 A2_{it} + \zeta_3 A3_{it} + \zeta_4 A4_{it} + \zeta_5 A5_{it} \\ & + \varphi_2 S2_i + \varphi_3 S3_i + \varphi_4 S4_i + \varphi_5 S5_i + \tau_2 Y2_t + \tau_3 Y3_t + \tau_4 Y4_t + \tau_5 Y5_t + \tau_6 Y6_t \end{aligned} \quad (4)$$

$$+ v_2Q2_t + v_3Q3_t + v_4Q4_t + \psi AS_t + \varepsilon_{it}$$

### 4.3 Mobility and net-employment models

These models, with the same set of regressors described above, are also used to estimate the total amount of the generic firm  $i$ 's mobility ( $Mob_{it} = H_{it} + F_{it}$ ) and net-employment ( $NE_{it} = H_{it} - F_{it}$ ) at time  $t$ . The models 5 and 6 are specified, respectively:

$$\begin{aligned} Mob_{it} = & \alpha + \beta E_{it} + \gamma_1 MM_{it} + \gamma_2 TM_{it} + \delta_1 M_{it} + \zeta_2 A2_{it} + \zeta_3 A3_{it} + \zeta_4 A4_{it} + \zeta_5 A5_{it} \\ & + \varphi_2 S2_i + \varphi_3 S3_i + \varphi_4 S4_i + \varphi_5 S5_i + \tau_2 Y2_t + \tau_3 Y3_t + \tau_4 Y4_t + \tau_5 Y5_t + \tau_6 Y6_t \\ & + v_2 Q2_t + v_3 Q3_t + v_4 Q4_t + \psi AS_t + \varepsilon_{it}; \end{aligned} \quad (5)$$

$$\begin{aligned} NE_{it} = & \alpha + \beta E_{it} + \gamma_1 MM_{it} + \gamma_2 TM_{it} + \delta_1 M_{it} + \zeta_2 A2_{it} + \zeta_3 A3_{it} + \zeta_4 A4_{it} + \zeta_5 A5_{it} \\ & + \varphi_2 S2_i + \varphi_3 S3_i + \varphi_4 S4_i + \varphi_5 S5_i + \tau_2 Y2_t + \tau_3 Y3_t + \tau_4 Y4_t + \tau_5 Y5_t + \tau_6 Y6_t \\ & + v_2 Q2_t + v_3 Q3_t + v_4 Q4_t + \psi AS_t + \varepsilon_{it}; \end{aligned} \quad (6)$$

### 4.4 Mobility and net-employment models by other characteristics

The estimations are conducted by two main characteristics, namely size of firms and formal/informal character of the industries. The last two models of mobility and net-employment (5 and 6) are also used to forecast firms' mobility and net-employment each in two subgroups, created based on the size of companies and formal/informal nature of the industry sector. One model is estimated among the companies with less than 55 (median) employees and one on those having 55 or more employees. Considering formal/informal character of the industry sectors, we classified finance, trade, and manufacturing sectors as formal, while service and constructions sectors are potential informal sectors. The last four models are labeled as models 7 and 8 and 9 and 10, respectively. The set of explanatory variables are constant across different model specifications.

## 5. Analysis of the Results

### 5.1 Hiring and separation level models

Table 3.A displays the results of the level models: hiring and separation, with parameter estimates and standard errors. The models explain 89.6% and 74.8% of variations in hiring and separation, respectively. The employment size of the firm is positively correlated with hiring but is statistically insignificant or unrelated to separation. The results show that gender, represented by male, is a statistically significant variable in both hiring and separation models. The positive sign suggests that males are more often hired and separated compared to their female counterparts. Given the results, the gender factor leads to a unique conclusion- namely the strong impact of this indicator in the hiring model. The analysis shows some interesting findings in the case of other variables as well that could help to explain hiring and separation patterns in greater detail.

The hiring model results indicate that although generally age is a negative factor in hiring, it has a positive impact on separation. The reference age cohort is the 18-24 segment. We conclude that employers are more likely to consider age below 35 as a determinant factor in hiring. However, age seems to be an insignificant factor in the separation decision. The latter could be a variable that is affected by labor market regulations, committed employment contract time and the level of experience in the field. Our analysis question is whether employers are willing to dismiss the older workers in order to trigger an effective increase in mobility that will open new opportunities for youth to establish a sustainable presence in the labor market. We also found that the manufacturing sector has a more negative effect on hiring compared with the reference sector of finance, despite occupying a large share of total employment. The result shows that both hiring and separation are much lower after the start of

the Arab Spring. Therefore, the data suggests that Tunisia's labor market is still vulnerable, but a deeper analysis on the raw data is needed to discover the reasons behind hiring and separation *ex ante* and *ex post* the Arab Spring.

