Marriage Timing of Men in Egypt: The Changing Role of Employment Status and Schooling over Time

Christine Binzel[1]

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[1] Department of International Economics, German Institute for Economic Research (DIW Berlin), Mohrenstraße 58, 10117 Berlin, Germany, E-mail cbinzel@diw.de.

1 Introduction

While women's age at marriage has tended to rise all over the world, the predominant trend for male age at marriage has been one of stability, leading to a narrowing of the wage gap among spouses around the world (Mensch 2005 a, b). The Arab world has deviated from the overall trend in the developing world by exhibiting a secular rise in the male age at marriage, keeping the age gap between spouses fairly constant over time (Ibid.). In Egypt, the median age at marriage for men rose from 26 for men born in the late 1940s to nearly 30 for men born in 1969 and 1970.[1] This delay has happened in a social context in which sexual relationships prior to marriage have remained taboo. With the share of youth rising over the same period and the increasing difficulties they face in integrating into the labor market after school, men's delay in marriage has contributed to social anxiety and raised fears about religious radicalism and social unrest. These worries are somewhat similar to the concerns of "surplus males" in China, called ""bare branches", indicating those male branches of a family tree that would never bear fruit because no marriage partner might be found for them" (Hudson and den Boer (2002: 11). Hudson and den Boer (2002, 2004) argue that societies with high sex ratios, such as China, are prone to political destabilization and violence. Men in Egypt do eventually marry with only 5% of the 1947-1977 cohort 'surviving' until the age 39 without being married (ELMPS 06). Yet, a delay in marriage of a few years in the given context has the potential to have implications similar to those described by Hudson and den Boer (2002, 2004).

Over the 1947-1977 period, both men and women have experienced a significant upward shift in educational attainment. One focus of this paper is therefore on how men with different educational attainments have experienced the delayed marriage phenomenon. With younger cohorts of women being increasingly educated, younger less educated men may be facing shrinking pools of eligible women. We therefore hypothesize that they may be the first to experience a delay in marriage.

Labor market conditions in Egypt have also significantly changed for the cohorts of men under consideration. The public sector had played a dominant role in the Egyptian labor market since the early 1960s, but that role has declined markedly in recent years. While older cohorts of men with secondary education and above benefited from an employment guarantee scheme for graduates for many years, this policy was abandoned gradually, first by

[1] Authors'estimates based on data from the Egypt Labor Market Survey of 2006 (ELMPS 06).

eliminating centralized hiring in state-owned enterprises in 1978 and then by slowly reducing hiring in the civil service. Starting from 1983, the waiting period for government employment was gradually increased to reach more than 13 years until the guaranteed employment policy was totally suspended (for in-depth studies see Handoussa and El-Oraby 2004, Assaad 1997). In 1991, Egypt started implementing the Economic Reform Structural Adjustment Program (ERSAP), a program supported by the International Monetary Fund and the World Bank, which severely limited the growth of public sector employment. Formal jobs in the private sector were growing even though they were doing so from a very low base; by the 2000s about 10 percent of new entrants and about 15 percent of educated new entrants were getting such jobs (see Assaad 2007). We hypothesize that his last labor market reform enabled highest-quality men to signal their ability not only through their educational attainment but additionally through their labor market outcome. Hence we hypothesize that these men have a significantly higher hazard of marrying compared to men having a formal job in earlier labor market periods.

We build on previous theoretical and empirical literature that suggests that labor market outcomes of men (and women) affect the timing of marriage. The theoretical literature, such as Keeley (1977), Becker (1973, 1974) and Bergstrom and Schoeni (1996), has focused on couples' relative wage income. With a female market labor force participation in Egypt of 22 percent (among women aged 15 to 64, ELMPS 06), the direct application of these theoretical models is limited. Our study therefore relates more to other empirical studies on marriage timing of men and women in Europe and the US using duration analysis, such as Ahn and Mira (2001), De la Riza and Iza (2005), and Gutiérrez-Domènech 2008 on Spain and Oppenheimer et al. (1997) on the US. This line of research analyzes how job status, the type of wage contract or more generally career status has affected men's age at first marriage. Due to limited data availability, few studies have been carried out on men's marriage timing in a developing country context and little attention has been paid to employment- and education-related factors and their change over time (e.g., Caltabiano and Castiglioni 2008, Ghimire et al. 2006). We are not aware of any other study on the male age at first marriage in the Middle East and North Africa region.

We rely on data from the Egypt Labor Market Panel Survey of 2006 (ELMPS 06). The survey was administered to a nationally representative sample of 8,349 households of which 3,684 were among the original 4,816 households originally interviewed in the Egypt Labor Market Survey of 1998 (ELMS 98). An additional 2,167 new households emerged from these 3,684 households as a result of splits, and a refresher sample of 2,498 households was added

in 2006. The full sample in 2006 includes 37,140 individuals.[2] It contains detailed information about education, current and past employment characteristics and marriage. We empirically determine four age cohorts that significantly differ in their survivor function of first marriage: 1947-1960, 1961-1965, 1966-1972 and 1973-1977. As we concentrate in the second part of our analysis on educated men only and our main interest is in formal versus informal jobs, we distinguish only between the following employment status types: not working, non-wage work, informal wage work and formal wage work, the letter referring essentially to government sector jobs, but include some private sector jobs covered by written employment contracts and social insurance.

Results from estimating discrete-time duration models with a non-parametric baseline hazard specification confirm our hypothesis that among men with low educational attainment, younger cohorts have significantly lower hazards of marrying. However, we find that men with primary or preparatory degrees (6 to 9 years of schooling) have been affected first by the delay in marriage, not those with no education. Finally, results show a strong division between men with secondary degree and above and those with a lower degree. Estimation results with regard to the employment-related variables are more mixed. We do not find a decrease in the hazard of marrying for the 1983-1990 and 1991-1998 labor market periods, but we do find an effect for men entering the labor market in the 1999-2005 period, in general, and, in particular, for men in informal and formal wage work. We also find an increase in the hazard of marrying for men having an informal job in the 1983-1990 period. We discuss possible explanations for these findings.

The paper is structured as follows: In Section 2, we describe the marriage market in Egypt. In Section 3, we provide information about the major explanatory variables. We present some descriptive statistics and derive our research hypotheses. The econometric model is given in Section 4 while we present and discuss estimation results in Section 5. Section 6 concludes.

