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Working Papers - Economics

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Working Paper N. 23/2014

DISEI, Università degli Studi di Firenze
Via delle Pandette 9, 50127 Firenze, Italia
www.disei.unifi.it

A Multilevel Analysis of the Unemployment in Egypt*

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November 14

Abstract

Despite its recent economic development, Egypt employment inequalities among gender and between different age cohorts are still an unresolved issue. In this work we apply a Multilevel Generalized Linear Mixed Model to the Egyptian Labor Market Panel Survey 2006 (ELMPS 2006) and 2012 (ELMPS 2012). By exploiting the hierarchical structure of the survey data, we investigate how the interplay between individual characteristics and regional context conditions Egyptians' individual probability of being unemployed. Moreover, we attempt to check *if* and *how* these same characteristics have changed between 2006 and 2012, that is, before and after the 2008 global financial crisis and the 2011 Revolution of the Arab world.

Keywords: Multilevel Generalized Linear Mixed Model; Unemployment probability; Egypt.
JEL classification: J01, C19, O1

1 Introduction

Since the late 1990s Egyptian economy was developing rather dynamically, particularly after the adoption of the *Economic Reform and Structural Adjustment Program* (ERSAP) in 1991. The ERSAP aimed at resolving the macro imbalances through market-oriented reforms increasing the private sector participation, boosting international trade and privatizing many state-owned companies [Herrera et al. 2010]. Thanks to this set of reforms, Egyptian real GDP grew on average at around 5% per year between 2000 and 2010, that is when the global economy was hit by

*We really thank Lorenzo Corsini, Gianna Giannelli, Maria Laura Parisi, Massimiliano Bratti and partecipants at the 54° Conference of the 'Italian Economic Society' held in Trento in October 2014 for their useful comments. Usual disclaimers apply.

two major financial crisis; to slow down to 2% between the revolutionary and post-revolutionary period 2011/2012[1]. Moreover, the 2010 World Bank Country Classification promoted Egypt from the low income category to the lower middle income one as the level of real GDP per capita increased from US$ 1140 bn in 2000 to US$ 1560 bn in 2012.

Despite these positive economic outcomes, Egypt still needs improvements when it comes to gender equality[2] and job opportunities for the young cohort. Egypt has in fact been repeatedly associated to the 'alarming trend' in female unemployment as many out-of-school young women between 15 and 19 are economically inactive and a huge number of the active ones work at home without being paid [Assaad 2009]. Major discriminatory factors are cultural norms, the structure of the labor market, the economic environment and employer discrimination particularly towards married women. Women are also generally receiving less schooling than man and earn less than them in the private sector [Assaad and Barsoum 2007; Amin and Al-Bassusi 2004; Assaad 2009; Barsoum et al. 2009]. More generally, the unemployment rate increased from 9 to 13% in the 2000-2013 period and the employability of both youth male and female deteriorated between 2006 and 2011, with females being particularly hard hit[3]. This seems to confirm the presence of the *jobless growth* phenomenon, which implies the coexistence of GDP growth and employment stagnation in both developed and developing countries [Bhalotra 1998; Verme 2006]. High economic growth is not necessarily leading to a substantial decline in unemployment unless it is generated by sectors with high employment content and is accompanied by structural changes in the labor market, mainly related to improving skill levels in line with the changing requirements of the labor market itself.

Being Egypt, with its 84 million inhabitants (April 2013), the most populous among Arab countries, this phenomenon could be thought as being inflated by Egyptian demographic environment. In fact, demographic dynamics occurring in the 1970-1990 period such as a decline in infant mortality rates, an increase in total life expectancy at birth (from 50 to 62 years) and in total fertility rates, led to the development of a 'Youth Bulge'[4] which translated into an unprecedented growth of new entrants into the labor market (considering that the labor force grew at 3.4% in the 1990-2010 period). Such a rapid and consistent population growth, in turns, led to severe labor supply pressures on the Egyptian labor market that concentrates almost half of the total labor force of the Arab world [Chaaban 2009]. Not only are Egyptian young cohorts more severely affected by the exclusion from the labor market, but they also have to deal with the 'education-occupation mismatch', a feature that mostly affects young Egyptians suggesting an inefficient labor market response to youth educational qualification. Indeed, Egyptian unemployed, particularly educated youth, are affected by a skill mismatch between the job requirements and the qualifications of job seeker, a result of an outdated, rigid and inefficient education system [Hassan and Sassanpour

[1] According to the IMF data, in the last 20 years Egyptian real GDP never felt below the average of MENA countries, exception made for the projections-periods which are probably influenced by the post-revolutionary socioeconomic-scenario.