The hiring and separation behaviors of middle and top managements are different compared to those of the low management category. The hiring is favorable to middle but not favorable to top management relative to the low management category. Separation is positively correlated with the professional level. Despite yearly variations, the dummies registered every year show less hiring and greater separations over time compared to the base year (2007). Similar variation and patterns are found in relation to seasonal dummies.

### **5.2 Hiring and separation rate models**

Table 3.B displays the results of the employment share models: hiring and separation rates. These models' performances in explaining variations in hiring and separation rates are 46.7 and 34.0, respectively. Compared with the separation level model, the separation rate model has a much lower variation measured as root mean square error. Here, we note that the size of firms has positive effects on both outcomes. When considering employment category, the middle category is negatively associated with hiring, compared with the low category, but no effects are found in relation with separation. We also note that the second age cohorts share (25-34 age segment) has a higher estimate in the hiring model compared to that of the separation model, which is not significant. The age cohort effects are in general very similar to those registered in the level models, with negative hiring for ages above 35 and positive association between age and separation rate.

The hiring rate model also returned negative estimates for the yearly dummy variables compared to the reference year of 2007, while separation rates were all positive and statistically significant. The negative hiring rate and the positive separation estimates are declining over quarters. This indicates systematic seasonal flow in employment or variations in hiring and separation patterns; moreover, hiring tapers off during the fourth quarters explained in both share models.

All 4 industry sectors show lower hiring rate compared with the reference sector of finance. None of the industry effects is significant in terms of separation rates. This shows evidence of industry heterogeneity in the hiring rate model, which suggests that some industries are more vulnerable to changes in the labor market, given its negative estimate in the original hiring level model in Table 3.A We also realized that the Arab Spring variable was negative in the hiring rate model, but unlike in the level model case, a positive estimate in the separation rate model.

### **5.3 Mobility and net-employment models**

The estimation results for the labor mobility and net-employment models are reported in Table 3.C. The fit of the model measured by  $R^2$  is much higher in the net-employment model compared with the mobility model, 0.547 vs. 0.1274, although the model variances are similar. The size of firms measured as number of employees has positive effects on both mobility and net-employment. Considering the employment type variables, we obtained similar sign patterns as those of the level model. The evidence shows that middle management has a positive estimate in the mobility model, but a negative estimate in the net-employment effect model. The top management share estimate is negative in mobility, but positive in net-employment, which suggests that although the upper management group is relatively settled in the labor market, it still has effects on broader net-employment. In addition, the middle management has an impact on mobility.

It is interesting that the age2 and age3 cohorts' shares had positive estimates in the mobility model, but the age4 and age5 cohort shares had negative estimates in the same model. Lower age groups tend to be more flexible, which was also explained in our previous models. However, Table 3.C shows that lower age cohorts, especially age3, have higher negative estimates in the net-employment effect model.

The yearly dummies for mobility indicate consistent results with our previous hiring level and rate models, in which mobility is reduced over time. On the contrary, the net-employment showed a changed sign from mainly positive to negative, interpreted as lower net-employment between 2008 and 2012 compared to 2007. The findings of the previous model show that hiring tapers off during the fourth quarter, which is why the estimate was positive in the mobility model, but negative in the net-employment model. The explanation relates to the effect of the seasonal trends. Meanwhile, the negative industry sector estimates suggest greater mobility in the finance sector.

#### ***5.4 Mobility by net-employment models by firm size***

The results of the mobility and net-employment models by firm size, small and large, is displayed in Table 3.D. Mobility and net-employment vary across different characteristics of the employees and other determinants. Comparing the results by firm size, we get a better sense of labor market conditions, which can be influenced by the business cycle. Generally, we hypothesized that smaller firms are more vulnerable to changes in the business cycle, which can have a negative effect on their net-employment and mobility in the labor market if the conditions get worse. After the 2008 global recession and heightened structural issues that contributed to the rise of the Arab Spring in 2010, we expected that the results would reflect these fundamental shifts in Tunisia's labor market. For small size businesses, mobility decreases with the number of employees, but an increase in the number of employees determines an upward trend of net-employment. The opposite holds for large size.

The share of top management has a positive estimate in the small size net-employment model, a greater estimate in the large size mobility model, but a negative and insignificant estimate within the large size net-employment model. The results suggest that although top management is usually stable as explained in previous models, mobility is greater in large size firms for the top management group. We suspect that opportunities for top-level management are higher in larger firms than smaller firms, which could influence mobility.

The lowest two age cohorts' positive estimates are associated to the small size mobility and net-employment models. However, despite having positive estimates in the large size mobility model, the two lower age cohorts had negative estimates in the large size net-employment model. The remaining higher age cohorts' shares returned negative estimates in all models when comparing firm sizes. The results suggest that lower age groups have a greater share of mobility and net-employment in small firm size class, but not so much in the case of large size firms. Given that further details would be provided later, we conclude that younger workers might benefit more of the available opportunities within smaller firms and entrepreneurial ventures that will train and develop a skilled workforce. As a result, they will be qualified for higher-level opportunities in larger private sector firms.

