Education Returns in the Marriage Market: Does Female Education Investment Improve the Quality of Future Husbands in Egypt?

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Abstract

Investment in female education may have non-labor-market motives, especially in the context of developing countries with bride-price systems. The hypothesis in this paper is that the expectation of better marriage prospects and the potential upward social mobility for an educated woman influences parental educational investment decisions. This paper examines how female education improves marriage characteristics in Egypt, including husband quality variables such as his education, his pre-marital wealth level and other marital characteristics. The relative contribution of spouses to marriage costs is also analyzed. Findings suggest that a high level of female education plays a strong role in her marrying a highly educated husband. It is also found that female education is highly associated with living independently upon marriage, as opposed to living in an extended-family household, and negatively associated with being in a consanguineous marriage. Female education seems to play an insignificant role with respect to the share of marriage costs borne by a bride and her family.

1. Motivation

This paper is motivated by the result found in my earlier work[1] in which gender differentials with respect to tutoring investment decisions in Egypt examined. I found--using the Egypt Labor Market Survey ELMS 98-- that even though an education gender bias generally exists in Egypt, there was no such bias detected in the context of tutoring. This finding was puzzling given the discretionary nature of such an investment: why would parents decide to bear the additional educational costs of tutoring when the labor market payoff for females is expected to be limited? It was concluded that while investment in male education is primarily motivated by market returns, investment in female education may have non-market-oriented motives. It may be the marriage market returns that justify investments in female education. This paper aims to examine how female education improves female marriage prospects, in terms of husband characteristics such as education and pre-marital wealth and other marital characteristics, in order to test for the hypothesis that one of the main motives for investing in female education in Egypt is marriage returns.

The remainder of the paper is organized as follows. In the next section, the literature is reviewed. The third section provides some institutional details about marriage in Egypt as well as elaborates on the paper hypothesis. The fourth section describes the data and methodology. Results and concluding remarks are shown in the last section.

2. Literature Review

Even though the education returns literature was predominantly focusing on market returns, some efforts have been made to take into account non-market returns of

[1] The paper title is "Private and Group Tutoring in Egypt: Where is the Gender Inequality?" and is joint with Ragui Assaad, Deborah Levison and Dennis Ahlburg.

education (Behrman and Stacey 1997, Michael 1973, Michael 1982, Wolfe and Haveman 1982 & 2001, Wolfe and Zuvekas 1997). Wolfe and Haveman (1982, 2001) try to estimate non-market returns and they provide a compilation of non-market benefits examined in the literature. Among these are the relation between own-education and own-health, spouse-cross-productivity effects where there is a relation between wife's education and her husband's earnings[2], effect of (mother's) education on children quality e.g., child education and health and the relation between (mother's) education and fertility. They also refer to marital choice efficiency as a non-market outcome of education and they cite the limited evidence of improved sorting in marriage market found in Becker et al. (1977).

Becker et al. (1977) analyze factors negatively affecting the gains from marriage and hence marital instability. They indicate that theoretically, education has an ambiguous effect on the gain from marriage and the probability of marriage dissolution: on the one hand it has a positive impact that arise because of an optimal sorting effect while on the other it affects the gains from marriage adversely because it may lead to less (spousal) specialization.[3] Empirically, they find that the simple correlation between education and divorce rates is negative. However, using multivariate regressions they find that education has a statistically insignificant effect.

The theoretical argument about how education relates to marital instability is in line with Becker's earlier seminal work on marriage (for example see Becker 1973, 1974, 1991). The basic premise in Becker's theory is that the decision to marry is based on an

[2] There is a large literature on cross-productivity effects. Examples include Benham (1974) and Tiefenthaler (1997).

[3] As the wife is more educated, she is less prone to specialize in household production and more prone to engage in market activities. In other words, there would be less division of labor.

individual's perceived gains from entering marital union (compared to remaining single) subject to the constraint of time and resources (households are endowed with production functions of nonmarket household commodities)[4].

Specialization within the household and assortative mating come as direct behavior implications of his theory. Positive assortative mating will take place along traits considered as complements in the production of the household good. Negative assortative mating would take place along traits that are substitutable. A key example is the negative sorting by wage rate and labor market productivity, in which case, males with high-wage males would specialize in market activities and marry low-wage females who would specialize in household activities.

Education, given a certain division of labor, improves productivity in both the labor market and household domain[5] thereby bringing about positive assortative mating[6] and at the same time specialization. On the other hand, if educated women are more prone to join the labor market, the marriage gains resulting from division of labor would not arise and therefore the direction of assortative mating could be negative.

In addition, educated women who acquire earning power may have weaker incentives to marry. This is in line with the independence hypothesis adopted to explain the retreat from marriage in the US and in developed countries. Female education attainment and work are thought, under this argument, to be the driving cause of the decrease in marriage prevalence since independent women can afford not to marry or at

[4] In his analysis, the production of nonmarket goods employs market goods and labor time of household members as inputs.
[5] The more educated can be of higher productivity in the household sector because of higher efficiency given a certain production function (as in Becker's work) or because they may use different production techniques.
[6] Studies in which positive assortative mating was found include Rockwell (1976), Kalmijn (1991) and Mare (1991).

least can afford marriage delays. In addition, educated women are expected to have higher standards when it comes to mate selection (Fossett and Kiecolt 1993).

A sizeable sociology literature has developed to examine the factors causing the retreat from marriage[7]. Despite initially finding some evidence supporting the independence argument (largely using aggregate-level data)[8], subsequent studies found that female attainment was actually positively related to the propensity to marry (e.g., Fossett and Kiecolt 1993, Goldscheider and Waite 1986, Lichter et al. 1992, Qian and Preston 1993). One explanation was that economically independent females were becoming attractive potential mates because of their capacity to contribute to household spending especially in a time where economic conditions and male employment were not promising.

In the economics literature on marriage, gains of marriage considered were (unsurprisingly) of economic nature (e.g., economies of scale, division of labor based on comparative advantage, sharing of public goods and insurance). However, the theory did not explicitly acknowledge other motives such as upward social mobility arising from marrying up. That was not the case in the sociological literature where some analysis of how female education plays a role in attaining upward social mobility through marrying high-status or potentially high-status males was undertaken. Elder (1969) examined the effect of education and attractiveness on marrying high-status males (measured by occupational prestige). He found, using multivariate analysis, that education helped in achieving mobility through marriage especially for females from the middle-class. Taylor and Glenn (1976) undertake similar analysis and find that education has a moderately

[7] Part of this literature was trying to explain marriage likelihood differentials by race.
[8] Oppenheimer (1997 p.437) discusses the drawbacks of the analyses used in those papers.

significant effect on marrying a high-potential husband while the attractiveness effect is close to zero.

3. Female Education and Marriage Outcomes in Egypt: Theoretical Arguments

Culturally speaking, marriage is a very central event in the Egyptian society. Getting children married is a very vital matter for parents and often represents a major expense to them. Daughters marriage can be perceived as more critical compared to sons because of the difference in fecundity horizons by gender and because of the concept of "honor". I hypothesize that one primary incentive parents have when making decisions regarding investment in their daughter's education is the improved marriage prospects and associated potential upward social mobility. Female education is therefore an intergenerational transfer mechanism used by parents.

Education can help a woman to match with a high-status man via two mechanisms: (1) higher-status men would prefer more educated females as future spouses (2) female education can reduce the transaction and search costs of matching with a high-status person for example because higher education institutions provide an opportunity for daughters to meet potential husbands.

A male preference for an educated wife in the Egyptian context does not primarily stem from the expected higher earnings, and hence expected higher contribution to household income, that a more educated wife has. It is rather because a more educated wife is expected to be more capable and more productive in raising high-quality children: a household public good. A mother's level of education is particularly thought to be positively related to child nutrition, health and education[9].

[9] It is also possible, in the Egyptian context, that more educated wives provide insurance as they are more capable of raising income for example in the case of husband illness.

There is a large body of literature on the channels through which maternal education positively affects child outcomes in developing and developed countries. One channel is related to the higher bargaining power educated mothers enjoy in making intra-household allocation decisions. However, according to the hypothesis of this paper, males, at the outset, choose a wife with characteristics they think are associated with better child outcomes. For example, educated mothers are more capable of properly nourishing a child and of averting and handling child illnesses. They are also more capable of helping their children in studies (Behrman et al.1999 find that in India child study hours per day are related to mother's education).

In addition to the two general mechanisms discussed above, there can be a third mechanism that is set in motion by recent tightening in the marriage market: education can play an important role in improving female competitiveness in the marriage market. Several factors can be thought to cause tightening in the marriage market in Egypt and hence call for more competitiveness. First, the level of education has generally increased for girls more than boys[10] implying that the level of education needed to secure a good match. Second, given that a spousal-age-gap is a marriage regularity in Egypt[11], a marriage squeeze could very well exist as a result of population growth (because a smaller male cohort would be matched with a bigger female cohort). Third, the rising unemployment entails a more limited pool of marriageable males. The above factors would generate more competition among females thereby pushing for profile-improving investments such as education.

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[10] There is more on this point in section 4.4.

[11] As will be discussed in the next section, it is found that for marriages that started between 1985 and 2006, husbands are 6 years older than wives on average.

The above discussion describes how female education can improve marriage prospects, an end parents may hope to achieve by investing in their daughter's education. Another incentive may be related to the contribution they will have to make towards their daughter's marriage in the future[12]. It is possible that the share of the costs borne by parents is negatively associated with the level of education of the daughter. Higher female education may result in the groom and his family contributing more (because of an improved bargaining position of the bride) and/or the daughter herself contributing more (because she is can work and save for their marriage). However, higher female education can also increase the contribution expected from the bride and her family. Therefore, the final effect of female education on the relative contribution of each partner is not unambiguous and would need to be tested.

4. Marriage in Egypt: Institutions and Data

4.1 Institutional details

Marriage in Egypt is generally viewed as a partnership between two families more than between two individuals. While marriage follows a bride-wealth system, a bride and her family are expected to contribute based on pre-defined traditions. A groom-to-be (and/or his family) is liable to offer his bride *mahr* (bride-wealth or dower) before marriage.[13] There is also an option of deferring part of the *mahr,* a *mu'akhar,* to a date later than the marriage contract date. Traditionally, a *mu'akhar* is to be paid only in the case of divorce and hence serves as an insurance payment. Grooms-to-be are also responsible to present a

[12] As will be explained in the next section, families of the bride and the groom usually share in the costs of marriage.

[13] Ideally, a *mahr* is meant to be a gift for the bride that serves to ensure her financial independence. However, in reality, the *mahr* is usually used towards purchasing items needed for the household such as furniture.

jewelry gift *shabka*, to arrange for housing and to buy some of the furniture and appliances needed for the marital household. The bride-to-be (and/or her family) is responsible for providing the *gihaz* (furnishings and trousseau[14]) and for acquiring part of the furniture. Other costs to be shared by both parties are the engagement and wedding ceremonies' costs.

The exact items and their quality vary by region and urban/rural residence and are thoroughly discussed in the pre-marital bargaining process in which the exact contributions of each partner towards the costs of marriage are determined. The bargaining position of each party can depend on factors such as relative socioeconomic status, spousal age gap, consanguinity, relative education levels and female work. Female education can increase the bargaining power of a bride and the *mahr* she receives. However, it can also increase the contribution expected from the bride and her family. Therefore, the final effect of female education on the relative contribution of each partner is ambiguous.

Marriage is usually preceded by an engagement period (which in turn can be subdivided into informal and formal engagement). This is the period in which the contribution of each party is determined (in addition to getting to know each other). There could possibly be a *katb-el-ketab* period where the couple is legally married but the couple does not live together yet.

4.2 Data

The dataset employed in this paper is the nationally-representative Egypt Labor Market Panel Survey ELMPS 06. It is a longitudinal survey that follows on the Egypt Labor Market Survey ELMS 98. ELMPS 06 includes detailed information on education and

[14] Examples of *gihaz* items include china, small kitchen appliances and carpets.

labor market variables. In ELMPS 06, the marital status of all individuals surveyed as well as the year and age at first marriage of individuals that were ever-married are known[15].

The ELMPS 06 individual questionnaire has a section eliciting more information on marriage characteristics[16]. Respondents to this section are ever-married women aged 16-49. Marriage-related information includes duration of pre-marriage stages (i.e., engagement stages and *katb-el- kitab*) in months, whether the husband is a relative (consanguineous marriage), and living arrangements upon marriage (i.e., whether the couple lived separately at the time of marriage or whether they were living as part of an extended-family household)[17].

