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Long Term Trends in Age-Assortative Mating: Spain, 1922-2004

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Abstract.-

Within a context of change in nuptiality patterns in Spain during the 20th century, this paper focuses on the composition of marriages by age of spouses between 1922 and 2004. Using Spanish vital statistics on marriages, we first analyze the age-assortative marriage patterns according to marital status of spouses and age at marriage. Second, we apply a standardization method to decompose the changes of age-assortative mating into the effects produced by changes in age-sex composition and those produced by the underlying age preferences of spouses. Results show that age homogamy increased in Spain during the 20th century while traditional marriages, with the husband older than the wife, are becoming less common. The analysis proves that under dramatic historical circumstances, changes in the age-sex composition of eligible partners modified age-assortative mating patterns, but major responsibility of such patterns must be found in behavioral factors. Valuable

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Introduction.-

As assortative mating by age is so taken for granted in western societies, researchers have paid less attention to it than to other dimensions of assortative mating, such as ethnicity, religion or socioeconomic status (McPherson *et al.* 2001). Indeed, spouses tend to mate according to age and, therefore, no greater average age differences than three years are observed. (Van Poppel *et al.* 2001). This constant difference is always positive for men and negative for women, husbands mostly being older than their wives. Changes in the average age difference between spouses across time and space are related to two main components (Ni Bhrolchain 1992): age at marriage and previous marital status of the spouses. Empirical evidence proves, on the one hand, that average age differences increase when men marry older and decrease when women marry older, and, on the other hand, that average age difference is greater in second marriages than in first marriages (Esteve, Cortina, forthcoming). Consequently, changes in marriage composition by age and order may influence age-assortative mating patterns.

Researchers have approached the age gap between partners from different perspectives, which offer their own explanations for this widespread pattern. We can identify two main views: the first stresses the importance of individual rational behavior regarding marriage, with emphasis on gender differences (economists and sociologists); the second focuses on the age-sex composition of eligible partners in the marriage market (demographers). For economists and sociologists interested in union formation, age at marriage and age difference between spouses account for gender differences. Men and women attain the convenient attributes for marriage at different ages in accordance with their different roles within the marriage and within society. Gary Becker's Family Economics Theory (1974) stated that husbands and wives develop complementary functions, the former specializing in productive work and the latter in reproductive tasks. This framework suggests that women would be ready to marry earlier than men, because their most valuable attributes would be ascribed, while those of men should be achieved. Oppenheimer (1988) has updated Becker's theory noting that the entry of women into the labour market forces us to reconsider the complementary couple model. In a new context where the productive labour of women is more highly valued, women postpone marriage and men should attach more importance to women's attributes in terms of schooling and employment. This change of attitudes should

have an influence on marriage partners and on assortative mating patterns according to age. Sociologists have further developed the analysis of gender differences in roles and functions within the marriage. Some have been critical of gender differences considering that age differences between spouses are a clear expression of the "social pattern of domination" of wives by their husbands (Bozon 1991).

Demographers, meanwhile, have also contributed to explaining age differences between spouses from within their own framework: the marriage market (McDonald 1995). Sex imbalances in the age-sex composition of the marriage market do affect the age and marital status distributions of marrying partners. Marrying older or younger partners than expected and increasing or decreasing remarriage are two potential mechanisms of adjustment to overcome shortage problems. Therefore, age-assortative mating patterns may change when there is a lack of either men or women, as a result of exceptionally high or low birth rates, or from different mortality or migration levels by sex. Nevertheless, to empirically describe the nature of the marriage market, severe challenges must be faced (Akers 1967, Henry 1969). For instance, there is no simple way of identifying who the eligible candidates are, or of establishing their individual mating preferences or properly measuring the extent of the sex imbalance (McDonald 1995).

Our analysis approaches the analysis of age-assortative mating in Spain by considering these two frameworks: i) individual behavior by gender and ii) age-sex composition of the population at risk. We carried out a long-term analysis using data from vital statistics on marriages from 1922 to 2004. The 82 year series is only interrupted between 1934 and 1940 because the Spanish civil register did not release any data during the Spanish Civil War. Analyzing such a long period enables us to explore age-assortative mating patterns in different marriage market conditions. Our knowledge of Spanish demographic history allows us to identify two potential imbalances in the marriage market, both of which either directly or indirectly resulted from the Spanish Civil War: i) during the war and postwar period the effects of high male mortality and adverse circumstances for marriage altered the timing and intensity of marriage; ii) during the 60s the small cohorts born during and after the war reached marriage ages and changed the age-sex composition of the marriage market (Cabré 1993, 1994).