Quarterly and yearly dummy variables were largely consistent with those from our previous models, showing little changes. Mobility and net-employment by size are negatively associated with time. The picture of small size firm mobility is different. However, given the sector breakdown we found that mobility was generally greater in larger firms relative to smaller firms. In comparison with the finance sector, the service area had a negative estimate in the small size mobility model, but the estimate for the small size net-employment model was

positive. The estimates for large size service firms are opposite. The evidence shows a different scenario for the remaining sectors: trade, construction, and manufacturing.

Additionally, despite large variations in fit of the models, lower for mobility and higher for net-employment, the standard robust errors were largely the same across all models when comparing mobility and net-employment by size. The Arab Spring has a positive effect on mobility and a negative effect on net-employment of small size firms. However, for the large size firms, both have declined *ex post* the Arab Spring.

### **5.5 Mobility and net-employment models by formal/informal sectors**

Table 3.E displays the summary results of the mobility and net-employment models by formal/informal sectors classification. Formal sectors are monitored by all forms of government regulations and included in GNP, whereas the informal sector operates in the underground economy – often with employees who do not benefit from job security, where participation could be influenced by the desire to avoid regulation and taxation (Williams, 2005). Assaad (1993) views informal institutions to be significantly important in shaping the labor market relations. It is important to compare the results of both formal and informal sectors in order to get a better understanding of labor market conditions that are often not reported. We considered the possibility that hiring and separation levels and rates and mobility and net-employment only reflect one side of the economy; given the focus on firm size in the previous model, we determined that the formal and informal sectors would provide greater insight into employment trends during the Arab Spring. Formal and informal are distinguished on an *ad hoc* basis by separating the industries according to their actual market characteristics. This approach is used in the absence of data regarding the formal nature of the firms operation.

We do not find much difference in mobility and net-employment by formal nature of firms in regards to the number of employees. The younger age cohorts (age2 and age3) have positive estimates in the formal mobility model, but age3 cohort has a negative estimate in the formal net-employment model. Age2 cohort had the only positive estimate in the formal net-employment model, whereas age4 cohort had negative estimates in both formal mobility and net-employment effect. While mobility is positive in the informal sectors for all age cohorts, in the informal sector the net-employment effect is negative. The age2 cohort received the highest informal mobility estimate (0.169). The results were mixed, but suggest that the net-employment effect is greater in formal sectors for the younger age cohorts. While mobility is better in the informal sector, all age cohorts would benefit of a positive impact on net-employment in the formal sector.

All yearly and quarterly dummies signs were consistent with our previous models, which point to too little change in mobility and net-employment from 2008 to 2012. Seasonal factors were less noticeable in the results, but quarters 2, 3 and 4 had a positive estimate in the informal sector mobility model. Arab Spring was also positive in the formal and informal sectors mobility models suggesting a negative mobility and net-employment over time compared with the base year of 2007.

Furthermore, we could also consider that separation is greater in the informal sector, which could help firms adapt to changes in the business cycle at the expense of workers. This could cause some discrepancy in quarterly trends and other variables, so we considered the data as additional evidence outside of our core models described in the previous sub-sections.

## **6. Summary and Recommendations**

One fact that remained consistent in all of our models is that hiring was relatively little changed from 2008 to 2012, which suggests that Tunisia still has lingering effects from the financial crisis and Arab Spring that will add further weight on the country's labor market. We continue

to believe that Tunisians will need to see significant reform or else further frustration with labor market constraints will lead to renewed protests, and similar structural issues from the Arab Spring will come to light once again. Our results indicate that there are significant challenges faced by Tunisian youth that can be mitigated through efficient policy action that incentivizes training and development that is geared towards the private sector.

The background problem is that labor market conditions that influenced the rise of the Arab Spring continue to weigh on the potential employment gains. Even though Tunisia's labor market is improving, it is still performing below potential as several groups like the youth population continue to struggle with sustained job placement. We know that targeted reform helps to address these concerns and provides support for sustainable employment growth in the labor market. Adjustment was faster during liberalization from 1986 to 1994 and post liberalization from 1995 to 1996 (7.5%). Slower adjustment (6.8%) from 1972 to 1985 during pre-liberalization times show that there is much room to gain from efficient economic policy (Haouas, Yagoubi, and Heshmati; 2003).

One highlight of our results was that age is a negative factor in hiring, and a positive impact on separation. We view that employers are more likely to consider age as a factor in hiring and separation decisions. This paper further implies that age can represent years of experience, skill set and training. The results suggest that age is still a factor that is less in favor with the younger generation of job seekers, while gender is less of a factor, especially as female labor force participation increases. We still saw evidence that females face some difficulties in the job market, but the additional labor supply will help, especially with more efficient policies to match skill sets with private sector demand.