The marriage section also has a detailed set of questions on the costs of marriage. The value of each cost component (*mahr, mu'akhar, shabka,* marriage ceremonies, housing, *gihaz*, and furniture/durables) is recorded. Moreover, the percentage contribution of each of the four involved parties: the bride, the bride's family, the groom and the groom's family, towards each cost component is identified. There is also a question on the percentage contributions towards total marriage costs (i.e., considering all cost components).

4.3 Marriage patterns based on ELMPS 06

This section aims at presenting some basic marriage patterns. Aspects of marriage discussed are marriage prevalence, female and male age at marriage, spousal age-gap, the extent of living independently upon marriage, the prevalence of consanguineous

[15] This information is also available in ELMS 98.
[16] No equivalent section exists in ELMS 98.
[17] Further details are gathered if the couple did not live independently at the time of marriage: which relatives they lived with, whether they shared living costs with the extended family and for how long they lived with the extended family.

marriages and the duration of pre-marriage stages. Furthermore, patterns of the costs of marriage are explored. Another important element examined is the distribution of husband education conditional on wife education and how this distribution was affected by changes taking place with respect to the non-conditional educational distribution of women and men. All figures provided are based on sampling weights[18].

4.3.1 Basic Marriage patterns

Variation in the different aspects of marriage is analyzed by urban/rural residence, by region[19] and by female (wife's) education, when relevant. In this paper, the focus is on marriages taking place in the last twenty years (1985-2006). Therefore, trends in marriage-related variables are examined within this time frame and often the 5-year marriage cohorts within 1985-2006 are compared.

The legal age of marriage for females in Egypt is 16 while that for males is 18. Figure 1 shows the percentage of ever-married men and women by age, both based on ELMS 98 and ELMPS 06. Marriage is practically universal in 1998 and 2006. Therefore, there is not a retreat from marriage accompanying the trend of increasing female education. Women approach universality at an earlier age than men but by their mid-thirties, almost all men and women would have ever-married. Ever-marrying is higher in rural areas at younger ages but there is a convergence in the percentage of ever-married individuals beyond mid-thirties.

Looking at the percentage of ever-married women by education level and age-group (Figure 2) shows that women with a university degree are less likely to be married

[18] The weight adjustment is used to offset an over-representation of urban areas.
[19] The regional breakdown used in this paper is as follows: Greater Cairo, Alexandria and Suez Canal governorates, Urban Lower Egypt, Rural Lower Egypt, Urban Upper Egypt and Rural Upper Egypt. For the purpose of this section, the regions of Greater Cairo and Alexandria and Suez Canal are lumped into an "Urban Governorates" category.

especially in their twenties. At older ages, the probability of ever-marrying among university graduates is closer to, though slightly lower than, other education groups. Similarly, university graduate males are less likely to be married for the younger age groups.

Divorce rates based on ELMS 98 and ELMPS 06 are very low. When the divorce rate is based on the ratio of divorced individuals to ever-married individuals, it is around 2%. A person who had divorced but re-married by the time of the survey would not be counted as divorced. No consistent difference in divorce rates by education level is observed.

Based on ELMPS 06, the mean female age at marriage for marriages taking place between 1985 and 2006 is 21. Looking at 5-year marriage cohorts shows that the average age at marriage for females rose from 20 years in the case of the 1985-1989 cohort to 22 in the 2000-2006 cohort (Figure 3). The increase in female age at marriage is larger for illiterate women and for those residing in Upper Egypt [20](Figure 4)[21].

For the marriage cohort of 1985-2006 as a whole, there are disparities in the age at marriage for females by education level, by urban/rural residence and by region. For example, the mean age at marriage is 19 for illiterate women and goes up to 24 for university graduate females. This is not surprising given that attending higher education institutions naturally delays marriage.

There is an average difference of 3 years between urban and rural areas for those married between 1985 and 2006: female age at marriage in urban areas is 23 while it is

[20] Upper Egypt is the Southern part of Egypt. This region generally has less developed infrastructure and a more conservative society.

[21] Conditioning on education level in Upper Egypt, the increase in female age at marriage becomes smaller suggesting that it may be caused by a compositional change where female education increased.

only 20 in rural areas. The urban/rural difference at each education level, however, only ranges from 1 to 2 years. This is because of the different educational composition where there are relatively more educated females (that tend to marry at a higher age) in urban areas. As for regional disparities, the female age at marriage is highest in the urban governorates region and lowest in Rural Upper Egypt. On average, regional differences can account for about 4 years of difference in female age at marriage (for marriages taking place between 1985 and 2006).

Male age at marriage has not gone up as much as female age at marriage. For the 1985-2006 marriages, the mean age at marriage for males is 27 and it has not really been increasing when comparing 5-year marriage cohorts within that period[22] (Figure 5). Within those marriage cohorts, however, there are disparities by wife education[23], by urban/rural residence and by region. Male age at marriage rises by wife education level: the mean age at marriage is 25 for those married to illiterate women and 30 for those married to university graduate women. There is also an average difference of 2-3 years between urban and rural areas: male age at marriage is 26 in urban areas and 29 in rural areas. As for regional differences, like in the case for females, the age at marriage is highest in the urban governorates region and lowest in Rural Upper Egypt.

Looking at the spousal age gap reveals that on average husbands are 6 years older than wives. There is no noticeable difference among 5-year marriage cohorts with respect to the spousal age-gap (Figure 6). In addition, there are no consistent differences by urban/rural areas or across regions or by female education levels.

[22] This is not in line with the anecdotal evidence that the male age at marriage has been rising.
[23] I am using variation by wife education since the focus of the paper is on marriage characteristics and how they relate to female education. Examining male age at marriage by (male) education gave similar results (not surprisingly so because of positive sorting by education).

Consanguineous marriages (where the husband and wife are relatives) are not uncommon in Egypt; 30% of marriages in the period 1985-2006 were consanguineous and 60% of these were marriages among cousins. Looking at 5-year marriage cohorts within that period shows that consanguineous marriages went down from 33% in 1985-1989 to 27% in 2000-2006 (Figure 7). This decrease took place in both urban and rural areas but was greater in urban areas. Another group witnessing a strong decline is the university and above education group where the likelihood of consanguineous marriages went down from 24% to 15%.

Within marriage cohorts, there are disparities by female education level, by urban/rural residence and by region. Apart from a spike at the R&W level, consanguineous marriages generally decrease as female education increases. For example 37% of illiterate women are married to a relative while only 16% of women with a university degree are married to a relative. This is expected given that attending higher education institutions increases the opportunities of getting to know potential spouses that are not relatives. Marrying a relative is more likely in rural areas (35%) compared to urban areas (22%). Consanguineous marriages are particularly common in rural Upper Egypt (46%).

Overall, 54% of couples married between 1985 and 2006 lived independently upon marriage. 95% of those who did not live independently at the time of their marriage lived with the husband's family[24] and also close to 90% of them did not separate in their living facilities. The percentage of couples living independently went up from 45% in the 5-year marriage cohort of 1985-1989 to more than 60% in the cohort of 2000-2006.

[24] Close to 5% of those who did not live independently at the time of their marriage lived with the wife's family.

As with other marriage characteristics, there are differences by female education level, by urban/rural residence and by region (Figure 8). The probability of living independently increases with female education: only 30% of illiterate women live independently upon marriage while around 84% of women with university degrees and above live independently upon marriage. Living with an extended family is a more common practice in rural areas. This is reflected in the figures where only 38% (76%) of women in rural (urban) areas live independently upon marriage. The urban/rural difference gets smaller for women with higher education levels. There are also differences by region (Figure 9). Looking closely, the differences are mainly along urban/rural lines. The rural parts of Lower and Upper Egypt are regions where the likelihood of independent living is the lowest. The urban parts of Lower and Upper Egypt are closer to the urban governorates. This is again linked to the extended family system being more prevalent in rural areas.

Finally, with respect to the pre-marital stages, their average duration for marriages between 1985 and 2006 is 15 months. There is no remarkable change over time, by education level, by urban/rural or by region.

4.3.2 Patterns of Costs of Marriage

The rank from highest to lowest contributor to the total costs of marriage between 1985 and 2006 is as follows: the groom (38%), the groom's family (30%), the bride's family (30%), and the bride (2%)[25,26]. Overall, the bride's family and the groom's family

[25] This same ranking also applies for the contribution to each cost component except for the contribution to furnishings which is largely a bride side obligation.

[26] The breakdown of contributions is similar across the 1985-1989 and the 2000-2006 marriage cohorts. However, there is a similar but slight decrease in what the groom contributes and a slight increase in what the families on both sides contribute (in both rural and urban areas).

contributions are close[27]. In rural areas, the groom's family contribution to total costs exceeds that of the bride's family whereas in urban areas the bride's family contribution exceeds that of the groom's family (Figure 10). It is worth noting that, in rural areas, the groom's family contributes more than in urban areas and that it slightly exceeds the groom's own contribution.

The bride's own contribution is minimal and is larger in urban areas. Also, in urban areas, even though university graduate brides still contribute a small amount, they contribute more than brides with less education. Another important thing to note is that the bride's family contribution does *not* decrease with their daughter's education. This provides initial evidence that parents are not really motivated by expected reductions in the contribution they have to make towards their daughter's marriage when they are formulating the education investment decisions.

Looking at individual cost components shows that 65% of women married between 1985 and 2006 did not receive any *mahr*[28] (dower). In addition, by comparing the 1985-1989 to the 2000-2006 marriage cohorts, the mean value of *mahr* has increased but by less than the other cost components. *Mahr* is more important in rural areas. Unlike urban areas, the *mahr* increased in rural areas across the 1985-1989 to 2000-2006 marriage cohorts (Figure 11). Generally speaking, *mahr* increases by female education but there is also a bit of a u-shape where illiterate women receive a higher *mahr*[29].

[27] This applies to individual costs as well except housing which is largely a groom (and/or his family) obligation and furnishings which is largely a bride (and/or her family) obligation as mentioned above.
[28] *Mahr* is the cost item with a large number of missing values. This is may be because of a coding problem where zero values were recorded as missing. These missing values are especially prevalent in the Lower Egypt region.
[29] This may be the case because that at lower levels of education, there is also low level of income making these women demand more mahr so that they are able to fund their part of the marriage cost obligations.

As for the rest of marriage costs (jewelry, furniture, housing, ceremony), the spending on each component almost doubled across the 1985-1989 to 2000-2006 marriage cohorts. The spending is higher in urban areas and is positively related to the bride's education level. The two components requiring the most spending are furniture and housing. This is followed by the spending on furnishings then that on jewelry and ceremony costs. *Mahr* is the lowest in value. The *muakhar* (deferred dower) is close to double the amount of *mahr*. The mean values of individual costs components for marriages between 1985 and 2006 are 9867 L.E. for furniture, 9443 L.E. for housing, 4049 for furnishing, 2409 for the jewelry gift, 1518 L.E. for the ceremony costs, 1363 L.E. for *mahr*, 2734 for the *muakhar*.

Variations in the relative contributions to the different components were generally found to be in line with the marriage traditions outlined earlier. For example, housing is mainly a groom side expense (it was found that the bride and her family contribute less than 10% of housing costs). Similarly, the bride and her family contribute only about 20% to marriage ceremonies. In contrast, the spending on furnishings is largely a bride's family obligation: close to 70% of spending is borne by the bride and her family. Generally, the bride's family contribution does *not* go down with the bride's education.

It is worth noting that those who do not live independently upon marriage tend to have smaller spending on marriage cost components. This is because they are not expected to bring in as much furniture or other things related to the house. Therefore, the relative difference by living independently is largest for housing and furniture costs and smallest for the *mahr* and *shabka*.

4.4 Husband and wife education

In this sub-section, the focus is on comparisons between 1985-2006: the "recent marriage cohort and 1965-1984: the "old" marriage cohort. There is clear positive sorting by education in matching (Figure 14). In addition, men are more likely to marry down and women are more likely to marry up as a result of men tending to be more educated. This is reflected in the observation that for a given level of education for a man (Figure 13): the adjacent cell down tends to be larger than the adjacent cell up whereas the opposite occurs for women (Figure 12).

Figure 12 also shows the advantage a highly educated female has over less educated females. For example, women with an intermediate degree only are 14% (34%) likely to marry a university graduate man in the recent (old) marriage cohort whereas women with a university degree are 74% (86%) likely to marry a university graduate man.

Looking at the distribution of education by gender across the 2 cohorts (Figure 14), shows that there is a general increase in education levels. For instance, the percentage of illiterate individuals has gone down and the percentage of individuals with intermediate and university degrees has gone up. The intermediate group increased by 40% for men and more than doubled for women. University graduates increased for men and women in both urban and rural areas. While the levels remain higher in urban areas, the rate of growth was relatively larger in rural areas. Also, within both urban and rural areas, while the levels remain higher for males, the rate of growth was larger for females.