[2] According to the Gender Inequality Index, Egypt presents a value of 0.599 which is well above the average of the Medium human development-countries of 0.495. In addition to that, in 2009 the value of female to male ratio in Parliament was 0.038 for Egypt and 0.211 for the Medium human development-countries and the Egyptian ratio of female to male shares in labor force participation in 2009 was 0.297 when the Medium human development-countries value for the same indicator was 0.644.

[3] In 2006, among 15-29 year old people, 14.1% of females were employed compared to 57.0% for males in the same age group. In 2011, employed male youth had declined to 53.7% while female to 9.1% .

[4] Term firstly used by Fuller[1995].

2008; El-Hamidi 2009]. Despite Egyptian youth have now reached as high education level as ever before, the education system is not able to provide the market with the quantity and quality of educated individuals most in demand [Galal 2002].

As one of the major challenges in both developed and developing countries, unemployment costs in terms of social, economic and individual level have been widely analyzed in the literature. Unemployment is one of the major cause of unpaid taxes and social security premiums as well as government's revenue loss [Reyher et al. 1980] and it is positively correlated to crime [Gould et al. 2002; Huang et al. 2004; Fougere et al. 2009]. Loss of self esteem have also been associated to unemployed individuals [Goldsmith et al. 1996] as well as to suicide [Lewis and Sloggett 1998] and to mental sickness [Murphy and Athanasou 1999]. In addition to that, long-term unemployment can cause depreciation of human capital which would affect subsequent wages [Clark 2006]. Moreover, developing countries have to deal with the so called 'luxury unemployment', that is, unemployment mainly becomes an urban issue and it is higher among the relatively well educated and first-time job seekers . In developing countries unemployment is a situation in which people queue for a public or a formal sector job and it is a consequence of insufficient job creation as well as loss of employment during crisis periods [Udall and Sinclair 1982].

In Egypt unemployment is a labor market insertion issue that mostly affect urban, educated and female youth. Egyptian unemployment rate pattern changed radically through the last 30 years as it was almost nonexistent in the mid-1970s, climbed to the 5-7% range in the '80s and to the 8-11% in the '90s by following the adoption of more liberal economic policies and declined to 9% between end-2004 and March 2007 as a result of a broad based economic reform program. However, this program did not managed to diminish youth unemployment as in 2009 an estimated 2 million Egyptians were still out of work [Hassan and Sassanpour 2008].

Egyptian women and educated workers have also been penalized by the progressive downsizing of public sector occurred in Egypt by the early 1990s. Indeed, the effect of liberalization policies endorsed by the Egyptian government from the beginning of the 1970s entailed that the public sector, which played a major role in absorbing the increasing labor force during the previous three decades (mainly because it has been the preferred sector of employment for many new entrants to the labor market, particularly women), by the early 1990s, prior to economic reforms, it was overstaffed and inefficient, and its wage bills constituted a huge burden on government expenditure. At the same time, the growth of the private formal sector in job creation and absorption has been limited. Thus, the Egyptian government turned to downsizing the public sector in an effort to reduce budget deficits and address the inefficiencies in the civil service as part of the economic reform program. By 2006, there was evidence to suggest that both the shares of government employment and public enterprises in total employment declined. For these reasons educated women suffered the most for public sector downsizing as this sector absorbed the 50% of women employment in 1998 and only the 34% in 2006 [Said et al. 2009].

Egyptian 2006 and 2012 labor market panel surveys (ELMPS 2006; ELMPS 2012), which will be described further in the paper, suggest different employment paths for what gender and age cohorts are concerned[5] (as we have previously argued) as well as *between* administrative

[5]In ELMPS 2012 female unemployment rate is 27.32% against a male unemployment rate of 3.98%. While in 2006 the rate was 21.45% and 5.01% respectively.

units[6]. For example in ELMPS 2006, despite an overall unemployment rate of 9.40%, there is evidence of a between government variation in the same rate ranging from 2.56% to 16.16% (the same pattern is present in 2012).

This paper aims at investigating which individual and contextual characteristics determine individuals' probability of being unemployed and if and how these characteristics have changed between 2006 and 2012, that is, before and after two major economic and political exogenous shocks such as the 2008 global financial crisis and the 2011 Revolution of the Arab world. We intend to understand which are the effects of a series of individual variables, such as age, gender, education, marital status, household background, and parent's personal influences, on the individual probability of being employed. Conditional to that, we investigate whether the differences in employment probability also derives from regional differences which, as for the Egyptian case, are represented by the belonging to one of 22 Governorates.

As for the previous premises, we expect, everything else being equal, individual probability of being employed to be lower for younger and more educated individuals (education-occupation mismatch); to heavily affect females (gender unbalances) and to be higher for first-time job seekers living in urban areas (luxury unemployment).
In Section 2 we introduce the econometric model and discuss the methodology, in Section 3 we describe the survey data on which the analysis is grounded, in Section 4 we present the main results and Section 5 concludes.