2 Characteristics of the Marriage Market in Egypt

Marriage in Egypt is a “family affair” from the very start. The process leading to marriage consists of several steps starting with a visit between the families where the groom asks for the hand of the bride. Prior to the engagement party, both families agree on their contribution to the marriage costs which are documented in detail in the marriage contract for Muslims or

[2] Since data collection started in December 2005, we generally use information as of 2005.

the Church register for Copts. While the bride and her family typically take over the cost of most of the furnishings (trousseau), the groom and his family are usually responsible for financing most other items, in particular housing and electrical appliances. For Muslims, the bride price typically consists of two parts: An advance payment, which is now typically fairly small, and a delayed payment, the amount the groom agrees to pay in case of divorce. The signature and registration of the marriage contract does not necessarily mean the consummation of the marriage. The couple moves together only after the wedding ceremony called the *dukhla*, which in some cases can be months if not years after the signing of the contract if the groom is "not ready." For qualitative studies on marriage in Egypt, see Hoodfar (1997), Singerman (1995), and Singerman (2007). While some details differ between a Coptic and a Muslim marriage, in general, the procedure is very similar.

Marriage in Egypt is associated with very high costs. Singerman and Ibrahim (2001) estimate that the marriage costs – such as the dowry, expenses for the wedding celebration, value of the jewelry, housing, furniture and electrical appliances – average 4.5 times Egypt's GNP per capita and 11 times per capita household expenditure. Whether costs have risen over the last decades is less clear. Qualitative studies and anecdotal evidence (e.g., Amin and Al-Bassusi 2003) suggest that living standards have risen and that young people nowadays have higher aspirations of nuclear family living arrangements upon marriage. Indeed, based on the ELMPS 06, the share of newly-weds setting up their own household directly after marriage has increased from under 40 percent in the 1970s to 60 percent in the 2000s.[3] Yet, whether total costs have increased is more difficult to assess. The retrospective data in the ELMPS 06 that Singerman (2007) uses to show that marriage costs have, contrary to common belief, actually decreased over the last decades is likely to be prone to recall and measurement errors. The marriage market as such, however, has changed little. Under the Egyptian (Muslim) family law, husbands have the right to divorce their wives with immediate effect but have to pay some financial compensation. Since 2000, a wife can also ask for divorce but has to return the dowry and the money she received from her husband at the time of the marriage and loses any right to compensation. Practically, few women can afford this. Among Coptic couples, divorce is essentially not possible unless one of the spouses changes his religious denomination so that the couple falls under Muslim family law. In view of the limited income

[3] Note that many of the questions related to marriage in the ELMPS 06, such as marriage costs and living arrangements after marriage, are asked to ever-married women aged 16 to 49 and relate to their first marriage. Consequently, this information can only be assigned to those married men in the sample who were, at the time of the survey, still married and living together with their first wife. Out of all interviewed women in this age group, 90% were still married and living together with their first husband at the time of the survey.

women earn (if any) and the gender-biased welfare system (Bibars 2001), women are, once married, legally and financially strongly dependent upon their husband.. As a result, women and their families have their greatest bargaining power at the time the contract is being signed and use that to make sure that the groom and his family provide a suitable standard of living for her over the long-run. This leads to a lot of the costs of marriage being capitalized at that stage of the couple's life, driving up the costs of marriage. It would also explain why, over the time period we are interested in, the share of costs born by the groom and his family has remained fairly constant at about 70 percent, so have the shares of the various cost items borne by the groom and his family (ELMPS 06).[4] Two further characteristics related to marriage have not changed much. The age gap between spouses has remained high at around 7 years and the share of consanguineous marriages, which mostly occurs among first cousins in Egypt, has remained relatively high at about 30 percent (ELMPS 06). By reducing the need for bargaining and increasing trust among the parties involved, consanguineous marriages tend to reduce the cost of marriage (which is supported by the ELMPS 06). There is limited evidence that the share of consanguineous marriages has begun to decline but only very recently, where it appears to have come down to 25 percent for marriages occurring since 2000 (ELMPS 06). Incidentally, this decline in consanguinity has coincided with other signals that the "marriage crisis" has abated (for more details on consanguinity in the region see Weinreb 2008).

Given that major features of the marriage market have stayed fairly the same over the period we are examining, it gives us some confidence that changes we observe in the timing of marriage for men can be attributed to changes in educational composition and labor market status.

3 Data and Research Hypotheses

3.1 Education and Cohort Effects

We use the log-rank test of the equality of the survival function to define cohort groups with significantly different survival functions of age at first marriage. We observe men only

[4] If we can assume that recall problems are not linked to specific cost items, the relative structure of costs should not be affected by such recall errors. While the section on the marriage costs in the ELMPS questionnaire is administered to women only, there could additionally be some misreporting of the groom's contribution. This concern is somewhat allayed by the fact that, in Egypt, the different financial contributions to the total costs of marriage are agreed upon by the two families involved and are closely monitored by all parties (Hoodfar 1997 and Singerman and Ibrahim 2001).

up to age 39 where the cumulative failure (the probability of being married) is 95 percent. The spell year 39 will also be the last spell year included later in the duration models we estimate. By age 39, 99 percent of men who will ever marry are already married. We start comparing birth cohorts 1947 and 1948, then 1947 and 1949, 1947 and 1950, and so forth. If 3 years in a row, the log-rank test is significant, we test these three cohorts against the previous ones. Results, which are reported in Appendix Table 1, propose the following grouping with the share of men in our sample in brackets: 1947-1960 (35%), 1961-1965 (15%), 1966-1972 (25%), 1973-1977 (25%). From birth cohort 1978 onwards survival functions differ significantly from each other, but most of the durations for these cohorts are censored as the majority of men in these cohorts had not yet married by the year of the survey. As we are mainly interested in explaining the delay in marriage timing for men, we restrict our analysis to men born by 1977.[5]

We distinguish four levels of educational attainment: no educational degree, primary or preparatory degree, secondary and post-secondary degree (general or technical), and university degree and above. For those who were enrolled in school at the time of their marriage, we assume that they will eventually obtain the degree toward which they are studying. Since this concerns merely 1% of all males in our sample, we can assume that, at the time when the decision to marry was made, all parties involved had correct expectations about their final educational attainment.