Given positive sorting, the higher improvement for females has affected the patterns of matching by changing a woman's probability of matching with a man of a given level of education; men are now matching with women that are more educated than

before. For a woman with a given level of education, it is now less easy to match with a highly educated man.

This is reflected in the following observations: (1) a university graduate woman in the recent cohort is less likely to marry a university graduate man (Figure 12) because of the higher increase in the proportion of female university graduates. Still, a university graduate woman has the highest probability of marrying a university man compared to other females[30]. (2) In the recent cohort: a woman with intermediate education is more likely to marry an intermediate educated man and less likely to marry a university educated man because in the recent cohort there is a relatively higher increase in the supply of women with intermediate education.

Comparing the recent to the old cohort, both illiterate men and women in the recent cohort are more likely to marry up[31]. This is primarily driven by the decrease in the pool of illiterate men and women as the population share of the illiterate group has gone down by about 55% for both men and women.

5. Methodology & Results

5.1 Methodology

This paper examines, using multivariate statistical analysis, the association between female education and spousal and marital characteristics. While the previous section looks into the variation in several marriage variables by wife education, the results do not control for other wife's background variables, and therefore may be partly capturing her

[30] The trend of higher growth of female university graduates continue across the 1985-1989 and the 2000-2006 cohorts. The probability of a university woman to marry a university graduate man did not go down further (see Figure 15).

[31] A similar observation holds when comparing the 1985-1989 to 2000-2006 cohorts.

socioeconomic background. Extra independent variables used in this section - mainly the mother and father education variables - help to isolate the effect of wife's education.

Several outcomes (dependent variables) are examined in separate regressions[32]: husband education level, whether the couple lived independently at the time of their marriage, whether this is a consanguineous marriage and the pre-marital wealth level of the husband. In addition, the relation between female education and the share of marriage costs that the bride and her family bear is tested.

The husband education variable' categories are: illiterate, reads and writes, less than intermediate, intermediate, above intermediate and university and above[33]. Since this variable is ordinal, an ordered probit model is used. A categorical education variable is superior to a continuous variable such as years of schooling because it captures the non-linearity in the effect of an extra year of education. For example, it makes a difference whether the year is a credential or a non-credential year- the so-called *sheepskin effect*.

The variable used in the living independently regression is an indicator variable taking the value zero if the couple did not live separately at the time of their marriage[34] and the value of one if they lived separately. A probit model is used. A marriage where a

[32] Table 1 provides the means and standard deviations of the dependent and independent variables used in the regressions.

[33] The read and write category is for those who never attended school but learnt how to read and write outside formal schooling or those who attended school and dropped out before finishing the primary (elementary) level. The less than intermediate category comprises those who got a primary (elementary) or preparatory (middle-school) certificate. Beyond the preparatory level, the secondary (high-school) level is branched off into general and technical streams. The general stream is usually for those who would continue on to university while the technical stream is usually terminal. The intermediate category is for those individuals whose highest attained level is the secondary level (high-school) and they are mostly graduates of the technical stream (since most of the general stream graduates eventually have a university degree). The above intermediate category corresponds to holders of a 2-year post-secondary degree that is of vocational/technical focus. The university and above category includes those with a Bachelor or post-graduate degrees. While the above intermediate and university and above categories are not sequential, the university and above category is considered to be of higher status.

[34] The variable takes the value zero whether the couple lived with the husband or the wife's family. As mentioned in the previous section, 95% of those who did not live separately upon marriage lived with the husband's family while 5% lived with the wife's family.

couple is living independently is thought to be better for a wife since it potentially implies greater participation in decision-making relative to living with in-laws. In addition, as husbands are responsible for providing housing, being able to afford separate housing indicates a higher economic standing of the husband.

As for the consanguinity regression, the dependent variable is an indicator variable taking a value of one if the spouses are relatives and the value zero otherwise. Therefore, a probit model is estimated. If higher female education is associated with a lower probability of marrying a relative then this can reflect that education expands the pool of potential spouses. An ordinary least squares regression (OLS) is used in the models where the share of total marriage costs borne by the bride's family and the bride herself are dependent variables.

Another model measures female education returns in terms of the husband's pre-marital wealth. ELMS 06 cannot be used for the construction of a pre-marital wealth variable because if such variable is constructed, it would reflect the household post-marital state (as it is the marital household that is observed at the time of the survey). To get around this issue, I am using the sub-sample of couples where the husband's family was interviewed in ELMS 98 prior to his marriage.

A wealth score is constructed using factor analysis based on household asset ownership and house characteristics information[35]. A separate score is created for urban and rural areas as what a wealthy person owns and his/her house characteristics vary across urban and rural areas. Households are then divided into quintiles according to the wealth score. An ordinal variable showing to which quintile the husband's pre-marital household belongs serves as the dependent variable. An ordered probit model is used.

[35] See Filmer and Pritchett (2001) for the methodology used to construct the asset score.

A uniform set of explanatory variables is used across the different regressions. Wife education is represented by a group of dummy variables, each denoting a given level of education attainment: illiterate, reads and writes, less than intermediate, intermediate, above intermediate and university and above. A set of the wife's father and mother education dummies identical to those used for the wife's education are also included as explanatory variables to capture the socioeconomic status of the pre-marital household of the wife.

For all education variables (the wife and her parents), each dummy is set to equal one if the education level attained is equal to or exceeds a given level of education. This configuration is followed in order to reflect the incremental effect of each education level compared to its previous level. The illiterate or above group is the omitted group. In addition to the education variables, dummies for different regions[36] are included in all regressions. The omitted region is Greater Cairo.

The sample used is restricted to married couples: (1) who are in their first marital union (2) where the wife is age 16-49 (3) whose year of marriage is between 1985 and 2006 (4) where both spouses are part of the household[37]. The sample excludes 33 records where the wife was still a student at the time of the survey.[38] The sample consists of 4441 observations (couples).

[36] The regions are: Greater Cairo, Alexandria & Suez Canal governorates, Urban Lower Egypt, Rural Lower Egypt, Urban Upper Egypt and Rural Upper Egypt.

[37] Spouse information is not collected if the spouse is not part of the household. 5.51 % of currently married 16-49 year old women's husbands are not part of the household.

[38] However, it includes women whose husband was a student at the time of the survey (16 cases). It also includes husbands who finished their education after marriage but before the survey time (48 cases representing 1.3% of the sample) and wives who finished after marriage but before the survey time (205 cases representing 5.6% of the sample).

For the pre-marital wealth regression, the same sample characteristics apply. An additional restriction is that the husband's pre-marital family was interviewed in ELMS 98, reducing the sample size to 1024 observations (couples).

5. 2 Results and concluding remarks

Regression results are presented in Table 2. In the husband education regression, all wife education variables are positive and significant at the 1% level. Father education variables are positive and jointly significant at the 1% level of significance but not all are individually significant. None of the mother education variables is significant but they are jointly significant at the 5% level.

As for the regression pertaining to living independently upon marriage, some of the wife education variables are significant and they are jointly significant at the 1% level. Similarly, father education variables are jointly significant at the 5% level. Mother education variables are not individually or jointly significant. With regard to the consanguineous marriages regression, being a university graduate significantly decreases the likelihood of marrying a relative. It is the mother's rather than the father's education that plays a significant role for that aspect of marriage.

With respect to the bride's family share in marriage costs, the education variables of the wife and her parents by and large are not playing any role whether individually or jointly. This confirms the descriptive evidence that female education does not really affect the share of costs borne by a family. It is worth noting, however, that while being non-statistically significant, the higher education variables of the wife are negative in value while the university graduated father variable is positive in value presumably because of an income effect. It is living in Upper Egypt (whether in the rural or urban

areas) that is significantly associated with the bride's family contributing less. This indicates, therefore, that it variations in regional traditions that are more important in determining contributions. As for the bride's own contribution, apart from the university graduate variable which increases the relative share of the bride, female education does not seem to play a role. Father education variables, however, are jointly significant at the 5% level and the father being a university graduate has a negative impact on the bride's contribution presumably because of an income effect where he is more able to fund his daughter's marriage. The region variables are again important where brides in all regions contribute less compared to Cairo.

Looking at the results of the pre-marital husband's wealth, it can be seen that while all education variables are not individually significant, the wife education and parental education variables are all jointly significant at the 1% level. Finally, there is an additional regression (results not shown) with the dependent variable combining husband education, living independently, consanguinity and the share of costs into a single marital outcome using factor analysis. In this regression, all wife education variables are positive and significant. In addition, parental education variables are jointly significant.

Based on the above results, female education plays a significant role in having a marriage with better characteristics. The regional dummies and parental education dummies are also significant. The father education effect is stronger than the mother education effect (except with respect to consanguineous marriages).

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FIGURE 1

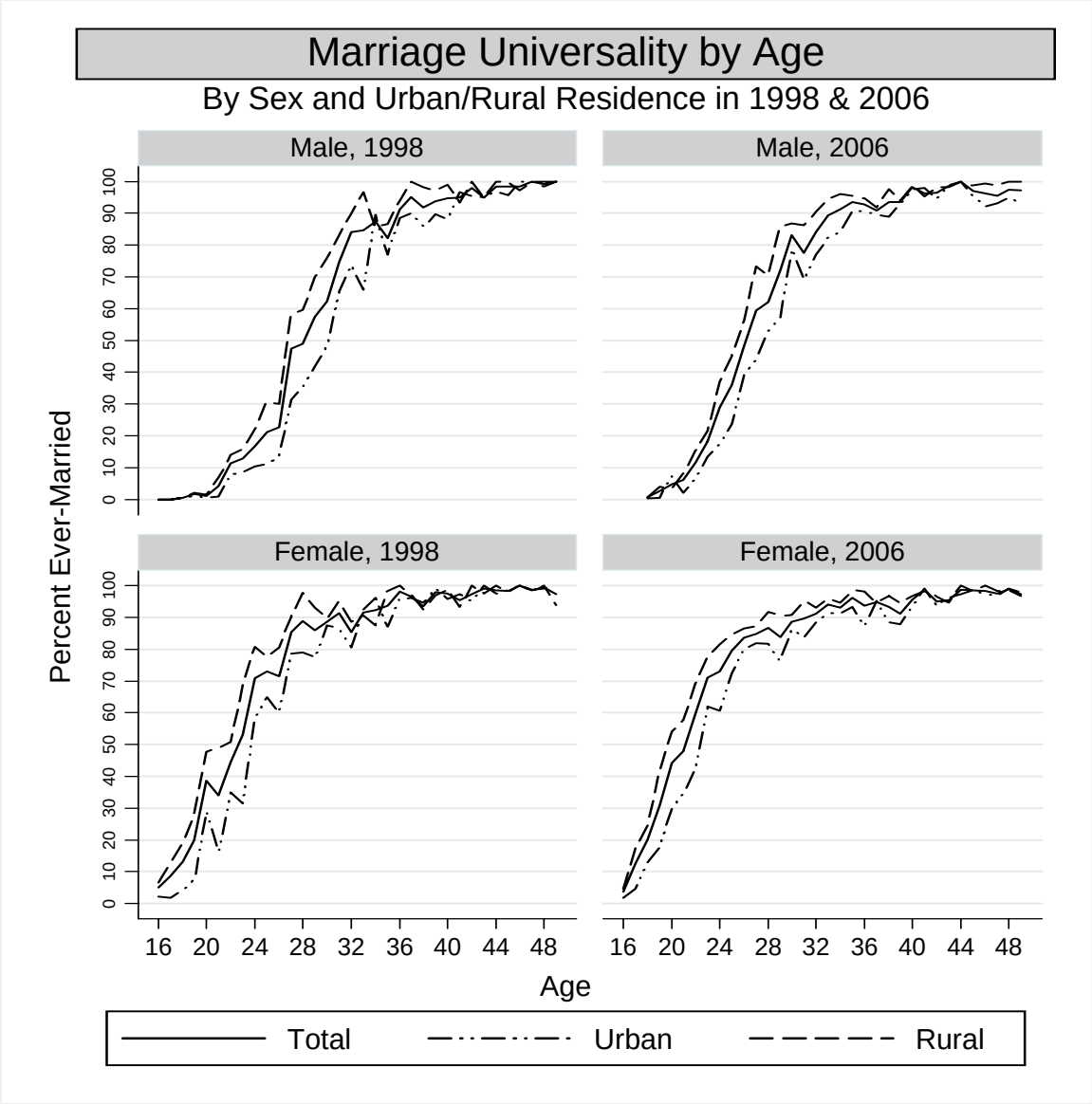
Marriage Universality by Age
By Sex and Urban/Rural Residence in 1998 & 2006
Male, 1998
Male, 2006
Female, 1998
Female, 2006
Percent Ever-Married
0 10 20 30 40 50 60 70 80 90 100
16 20 24 28 32 36 40 44 48
Age
Total
Urban
Rural