We also noticed that top management is more mobile in larger firms, which could stem from increased opportunities contributing to upward mobility in the corporate sector. Contrary to the top age group, lower age groups are more mobile in smaller firms, where we see most of the entry to the labor market occurring, as youth gain placement with start-ups and small enterprises. The mobility and separation among firms with limited resources could be a challenge to policy that focuses on training and continued efforts to retain employees. We suggest that a revamp of the educational framework is needed in order to shift focus towards private sector employment upon graduation. This could enable many younger Tunisians to engage in entrepreneurial ventures of their own and thereby sustain hiring and continue to grow and develop into larger firms where they will eventually sustain net-employment.

The fourth quarter continued to show a seasonality effect within our results, as hiring starts to taper off in many sectors. We also noticed that mobility is positive in the informal sector, but net-employment effect is greater in the formal sector. Seasonality was less noticeable in the formal vs. informal sector analysis. Our results provide evidence of the reasons and factors behind continued struggles in Tunisia's labor market, which demand more policy action.

Tunisia will need to focus on balancing its economy to avoid heavy seasonal impact on hiring in sectors like manufacturing and services. Our results show that net-employment is greater among large firms in the formal sector which helps to increase employment in lower age cohorts. We learned that lower age cohorts are more mobile, but also face greater separation as the decision to continue education is likely to result in extra time to avoid the feeling of discouragement in the competitive labor market. Tunisian youth will need to be trained early and continue acquiring developing skills that are in line with demand through coops and internships that could lead to sustainable positive net-employment.

We view the Tunisia's government response to high unemployment resulting from the financial crisis in 2008 and Arab Spring in 2012 as not being enough. A higher wage bill, job creation



programs, and rising subsidies in response to increasing social welfare demands were welcome, but the trade-off of higher government spending swelled the country's fiscal deficit in 2012. By using the results in this paper, Tunisia's government can focus on allocating resources more efficiently based on the direct impacts that result in higher or lower estimates in hiring and separation rates.

There is evidence that the unemployment rate of educated youth is higher than those provided in official statistics, increasing from 14.8 % in 2005 to 21.6 % in 2008. Our previous study found that in Tunisia unemployment is essentially a youth issue (Haouas, Sayre and Yahoubi; 2012). The results in this paper show that age is generally a negative factor in hiring, and has a positive impact on separation. We conclude that employers are more likely to consider age as a factor in separation, which could lead to further discouragement.

Young people who delay labor market entry by way of continuing education are perhaps discouraged by low wages. In addition, emigration of skilled workers that historically reduced labor market pressures are no doubt concerning (Haouas, Yagoubi, and Salvino; 2012). In fact, a recent Gallup study conducted by Abu Dhabi Gallop Center shows the growing public distrust in the Tunisian government. As Tunisia's GDP continued to show small positive growth rate in recent years, Tunisians' life evaluations continued to plummet by 10% from 2008 to 2010 compared to an approximate 1% rise in GDP per capita over the same time period. Survey data also showed a significant lack of trust in government to provide basic services and infrastructure. The findings of the Gallup which polled 1,000 Tunisian nationals should be sufficient reason to truly get to the heart of the matter.

Sustainable public policy action starts with an in-depth study of the structural problems that led up to the Arab Spring, as well as the impact of the actual event on hiring and separation rates. We will see if more efforts are required to efficiently expand employment opportunity for the youth, while reducing the strain of public sector crowd out. This will ease the constraints of an impatient majority in the labor force and thereby allow the private sector to organically break away from the recessionary past and increase its recruitment efforts to attract skillful talents. It is crucial for the new government to utilize the research presented in our study to address the concerns of the people of Tunisia who have justifiably high expectations.

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## Appendix

**Table 1: Summary Statistics of the Tunisian Labor Market, 2007- 2012, 12,072 Observations**

Variable	Definitions	Mean	Std Dev	Minimum	Maximum
hiring*	Hiring	3.513	4.347	0	43
separation*	Separation	3.51	5.425	0	121
employee	Employees	118.353	126.366	2	604
lowman	Low management	77.661	88.815	0	443
midman	Middle management	29.416	33.057	0	254
topman	Top management	11.269	9.031	0	92
male	Male number	73.767	97.291	2	584
female	Female number	44.577	60.738	0	432
age1824	Age 18-24 number	13.574	15.102	3	173
age2534	Age 25-34 number	22.999	24.627	0	212
age3544	Age 35-44 number	33.578	36.698	1	222
age4554	Age 45-54 number	36.531	40.143	1	182
age5564	Age 55-64 number	11.628	12.695	0	90
hirerate*	Hiring rate	0.029	0.021	0	0.333
separate*	Separation rate	0.026	0.023	0	0.5
mobility*	Mobility	0.055	0.027	0	0.5
netemploy*	Net-employment	0.003	0.035	-0.5	0.333
lowshare	Low management rate	0.589	0.235	0	0.946
midshare	Middle management rate	0.249	0.084	0	0.556
topshare	Top management rate	0.162	0.166	0	0.75
malshare	Male share	0.549	0.219	0.116	1
femshare	Female share	0.451	0.219	0	0.884
age1share	Age 18-24 share	0.112	0.027	-0.088	0.8
age2share	Age 25-34 share	0.2	0.072	0	0.685
age3share	Age 35-44 share	0.277	0.029	0.091	0.5
age4share	Age 45-54 share	0.296	0.038	0.07	0.5
age5share	Age 55-64 share	0.114	0.068	0	0.75
trend	Quarterly time trend	37.5	17.116	11	64