Changes in educational attainment for males and females over the four cohorts are presented in Table 1. Not only has educational attainment risen significantly over that period but women almost caught up with their male counterparts. (In urban areas, shares of men and women with secondary degree and above are equal.) The share of women with no formal education has strongly declined but is still high at 28 percent. If we take into account the average age gap of 7 years between spouses, the relative share of educated men to women decreases even further.

[5] Assaad and Ramadan (2008) examine the effect of housing market reforms that were enacted in the late 1990s on men's marriage timing in Egypt. They find that cohorts most likely to be affected by the reforms experienced a reversal in the trend toward delayed marriage that affected prior cohorts. Yet, this recent improvement in marriage prospects is not yet felt in society and, with youth unemployment remaining high, social anxiety about marriage has not abated.

	Cohorts				
	1947-60	1961-65	1966-72	1973-77	Total
Men born 1947-1977 (N=6102)					
no educational degree	42.45	33.04	24.27	16.89	29.99
primary and preparatory degree	16.85	14.89	15.67	16.76	16.24
secondary degree	19.92	28.04	33.53	36.58	28.78
university degree and above	20.78	24.02	26.53	29.76	24.99
Women born 1947-1977 (N=5905)					
no educational degree	68.03	54.55	42.01	27.66	50.64
primary and preparatory degree	10.72	11.76	12.32	13.34	11.85
secondary degree	12.08	19.76	29.77	32.25	22.02
university degree and above	9.17	13.93	15.91	26.75	15.50
Relative shares of men:women					
no educational degree	0.62	0.61	**0.58**	0.61	0.59
primary and preparatory degree	1.57	**1.27**	1.27	1.26	1.37
secondary degree	1.65	1.42	1.13	1.13	1.31
university degree and above	2.27	1.72	1.67	1.11	1.61

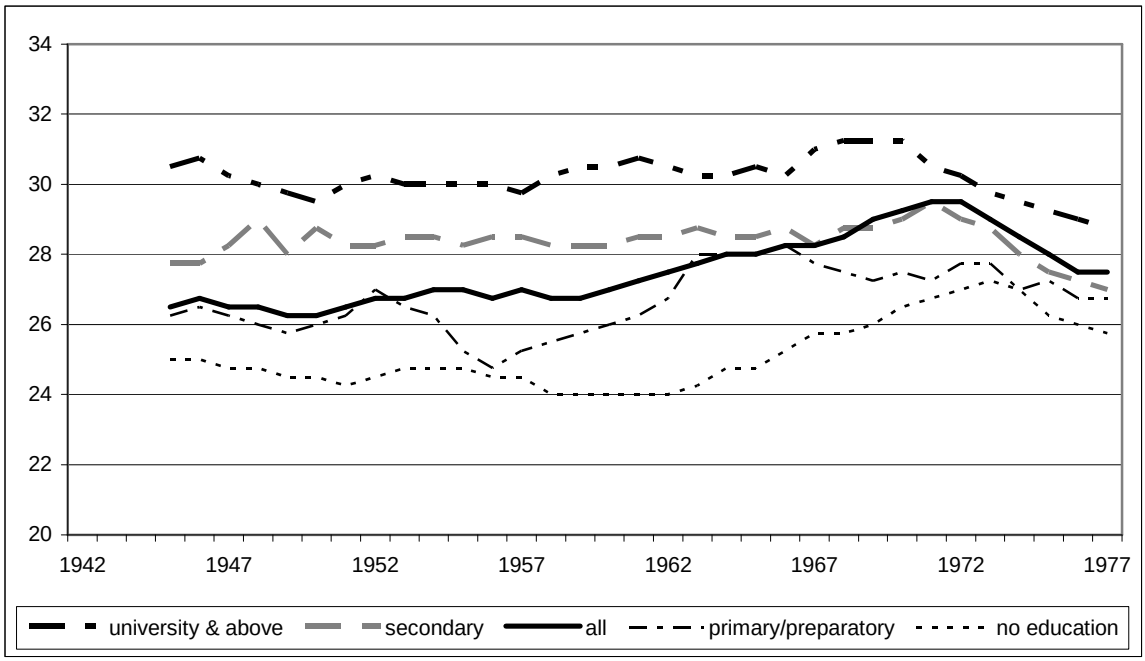
Table 1: Changes in Educational Attainment over Time (ELMPS 06).

Figure 1 depicts the median age at first marriage for men in our sample taking censored observations into account. It illustrates that men born from the mid 1960s to the beginning of the 1970s married significantly later compared to those born up to the mid 1960s. It furthermore shows that men with higher educational attainment marry later and it suggests that men with preparatory degrees or less were the first to experience a delay in marriage, which we argue is due to the increasing share of educated women. We originally hypothesized that men with no education would be affected first, but Figure 1 suggests that it is those with basic education that are. That the relative educational attainment of couples affects marriage costs is plausible and is confirmed by the ELMPS 06: Total marriage costs are significantly higher among couples where the bride is better educated than the groom compared to those where the wife is less educated than her husband. We propose the following hypotheses:

Hypothesis 1: Men born between 1966 and 1972 have a lower hazard of marrying compared to previous male cohorts.

Hypothesis 2: Men with no educational degree are the first to experience a lower hazard of marrying.

Hypothesis 3: Among the lower educated, men of the younger cohorts have a lower hazard of marrying compared to men of the older cohorts. As a result, we should find convergence among men with different schooling background over time.



Note: Four Year Moving Average.

Figure 1: Median Age at First Marriage for Men (by Year of Birth)

3.2 Labor Market Conditions and Employment Status

In this part, we look at whether it is primarily educational outcomes per se that matter or also whether men are able to turn their educational outcomes into (appropriate) labor market outcomes. With the introduction of the employment guarantee scheme in the public sector in the beginning of the 1960s, the labor market became very much segregated along educational lines with only those with secondary degree and above being eligible to the scheme.[6] This law resulted in a huge demand for higher educational institutions as government sector jobs meant – and still mean – not only job security but also social security, a relatively low number of work hours (which men use as an opportunity for moonlighting) and access to certain subsidized goods and services, such as public transportation (Assaad 1997). Changes in the civil service sector have been documented in detail elsewhere (e.g., Handoussa and El-Oraby 2004, Assaad 1997). As the phasing out of the employment guarantee scheme has been gradual, it is difficult to nail it down to a specific year. Yet, according to Handoussa and El-Oraby (2004), appointments by the Ministry of Manpower strongly declined from 1983 onwards. Depending amongst others on the profession, the waiting period for a job in the

[6] First, in 1961/1962 the employment guarantee scheme only addressed university graduates. However, the scheme was expanded in 1964 for secondary school graduates (Handoussa and El-Oraby 2004, Assaad 1997).

government sector increased to up to 13 years. The next major policy change affecting labor market conditions (this time regardless of individuals' educational attainment) took place in 1991 when Egypt adopted the ERSAP program supported by the World Bank and the IMF (e.g., Korayem 1997). As the sample size allows us to split up the 1991-2005 period, we can additionally look at the first years under the ERSAP program versus later years. All in all, this gives us the following four labor market periods: 1965-1982, 1983-1990, 1991-1998, and 1999-2005; the lower bound is determined by the fact that we restrict our analysis to men born in 1947 and later and to spell year 18 onwards (see below).