FIGURE 2

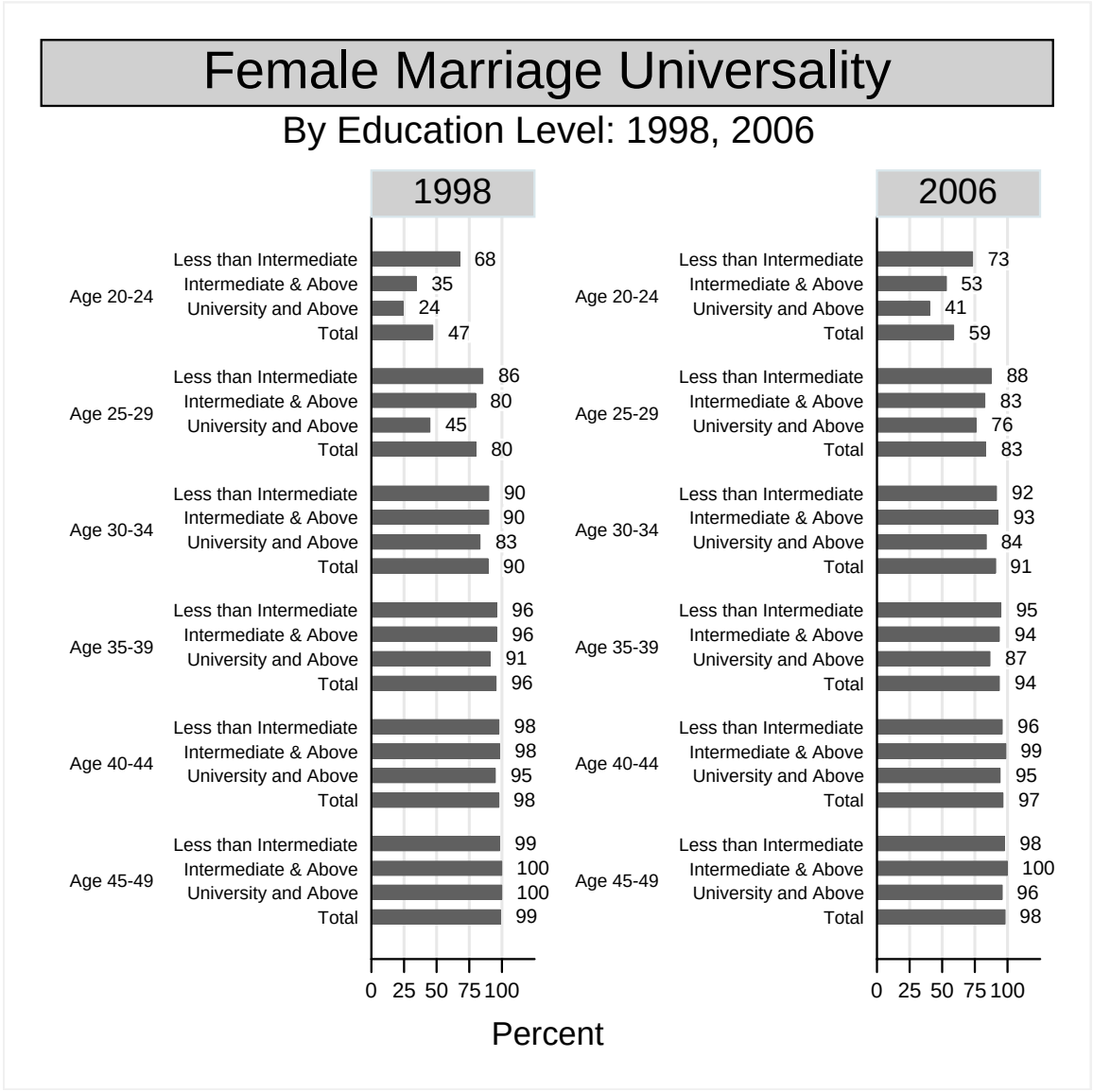
Female Marriage Universality
By Education Level: 1998, 2006
1998
2006
Age 20-24
Age 25-29
Age 30-34
Age 35-39
Age 40-44
Age 45-49
Less than Intermediate
Intermediate & Above
University and Above
Total
68
35
24
47
86
80
45
80
90
90
83
90
96
96
91
96
98
98
95
98
99
100
100
99
73
53
41
59
88
83
76
83
92
93
84
91
95
94
87
94
96
99
95
97
98
100
96
98
0 25 50 75 100
Percent

FIGURE 3

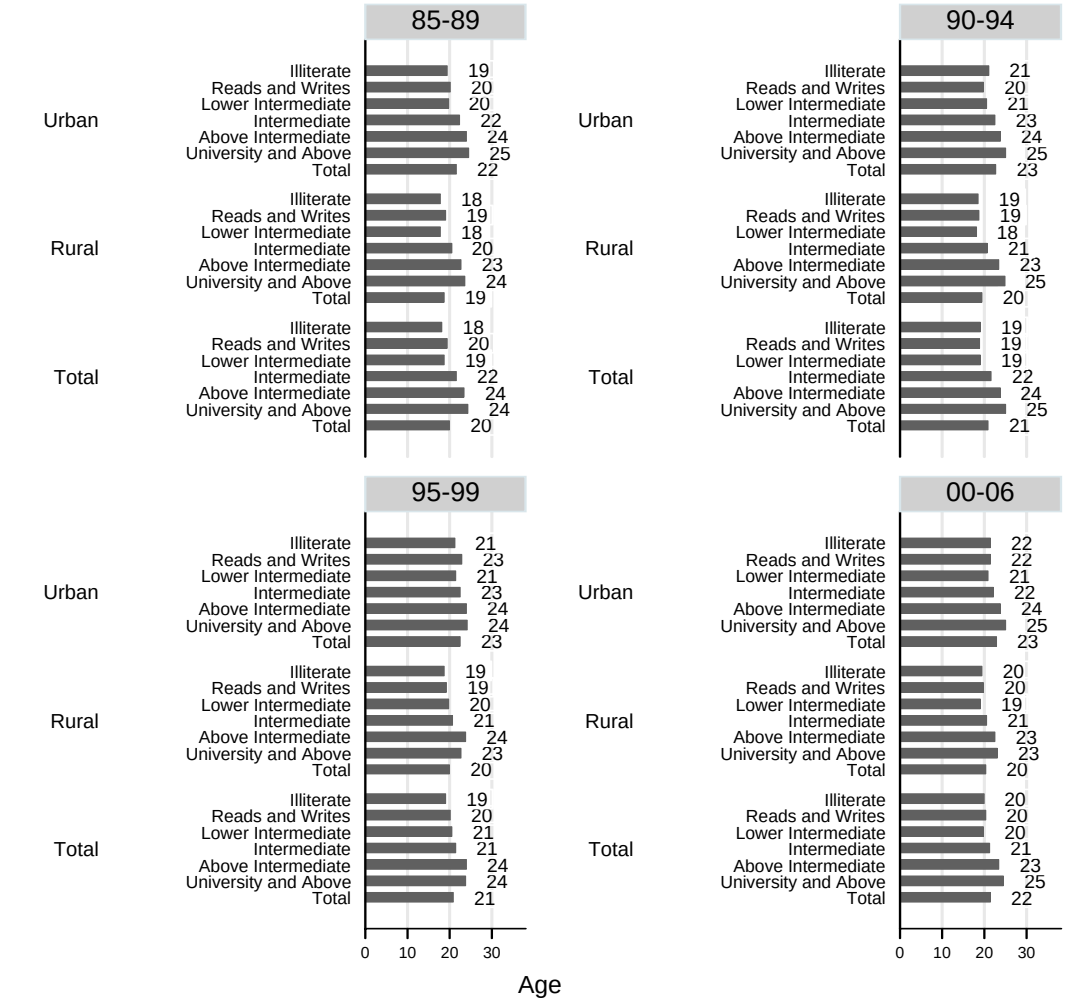
Mean Female Age at Marriage
By Marriage Cohort, Education Level and Urban/Rural
85-89
90-94
95-99
00-06
Urban
Rural
Total
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Total
0
10
20
30
Age

FIGURE 4


Mean Female Age at Marriage
By Marriage Cohort, Education Level and Region
85-89
00-06
Urban Governorates
Urban Lower Egypt
Urban Upper Egypt
Rural Lower Egypt
Rural Upper Egypt
Total
Less than Intermediate
Intermediate & Above
University and Above
Total
20
24
25
23
20
23
24
22
19
21
24
20
19
21
24
20
17
20
17
18
22
24
20
22
23
26
23
21
22
24
22
21
22
25
23
20
21
23
21
19
21
23
20
20
21
25
22
0
10
20
30
Age

FIGURE 5

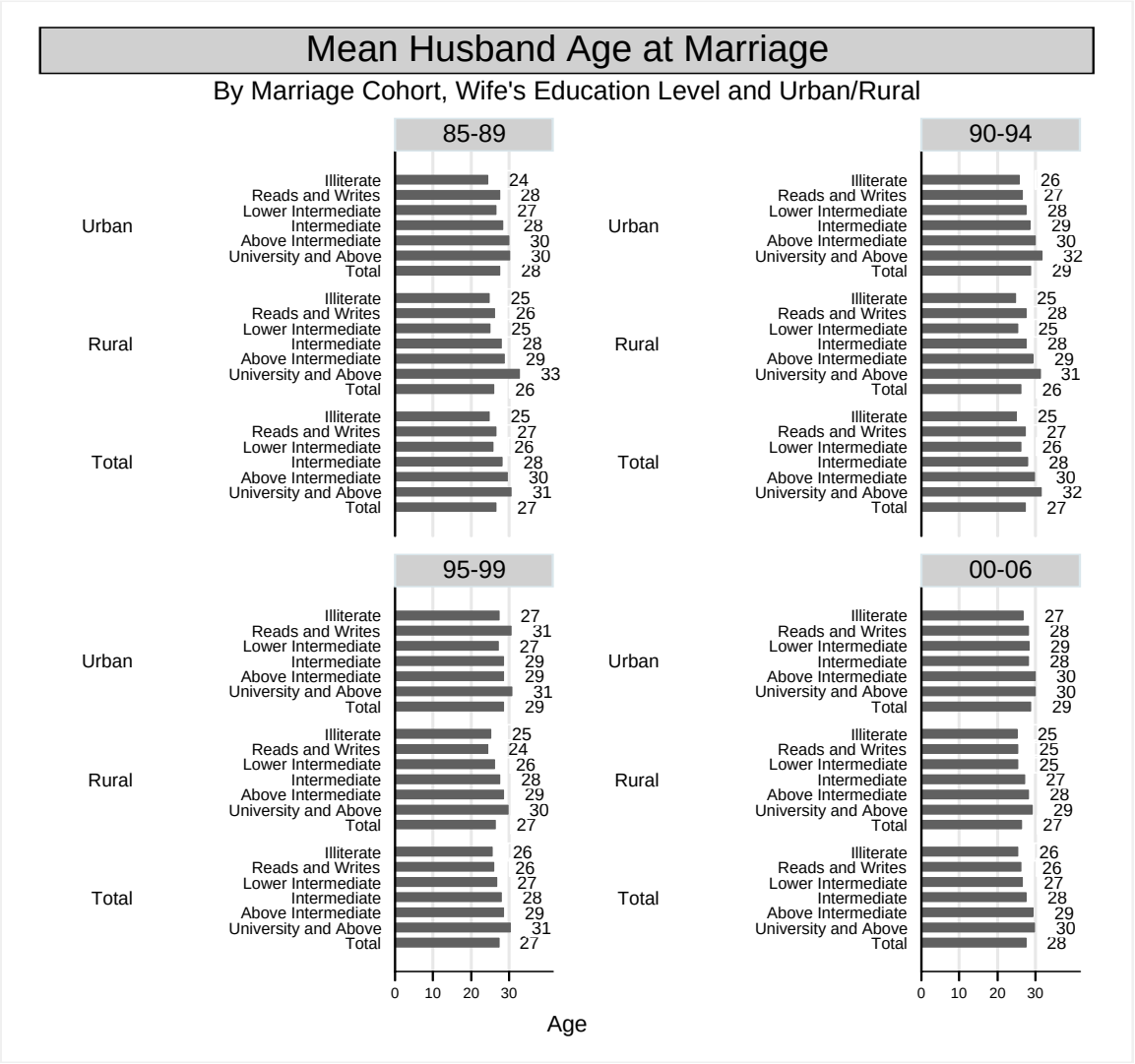
Mean Husband Age at Marriage
By Marriage Cohort, Wife's Education Level and Urban/Rural
85-89
90-94
95-99
00-06
Urban
Rural
Total
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Total
0
10
20
30
Age