Besides, since the period analyzed is rather long, we must take into account the many social and legal transformations that occurred in Spain during the 20th century, which had an impact on nuptiality patterns. In 1931 the Second Spanish Republic allowed divorce and civil marriages for the first time. However, official statistics barely reflect those changes because just after the war, the Franco dictatorship reestablished the old 1887 civil code. In 1978, the first democratic Constitution allowed civil marriages again and in 1981 the Divorce law was passed. Since then, second and later order marriages have constantly been on the increase. Finally, in 2005 the Spanish government changed the civil code in order to allow same-sex marriages[1]. All these legal changes took place in a context of radical transformation of gender roles and of increasing gender equity within couples and in a context of marriage postponement and of the diffusion of consensual unions (Nazio 2003). All of these changes are taken into account in our analysis of age-assortative mating patterns when we control age at marriage and previous marital status of spouses.

Next, the paper moves onto a presentation of the data and continues with a description of the results, divided into three parts. The first sets up the context of trends in nuptiality in which our analysis of age homogamy occurs; the second analyzes age-assortative mating patterns and trends by marriage order and age at marriage; the third and final part is dedicated to the results of the standardization method applied to decompose the changes in age-assortative mating into the effects produced by age-sex composition and those produced by the underlying age preferences of the spouses

Data.-

We use two kinds of demographic data: vital statistics and census data.

Marriage statistics.- From 1922 to 1975, the Spanish civil register published yearly information on marriages by age of both spouses and province of residence. As a result of the Spanish Civil War, however, no data were released from 1934 to 1940[2]. Before 1934, marriages were also classified according to the marital statuses of both spouses. This information was not recorded from 1940 until 1975, which means that the distribution of first marriages by age of both spouses is not known for this period, but we can estimate it

[1] Our analysis ends in 2004 and therefore does not consider same-sex marriages.

[2] Recaño and Muñoz (2001) have estimated the number of marriages by marital status for the 1934-1940 period.

(see Appendix 1). From 1976 to the present day, researchers have access to the Microdata of the Spanish civil register, and so there are no limitations on the number of variables that can be cross-tabulated (i.e. ages of both the groom and the wife, marital status, national origin, among others). The age categories used in the official publication from 1922 to 1975 have different ranges and vary over time. We have harmonized these categories to create a standard and comparable cross-tabulation of marriages by age of spouses. We use the standard age categories used in demographic research, i.e. five year categories between 15 and 39 years old, and one final age category from 40 to 49. For the sake of comparability, from 1976 to 2004 single age years have been grouped into the same classification.

Census data and intercensus estimates.- We use data on the distribution by sex, age and marital status of the Spanish population from all population censuses published between 1920 and 2001. From this information we obtain the denominators required to compute marriage rates. Intercensus total and single population estimates have been calculated using an interpolation technique between census years. For the total population, we use estimated data for the total population by age and sex produced by Amand Blanes (2007). The final estimates were subjected to a double correction process affecting both the census figures and the intercensus estimates. First, a comprehensive array of measures was implemented to correct the census figures: (i) adjust the figures to a similar time reference, i.e. January 1st; (ii) correct open age groups; (iii) correct the issue of digit attraction and deficient age declaration; (iv) and solve the underegistration of the infant and elderly population. Second, data series for births, deaths and migration were used to estimate intercensus population counts. Before 1975, when no data on migration was available, the difference between the estimated count and the observed count at the time of the census was assumed to be due to migration and, thus, distributed retrospectively. Appendix 1 discusses the method used to estimate single population counts by sex and age in detail.

Results.-

Nuptiality Patterns in Spain in the 20th Century

To explore age-assortative mating patterns in Spain during the 20th century we first examine trends over time in marriage intensity and marriage timing. Figure 1 shows the trends in the Total Marriage Rate and the Mean Age at Marriage by sex (obtained from the

15-49 marriage rates) between 1922 and 2004. Trends in the timing of marriage, which appears to be the same for both men and women, exhibit four different stages. i) The mean age at marriage decreases during the 20s until the mid 30s, when said decrease was interrupted, first, by the impact of the economical crisis resulting from the 1929 crash in the USA (Miret 2002) and, second, by the consequences of the Spanish Civil War (1936-1939). ii) Both the economic crisis and the war were responsible for the dramatic increase in the male and female age at marriage that continued during the postwar years and occurred in parallel to the collapse of Total Marriage Rates (TMR). iii) People married earlier during the 50s, 60s and 70s, passing from 30 years of age to 26 for men and from 27 years to 24 for women. iv) Since the late 70s, the figures on age at marriage show an important and sustained postponement of marriage ages, which in 2004 reached the oldest mean age of the whole 20th century.