Note: \* dependent variables

**Table 2: Pearson's Correlation Coefficients / p-values, 12,072 observations**

Prob >  r  under H0: Rho=0																		
	hiring	separate	hirerate	seprate	mobility	netemply	employee	lowman	midman	topman	male	female	age1824	age2534	age3544	age4554	age5564	trend
hiring	1																	
separate	0.621 <.0001	1																
hirerate	0.2794 <.0001	-0.0654 <.0001	1															
seprate	0.0229 0.0119	0.4256 <.0001	-0.2811	1														
mobility	0.2387 <.0001	0.3236 <.0001	0.5344 <.0001	0.6608 <.0001	1													
netemply	0.1489 <.0001	-0.3197 <.0001	0.7729 <.0001	-0.8262 <.0001	-0.1231 <.0001	1												
employee	0.9039 <.0001	0.7943 <.0001	0.0302 0.0009	0.1374 <.0001	0.1447 <.0001	-0.073 <.0001	1											
lowman	0.9008 <.0001	0.7658 <.0001	0.046 <.0001	0.1016 <.0001	0.1255 <.0001	-0.0401 <.0001	0.9916 <.0001	1										
midman	0.8643 <.0001	0.8055 <.0001	0.0046 0.606	0.1813 <.0001	0.1634 <.0001	-0.1171 <.0001	0.9693 <.0001	0.9347 <.0001	1									
topman	0.6244 <.0001	0.6352 <.0001	-0.0469 <.0001	0.2594 <.0001	0.1917 <.0001	-0.199 <.0001	0.6918 <.0001	0.6184 <.0001	0.7098 <.0001	1								
male	0.8233 <.0001	0.6972 <.0001	0.0448 <.0001	0.1375 <.0001	0.1562 <.0001	-0.0645 <.0001	0.8843 <.0001	0.9041 <.0001	0.769 <.0001	0.6665 <.0001	1							
female	0.5617 <.0001	0.5357 <.0001	-0.0091 0.313	0.0656 <.0001	0.0506 <.0001	-0.0487 <.0001	0.6639 <.0001	0.6146 <.0001	0.7848 <.0001	0.3716 <.0001	0.238 <.0001	1						
age1824	0.89 <.0001	0.8082 <.0001	0.0299 0.001	0.1547 <.0001	0.1597 <.0001	-0.0847 <.0001	0.9848 <.0001	0.9727 <.0001	0.9619 <.0001	0.6921 <.0001	0.8727 <.0001	0.651 <.0001	1					
age2534	0.8793 <.0001	0.7622 <.0001	0.0536 <.0001	0.097 <.0001	0.1274 <.0001	-0.0326 0.0003	0.9606 <.0001	0.9495 <.0001	0.9519 <.0001	0.6179 <.0001	0.7714 <.0001	0.7627 <.0001	0.9409 <.0001	1				
age3544	0.8983 <.0001	0.8069 <.0001	0.0236 0.0094	0.1535 <.0001	0.1537 <.0001	-0.0876 <.0001	0.9975 <.0001	0.9862 <.0001	0.9733 <.0001	0.6954 <.0001	0.8815 <.0001	0.6633 <.0001	0.9858 <.0001	0.9526 <.0001	1			
age4554	0.888 <.0001	0.7791 <.0001	0.0207 0.0227	0.1426 <.0001	0.1418 <.0001	-0.0821 <.0001	0.9931 <.0001	0.9851 <.0001	0.9629 <.0001	0.6822 <.0001	0.8799 <.0001	0.6573 <.0001	0.9708 <.0001	0.938 <.0001	0.9915 <.0001	1		
age5564	0.8179 <.0001	0.6792 <.0001	0.0233 0.0104	0.1107 <.0001	0.1158 <.0001	-0.0595 <.0001	0.8904 <.0001	0.9011 <.0001	0.793 <.0001	0.694 <.0001	0.9355 <.0001	0.3541 <.0001	0.8622 <.0001	0.7762 <.0001	0.8788 <.0001	0.8835 <.0001	1	
trend	-0.0904 <.0001	0.0738 <.0001	-0.265 <.0001	0.1413 <.0001	-0.0827 <.0001	-0.249 <.0001	0.0076 0.4005	0.0104 0.2493	0.0005 0.951	0.0026 0.7739	-0.0002 0.9756	0.0164 0.0701	0.0028 0.7546	0.0246 0.0067	-0.0006 0.9468	-0.0041 0.6473	0.0383 <.0001	1