FIGURE 6

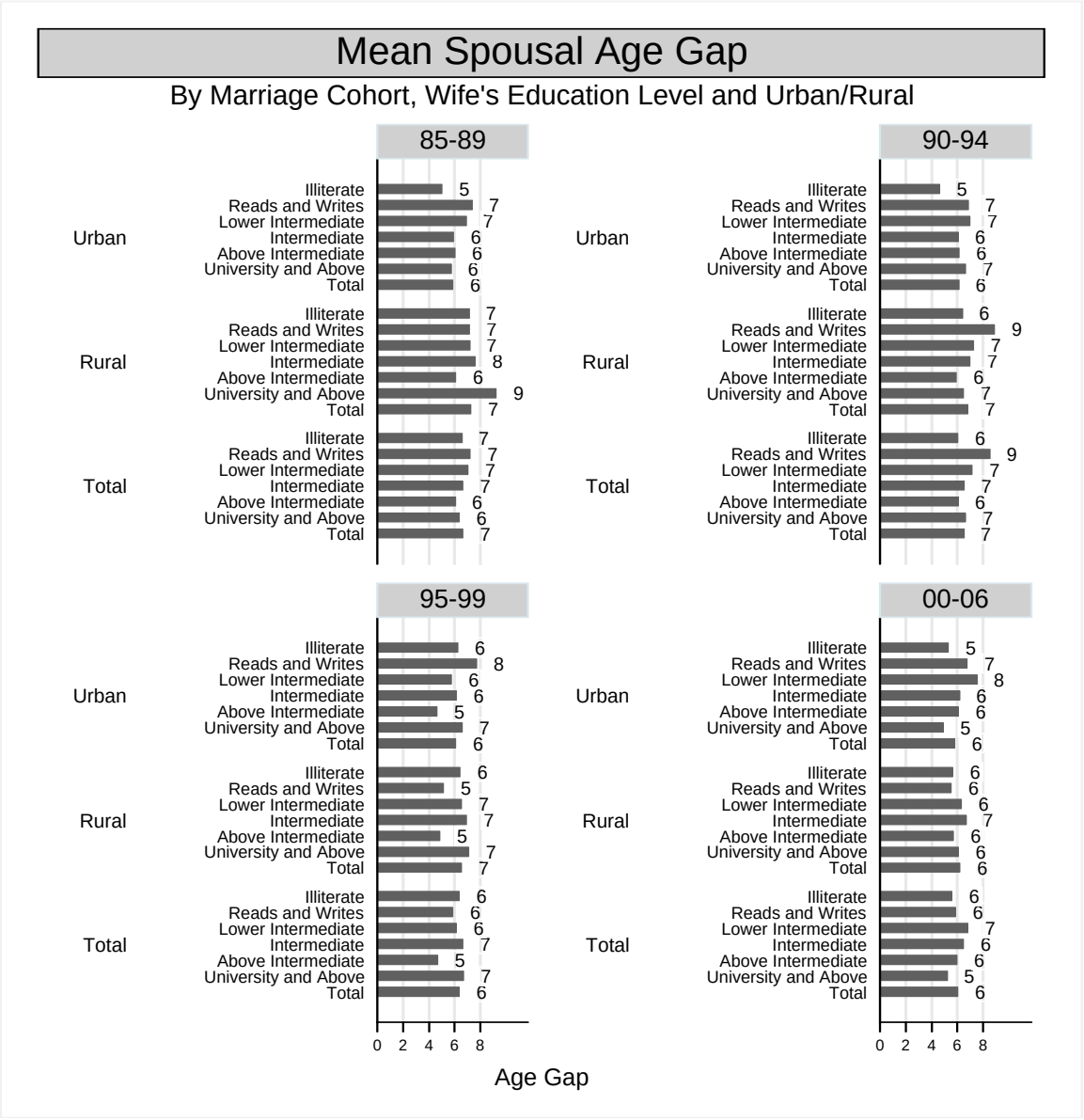
Mean Spousal Age Gap
By Marriage Cohort, Wife's Education Level and Urban/Rural
85-89
90-94
95-99
00-06
Urban
Rural
Total
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Total
0 2 4 6 8
Age Gap

FIGURE 7

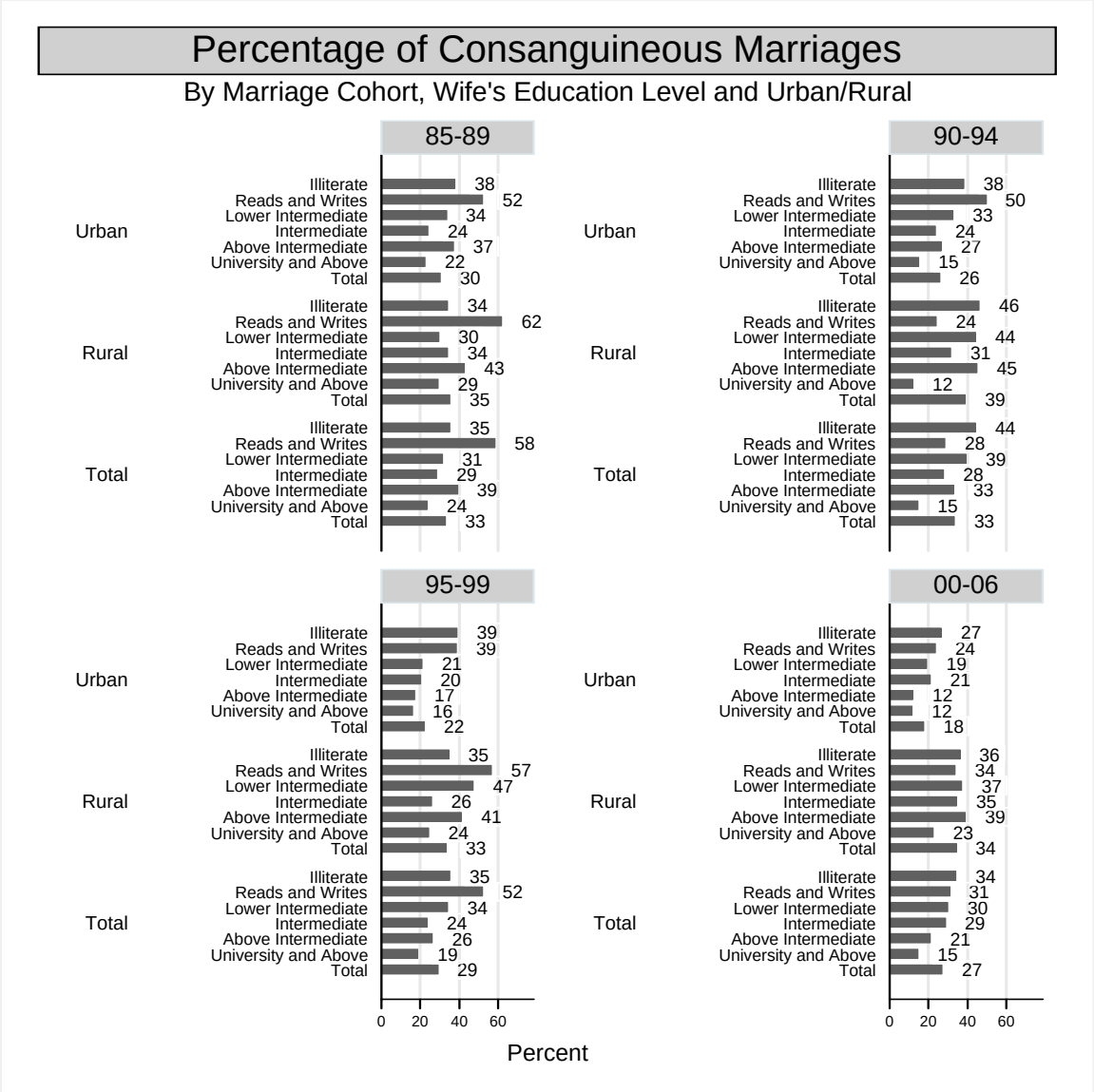
Percentage of Consanguineous Marriages
By Marriage Cohort, Wife's Education Level and Urban/Rural
85-89
90-94
95-99
00-06
Urban
Rural
Total
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Total
38
52
34
24
37
22
30
34
62
30
34
43
29
35
35
58
31
29
39
24
33
38
50
33
24
27
15
26
46
24
44
31
45
12
39
44
28
39
28
33
15
33
39
39
21
20
17
16
22
35
57
47
26
41
24
33
35
52
34
24
26
19
29
27
24
19
21
12
12
18
36
34
37
35
39
23
34
34
31
30
29
21
15
27
0
20
40
60
Percent

FIGURE 8

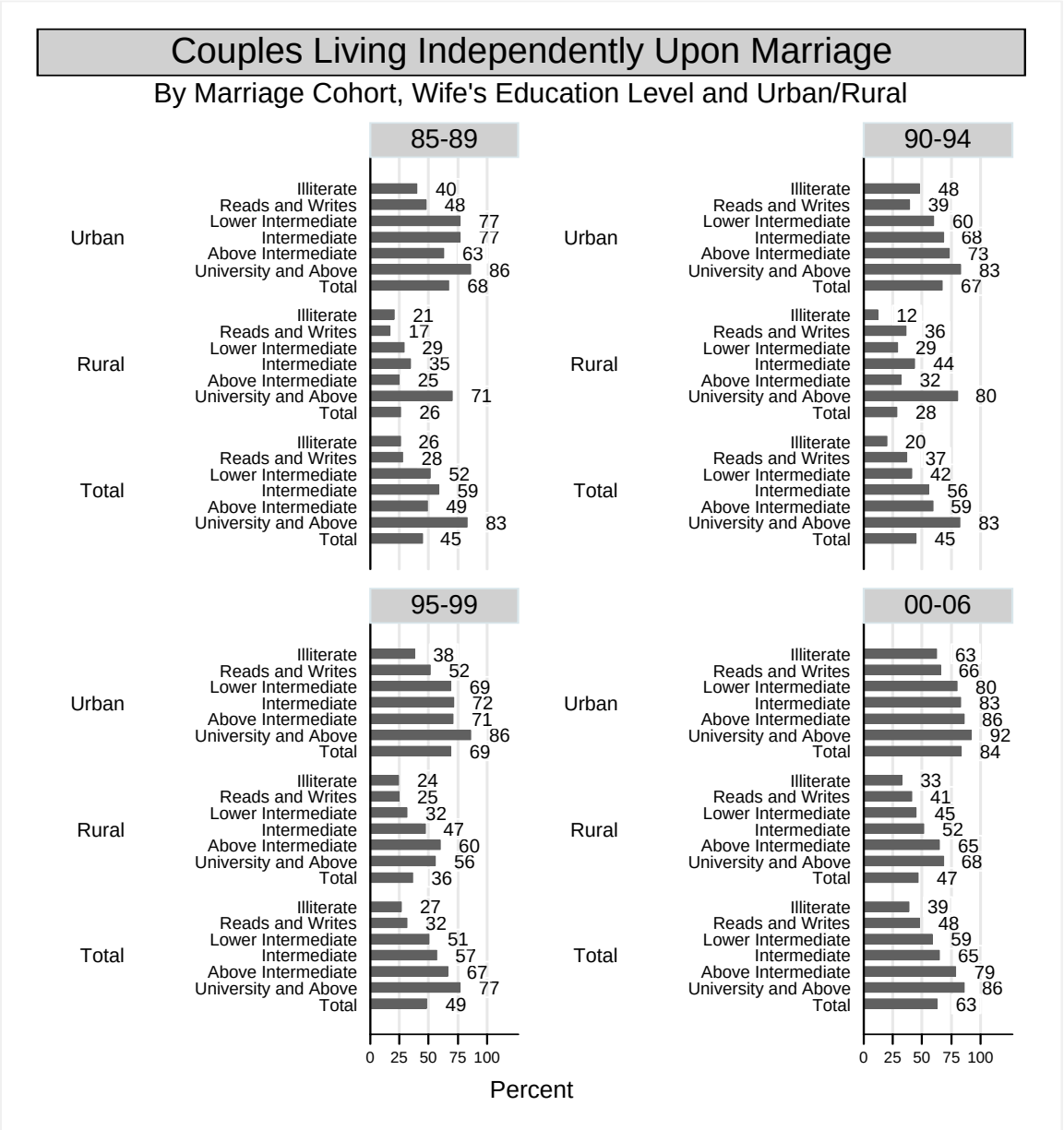
Couples Living Independently Upon Marriage
By Marriage Cohort, Wife's Education Level and Urban/Rural
85-89
90-94
95-99
00-06
Urban
Rural
Total
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Total
40 48 77 77 63 86 68
21 17 29 35 25 71 26
26 28 52 59 49 83 45
48 39 60 68 73 83 67
12 36 29 44 32 80 28
20 37 42 56 59 83 45
38 52 69 72 71 86 69
24 25 32 47 60 56 36
27 32 51 57 67 77 49
63 66 80 83 86 92 84
33 41 45 52 65 68 47
39 48 59 65 79 86 63
0 25 50 75 100
Percent