2 The Model

2.1 Multilevel Mixed-Effects Model for Binary Data

Given the hierarchical structure of our data (level-1 Individuals; level-2 Households; level-3 Municipalities; level-4 Urban/Rural divide) and the binary nature of the outcome variable of interest (1 unemployed and actively searching for a job in the past 3 months; 0 employed in the past 3 months) we decided to implement a Multilevel Generalized Linear Mixed Model which takes into account both fixed and random effects[7]. Indeed, our model includes several fixed effects predictors such as age, gender, marital status, etc. plus a fixed intercept and a random intercept for each level-2 component (e.g. one for each municipality).

The multilevel approach for binary outcome variables[8] has been used in several disciplines

[6]From an administrative perspective, Egypt is divided into 27 Governorates which, in turn, can be grouped into 4 macro-regions: Urban Governorates (Cairo, Alexandria, Port-Said, Suez); Lower Egypt (Damietta, Dakahlia, Sharkia, Kalyoubia, Kafr ElSehikh, Gharbia, Menoufia, Behera, Ismailia); Upper Egypt (Giza, Beni Suef, Al Fayoum, Menia, Sohag, Qena, Aswan, Luxor); Frontier Governorates (Red Sea, El Wadi El Gidid, Matrouh, North Sinai, South Sinai). This is the grouping structure used by the Egyptian official statistical agency (the Central Agency for Public Mobilization and Statistics). This official aggregation entails the additional division: Urban/Rural Lower Egypt; Urban/Rural Upper Egypt; Urban/Rural Frontier Governorates. In the surveys of reference data on frontier governments were missing.

[7]Generalized linear mixed models (or GLMMs) are an extension of linear mixed models to allow response variables from different distributions, such as binary responses. We could think of GLMMs as an extension of generalized linear models (e.g., logistic regression) to include both fixed and random effects (hence mixed models).

[8]Such phenomena may be the occurrence of discrete events such as dropping out of high school, getting a four-year college education, marrying, giving birth, divorcing, using narcotic drugs, having a business go

(sociology, epidemiology, demography, etc.) to study data with hierarchical structure (individual, familiar, geographical, social, etc.) [Bryk and Raudenbush 1992; Goldstein 1999; Tolnay and Crowder 1999]. Standard regression models (such as Generalized Linear Models) and clustering are not adequate when dealing with data (hidden) hierarchical structure, providing biased estimates and standard errors [Aitkin and Longford 1986]. On the contrary, multilevel modeling corrects for the biases in parameter estimates, provides correct standard errors[9] and estimates of the variances and covariances of random effects at various levels [Snijders and Bosker 1999].

'Mixed effects' models, containing both fixed and random effects, allow to analyze data with a complex variance through maximum likelihood estimation [Searle et al.1992]. The fixed effects are analogous to standard regression coefficients and are estimated directly, the random effects are not directly estimated (although they may be obtained postestimation) but are summarized according to their estimated variances and covariances. The distribution of the random effects is assumed to be Gaussian while the conditional distribution of the response given the random effects is assumed to be Bernoulli, with success probability determined by the logistic cumulative distribution function (c.d.f.).

Defining the probability of the response variable equal to one as $p_{ij} = \Pr(y_{ij} = 1)$ and applying to p_{ij} a logit link function, our multilevel varying-intercept model will take the following form:

$$\log[p_{ij}/(1-p_{ij})] = \beta_{0j} + \beta_1 x_{ij} \tag{1}$$

where

$$\beta_{0j} = \beta_0 + u_j \tag{2}$$

with $i : 1,...n$ denoting the individual level; $j = 1,...s$ denoting the contextual level; $u_j \sim N(0,\sigma^2)$ being the level-2 group specific random effect.

Logit model of occupational attainment presented in the literature used different individual characteristics as explanatory variables of the probability of being employed such as age, sex, race, educational level, labor market experience, region of residence, health, union membership, occupation, family status [Boskin 1974; Schmidt and Strauss 1975; Poterba and Summers 1995; Stampini and Verdier 2011]. Others focused on the effect of policies and institutions, as well as on macroeconomic shocks and the interactions between them [Bassanini and Duval 2006]. In another multilevel setup, educational level, region and urban-rural locality of residence were also presented as explanatory variables of the variation in fertility rate [Amin et al 1994].

In order to compare the same specifications for both 2006 and 2012, we had to select a restricted set of individual and contextual characteristics. Hence, as fixed individual characteristics we considered: age; sex; marital status; urban/rural region of residence; household size; individuals' and parental educational level; years spent on the job market; the presence of another employed individual in the same household. As for covariates at the contextual level we had to build a new dataset comprehensive of data at the governorates level which we have then merged to survey data. The available data we could collect for this new dataset included: birth rate; total

bankrupt, adopting a new technology, implementing a new public policy [Guo and Zhao 2000].