The ELMPS 06 includes an extensive set of retrospective questions about an individual's employment history which enables us to derive information about the type of job at any given age. We can observe a maximum of 4 positions whereby a position does not only refer to a job position but generally to the type of activity an individual carried out.[7] We therefore also know about periods where an individual was not working but, for instance, unemployed, studying or temporarily disabled. Unfortunately, military service which typically lasts between one and three years depending on a man's educational attainment is part of a residual category. All these various cases are lumped together as not working. Information about current and past jobs includes waged status, sector of employment, job stability, social security and work contract. Income is only available for current wage work. Yet, in Egypt, as in many other developing countries, it is not only income that matters but other job characteristics, such as job security, social insurance and the presence of a formal contract. Against the background that even nowadays men are widely perceived as the main (or even sole) breadwinner in the family (e.g., Hoodfar 1997, World Bank 2004), this holds especially with regard to marriage and family formation: Among the well-educated, having a formal job used to be almost a pre-condition for marriage. Furthermore, a relatively high share of men does not work for wage but as unpaid family workers (7% of the working-age male population, based on current job, ELMPS 06), self-employed (9%) or as employer (16%), for whom earnings data are not even available with respect to their current job.

As we are mainly concerned with the effects of the decline in job opportunities in the public sector and the relatively small contribution of the private sector to formal employment, our major distinction is that between a formal job and an informal job. To avoid sample size

[7] The ELMPS questionnaire allows only for three positions. Due to inconsistencies between the employment history section and other parts of the questionnaire, for a small number of individuals information is actually available for four positions. Since job turnover is comparatively low, for most men we know about their entire job history. Excluding men with errors or inconsistencies in the employment history section, we have valid data for 93% of the men born between 1947 and 1977.

problems we do not further distinguish between formal jobs in the public and private sectors, keeping in mind that the public sector made up three quarters of formal wage employment in Egypt in 2006 (see Assaad 2007). The remaining two categories are non-wage work (unpaid family work, employers, self-employed, and irregular wage work) and not working.

To get a sense of the tremendous decline in the availability of formal wage work, Figure 2 shows the shares of men with non-wage work, informal wage work and formal wage work in their first job by year of birth. Albeit women have also been affected by these changes, their market labor force participation has remained fairly constant and low so that relative income or employment status cannot be a major driving force for the timing of marriage.

Based on these trends in the labor market, we propose the following hypotheses:

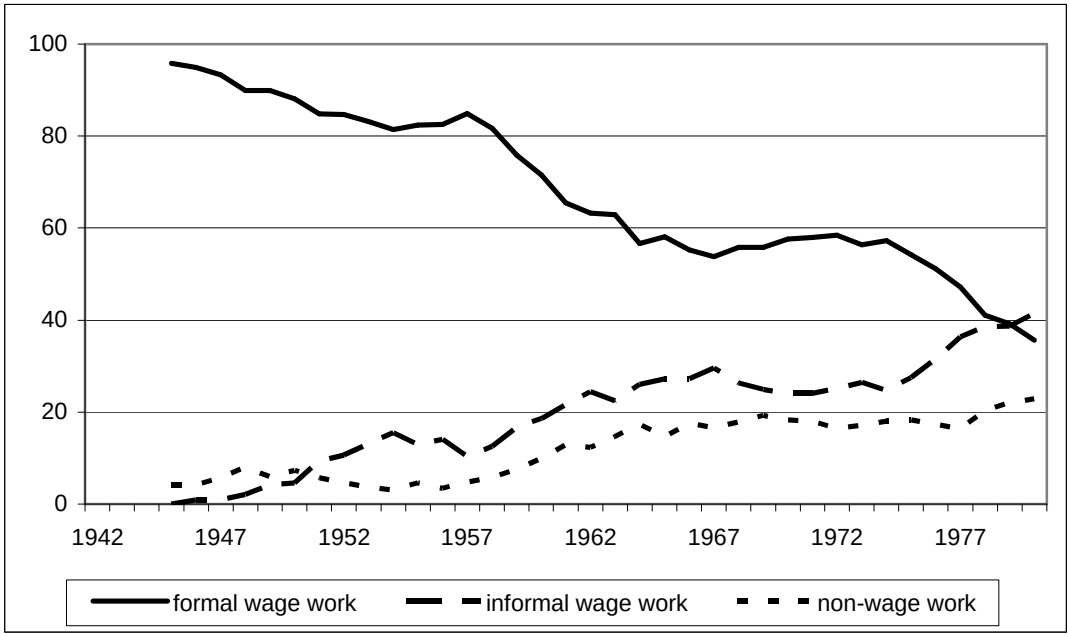
Hypothesis 4: Men with formal wage work have a higher hazard of marrying compared to men with informal wage work.

Hypothesis 5: Men exposed to the decline in government and public sector, i.e. formal, jobs in the 1980s and 1990s, do not have a significantly lower hazard of marrying.

Hypothesis 6: Obtaining a formal (increasingly private sector) job in the more recent LM periods is associated with a higher hazard of marrying compared to obtaining a formal (government sector) job under the employment guarantee scheme.

We do not expect any impact of the phasing out of the employment guarantee scheme on men's age at first marriage. The argument is that this policy measure did not affect the selection of new employees based on quotas so that having a government sector job did not provide an additional signal to men's educational attainment. This is in contrast to the increasingly available private sector jobs where hiring is (becoming increasingly) based on applicants' ability. Hence, highest-quality men can signal their ability through their labor market achievement.