FIGURE 9

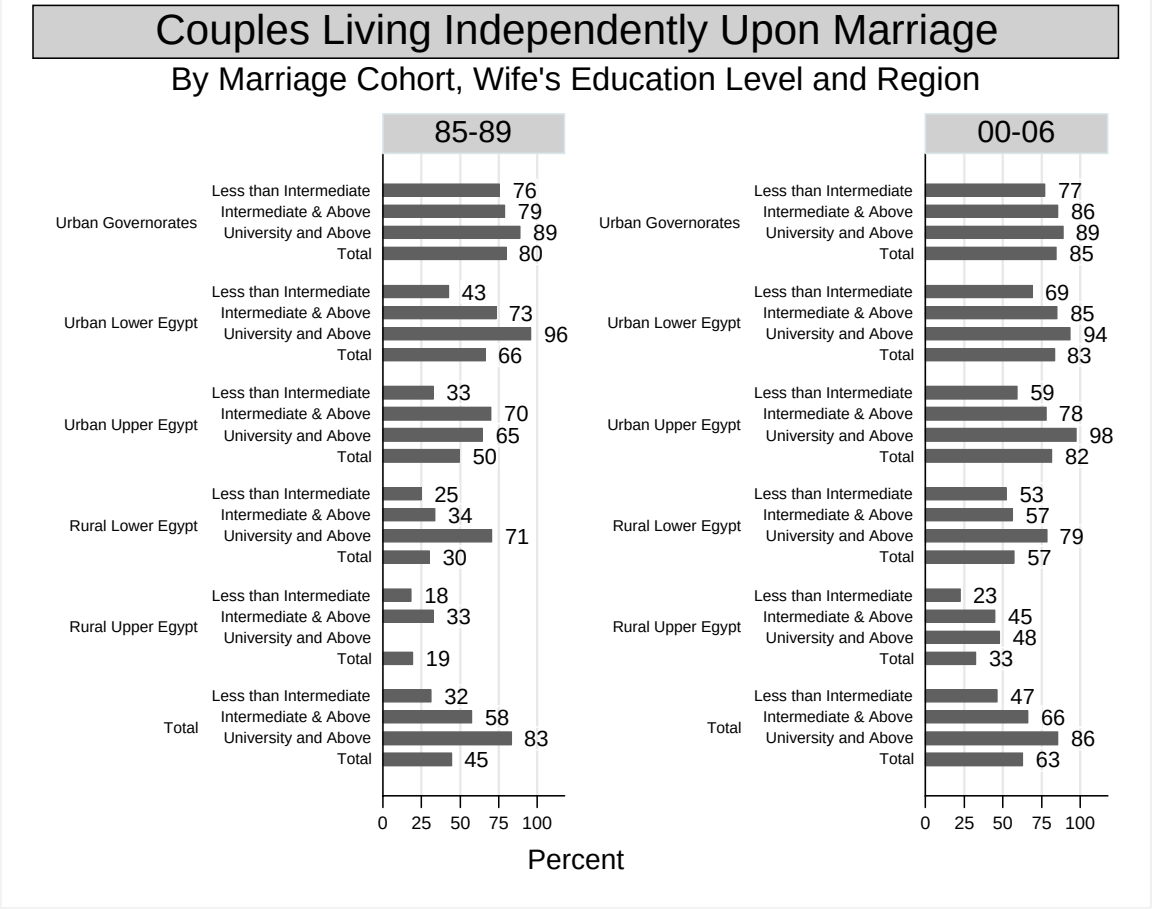
Couples Living Independently Upon Marriage
By Marriage Cohort, Wife's Education Level and Region
85-89
00-06
Urban Governorates
Urban Lower Egypt
Urban Upper Egypt
Rural Lower Egypt
Rural Upper Egypt
Total
Less than Intermediate
Intermediate & Above
University and Above
Total
76
79
89
80
43
73
96
66
33
70
65
50
25
34
71
30
18
33
19
32
58
83
45
77
86
89
85
69
85
94
83
59
78
98
82
53
57
79
57
23
45
48
33
47
66
86
63
0
25
50
75
100
Percent

FIGURE 10

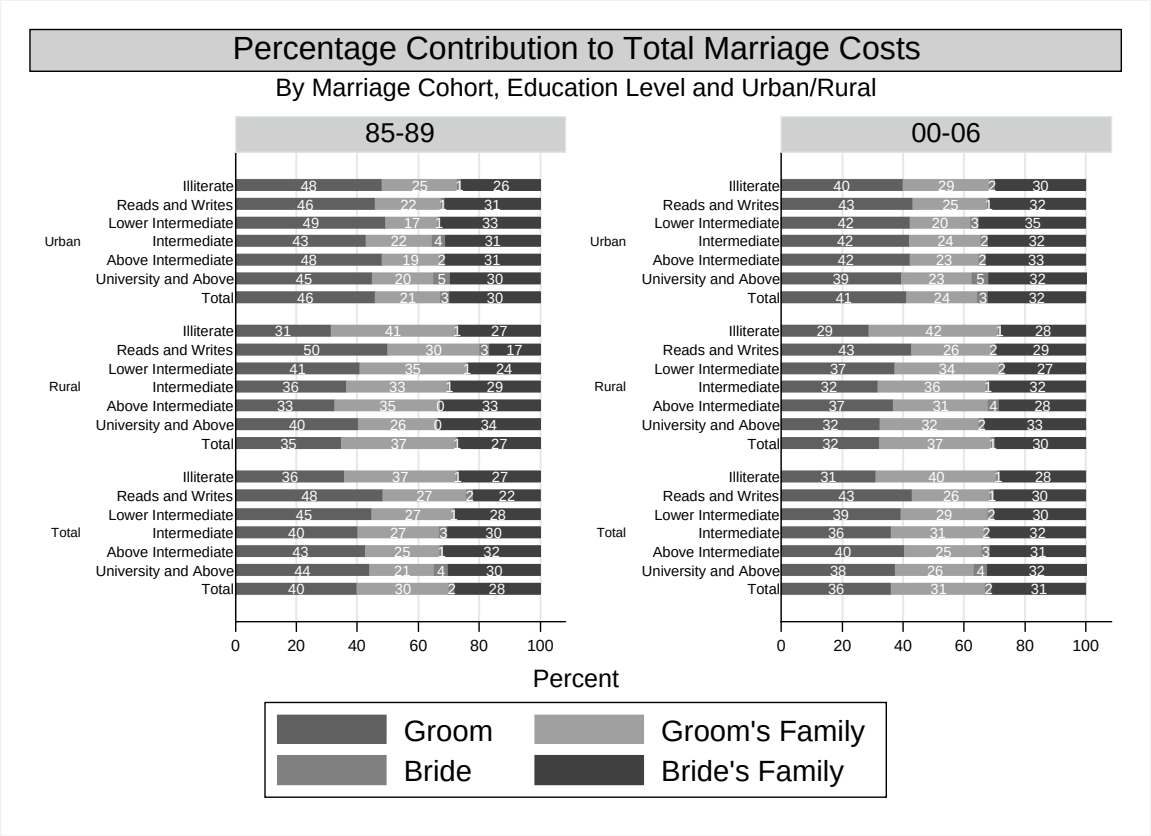
Percentage Contribution to Total Marriage Costs
By Marriage Cohort, Education Level and Urban/Rural
85-89
00-06
Urban
Rural
Total
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Total
48 25 1 26
46 22 1 31
49 17 1 33
43 22 4 31
48 19 2 31
45 20 5 30
46 21 3 30
31 41 1 27
50 30 3 17
41 35 1 24
36 33 1 29
33 35 0 33
40 26 0 34
35 37 1 27
36 37 1 27
48 27 2 22
45 27 1 28
40 27 3 30
43 25 1 32
44 21 4 30
40 30 2 28
40 29 2 30
43 25 1 32
42 20 3 35
42 24 2 32
42 23 2 33
39 23 5 32
41 24 3 32
29 42 1 28
43 26 2 29
37 34 2 27
32 36 1 32
37 31 4 28
32 32 2 33
32 37 1 30
31 40 1 28
43 26 1 30
39 29 2 30
36 31 2 32
40 25 3 31
38 26 4 32
36 31 2 31
0 20 40 60 80 100
Percent
Groom
Bride
Groom's Family
Bride's Family

FIGURE 11

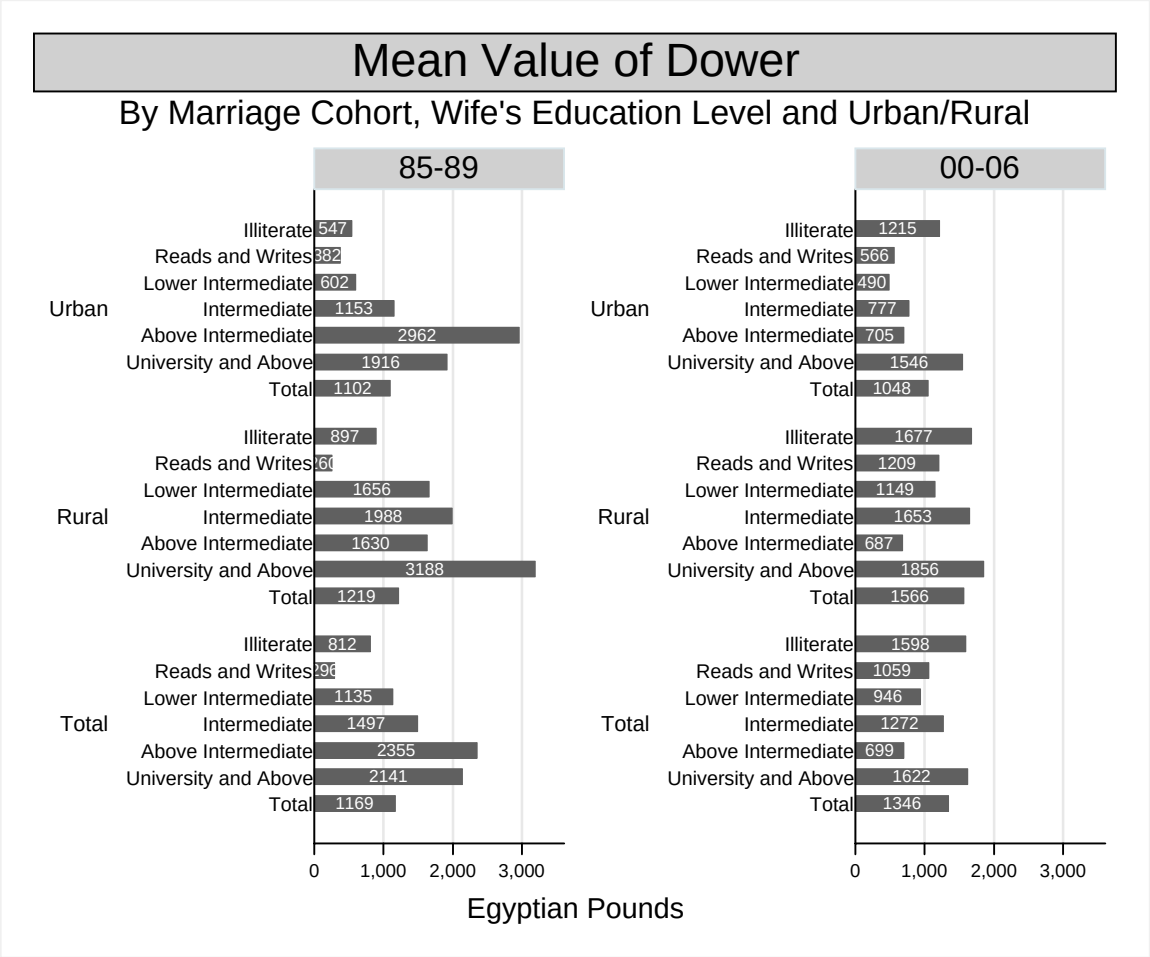
Mean Value of Dower
By Marriage Cohort, Wife's Education Level and Urban/Rural
85-89
00-06
Urban
Rural
Total
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Total
547
382
602
1153
2962
1916
1102
897
760
1656
1988
1630
3188
1219
812
796
1135
1497
2355
2141
1169
1215
566
490
777
705
1546
1048
1677
1209
1149
1653
687
1856
1566
1598
1059
946
1272
699
1622
1346
0
1,000
2,000
3,000
Egyptian Pounds