**Table 3A: Hiring and Separation Levels Pooled Parameter Estimates**

Variable	Hiring level			Separation level		
	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t
Intercept	1.85453	0.14136	<.0001	-5.05177	1.07009	<.0001
employee	0.03689	0.01800	0.0404	-0.18653	0.11774	0.1131
midman	0.06075	0.01709	0.0004	0.23032	0.08720	0.0083
topman	-0.02647	0.01006	0.0085	0.15660	0.05977	0.0088
male	0.01538	0.00253	<.0001	0.02477	0.01074	0.0211
age2534	0.04652	0.01886	0.0137	0.13447	0.11948	0.2604
age3544	-0.08418	0.03648	0.0211	0.33688	0.23973	0.1600
age4554	-0.04259	0.02185	0.0513	0.00541	0.09892	0.9564
age5564	-0.00051	0.01791	0.9773	0.11995	0.11069	0.2786
d2008	-1.24498	0.04780	<.0001	0.94081	0.10828	<.0001
d2009	-2.80717	0.04452	<.0001	2.18357	0.05928	<.0001
d2010	-1.02244	0.04763	<.0001	0.80842	0.08740	<.0001
d2011	-1.97511	0.07731	<.0001	2.81988	0.37482	<.0001
d2012	-1.27828	0.04840	<.0001	0.94125	0.10823	<.0001
quart2	-0.05162	0.03501	0.1404	0.12368	0.04948	0.0124
quart3	-0.31303	0.03350	<.0001	0.45159	0.06597	<.0001
quart4	-1.38874	0.04007	<.0001	1.19839	0.05251	<.0001
service	0.30787	0.14171	0.0298	3.35966	1.11665	0.0026
trade	-0.01626	0.15892	0.9185	3.38169	1.20936	0.0052
construct	-0.05312	0.17327	0.7592	3.46248	1.20010	0.0039
manufact	-0.56138	0.16138	0.0005	2.66097	0.96582	0.0059
arab spring	-0.96807	0.08507	<.0001	-0.21998	0.41864	0.5993
R2 adj	0.8964			0.7482		
RMSE	1.3992			2.7227		
F-value	4974.4500			1708.5600		

**Table 3B: Hiring and Separation Rates Pooled Parameter Estimates**

Variable	Hiring rate			Separation rate		
	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t
Intercept	0.09886	0.01969	<.0001	-0.10813	0.03216	0.0008
employee	0.00001	0.000001	<.0001	0.000005	0.000002	0.0065
midshare	-0.09477	0.03117	0.0024	0.07820	0.05604	0.1629
topshare	0.00096	0.00632	0.8787	-0.01034	0.00934	0.2685
maleshare	0.04005	0.00802	<.0001	0.05248	0.01720	0.0023
age2share	0.03375	0.01931	0.0806	0.04518	0.03121	0.1477
age3share	-0.07239	0.03365	0.0315	0.23340	0.06324	0.0002
age4share	-0.04327	0.02149	0.0441	-0.02333	0.04170	0.5758
age5share	-0.05403	0.01806	0.0028	0.06590	0.02995	0.0278
d2008	-0.01766	0.00054	<.0001	0.00986	0.00054	<.0001
d2009	-0.03396	0.00045	<.0001	0.01833	0.00065	<.0001
d2010	-0.01442	0.00055	<.0001	0.00949	0.00059	<.0001
d2011	-0.02736	0.00069	<.0001	0.01684	0.00163	<.0001
d2012	-0.01787	0.00054	<.0001	0.00986	0.00055	<.0001
quart2	-0.00059	0.00042	0.1626	0.00029	0.00039	0.4652
quart3	-0.00377	0.00041	<.0001	0.00486	0.00047	<.0001
quart4	-0.01331	0.00043	<.0001	0.01396	0.00051	<.0001
service	-0.01525	0.00795	0.0549	-0.00625	0.01232	0.6121
trade	-0.01361	0.00645	0.0347	0.00401	0.00970	0.6790
construct	-0.03051	0.00958	0.0014	-0.01798	0.01655	0.2775
manufact	-0.00948	0.00457	0.0381	0.00329	0.00671	0.6241
arab spring	-0.00760	0.00071	<.0001	0.00664	0.00183	0.0003
R2 adj	0.4672			0.3396		
RMSE	2.4395			0.0191		
F-value	505.0600			296.6100		