[FIGURE 1]

Trends in marriage timing are somewhat related to the changes in Total Marriage Rates. It appears that the postponement of marriage timing happens together with a decrease in TMR, while the early timing coincides with high nuptiality levels. Figure 1 clearly shows the sudden changes in TMR resulting from exceptional events such as the Spanish Civil War: a strong decrease in TMR between 1937 and 1939 occurred that was followed by a dramatic but momentary recovery in 1940. The level stayed low during the postwar years and started recovering during the 60s and mid 70s, when the highest levels were reached. After that, Total Marriage Rates rapidly decreased, as a result of the economical crisis, and stayed low in a new context of expansion of consensual unions in Spain (Domingo 1997, Nazio 2003).

[FIGURE 2]

Furthermore, Figure 2 presents the distribution of marriages according to the marital status of spouses between 1922-2004. We found that when Total Marriage Rates were high, marriages between single people (i.e. first marriages) represented more than 97% of all marriages. However, the proportion of second or later order marriages increased in the two periods of low nuptiality, i.e. during the 20s and 30s and again during the last three decades. Nevertheless, the second or later order marriages in those two periods corresponded to different compositions in terms of the marriage status of the spouses. Before the Civil War

and during the postwar years, those marriages only involved widows. But since 1982, and after the Spanish Divorce Law of 1981, divorced men and women were generally those remarrying. Their marriages represent more than 90% of second marriages between 1982 and 2004. The percentage of marriages of widows also decreased because the number of widows and their propensity to remarry were lower than at the beginning of the century.

Age-assortative Mating in Spain in the 20th Century

Figure 3 shows the distribution of marriages occurring in Spain by the age difference between spouses. Since we grouped age at marriage into five and ten year age categories, homogamous couples are those in which both spouses belong to the same category, even if they are not of exactly the same age. We classified heterogamous couples according to whether the husband or the wife is one or two age categories older than his or her spouse. As a constant throughout the entire period, the figure shows the importance of the proportion of age-homogamous couples as well as, for heterogamous couples, the proportions of marriages in which the husband is one age category older than his wife. The latter proportion is up to three times larger than the proportion of marriages in which the wife is one age category older than her husband.

[FIGURE 3]

Beyond these constant time patterns, three interesting episodes arise from the analysis of the trends shown in Figure 3. First, there is a decrease in the number of age homogamous marriages in the years before and after the Spanish Civil war (1936-1939). The proportion of marriages in which the husband and wife belonged to the same age category decreased after 1932. It declined from 42% in 1932 to 37% ten years later. The 1932 level was not restored until 1977. Second, during the 1960s the proportion of age-homogamous marriages fell at the same time that the proportion of men marrying younger women rose in comparison with earlier and later decades. As a result, the average age difference increased. These changes coincided with the arrival in the marriage market of the small cohorts born during and after the Spanish Civil war. Third, from the 1970s until the present day the trend has been for an increase in the proportion of age homogamous marriages. The proportion of age homogamous marriages has increased in parallel to a decrease in the number of marriages in which the husband is older than his wife and to a slight increase in those marriages in which the wife is older than the husband. Specifically, the proportion of marriages in which

the wife is one age category older than her husband rose from 6% in 1980 to 10% in 2004. This trend is a clear sign of a reduction in age asymmetry among recent marriages. In recent decades, there has been a steady trend towards fewer female age hypergamic marriages, along with a progressive increase in male and female ages at marriage (see Figure 1).

[FIGURE 4]

Figures 4 and 5 present trends in age homogamy by marriage order and male and female age at marriage respectively. As an indicator of age homogamy, we use the average age difference between spouses. To calculate the measure, we assign an age difference of 0 years to spouses from the same age category, and 5 or -5 years to spouses of adjacent categories depending on whether the husband or the wife is the oldest partner. The same method has been applied for the other age categories. Undoubtedly, this procedure underestimates the age difference of those marriages where both partners belong to the same age category and overestimates the difference of those marriages where spouses belong to different age categories. To examine the reliability of this procedure, we compared the average age difference resulting from using age groups of 5 and 10 years with the same difference using one year age categories for those years where this information is available, i.e. 1976-2001. As shown by Van Poppel *et al.* (2001), the difference between both procedures is minimal.