FIGURE 12

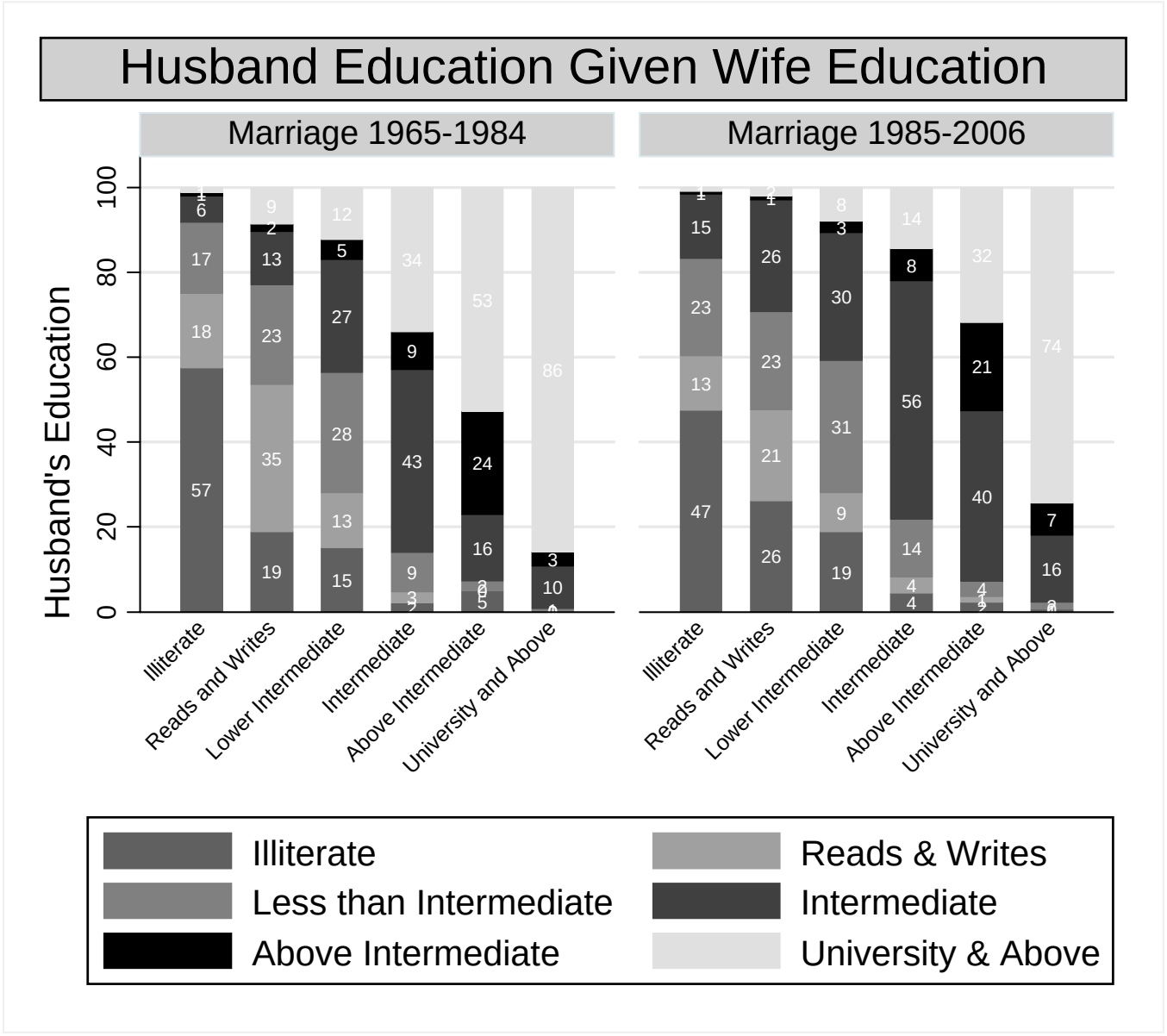
Husband Education Given Wife Education
Marriage 1965-1984
Marriage 1985-2006
Husband's Education
0
20
40
60
80
100
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Illiterate
Less than Intermediate
Above Intermediate
Reads & Writes
Intermediate
University & Above

FIGURE13

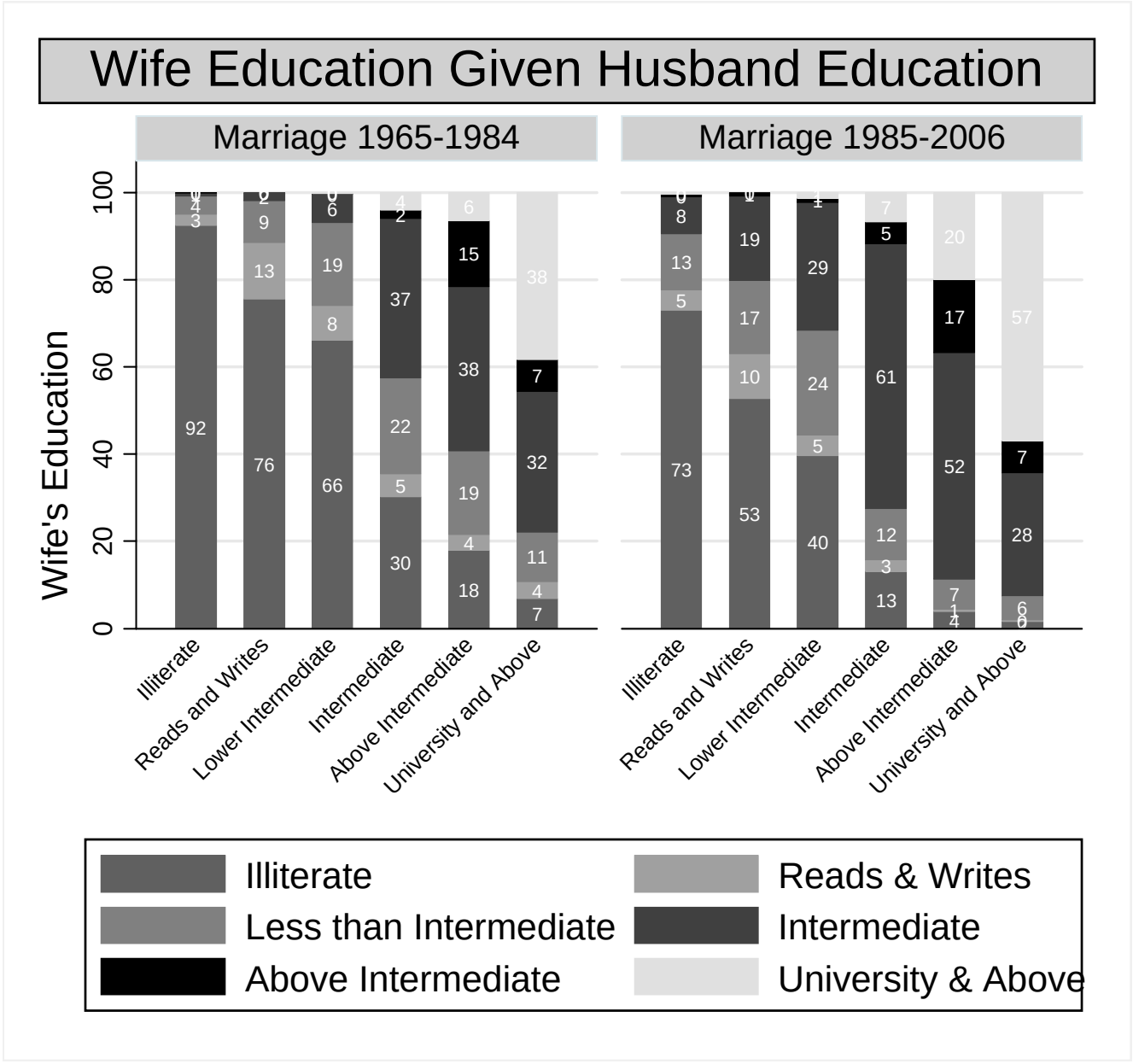
Wife Education Given Husband Education
Marriage 1965-1984
Marriage 1985-2006
Wife's Education
0
20
40
60
80
100
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Illiterate
Reads & Writes
Less than Intermediate
Intermediate
Above Intermediate
University & Above

FIGURE 14

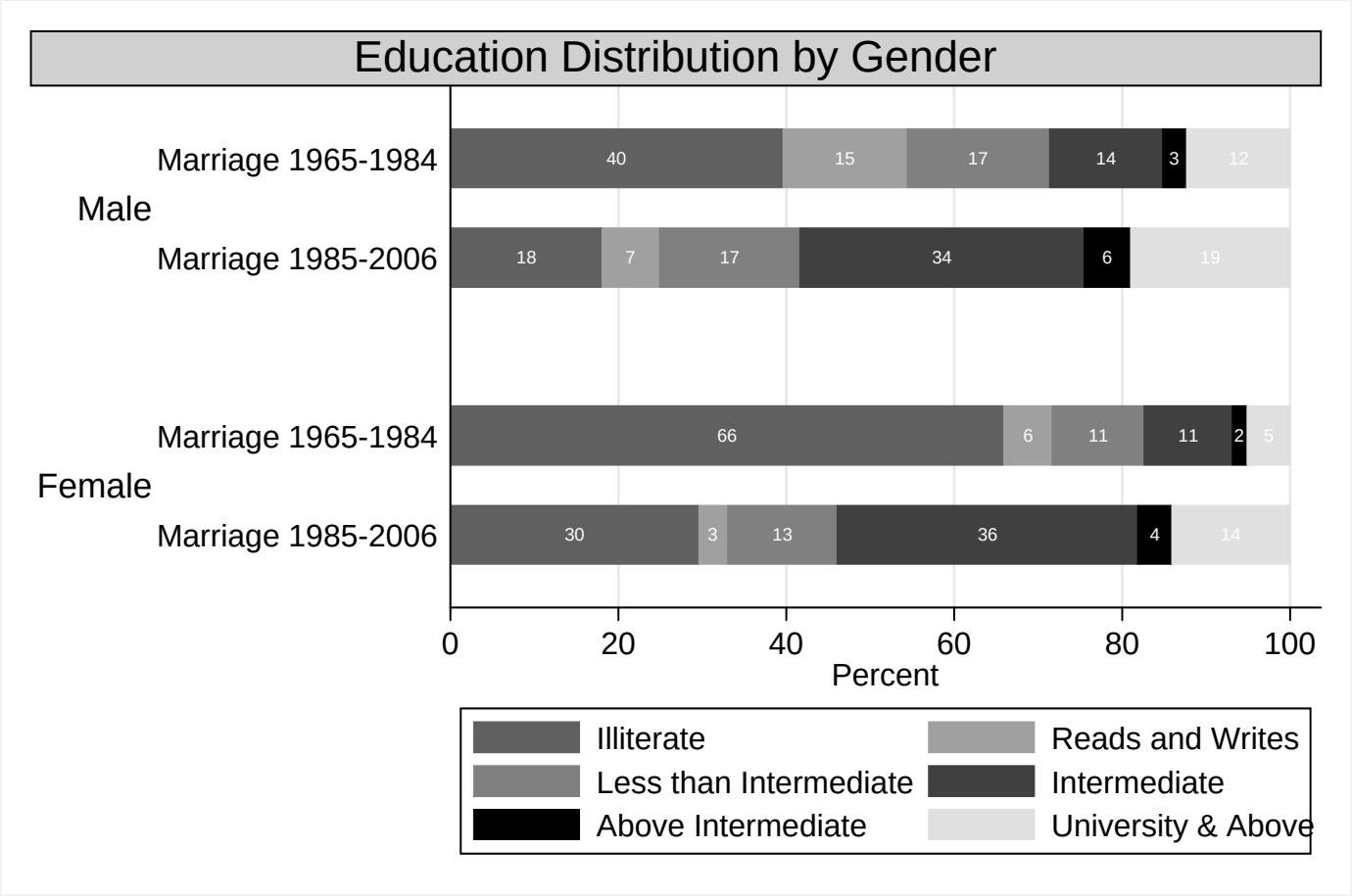
Education Distribution by Gender
Male
Marriage 1965-1984
40
15
17
14
3
12
Marriage 1985-2006
18
7
17
34
6
19
Female
Marriage 1965-1984
66
6
11
11
2
5
Marriage 1985-2006
30
3
13
36
4
14
0
20
40
60
80
100
Percent
Illiterate
Reads and Writes
Less than Intermediate
Intermediate
Above Intermediate
University & Above