In line with the literature (e.g., Guitérrez-Domènech 2008), we lag variables that are related to the employment status by 1 year in order to capture the time-lag between the decision to marry and marriage itself.



Note: Four Year Moving Average.

Figure 2. Type of First Job for Men with Secondary Degree and Above (by Year of Birth).

4 Econometric Model and Control Variables

We use duration analysis in order to be able to take into account the fact that the probability of marrying is conditional on how long the individual remains in the unmarried state and that this time dependence could be non-linear. Duration models also allow us to include in the analysis both married and unmarried men (with the latter treated as censored observations) and to include time-varying covariates. Although marriage takes place in continuous-time, we observe spell lengths in units of one year. Our spell lengths are thus interval-censored and we have to deal with 'grouped' or 'banded' data. Consequently, we estimate discrete-time duration models rather than continuous time models. Data are restructured so that the sample actually consists of person-years rather than persons, i.e., each observation is an individual in a given spell year (age). Moreover, the basic model we estimate allows for unobserved heterogeneity (see Jenkins 2005). More specifically, we assume a parametric Gamma distribution of the disturbances. This is a common approach since it is a continuous distribution with a support of 0 and above, a mean of one and finite variance which provides a closed form expression for the survival function with frailty (Jenkins 2005). Consequently, the discrete-time hazard function at interval j now includes a normally distributed random variable ε_i and is given by:

$$h_j(X_{ij}) = 1 - \exp\{-\exp[X_{ij}'\beta + \gamma_j + \log(\varepsilon_i)]\}$$

where X_{ij} is a vector of time-varying and time-constant covariates with observed characteristics for person i and interval j, β is a vector of parameters to be estimated and γ_j is the logarithm of the integral of the baseline hazard over interval j (Jenkins 1997, 2005). We use the STATA program *pgmhaz8* written by Jenkins to undertake the estimation.

Note: Vertical bars indicate 95% confidence intervals

Figure 3: Discrete-Time Hazard Function for the Age at First Marriage for Men Born 1947-9177.

Figure 3 shows the discrete-time hazard function based on life table estimates that take censoring into account. For discrete-time survival data, the hazard function gives the conditional probability that marriage occurs in year t, given that the person had remained unmarried until that year. To derive continuous survival times, we follow the common assumption that failures within each interval occur at a uniform rate so that one essentially estimates the rate for the midpoint of each interval, the so-called "actuarial adjustment" (Jenkins 2005). The hazard function shown in Figure 3 reveals a non-monotonic relationship with age, first increasing until age 30, then remaining roughly constant for another decade before declining again at higher ages.

Very few men (in total 50 observations) married before age 18, the earliest marrying at age 14. Because of the small number of cases, we exclude individuals who married before age

18, the legal age at first marriage for men in Egypt. After age 39, few men are left unmarried and confidence intervals become larger. We therefore deliberately truncate our sample at age (i.e., spell year) 39. By that age 95 percent of men born between 1947 and 1977 are married. To capture the age profile shown in Figure 3 in our modeling work, we use a non-parametric specification of the baseline hazard, the least restrictive specification of the age dependency. This specification essentially implies including dummy variables for each spell year in which marriage occurs, in our sample thus from spell year 18 onwards. By excluding the dummy for spell year 32, we designate that to be the reference category.

In addition to the variables explained in detailed above, we control for school enrolment, a time-varying, binary covariate that captures whether for a given spell year (i.e. age), the individual is attending school or not. Since the analysis is restricted to spell years 18 onwards, the variable varies mainly for those with university degree and above. In line with the literature, we furthermore control for the annual sex ratio, i.e. the number of males per 100 females in the population using the UN Population statistics. From 1965, when the 1947 birth cohort is 18 years old, up to 2005 the annual sex ratio has been on average 100.90 with a minimum of 100.36 and a maximum of 101.47.[8] Finally, due to stark regional differences in Egypt, we distinguish the following six regions of residence in our model: the Greater Cairo Region, Alexandria and Suez Canal, rural and urban Lower Egypt and rural and urban Upper Egypt. We expect men in rural areas, especially in Upper Egypt, to marry earlier compared to their urban counterparts.

5 Results

5.1 Cohort and Education Effects

In the first model (see Table 2), we do not include any interaction terms between cohort and educational level. We have chosen secondary degree as reference category in order to be able to directly assess in the second model with the interactions terms whether low-educated men have changed their marriage behavior over time. Note that the gamma variance is significant in both models (see Appendix Table 2). We therefore report marginal effects from estimating the duration models assuming a gamma distribution to control for unobserved heterogeneity. In Models 3 and 4 later-on, when we include additional variables that seem to

[8] We would have liked to capture the age gap between spouses in the sex ratio. Yet, data on age groups by gender are available only every five years. We therefore preferred the annual data.

capture individual differences better, in part probably because they are time-varying, unobserved heterogeneity is not significant anymore and, as a result, estimated coefficients of the frailty and non-frailty model are very much alike (see next Section). In turn, when interpreting the exponentiated coefficients in the first models with gamma frailty we should be cautious about the size of the effects as these estimates will tend to be too large. We therefore discuss estimates of variables of less interest for this paper later.

Like most previous studies (e.g., Yabiku 2005, Ghimire 2005) we find that being enrolled in school significantly reduces the hazard of marrying (see Model 1 and 2, Table 2). Correcting for enrollment status, higher educational attainment significantly delays marriage. Having a university degree or above, for instance, reduces the hazard by 59% (Model 2) compared to secondary graduates. Vice versa, having a less than secondary degree strongly increases the hazard, though presumably less than suggested by our estimates as discussed above. This may be due to the fact that educated men are more likely to marry educated women and that these women and their families are more likely to insist on having independent living arrangement upon marriage and higher standards of living within marriage, both of which raise the cost of marriage and may therefore delay it.

Hazard estimates for the cohort dummies are quite different from our expectations. Instead of a gradual delay in marriage over the first three cohorts, results suggest an increase in the hazard of marrying from the first to the second and from the third to the fourth cohorts (in both Models, the estimates for the 1961-1965 and the 1966-1972 cohorts are statistically not different from each other with p=0.7992 for Model 1 and p=4620 for Model 2). Hence, we cannot confirm Hypothesis 1, albeit later in Model 4, when we restrict our analysis to secondary graduates and above and additionally control for labor market conditions and type of employment, we do find a significant delay for the 1966-1972 cohort.