[9]When observations are clustered into higher-level units, they are no longer independent. When the clustering structure in the data is ignored and the independence assumption is violated, the traditional linear and binary models tend to underestimate the standard errors [Guo and Zhao 2000].

enrollment in primary, preparatory and secondary school; total labor force rate; total population rate; total unemployment rate; level of public water supply; percentage of inhabited area. In addition to that, we generated governorates' university and adult literate rate from survey data.

The model basic assumptions are:

$$E[\epsilon_{ij}|u_j] = 0 \tag{3}$$

$$E[\epsilon_{ij}|X_{ij}] = 0 \tag{4}$$

$$E[u_j|X_{ij}] = 0 \tag{5}$$

$$E[y_{ij}|u_j] = 0 \tag{6}$$

That is, the random terms are assumed to be uncorrelated with each other (4), with the covariates (5)-(6) and with the individual outcomes (7).

As long as individuals tend to be more homogeneous within municipalities, we consider a random intercept model as we expect individuals' employment probability *within* municipalities to be correlated, which will not be the case when considering the same variation *between* them[10].

3 Data

In this paper we use the two Egypt Labor Market Panel Surveys 2006-2012 (ELMPS 2006 and ELMPS 2012), conducted by the Egyptian Research Forum in cooperation with the Population Council and the Egyptian Central Agency of Public Mobilization and Statistics (CAPMAS) as a follow-up to the Egypt Labor Market Survey 1998 (ELMS 1998, that will not be used in this analysis).

The ELMPS 2006 is designed to be comparable to the ELMS 1998 but to also include a longitudinal component in which the same households and individuals interviewed in 1998 would be re-interviewed in 2006. The final sample of 8.349 households is made up of 3.684 households from the original ELMS 1998 survey, 2.167 new households that emerged from the former as a result of splits, and a refresher sample of 2.498 households. Of the 23.997 individuals interviewed in 1998, over 72% (17.357) were successfully re-interviewed in 2006, forming a panel data that can be used for longitudinal analysis. The 2006 sample contains 19.743 new individuals among which, 2.633 joined the 1998 survey, 4.880 joined the split households and 12.200 were part of the refresher sample [Assaad 2009]. The ELMPS 2012 is the third round of this periodic longitudinal survey, it includes 12060 households consisting of 6752 from the 2006 sample (28770 re-interviewed individuals), 3318 new households that emerged from these households as a result of split and 2000 new households [Assaad and Krafft 2013]. Moreover in ELMPS 2012 new variables, regarding household wealth, were added. Although the two surveys cover the civilian non-institutionalized population 6 years old and above, we have selected the 15-64 age group as the purpose of this analysis needs an investigation of individuals belonging to population in the labor force. By using Egyptian National Census, made available by CAPMAS at the Governorate level, we have selected a series of contextual indicators. Other contextual aggregate covariates

[10] At the beginning of our analysis we performed a likelihood-ratio test in order to decide whether to consider a random intercept (RI) or a random coefficient (RC) model. The test suggested that we could reject the null of the RI being nested in the RC, so that we focused on a RI model only.

were generated from survey data.

3.1 Descriptive Statistics

The dependent variable is a dummy variable of value one when the individual is unemployed and actively searching for a job. Although survey data provide a similar response (1 employed in the past 3 months; 0 unemployed in the past 3 months) we generated this outcome variable as to keep track of the solely active unemployed individuals, coherently with the International Labour Organization definition of the economically active population[11]. In Tab.(1) we report descriptive statistics of our dependent variable by gender. While in both surveys the population is fairly divided between male and female, only 28.19% (18.08% in 2012) of female population is in the labor force. Moreover, it is worth noting that while the unemployment rate is quite stable (around 9.40% in both years) male unemployment rate is low and decreased from 5.01% in 2006 to 3.98% in 2012, while female unemployment rate increased from a 21.45% in 2006 to a 27.32% in 2012.

Var			**2006**		**2012**	
Total Population	Tot		23823		40668	
		Male	11847	49.73[a]	20079	49.38[a]
		Female	11976	50.28[a]	20589	50.63[a]
Labor Force (15-64)	Tot		12638	53.05	15993	39.33
		Male	9263	78.19[b]	12270	61.11[b]
		Female	3375	28.19[b]	3723	18.08[b]
Unemployed	Tot		1.188	9.40	1.505	9.41
		Male	464	5.01[c]	488	3.98[c]
		Female	724	21.45[c]	1017	27.32[c]

[a] $\%Tot.Population$
[b] $\%Male/FemaleoftheTot.LaborForce$
[c] $\%Male/FemaleoftheLaborForce$

Table 1: *Unemployment by Gender*

In Tab.(2) and Tab.(3) we report a summary of the dependent variable by age. It is clear that, for both surveys, unemployment decreases when age increases, and it is a phenomenon that clearly hinders the youngest generations: the group 15-24 presents the highest unemployment rate (23.98% in 2006 and 20.28% in 2012). Moreover, in all but in the 15-24 cohort, the unemployment rate decreased between 2006 and 2012.