FIGURE 15

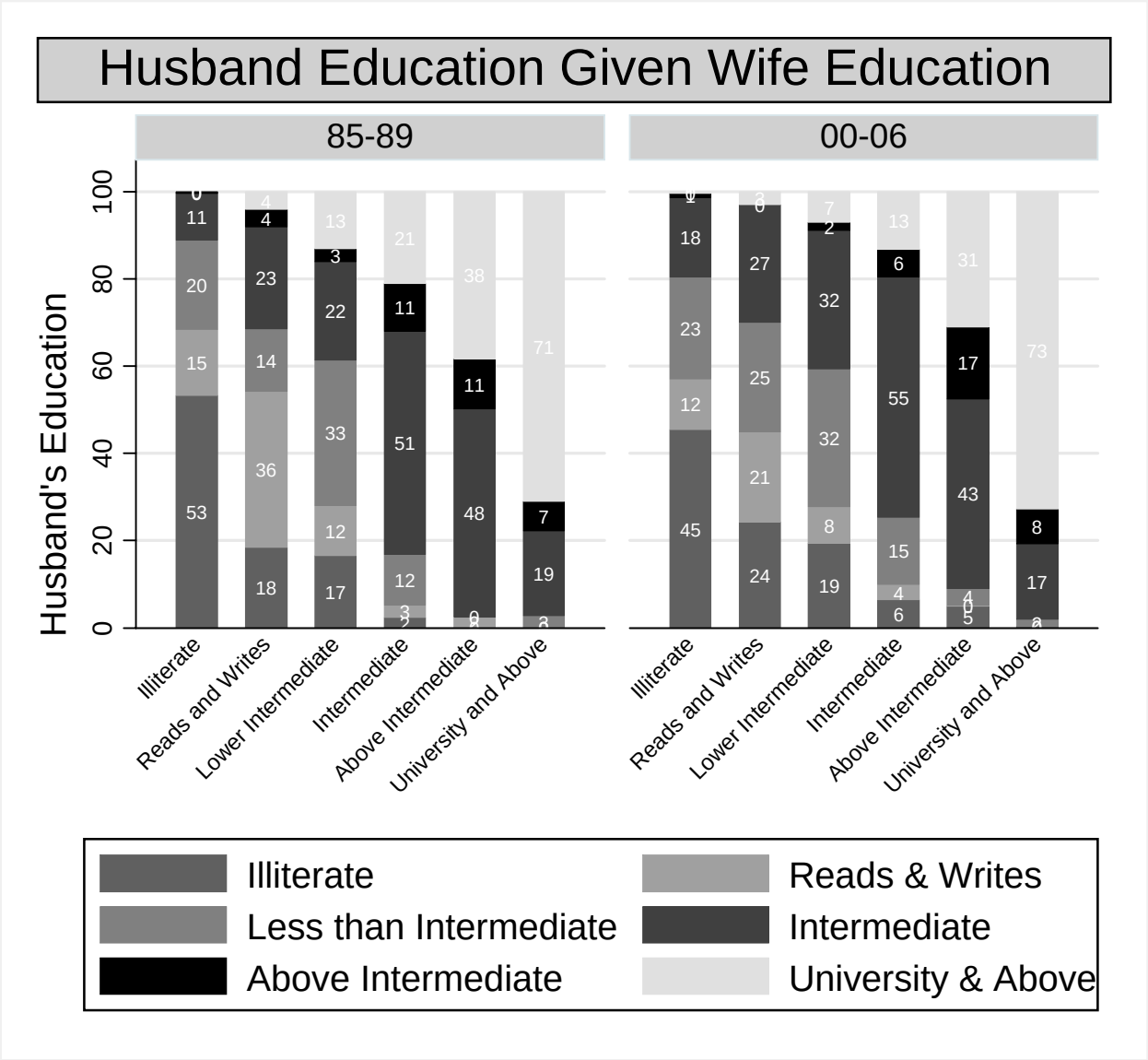
Husband Education Given Wife Education
85-89
00-06
Husband's Education
0
20
40
60
80
100
Illiterate
Reads and Writes
Lower Intermediate
Intermediate
Above Intermediate
University and Above
Illiterate
Less than Intermediate
Above Intermediate
Reads & Writes
Intermediate
University & Above

Table 1 Variable Means and Standard Deviations - Marriages between 1985 and 2006

	Un-Weighted		Weighted	
	Mean	Standard Deviation	Mean	Standard Deviation
Independent Variables				
Wife at least illiterate	1.00	0.00	1.00	0.00
At least reads and writes	0.75	0.44	0.72	0.45
Wife at least lower intermediate	0.71	0.45	0.69	0.46
Wife at least intermediate	0.58	0.49	0.56	0.50
Wife at least above intermediate	0.21	0.41	0.19	0.39
Wife at least university and above	0.16	0.37	0.15	0.35
Father at least illiterate	1.00	0.00	1.00	0.00
Father at least reads and writes	0.52	0.50	0.50	0.50
Father at least lower intermediate	0.25	0.44	0.24	0.42
Father at least intermediate	0.16	0.36	0.15	0.35
Father at least above intermediate	0.08	0.27	0.07	0.26
Father at least university and above	0.06	0.23	0.06	0.23
Mother at least illiterate	1.00	0.00	1.00	0.00
Mother at least reads and writes	0.24	0.43	0.23	0.42
Mother at least lower intermediate	0.12	0.33	0.11	0.32
Mother at least intermediate	0.07	0.25	0.06	0.24
Mother at least above intermediate	0.03	0.16	0.02	0.15
Mother at least university and above	0.02	0.13	0.02	0.12
Greater Cairo	0.13	0.33	0.13	0.33
Alexandria & Suez Canal	0.11	0.31	0.08	0.27
Urban Lower Egypt	0.13	0.34	0.10	0.30
Urban Upper Egypt	0.17	0.37	0.11	0.32
Rural Lower Egypt	0.27	0.44	0.33	0.47
Rural Upper Egypt	0.20	0.40	0.24	0.43
Dependent Variables				
Husband illiterate	0.17	0.38	0.18	0.39
Husband reads & writes	0.07	0.25	0.07	0.25
Husband less than intermediate	0.16	0.37	0.16	0.37
Husband intermediate	0.34	0.48	0.34	0.47
Husband above intermediate	0.06	0.23	0.06	0.23
Husband university & above	0.20	0.40	0.19	0.39
Live independently	0.58	0.49	0.54	0.50
Consanguineous marriage	0.30	0.46	0.29	0.46
Bride's family contribution	29.70	15.07	29.50	15.18
Bride's contribution	1.99	7.35	2.04	7.52
Husband in lowest wealth quintile in 98	0.19	0.40	0.18	0.39
Husband in second wealth quintile in 98	0.23	0.42	0.24	0.43
Husband in third wealth quintile in 98	0.19	0.39	0.20	0.40
Husband in fourth wealth quintile in 98	0.20	0.40	0.21	0.40
Husband in highest wealth quintile in 98	0.18	0.39	0.17	0.37

Table 2 Marital Outcomes Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Husband Education	**Living Independently**	**Consanguinity**	**Bride's Family Contribution**	**Bride Contribution**	**Husband Pre-marital Wealth**
	Ordered Probit	**Probit**	**Probit**	**OLS**	**OLS**	**Ordered Probit**
Wife's Education (omitted=illiterate)						
At least reads and writes	0.370	0.243	0.127	-0.873	-0.168	0.411
	(3.92)***	(2.10)**	(1.12)	(0.67)	(0.26)	(1.81)*
At least lower intermediate	0.374	0.193	-0.133	1.561	0.303	-0.075
	(3.78)***	(1.59)	(1.11)	(1.15)	(0.45)	(0.32)
At least intermediate	0.685	0.162	-0.095	0.271	0.656	0.304
	(12.99)***	(2.51)**	(1.46)	(0.38)	(1.88)*	(2.76)***
At least above intermediate	0.601	-0.005	0.033	-0.133	-0.315	0.222
	(7.42)***	(0.05)	(0.33)	(0.12)	(0.60)	(1.35)
At least university and above	0.727	0.430	-0.331	-0.704	2.328	0.179
	(7.94)***	(3.77)***	(2.91)***	(0.60)	(4.04)***	(1.05)
Wife's Father Education (omitted=illiterate)						
At least reads and writes	0.206	0.113	-0.092	0.516	-0.008	0.295
	(4.92)***	(2.21)**	(1.78)*	(0.92)	(0.03)	(3.31)***
At least lower intermediate	0.133	0.094	0.035	0.576	0.317	0.087
	(2.12)**	(1.19)	(0.44)	(0.69)	(0.78)	(0.68)
At least intermediate	0.132	-0.034	0.022	-0.936	-0.474	0.091
	(1.57)	(0.32)	(0.21)	(0.86)	(0.89)	(0.59)
At least above intermediate	0.099	0.150	0.014	-0.750	2.017	0.126
	(0.67)	(0.82)	(0.08)	(0.42)	(2.29)**	(0.51)
At least university and above	0.358	-0.194	0.052	2.598	-2.971	0.009
	(2.15)**	(0.98)	(0.27)	(1.35)	(3.16)***	(0.04)
Wife's Mother Education (omitted=illiterate)						
At least reads and writes	0.081	0.006	-0.034	0.921	0.274	0.352
	(1.48)	(0.09)	(0.50)	(1.26)	(0.77)	(3.09)***
At least lower intermediate	0.025	0.122	-0.199	-0.226	-0.323	-0.255
	(0.28)	(1.06)	(1.73)*	(0.19)	(0.57)	(1.54)

	(1)	(2)	(3)	(4)	(5)	(6)
	Husband Education	**Living Independently**	**Consanguinity**	**Bride's Family Contribution**	**Bride Contribution**	**Husband Pre-marital Wealth**
	Ordered Probit	**Probit**	**Probit**	**OLS**	**OLS**	**Ordered Probit**
At least intermediate	0.161	-0.023	-0.148	-0.138	-0.917	0.510
	(1.30)	(0.15)	(0.97)	(0.09)	(1.29)	(2.71)***
At least above intermediate	0.151	0.092	0.116	5.966	-1.658	-0.207
	(0.58)	(0.32)	(0.42)	(2.25)**	(1.28)	(0.53)
At least university and above	0.213	0.594	-0.778	-3.531	1.390	0.466
	(0.63)	(1.56)	(2.08)**	(1.17)	(0.94)	(1.08)
Regions (omitted=Greater Cairo)						
Alexandria & Suez Canal	-0.221	0.270	-0.098	0.921	-0.943	-0.261
	(3.16)***	(2.94)***	(1.10)	(1.01)	(2.11)**	(1.97)**
Urban Lower Egypt	-0.255	0.094	-0.258	1.530	-3.540	-0.546
	(3.80)***	(1.11)	(2.97)***	(1.75)*	(8.29)***	(4.39)***
Urban Upper Egypt	0.030	-0.299	0.311	-5.641	-3.311	-0.612
	(0.47)	(3.83)***	(3.99)***	(6.84)***	(8.20)***	(4.99)***
Rural Lower Egypt	-0.144	-0.447	0.035	0.219	-3.639	0.382
	(2.44)**	(6.21)***	(0.47)	(0.28)	(9.60)***	(3.22)***
Rural Upper Egypt	-0.013	-1.018	0.533	-6.923	-3.528	0.176
	(0.20)	(13.02)***	(6.95)***	(8.32)***	(8.66)***	(1.37)
Constant		-0.021	-0.515	30.542	4.076	
		(0.28)	(6.92)***	(38.33)***	(10.45)***	
Observations	4441	4439	4439	4439	4439	1024
R-squared				0.06	0.05	
Joint Significance of Education Variables						
Wife's Education	***	***	***	-	-	***
Father Education	***	**	-	-	**	***
Mother Education	**	-	***	-	-	***

Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, - not significant