	Model 1	Model 2
school enrolment	0.733**	0.757**
	(0.095)	(0.098)
no educational degree [1]	4.059***	6.228***
	(0.465)	(1.048)
primary or preparatory degree[1]	2.240***	3.537***
	(0.254)	(0.683)
university degree and above[1]	0.417***	0.411***
	(0.045)	(0.075)
1961-1965 cohort[2]	1.274**	1.479*
	(0.154)	(0.305)
1966-1972 cohort[2]	1.312*	1.704***
	(0.192)	(0.349)
1973-1977 cohort[2]	2.106***	2.677***
	(0.323)	(0.545)
1961-1965 cohort * no educational degree		0.776
		(0.196)
* primary or preparatory degree		0.543*
		(0.176)
* university degree and above		1.053
		(0.300)
1966-1972 cohort * no educational degree		0.484***
		(0.112)
* primary or preparatory degree		0.669
		(0.184)
* university degree and above		0.858
		(0.203)
1973-1977 cohort * no educational degree		0.366***
		(0.086)
* primary or preparatory degree		0.429***
		(0.111)
* university degree and above		1.202
		(0.270)
N	6052	6052
person-years	65393	65393

* p<0.10, ** p<0.05, *** p<0.01, *italic:* time-varying covariates
[1] reference category: secondary degree, [2] reference category: 1947-1960 cohort

Hazard ratio estimates from estimating discrete-time duration models with a non-parametric baseline hazard specification and allowing for gamma frailty using the ELMPS 06. Estimations are restricted to men born 1947-1977 and to spell year 18 to 39.
For all other marginal effects, see ***Appendix Table 2***.

Table 2: Education and Cohort Effects on Male Age at First Marriage.

The interaction terms in Model 2 imply that the exponentiated coefficients for the non-interacted cohort and the non-interacted education dummies reflect the mean effect. Contrary to Hypothesis 2 but in line with Figure 1, men with primary or preparatory degree have been the first to experience a delay in marriage; the hazard of marrying for this group declines by 56 percent from the 1947-1960 to the 1961-1965 cohort. Moreover, the non-educated men born between 1966 and 1972 seem to driving the delay in marriage observed for this cohort as a whole. In the adjacent cohort (1973-1977), all men with a less than a secondary degree have

a lower hazard of marrying. Albeit this confirms Hypothesis 3, we cannot find further differences among the four educational levels. Coefficients for men with no and with primary or preparatory degree are not significantly different from each other (p=0.5532), neither are the effects different for those with university degree and above compared to those with secondary degrees. Hence, the main divide appears to be at the secondary level. This is consistent with the segregation one can observe in the labor market and thus supports our approach in the next section, which is to restrict the analysis to those with secondary degrees or above. A comparison of the estimates of the un-interacted schooling dummies across models 1 and 2 reveals that the coefficients of the "no educational degree" and "primary or preparatory degree" dummies increase. Hence, in Model 1, they capture part of the delay that lower-educated men of the younger cohorts experienced. Finally, given this delay among men of the younger cohorts and the fact that the lower-educated men have significantly higher hazard estimates overall, this suggests that the age at first marriage is converging for men from different educational levels.

5.2 Labor Market Period and Employment Status Effects

From this point on, we restrict the analysis to men with secondary degree and above, i.e. those who have experienced major changes in their labor market prospects in the last three decades. Starting with Model 2 in the previous section, we add the employment-related factors, first without (Model 3) and the then with interactions terms for labor market period and employment status (Model 4). Interestingly, our explanatory power seems to have improved significantly as unobserved heterogeneity does not play a statically significant role anymore. We nevertheless present the frailty results for the final model for comparison. As one would expect given that unobserved heterogeneity is insignificant, estimates are very similar for the frailty and non-frailty model, see Table 3 and Appendix Table 3. After including the interaction terms, being born between 1966 and 1972 does reduce the hazard of marrying, which is in line with Hypothesis 1. Hence, in the earlier models, changes in the labor market were being captured by the cohort variables, masking the delay that occurred for people with similar labor market outcomes. University degree and above versus secondary degree remains insignificant and the effect of school enrolment status is slightly lower than in the first two models.

We find evidence for Hypothesis 4, i.e. men with a formal job have a significantly higher hazard of marrying – 2.14 times in Model 4 – compared to men with an informal job. Albeit Model 3 suggests that men in informal wage work also have a generally higher hazard of

marrying than those not working, it seems to be restricted to the years 1983 to 1990, since these two coefficients lose their significance when we include the interaction terms (see Model 4). Even in Model 3, however, the hazard of marrying for men with a formal job is significantly larger (p=0.000) than for men with an informal job (and larger at the 5 percent significance level than men with non-wage work).

In line with Hypothesis 5, we find that the 1983-1990 labor market period is not significantly different from the reference period. Thus, the overall delay in marriage for men born in the late 1960s and early 1970s has not been caused by the phasing-out of the employment guarantee scheme but by other factors, such as rising expectations about living standards and, possibly, developments in the housing market as Assaad and Ramadan (2008) suggest.

Our last hypothesis concerns the changing value of having a formal job on the age at marriage. We do not find such an effect for the first three labor market periods but for the last one (1999-2005), albeit only at the 10 percent significance level. Surprisingly, however, men in informal wage work follow suit (estimates are not significantly different from each other, p=0.4799). Another surprising result is that men with an informal job in the 1983-1990 period have a higher hazard of marrying compared to the previous and the subsequent period. An explanation for this later finding could be that these men were waiting for a formal job and chances in the 1983-1990 period were still relatively high (or at least people believed them to be high). By the1999-2005 period, brides and their families are likely to have adapted their expectations about the appropriateness of jobs for potential grooms. And even though female age at marriage has increased over the last few decades, societal pressure on women to marry at young age is still immense. Marriage is also essentially the only way for young women to move out of their parents' home as independent living is socially not accepted and financially for most part of the society not feasible. In part, this change in expectations might also be explained by the recent private sector development in Egypt. Even though still few jobs offer social insurance and a formal contract, earnings and career opportunities have improved, at least for the well-educated (World Bank 2007).