In Tab.(4) we report summary statistics for the individual-level covariates both in 2006 and 2012. In particular, at the individual level, we have selected the followings. Sex (not present in this

[11] 'The total labor force, or currently active population, comprises all persons who fulfill the requirements for inclusion among the employed or the unemployed during a specified brief reference period'. More precisely, 'The unemployed comprise all persons above a specified age who during the reference period were: without work, that is, were not in paid employment or self employment during the reference period; currently available for work, that is, were available for paid employment or self-employment during the reference period; and seeking work, that is, had taken specific steps in a specified recent period to seek paid employment or self-employment'.

	Age Groups					
	15-24	25-34	35-44	45-54	55-64	Total
Employed	76.02	89.79	97.66	99.71	99.47	90.60
Unemployed	23.98	10.21	2.34	0.29	0.53	9.40
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Authors own elaboration based on ELMPS 2006

Table 2: *Unemployment by Age Groups 2006*

table as previously described with respect to the response) is 1 for male and 0 for female. Head of HH is a dummy which equals 1 if the individual is the head of the family, 0 otherwise. Marital Status is equal 1 if the individual is married, 0 otherwise. Primary/Preparatory is a dummy equal 1 if the individual has either primary or preparatory school as highest educational level; Secondary or above if she/he has got a diploma or more. HH_occup, which we generated from survey data, equals one if there is another employed individual within the same household. Age_enterLM is the age at which the individual has entered the labor market; Years Worked is the difference between age and Age_enterLM. In 2012 we could dispose of two additional individual-level covariates: the household wealth decile and a dummy variable that takes into account the presence of the mother in the household (1 present; 0 not present).

	Age Groups					
	15-24	25-34	35-44	45-54	55-64	Total
Employed	79.72	87.60	95.36	99.04	98.80	90.59
Unemployed	20.28	12.40	4.64	0.96	1.20	9.41
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Authors own elaboration based on ELMPS 2012

Table 3: *Unemployment by Age Groups 2012*

On average, in 2006[12] the survey population is 33 (31) year-old, entered the labor market at 18, and have been working for 19 (22) years, the 65% (59%) is married. In each family there are on average 5.4 members (roughly 5) and 30% of the invididuals are the head of the household in both surveys. In 2012, the mother is still part of the household for the 90% of the surveyed.

In Tab.(5) we report summary statistics for the contextual-level covariates both in 2006 and 2012. In particular, Urban equals one if the governorate belongs to a urban area, 0 if rural. University rate is the share of governorate's population holding a degree while Adult literate rate is the share of governorate's population that is able to read and write. Water_pc is the share of available public water (m^3) per capita in each governorate and Birth rate is the annual birth rate in each municipality. Tab.(5) shows evidence of positive trends on average adult literacy rate and birth rate from 2006 to 2012 while a slight decrease is associated to average university rates and population rate.

[12] Values for 2012 in brackets

	2006			2012		
Variable	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**
Age	33.023	13.518	23823	31.34	18.268	40668
Age_enterLM	18.055	5.722	12742	18.031	5.657	17395
Years Worked	19.26	13.387	12742	22.255	15.958	17395
Marital status	0.65	0.477	23823	0.589	0.492	40668
Education	2.481	0.758	15855	2.245	0.799	40632
Mother_educ	1.242	0.52	14749	1.366	0.584	40652
Father_educ	1.591	0.700	16870	1.608	0.664	40666
HH_size	5.435	2.582	23823	4.967	2.214	40668
HH_occup	0.747	0.435	23823	0.723	0.448	40668
Head of HH	0.301	0.459	23823	0.297	0.457	40668
Wealth Decile of HH	-	-	-	5.436	2.858	40668
Mother present in HH	-	-	-	0.978	0.146	40668

Table 4: Individual Covariates Descriptives

	2006			2012		
Variable	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**
Urban	0.547	0.498	23823	0.445	0.497	40668
Population rate	5.636	2.593	23823	5.352	2.514	40668
Birth rate	28.792	1.744	23823	32.072	2.869	40668
Water_pc	25.81	68.882	23823	27.81	71.911	40668
Inhabited area (%)	49.641	40.542	23823	48.791	40.567	40668
Adult Literacy rate_survey	12.987	3.708	23823	30.156	2.743	40668
University rate_survey	12.845	5.078	23823	11.171	5.187	40668