From a demographic perspective, marriage order is a key factor affecting the average age difference between spouses due to significant differences in this measure by first or second order marriage. The accumulated evidence shows that the average age difference between spouses is systematically larger for second order marriages than for first order marriages. Thus, the larger the proportion of second or later marriages, the larger the impact on global average age difference will be. Figure 4 shows trends in average age differences for all marriages, first marriages (both partners are single), and second or later order marriages. Throughout the whole period, second order marriages present the largest average age differences. However, the impact of such differences on the average age difference for all marriages is scarce. All marriage trends are mostly driven by trends in first marriages, which always represent more than 85% of the total marriages contracted in a year (as shown in Figure 2).

In any case, regardless of the kind of marriage, the average age differences observed in 1922 are systematically higher than those observed at the end of the period, 2004. The

chronology of this decrease differs, however, in terms of the type of marriage we are dealing with. Similar conclusions can be drawn for first and all marriages. First, the average age difference between spouses increased from 1922 to 1932. In 1933 a sudden change in that difference occurred. During the second half of the 1930s, although there is no data for that period, an increase in average age differences may have occurred, which would have happened in parallel with the fall in marriage rates (as shown in Figure 1). From the 1940s there has been a trend towards smaller average age differences, from 3.4 years in 1941 to 1.9 in 2004. This long-term trend in declining average age differences was only temporally interrupted during 1960s, a decade in which the average age difference increased. The 3.2 average age difference in 1965 had not been observed since the first half of the 1940s.

Regarding second or later order marriages, average age differences between spouses also declined from 1922 to 1963. Contrary to what happened to first and all marriages, from 1963 to the mid 1980s the average age difference increased. And during the last two decades the average age difference steadily decreased. Even when the largest differences between first and second order marriages are observed, average age differences for all marriages did not differ drastically from those of first marriages. During the whole period, the maximum difference in the average age difference between all marriages and first marriages was 0.25 years.

[FIGURE 5]

We now examine average age differences by age at marriage for both men and women. Figure 5 presents trends in average age difference by male and female age at first marriage. Only first marriages were selected to avoid any interference of second order marriages especially at older ages. On examining the differences between males and females, we observe a significant gender asymmetry in the relationship between average age differences and age at marriage. Average age differences increase when men marry older and decrease when women marry older. For instance, men that marry before the age of 20 marry women that are on average two years older than them. Meanwhile, women of the same age marry men that are on average between 6 and 7 years older than them. In contrast, for later ages at marriage, let us say between 35 and 39 years of age, men marry women that are an average of 8 years younger than them and women marry, on average, men of the same age. In other words, there is a positive relationship between age at marriage and the average age

difference for men, while this relationship is negative for women (Esteve, Cortina, in press, Ni Bhrolchain 1992). For both men and women, this relationship stays the same for the whole period, although there are some modifications worth mentioning.

First, during the second half of the 1930s and the early 1940s, the trend was for an increase in the average age difference for women marrying between 20 and 30, which were the ages at which the vast majority of women married. This trend explains the increase in the average age difference observed for first and all marriages for the same years (as shown in Figure 4). Simultaneously, the age at marriage for both men and women also rose during these years (as shown in Figure 1). It can therefore be concluded in reference to these years that we are observing marriages that should have occurred some years earlier but, due to the exceptional circumstances of the times, these couples were forced to postpone their marriages. When these women married, they showed the patterns that would have been observed if no postponement had occurred some years before and, more importantly, they had married at younger ages.

Secondly, the average age difference for men marrying between 20 and 34 years increased during the 1960s, when men of these ages married younger women in comparison to earlier decades. This may be the consequence of the shortage of women caused by the arrival in the marriage market of the small cohorts born during the Civil War and post-war years.