	Model 3 (non-frailty)	Model 4 (non-frailty)	Model 4 (frailty)
school enrolment	0.819*	0.811*	0.814*
	(0.094)	(0.093)	(0.095)
university degree and above[1]	0.903	0.891	0.881
	(0.071)	(0.070)	(0.081)
1961-1965 cohort[2]	1.117	1.065	1.069
	(0.119)	(0.116)	(0.121)
1966-1972 cohort[2]	0.851	0.793*	0.795*
	(0.109)	(0.106)	(0.110)
1973-1977 cohort[2]	0.990	0.896	0.901
	(0.153)	(0.146)	(0.153)
1961-1965 cohort * university degree and above	0.788*	0.815	0.811
	(0.100)	(0.104)	(0.107)
1966-1972 cohort * university degree and above	0.976	0.992	0.990
	(0.105)	(0.108)	(0.111)
1973-1977 cohort * university degree and above	0.893	0.891	0.894
	(0.099)	(0.100)	(0.104)
LM period 1983-1990[3]	1.369**	1.182	1.188
	(0.192)	(0.182)	(0.190)
LM period 1991-1998[3]	1.350	1.305	1.316
	(0.292)	(0.292)	(0.310)
LM period 1999-2005[3]	2.575***	2.117***	2.127***
	(0.588)	(0.523)	(0.545)
non-wage work (lagged 1 year)	2.095***	2.027***	2.028***
	(0.182)	(0.430)	(0.435)
informal wage work (lagged 1 year)	1.850***	1.263	1.248
	(0.164)	(0.304)	(0.308)
formal wage work (lagged 1 year)	2.344***	2.158***	2.145***
	(0.188)	(0.285)	(0.291)
*LM period 1983-1990 * non-wage work (lagged 1 year)*		0.979	0.979
		(0.236)	(0.238)
** informal wage work (lagged 1 year)*		1.741**	1.754**
		(0.459)	(0.469)
** formal wage work (lagged 1 year)*		1.139	1.144
		(0.161)	(0.166)
*LM period 1991-1998 * non-wage work (lagged 1 year)*		0.983	0.981
		(0.229)	(0.232)
** informal wage work (lagged 1 year)*		1.447	1.457
		(0.381)	(0.388)
** formal wage work (lagged 1 year)*		0.905	0.907
		(0.142)	(0.144)
*LM period 1999-2005 * non-wage work (lagged 1 year)*		1.204	1.211
		(0.284)	(0.289)
** informal wage work (lagged 1 year)*		1.605*	1.625*
		(0.422)	(0.436)
** formal wage work (lagged 1 year)*		1.353*	1.368*
		(0.216)	(0.227)
N	2909	2909	2909
person-years	34926	34926	34926

* p<0.10, ** p<0.05, *** p<0.01, *italic:* time-varying covariates
[1] reference category: secondary degree, [2] reference category: 1947-1960 cohort, [3] reference category: labor market (LM) period 1965-1982

Hazard ratio estimates from estimating discrete-time duration models with a non-parametric baseline hazard specification and allowing for gamma frailty using the ELMPS 06. Estimations are restricted to men born 1947-1977 and to spell year 18 to 39. For all other marginal effects see ***Appendix Table 3***.

Table 3: Labor Market Effects on Male Age at First Marriage for Men with Secondary Degree and Above.

As regards other variables we are controlling for, see Appendix Tables 2 and 3, we find that consistent with the literature, higher sex ratios, i.e. more men relative to women in a given year, strongly decrease the likelihood for men to marry. The results for the region of residence are also as expected. Whereas the coefficients for urban and rural Lower Egypt are significantly different from each other at the 5 percent significance level, the coefficients for rural Lower and rural Upper Egypt are not. This suggests that there is essentially an urban-rural divide with regard to male age at first marriage, i.e. men living in rural areas are much more likely to marry early compared to their urban counterparts.

6 Conclusions

In this paper, we have been interested in the role that men's educational attainment and employment status play with regard to their marriage age and whether these roles have changed over time (i.e. across cohorts) and, respectively, over labor market periods. We find some evidence for Hypothesis 1, i.e. there has been a significant delay for men born between 1966 and 1972, if we restrict our analysis to secondary and above graduates and control for labor market related determinants; otherwise, we find an increase in the hazard of marrying over cohorts (Models 1 and 2). Controlling for cohorts, results suggest that the non-educated men are the drivers for the delay in marriage for the 1966-1972 cohort. Moreover, lower-educated men of the younger cohorts tend to have a higher hazard of marrying. As a result, there is convergence among men with different education levels with regard to the age at first marriage. What remains puzzling is that men with primary or preparatory degree are the first to experience a reduction in the hazard of marrying, i.e. before the non-educated. This suggests that further analysis is needed to look at additional determinants of the age at first marriage for lower-educated men.

Contrary to anecdotal evidence, the delay in marriage for the 1966-1972 cohort was not caused by labor market-related factors – we do not find any significant effect for the 1983-1990 and the 1991-1998 periods. Employment status does, however, matter: men with formal wage work have a higher probability to marry than those with informal wage work. Moreover, estimation results support that among secondary and above graduates the age at first marriage is declining significantly in the last labor market period (1999-2005), in particular for men with (formal or informal) wage work. This might suggest that Egypt's private sector is eventually showing some improvement in the sense that jobs are given to highest-ability men and that these jobs are of becoming of better quality in terms of earnings and working

conditions. This result provides a more optimistic picture than labor market studies (e.g., Assaad 2007), at least for the well-educated.

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Appendix

Birth cohorts tested against each other	Log-rank test for the equality of survivor functions
1947 vs. 1948	0.9681
1947 vs. 1949	0.4799
1947-1949 vs. 1950	0.8856
1947-1949 vs. 1951	0.4445
1947-1949 vs. 1952	0.7430
1947-1949 vs. 1953	0.1967
1947-1949 vs. 1954	0.4970
1947-1949 vs. 1955	0.5088
1947-1949 vs. 1956	0.8479
1947-1949 vs. 1957	0.8853
1947-1949 vs. 1958	0.2420
1947-1949 vs. 1959	0.2949
1947-1949 vs. 1960	0.4661
1947-1949 vs. 1961	**0.0419**
1947-1949 vs. 1962	**0.0086**
1947-1949 vs. 1963	**0.0011**
1947-1960 vs. 1961-1963	**0.0000**
1961-1963 vs. 1964	0.8510
1961-1963 vs. 1965	0.7237
1961-1963 vs. 1966	**0.0006**
1961-1963 vs. 1967	**0.0036**
1961-1963 vs. 1968	**0.0062**
1961-1965 vs. 1966-1968	**0.0000**
1966-1968 vs. 1969	0.5170
1966-1968 vs. 1970	0.4494
1966-1968 vs. 1971	0.1512
1966-1968 vs. 1972	0.2638
1966-1968 vs. 1973	**0.0328**
1966-1968 vs. 1974	**0.0444**
1966-1968 vs. 1975	**0.0003**
1966-19672 vs. 1973-1975	**0.0000**
1973-1975 vs. 1976	0.2642
1973-1975 vs. 1977	0.2467
1973-1975 vs. 1978	**0.0003**
1973-1975 vs. 1979	**0.0053**
1973-1975 vs. 1980	**0.0001**
1973-1977 vs. 1978-1980	**0.0001**

Note: The tests are restricted to age 39 where the cumulative failure is 95%. If the log-rank test revealed significantly different survivor functions for three birth cohorts in a row, these three cohorts were tested against the previous cohort group.