Table 5: *Contextual Descriptives*

4 Results

We are reporting the results of our analysis for 2006 and 2012 respectively. Coefficients should be interpreted in terms of log(odds) e.g. the coefficient on the sex dummy suggests that 'a switch from female to male' results in a 1.661 (2.096 in 2012) unit reduction in the log of the odds (of being unemployed). A more refined interpretation could be achieved by exponentiating these coefficients to obtain the odds ratio (OR) [Rabe-Hesketh and Skrondal 2012]. In the previous example, exp(1.661)=5.26, we have that the odds of being unemployed are 5.26 (8.08 in 2012) times lower for males than for females. For ease of interpretation we will not report each and every OR in the following analysis, we will instead give a more intuitive explanation of the obtained results.

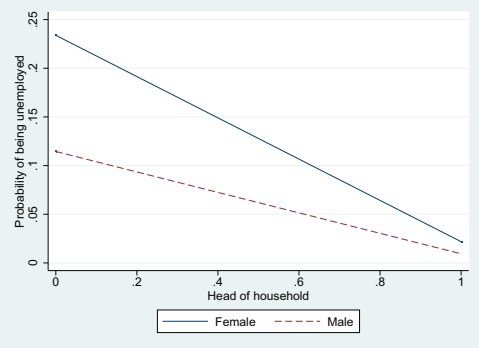
In general, these results suggest that, as expected, the probability of being unemployed increases for female and, more generally, for younger and more educated cohorts. The individual probability of being unemployed is reduced for married individuals (in 2006, not significant in 2012), head of households, and when there are other employed relatives in the same household.

The age at which individuals enter the labor market has a non linear effect on unemployment

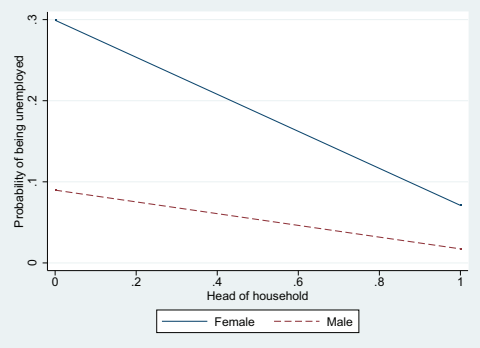
probability, it is more pronounced in 2006 while weakly significant in 2012, suggesting that, up to a certain age, a later entrance in the labor market lowers the probabilities of being unemployed soon after (this is coherent with the higher unemployed probabilities associated to younger cohorts). Coherently with the 'luxury unemployment' features, individuals living in urban areas are more likely to be unemployed. This could reflect the more structured search for job in urban areas which leads individuals to enter the labor force definition more often than those in rural areas, this trend is confirmed with lower magnitude in 2012. Moreover, living in governorates with, on average, higher university and adult literacy rates reduces the probability of being unemployed, perhaps as for labor market effects such as the higher employability in the academic sector.

The population rate in 2006 and the inhabited area (km^2) in 2012 sum up part of the demographic determinants of the unemployment issue and reveal that living in more densely populated governorates raises unemployment probability. This could reasonably be linked to the fact that highly populated governorates are, again, the urban ones. Another demographic regressor, birth rate, goes in the opposite direction. We could think of the latter as a measure of general positive trends in health and welfare performances in the governorates of reference rather than as a measure of demographic pressure, although this could be debatable. The 2012 additional covariates suggest that the presence of the mother in the household increases individual unemployment probability, while the household wealth decile does not appear to be significant.

In the last specification we are reporting the interaction between sex and head of household and the one between sex and marital status as we think of these as important variations to be exploited. In Fig.(1) and in Fig.(2) we present the relation between our dependent variable and these interaction effects. In Fig.(1) it is worth noting that within head and non-head of household the gap between male and female unemployment probability is wider in 2012, being always higher for females, while between head and non-head the unemployment probability is higher for non-head of household in both years. This suggests that the gap in gender unemployment probability decreases when both males and female are head of household so that when, most probably, the male-head of the household is absent and the woman is 'forced' to search for a job. In Fig.(2) we can find evidence of similar trends, we should notice that in 2012 unemployment probability for both married and non-married women is higher while it slightly decreases for non-married men. This is coherent with the previous interaction outcome as, in this case, the gap between married men and women is wider as, most probably, male-heads of household are working while spouses are not.