**Table 3C: Mobility and Net-employment Parameter Estimates**

Variable	Mobility			Net-employment		
	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t
Intercept	-0.00927	0.03688	0.8016	0.20699	0.03852	<.0001
employee	0.000018	0.000002	<.0001	0.000008	0.000002	0.0002
midshare	0.01657	0.05979	0.7817	-0.17297	0.06817	0.0112
topshare	-0.00937	0.01101	0.3947	0.01130	0.01154	0.3276
maleshare	0.09253	0.02001	<.0001	-0.01242	0.01788	0.4873
age2share	0.07892	0.03599	0.0284	-0.01143	0.03739	0.7598
age3share	0.16101	0.06993	0.0213	-0.30580	0.07331	<.0001
age4share	-0.06660	0.04803	0.1656	-0.01994	0.04577	0.6631
age5share	-0.01188	0.03380	0.7253	-0.11993	0.03610	0.0009
d2008	-0.00779	0.00076	<.0001	-0.02752	0.00075	<.0001
d2009	-0.01564	0.00078	<.0001	-0.05229	0.00079	<.0001
d2010	-0.00492	0.00075	<.0001	-0.02391	0.00087	<.0001
d2011	-0.01051	0.00181	<.0001	-0.04420	0.00174	<.0001
d2012	-0.00801	0.00077	<.0001	-0.02774	0.00077	<.0001
quart2	-0.00030	0.00059	0.6121	-0.00088	0.00056	0.1201
quart3	0.00108	0.00064	0.0949	-0.00863	0.00061	<.0001
quart4	0.00065	0.00066	0.3301	-0.02727	0.00067	<.0001
service	-0.02150	0.01373	0.1173	-0.00900	0.01554	0.5624
trade	-0.00960	0.01134	0.3972	-0.01763	0.01194	0.1399
construct	-0.04849	0.01818	0.0077	-0.01253	0.02003	0.5314
manufact	-0.00620	0.00792	0.4343	-0.01277	0.00831	0.1243
arab spring	-0.00096	0.00201	0.6340	-0.01423	0.00192	<.0001
R2 adj	0.1274			0.5471		
RMSE	0.0248			0.0238		
F-value	84.9600			695.4300		

**Table 3D: Mobility and Net-employment Parameter Estimates by Firm Size**

Variable	Small Size Mobility			Small Size Net-employment			Large Size Mobility			Large Size Net-employment		
	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t
Intercept	-0.04386	0.03713	0.2376	0.20581	0.04032	<.0001	-0.10048	0.07998	0.2091	0.33057	0.06937	<.0001
employee	-0.00023	0.00006	0.0001	0.00027	0.00006	<.0001	0.00002	0.000002	<.0001	-1.129E-7	0.000002	0.9472
midshare	-0.07978	0.05868	0.1740	-0.15887	0.07596	0.0365	0.30453	0.10301	0.0031	-0.24078	0.10069	0.0168
topshare	-0.01669	0.01212	0.1684	0.03565	0.01305	0.0063	0.07283	0.04816	0.1306	-0.08131	0.05077	0.1093
maleshare	0.18973	0.03016	<.0001	-0.03609	0.03071	0.2400	0.01093	0.01864	0.5579	-0.00256	0.01763	0.8844
age2share	0.11441	0.03701	0.0020	0.00207	0.04066	0.9594	0.09497	0.06838	0.1649	-0.13136	0.06318	0.0377
age3share	0.09923	0.06440	0.1234	-0.27050	0.07195	0.0002	0.06179	0.13341	0.6433	-0.36833	0.13950	0.0083
age4share	-0.02010	0.05196	0.6989	-0.06365	0.05266	0.2268	-0.09588	0.08232	0.2442	-0.09446	0.08749	0.2803
age5share	-0.05704	0.03553	0.1085	-0.12077	0.04066	0.0030	-0.00980	0.06131	0.8731	-0.16975	0.05563	0.0023
d2008	-0.00819	0.00131	<.0001	-0.03827	0.00128	<.0001	-0.00338	0.00067	<.0001	-0.01699	0.00062	<.0001
d2009	-0.02365	0.00129	<.0001	-0.06317	0.00133	<.0001	-0.00547	0.00058	<.0001	-0.04023	0.00051	<.0001
d2010	-0.00455	0.00134	0.0007	-0.03153	0.00159	<.0001	-0.00224	0.00063	0.0004	-0.01567	0.00064	<.0001
d2011	-0.02586	0.00277	<.0001	-0.04924	0.00270	<.0001	0.00402	0.00184	0.0286	-0.03660	0.00180	<.0001
d2012	-0.00848	0.00134	<.0001	-0.03849	0.00131	<.0001	-0.00357	0.00068	<.0001	-0.01719	0.00062	<.0001
quart2	-0.00129	0.00105	0.2201	-0.00115	0.00101	0.2544	0.00106	0.00046	0.0212	-0.00063	0.00043	0.1426
quart3	0.00316	0.00112	0.0048	-0.01207	0.00109	<.0001	-0.00032	0.00052	0.5417	-0.00520	0.00045	<.0001
quart4	0.00478	0.00115	<.0001	-0.03446	0.00121	<.0001	-0.00297	0.00048	<.0001	-0.01992	0.00047	<.0001
service	-0.03736	0.01362	0.0061	0.00039	0.01740	0.9818	0.08184	0.03038	0.0071	-0.06046	0.02993	0.0434
trade	0.00214	0.01115	0.8478	-0.01401	0.01136	0.2176	0.05650	0.02905	0.0518	-0.06165	0.02990	0.0392
construct	-0.09209	0.02048	<.0001	-0.00195	0.02562	0.9394	0.07889	0.03322	0.0176	-0.06693	0.03174	0.0350
manufact	-0.01117	0.00813	0.1697	-0.00672	0.00797	0.3991	0.05312	0.02464	0.0311	-0.05480	0.02555	0.0320
arab spring	0.00962	0.00317	0.0024	-0.02239	0.00311	<.0001	-0.00936	0.00199	<.0001	-0.00757	0.00199	0.0001
R2 adj	0.1511			0.5445			0.3463			0.6696		
RMSE	0.0302			0.0297			0.0146			0.0138		
F-value	52.8700			349.3900			151.0900			575.0500		