Results suggest comparing the following cohort groups: 1947-1960, 1961-1965, 1966-1972, and 1973-1977.

Appendix Table 1: Constructing Cohort Groups with Similar Survival Function.

	Model 1	Model 2
d18	0.000***	0.000***
	(0.000)	(0.000)
d19	0.001***	0.001***
	(0.000)	(0.000)
d20	0.001***	0.001***
	(0.000)	(0.000)
d21	0.001***	0.002***
	(0.001)	(0.001)
d22	0.002***	0.003***
	(0.001)	(0.001)
d23	0.004***	0.004***
	(0.002)	(0.002)
d24	0.008***	0.009***
	(0.003)	(0.003)
d25	0.015***	0.016***
	(0.005)	(0.005)
d26	0.025***	0.026***
	(0.007)	(0.007)
d27	0.045***	0.046***
	(0.011)	(0.011)
d28	0.079***	0.081***
	(0.017)	(0.018)
d29	0.140***	0.143***
	(0.026)	(0.026)
d30	0.324***	0.329***
	(0.047)	(0.047)
d31	0.535***	0.539***
	(0.059)	(0.059)
d33	1.675***	1.661***
	(0.204)	(0.201)
d34	3.198***	3.144***
	(0.528)	(0.514)
d35	4.785***	4.667***
	(1.039)	(1.000)
d36	8.911***	8.629***
	(2.372)	(2.263)
d37	14.792***	14.211***
	(4.752)	(4.495)
d38	18.907***	18.041***
	(7.168)	(6.736)
d39	24.651***	23.397***
	(10.598)	(9.911)
sex ratio	0.342***	0.389***
	(0.053)	(0.061)
Alexandria and Suez Canal[3]	0.691***	0.703***
	(0.088)	(0.089)
urban Lower Egypt[3]	1.195	1.211
	(0.142)	(0.143)
rural Lower Egypt[3]	1.860***	1.854***
	(0.193)	(0.192)
urban Upper Egypt[3]	1.370***	1.376***
	(0.159)	(0.159)
rural Upper Egypt[3]	3.040***	3.054***
	(0.353)	(0.356)
constant	7.10e+47***	1.41e+42***
	(1.11e+49)	(2.25e+43)
gamma variance	2.538***	2.510***
	(0.238)	(0.232)

Note: With regard to the non-parametric baseline hazard, the reference is spell year 32.
[3] reference category: Greater Cairo Region

Appendix Table 2: Continuation of Table 2.

	Model 3 (non-frailty)	Model 4 (non-frailty)	Model 4 (frailty)
d18	0.036***	0.037***	0.035***
	(0.013)	(0.014)	(0.015)
d19	0.053***	0.055***	0.052***
	(0.016)	(0.016)	(0.019)
d20	0.072***	0.074***	0.070***
	(0.018)	(0.018)	(0.023)
d21	0.071***	0.073***	0.069***
	(0.017)	(0.018)	(0.022)
d22	0.143***	0.150***	0.142***
	(0.025)	(0.027)	(0.038)
d23	0.226***	0.237***	0.225***
	(0.033)	(0.035)	(0.054)
d24	0.329***	0.346***	0.330***
	(0.042)	(0.044)	(0.073)
d25	0.418***	0.437***	0.418***
	(0.049)	(0.052)	(0.086)
d26	0.465***	0.483***	0.463***
	(0.053)	(0.055)	(0.088)
d27	0.601***	0.620***	0.598***
	(0.065)	(0.067)	(0.103)
d28	0.708***	0.726***	0.706**
	(0.075)	(0.077)	(0.107)
d29	0.753***	0.772**	0.754**
	(0.080)	(0.083)	(0.103)
d30	0.967	0.981	0.966
	(0.102)	(0.104)	(0.117)
d31	0.959	0.962	0.954
	(0.107)	(0.107)	(0.110)
d33	0.869	0.871	0.877
	(0.115)	(0.115)	(0.118)
d34	0.945	0.951	0.964
	(0.132)	(0.133)	(0.143)
d35	0.725*	0.718**	0.732*
	(0.120)	(0.119)	(0.133)
d36	1.011	1.007	1.035
	(0.164)	(0.164)	(0.199)
d37	0.785	0.769	0.796
	(0.155)	(0.152)	(0.189)
d38	0.811	0.790	0.823
	(0.176)	(0.172)	(0.219)
d39	0.631*	0.622*	0.652
	(0.170)	(0.167)	(0.211)
sex ratio	0.636**	0.698	0.687
	(0.139)	(0.174)	(0.190)
Alexandria and Suez Canal[4]	1.067	1.067	1.066
	(0.079)	(0.079)	(0.081)
urban Lower Egypt[4]	1.180**	1.187**	1.190**
	(0.083)	(0.083)	(0.086)
rural Lower Egypt[4]	1.365***	1.364***	1.376***
	(0.087)	(0.087)	(0.100)
urban Upper Egypt[4]	1.021	1.018	1.017
	(0.068)	(0.068)	(0.069)
rural Upper Egypt[4]	1.441***	1.447***	1.468***
	(0.106)	(0.107)	(0.137)
constant	4.72e+18*	4.55e+14	2.34e+15
	(1.04e+20)	(1.14e+16)	(6.54e+16)
gamma variance			0.037
			(0.135)

Note: With regard to the non-parametric baseline hazard, the reference is spell year 32.
[4] reference category: Greater Cairo Region

Appendix Table 3: Continuation of Table 3.