The overall trend in the global average age difference between spouses is the result of a combination of patterns of average age difference by age at marriage shown in figure 5 and the actual distribution of spouses by age at marriage, i.e. marriage timing. Thus, if men marry later, the global average age difference between spouses will increase. Meanwhile, if women marry later, this difference will decrease. For both cases, patterns in the opposite sex would have to remain constant. During the last 30 years, the interaction between trends in age at marriage and trends in average age differences by age at marriage is of particular interest. Age at marriage rises both for men and women (as shown in Figure 1) while the average age difference for first marriages decreases (as shown in Figure 4). An increase in the age at marriage implies that the average age differences observed at later ages have more influence on the global average age difference than in earlier years. This change would have produced the opposite effect as long as changes in the average age difference by age at marriage had not occurred. In other words, men marry later but the age differences with

respect to their wives decrease, and women also marry later but there are wider age differences with respect to their husbands in comparison with those men and women marrying at the same age some years earlier. Therefore, the delay in the age at marriage entailed an upward transfer of average age differences from one age category to the one above. At this stage, it is difficult to formulate a hypothesis for the reasons behind these changes. One possible explanation may be the interference of consensual unions. Since some of the marrying couples may have cohabited before marriage, that could be the reason for the aforementioned upward transfer.

Using two sex nuptiality models to estimate age-assortative mating patterns under several age preference standards

Up to this point, we have examined trends in age-assortative mating patterns of marriages contracted in Spain throughout the 20th century in detail, but we have not made any comment on the factors associated with such patterns. We have only indicated some historical circumstances to locate in time some of the shifts observed in the overall trends of age homogamy and examined the variations in these trends by marriage order and male and female age at marriage. We now aim to decompose the observed age homogamy behavior into the effects produced by the age-sex composition of the population at risk and those produced by underlying preferences, which are measured by the forces of attraction. For instance, controlling by the marriage market conditions would make it possible to assess the extent to which the variations in age homogamy trends observed during the 1960s were the result of a broken equilibrium in the age-sex composition of the population at risk, due to the arrival in the marriage market of the small cohorts born during and after the Spanish Civil War. We use Schoen's harmonic mean model to predict the number of marriages that would have occurred if underlying age preferences had remained the same for the whole period (see Appendix 2).

[FIGURE 6]

Figure 6 shows the observed average age difference for first marriages contracted in Spain between 1922 and 2001 and the expected difference according to three distinct standards of age preferences. We use first marriages because they represent the vast majority of marriages and because second order marriages do differ in terms of their preferences in age with respect to first marriages. To obtain the expected average age difference, we first

calculate the force of attractions for each combination of spouses' ages and year (see Appendix 2). The whole matrix of forces of attraction is taken to be the standard set of underlying age preferences. Each standard can then be applied to the population at risk for every year in order to estimate the number of expected marriage for each combination of spouses' ages. Finally, from these marriages, we compute the average age differences following the same procedure as for the average age differences shown in Figure 4. Some conclusions can be drawn regarding the effect of changes in the age-sex composition of the population at risk on the average age difference by comparing the observed and the expected trends.

Specifically, Figure 6 presents the expected trends in average age difference using three distinct standards of age preferences: (i) 1941 is the year when the greatest age asymmetry between men and women was observed; (ii) 1975 is the year that had the highest marriage rates and youngest marriage timing of the whole period; (iii) 2001 is the year with the lowest marriage rates, the highest age at marriage and the greatest gender symmetry (see Figure 1 and Appendix 2). Besides differences in intensity, the three scenarios show the same trends over time, which allow us to make the following comments.

The average age difference is sensitive to the standard of age preferences taken as a reference. Therefore, the 1941 standard produced a higher average age difference than that for 1975, and the difference in 1975 was also higher than that for 2001. The differences between standards are due to a double factor: the strength of age homogamy and the degree of gender symmetry in age preferences. The 1941 standard is that with the all time lowest levels of homogamy and the highest levels of gender asymmetry in age preferences. In other words, it is the standard by which the trend of men marrying younger women is most important and the trend of marrying within the same age is less important compared to the 1975 and 2001 standards. As asymmetry declines and homogamy increases, average age differences decrease. If the trend of men marrying younger women had been balanced by the trend of women marrying younger men, the average age difference would tend to disappear. So, depending on the degree of gender asymmetry in age preferences, the marriage market would be more or less responsive to imbalances in the age-sex composition of the population at risk. The increase in the average age difference between spouses observed during the late 30s and early 40s and, twenty years later, during the 60s, prove the capacity of reaction of the average age difference to such imbalances. From the variation of