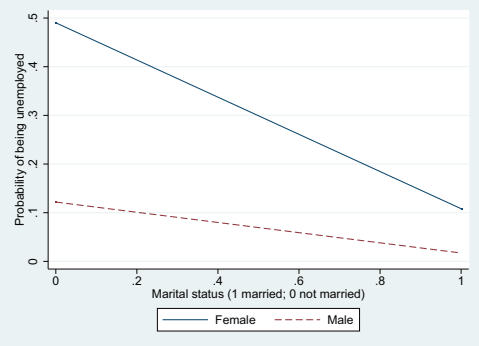


(a) 2006

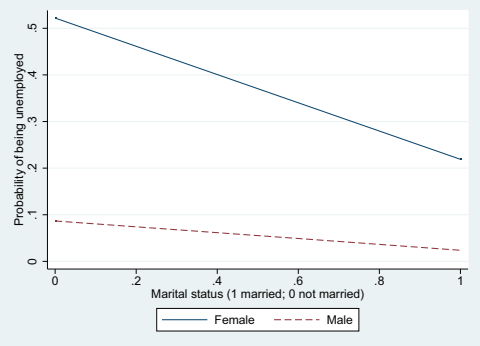


(b) 2012

Figure 1: Interaction effect Sex and Head of household



(a) 2006



(b) 2012

Figure 2: Interaction effect Sex and Marital status

	2006					
	(1)	(2)	(3)	(4)	(5)	(6)
Level-1 Covariates						
Sex	-1.661***	-0.552***	-0.600***	-1.629***	-1.626***	-0.630***
	(0.0851)	(0.212)	(0.208)	(0.0857)	(0.0856)	(0.259)
Age	-0.124***	-0.0296**		-0.129***	-0.129***	-0.130***
	(0.00703)	(0.0125)		(0.00717)	(0.00716)	(0.00713)
Age enterLM		0.363**				
		(0.144)				
Age enterLM_sq		-0.00719**				
		(0.00335)				
Years Worked			-0.0340***			
			(0.0123)			
Head of hh	-1.364***	-0.832***	-0.810***	-1.378***	-1.375***	0.223
	(0.181)	(0.311)	(0.311)	(0.182)	(0.182)	(0.280)
Marital Status	-0.436***	-0.694***	-0.646***	-0.384***	-0.381***	-0.146
	(0.103)	(0.252)	(0.245)	(0.105)	(0.104)	(0.113)
Primary/Preparatory	0.553*	-0.0983	0.141	0.524	0.518	0.498
	(0.325)	(0.390)	(0.380)	(0.325)	(0.325)	(0.324)
Secondary/above	2.519***	-0.268	0.283	2.462***	2.453***	2.521***
	(0.281)	(0.392)	(0.332)	(0.282)	(0.281)	(0.282)
HH_occup	-0.595***	-0.664***	-0.684***	-0.571***	-0.565***	-0.575***
	(0.105)	(0.205)	(0.205)	(0.105)	(0.105)	(0.106)
Level-2 Covariates						
Urban				0.380***	0.380***	0.385***
				(0.0864)	(0.0858)	(0.0858)
Inhabit_area				0.00405**		
				(0.00176)		
University rate_survey				-0.00788	-0.0362**	-0.0359**
				(0.0161)	(0.0155)	(0.0147)
Adult literate rate_survey				-0.0326	-0.0684***	-0.0652***
				(0.0210)	(0.0200)	(0.0189)
Water_pc					-15.74*	-15.71*
					(9.498)	(9.029)
Population rate				0.0556*	0.0499**	0.0498**
				(0.0292)	(0.0254)	(0.0243)
Birth rate					-0.139***	-0.144***
					(0.0373)	(0.0355)
Sex*Head						-1.666***
						(0.377)
Sex*Marital						-0.381***
						(0.111)
Constant	1.066***	-5.883***	-2.622***	0.988**	6.182***	6.015***
	(0.349)	(1.460)	(0.452)	(0.492)	(1.335)	(1.270)
Observations	10,508	9,460	9,460	10,508	10,508	10,508
Number of groups	22	22	22	22	22	22