**Table 3E: Mobility and Net-employment Parameter Estimates by Formal/Informal Sector**

Variable	Formal sector Mobility			Formal sector Net-employment			Informal sector Mobility			Informal sector Net-employment		
	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t	Parameter Estimate	Robust Std Err	Pr >  t
Intercept	-0.05526	0.04728	0.2426	0.18230	0.05767	0.0016	-0.09168	0.03860	0.0176	0.28536	0.03785	<.0001
employee	0.000015	0.000004	0.0002	0.00001	0.000004	0.0032	0.00002	0.000003	<.0001	0.000007	0.000004	0.0623
midshare	-0.13337	0.04033	0.0009	-0.07496	0.05926	0.2059	0.30852	0.06833	<.0001	-0.27402	0.06660	<.0001
topshare	-0.02448	0.00732	0.0008	0.04250	0.00689	<.0001	0.02346	0.01467	0.1099	0.00136	0.01412	0.9231
maleshare	0.24677	0.03424	<.0001	-0.05606	0.04563	0.2193	-0.01634	0.00483	0.0007	-0.01213	0.00464	0.0090
age2share	0.10121	0.04592	0.0276	0.01411	0.05504	0.7976	0.16920	0.04234	<.0001	-0.22097	0.04205	<.0001
age3share	0.13799	0.07152	0.0537	-0.27723	0.08877	0.0018	0.15548	0.07193	0.0307	-0.30442	0.07191	<.0001
age4share	-0.05186	0.05344	0.3319	-0.04238	0.06230	0.4964	0.08885	0.05971	0.1368	-0.12697	0.05725	0.0266
age5share	0.11188	0.04738	0.0182	-0.15302	0.05969	0.0104	0.01283	0.03490	0.7133	-0.17136	0.03522	<.0001
d2008	-0.01025	0.00103	<.0001	-0.03421	0.00089	<.0001	-0.00075	0.00107	0.4813	-0.01770	0.00108	<.0001
d2009	-0.01091	0.00096	<.0001	-0.06057	0.00095	<.0001	-0.01888	0.00105	<.0001	-0.04454	0.00099	<.0001
d2010	-0.00678	0.00097	<.0001	-0.02741	0.00113	<.0001	-0.00113	0.00122	0.3572	-0.01791	0.00121	<.0001
d2011	-0.01003	0.00223	<.0001	-0.05241	0.00231	<.0001	-0.01526	0.00240	<.0001	-0.03502	0.00232	<.0001
d2012	-0.01044	0.00104	<.0001	-0.03445	0.00092	<.0001	-0.00098	0.00108	0.3605	-0.01787	0.00109	<.0001
quart2	-0.00053	0.00086	0.5372	-0.00028	0.00085	0.7414	0.00200	0.00067	0.0029	-0.00327	0.00064	<.0001
quart3	0.00297	0.00089	0.0008	-0.01357	0.00085	<.0001	0.00099	0.00083	0.2289	-0.00345	0.00081	<.0001
quart4	-0.00091	0.00088	0.3004	-0.02303	0.00090	<.0001	0.00492	0.00084	<.0001	-0.03548	0.00089	<.0001
arab spring	0.00067	0.00243	0.7818	-0.01277	0.00254	<.0001	0.00287	0.00279	0.3039	-0.01789	0.00276	<.0001
R2 adj	0.1742			0.5595			0.3411			0.6081		
RMSE	0.0262			0.0252			0.0191			0.0191		
F-value	74.3300			540.7600			148.6000			443.3900		