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

	2012					
	(1)	(2)	(3)	(4)	(5)	(6)
Level-1 Covariates						
Sex	-2.096***	-0.937***	-0.870***	-2.033***	-2.079***	-1.583***
	(0.0835)	(0.153)	(0.154)	(0.0849)	(0.0840)	(0.155)
Age	-0.0834***	-0.0267***		-0.0849***	-0.0849***	-0.0878***
	(0.00456)	(0.00658)		(0.00463)	(0.00461)	(0.00473)
Age enterLM		0.0939	0.106*			
		(0.0632)	(0.0638)			
Age enterLM_sq		-0.00250*	-0.00300**			
		(0.00151)	(0.00152)			
Years worked	-0.022***					
	(0.0062)					
Head of hh	-1.157***	-1.022***	-1.134***	-1.167***	-1.161***	-2.348***
	(0.129)	(0.192)	(0.187)	(0.129)	(0.129)	(0.382)
Marital Status	-0.144	-0.0150	-0.241	-0.133	-0.128	-0.374*
	(0.0907)	(0.161)	(0.151)	(0.0918)	(0.0916)	(0.206)
Primary/Preparatory	0.397**	0.919***	1.065***	0.381**	0.385**	0.420**
	(0.189)	(0.286)	(0.286)	(0.190)	(0.189)	(0.188)
Secondary/above	1.563***	1.173***	1.379***	1.534***	1.526***	1.538***
	(0.144)	(0.267)	(0.269)	(0.149)	(0.145)	(0.144)
HH_occup	-0.560***	-0.571***	-0.569***	-0.559***	-0.556***	-0.538***
	(0.0916)	(0.138)	(0.134)	(0.0919)	(0.0917)	(0.0908)
HH Wealth decile			-0.0226	0.000529		
			(0.0227)	(0.0135)		
Moth in hh			0.852**	1.146***		
			(0.419)	(0.291)		
Level-2 Covariates						
Urban				0.206***	0.214***	0.224***
				(0.0734)	(0.0711)	(0.0712)
Inhabited area				0.00817***	0.00819***	
				(0.00290)	(0.00289)	
University rate_survey				-0.0753**	-0.0742**	-0.0447
				(0.0300)	(0.0299)	(0.0296)
Adult literate rate_survey				-0.0137	-0.0135	0.0121
				(0.0388)	(0.0387)	(0.0424)
Water_pc				0.00404*	0.00406*	-0.00121
				(0.00232)	(0.00231)	(0.00283)
Population rate				0.056	0.0752**	0.0714
				(0.0500)	(0.0382)	(0.0549)
Sex*Head						0.916***
						(0.252)
Sex*Marital						0.110**
						(0.0514)
Constant	0.923***	-3.325***	-3.268***	2.775**	1.608	1.723
	(0.237)	(0.682)	(0.774)	(1.378)	(1.342)	(1.686)
Observations	15,978	14,614	14,614	15,978	15,978	15,978
Number of groups	22	22	22	22	22	22

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5 Conclusions

Despite the general positive economic outcomes of the last two decades, Egypt is still affected by a lack of job opportunities for both female and the younger cohorts, for whom the coexistence of GDP growth and employment stagnation stirs up a poorly reassuring scenario. By making reference to the Egyptian Labor Market Panel Surveys of 2006 (ELMPS 2006) and 2012 (ELMPS 2012), and by exploiting the hierarchical structure of these data, we investigate Egyptians' individual probability of being unemployed as the response of both fixed individual characteristics (such as gender, age, educational level, etc.) and 'randomly assigned' regional context, being reasonably convinced that unemployment does originate from a combination of these two level of analysis. At first stage, we decided to implement a separate analysis for the two surveys, thus working 'as if' on cross-sectional data. We are doing this as we do not believe panel data analysis will necessarily add robustness to this study. Nevertheless, we find it advisable to leave a deeper analysis - as difference in difference estimation - as a further step. We are also aware that selection bias is an issue that could be pointed at as a result of our choice to shrink the analysis on individuals in the labor force only. We will take this aspect into account and we will address it through Heckman selection bias models [Heckman 1979] and endogenous treatment effect models [Vella and Verbeek 1999].

The achieved results are robust and validated for both 2006 and 2012. We show that for females, and younger and more educated populace, the probability of being unemployed is higher, a finding which is in line with the previously mentioned education-occupation mismatch concern. Moreover, a later entrance in the labor market leads to a reduction of individual unemployment probability. In addition, a married individual who is in head of its household (leaving out of account whether it is male or female), who lives in rural governorates, or in areas interested by higher university or adult literacy rates, shows a lower probability of being unemployed.

We do not esteem our results to be exhaustive. On the contrary, further investigation in this direction would include a deeper understanding of the between-governorate differences for what economic performances and labor market policy agenda outcomes are concerned. However, the scarcity of data at the municipal level prevented our work from detecting the effects of the 2008 global financial crisis spillovers on the Egyptian labor market in both 2006 and 2012. The same could be said for individual level data as information on the geographical origin of the respondents could have said something about possible 'migration effect' on the unemployment probability. As this was the case, an additional analysis could be addressed to the MENA region as a whole. Other interaction effects among the survey data could be documented and lagged regressors could be added in both models.

More generally, to be able to have a say on a plausible comparison between the two periods of reference, we should firstly take into account the profoundly different political scenarios in which the two surveys were collected. In 2006 the country was still ruled by Mubarak's 30-year dictatorship which was then overturned in February 2011, leaving Egypt well far from the peaceful democratic transitions its people expected. After 3 years from the beginning of the worldwide known (and investigated) Arab Spring upheaval, the future of the country is still uncertain and, among others, social disparities in employability opportunities are not yet out-fashioned[13].

[13] At the time of writing, 15 May 2014, national elections in Egypt have not yet occurred.

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