the expected average age difference in these two periods, regardless of the standard of reference, we can draw some conclusions concerning the way the marriage market works. First, sudden shifts in the average age difference will be more or less obvious depending on the degree of age homogamy and gender symmetry in age preferences. Second, the observed shift in the average age difference for these two periods (1930-1940 and 1960) is remarkably higher than the expected shift by any of the standards. This means that according to the method we have used, the change in the average age difference for those years was not only due to changes in the age-sex composition of the population at risk, but also to changes in the underlying preferences. Third, the change in the average age difference due to changes in the age-sex composition of the population at risk will happen sooner or later depending on the marriage timing that is embedded in each standard of preferences. The 1975 standard is the first to anticipate the rise in the average age difference of the 60s compared to the 1941 and 2001 standards.

In any case, beyond the specific conclusions that we can draw regarding the marriage market in exceptional circumstances, the difference between the lowest and the highest average age difference in the three standards would have been relatively small. The observed trend shows a difference between the lowest and the highest values of 1.5 years, while the same difference for the estimated trends is lower than 0.5 years. The three standards show the same change over time. The average age difference would have slightly increased from 1922 to the mid 70s, and then stabilized until the end of the period. From these results we can conclude that, except for in specific circumstances, changes in the age-sex composition of the marriage market have had little effect on changes in average age differences over time. Therefore, major responsibility for these changes must be found in other kinds of factors, mostly related to individual behavior.

Summary and Discussion.-

The analysis of the age-assortative mating patterns in Spain between 1922 and 2004 confirms that marriages occur mostly between spouses of similar ages, the husband being more likely to be the older of the two. The results show that age homogamy increased during the 20th century, particularly in the last 30 years, while traditional marriages, in which the husband is older than the wife, are becoming less common. Although the analysis

proves that under dramatic historical circumstances, changes in the age-sex composition of eligible partners modified age-assortative mating patterns, major responsibility of such patterns must be found in behavioral factors. The standardization method applied to decompose the changes in age-assortative mating into the effects produced by age-sex composition and those produced by the underlying age preferences of the spouses indicates that the latter are clearly more decisive. Regardless of the standard of preferences used, changes in the expected average age difference between spouses are smaller than those observed. This gap implies that the age-sex composition of eligible candidates does not explain, on its own, trends in age-assortative mating.

The Spanish patterns appear to be similar to those of other European countries, such as France or the Netherlands, where average age differences between partners also decreased from the beginning of the 20th century (Bozon 1991, Van Poppel *et al.* 2001). In the Netherlands, however, the average age difference started to increase in the later years and researchers assume that this increase can be accounted for by the diffusion of cohabitation, which would modify both marriage timing and age-assortative patterns. As in Spain consensual unions are also increasing considerably, the Dutch precedent seems particularly appropriate for future years.

The analysis of age-assortative marriage patterns by components has revealed important differences in terms of marital status of the spouses and the age at marriage. Second and later order marriages present higher age differences between partners but they barely modify the average age difference of all marriages. The proportion of second order marriages has increased dramatically during the last three decades, but its impact on the total average age difference between remained fairly low, in spite of the fact that second or later marriages are in average less age homogamous than first marriages.

Age at marriage also proves to be related with age differences between spouses: the relation is positive with the age of the groom and negative with the age of the bride; that means that average age differences increase when men marry older and decrease when women marry older. Within the current context of marriage postponement, this opposite relation should have had counterbalanced effects, with the average age difference between spouses remaining untouched. Nevertheless, the delay in the age of marriage entailed an upward transfer of average age differences from one age category to the one above, and therefore the

global age difference between spouses decreased. Demographic and social implications of these transfers remain unexplained though.

From our observations, we conclude that neither the changes in the age-sex composition of the marriage market nor the rise of second order marriages are responsible for the decrease in the average age difference observed since the early 80s. Instead, the rise of the age at marriage would hold the overall responsibility. From a demographic point of view, reasons for this steady increase may be related to unmarried cohabitation. Considering the low prevalence of consensual unions after age 30 in Spain, unmarried cohabitation should be regarded mostly as a stage before marriage, cohabitation contributes to marriage postponement. Therefore, using complementary statistical sources to marriage statistics, future research on age-assortative mating patterns in Spain should be extended to consensual unions. In addition, to better understand how marriage timing and age preferences change, we should take into account the transformation of gender roles, as well as the interaction between age preferences and other dimensions of assortative mating, which may be influencing current and future trends in age homogamy, such as education or ethnicity.

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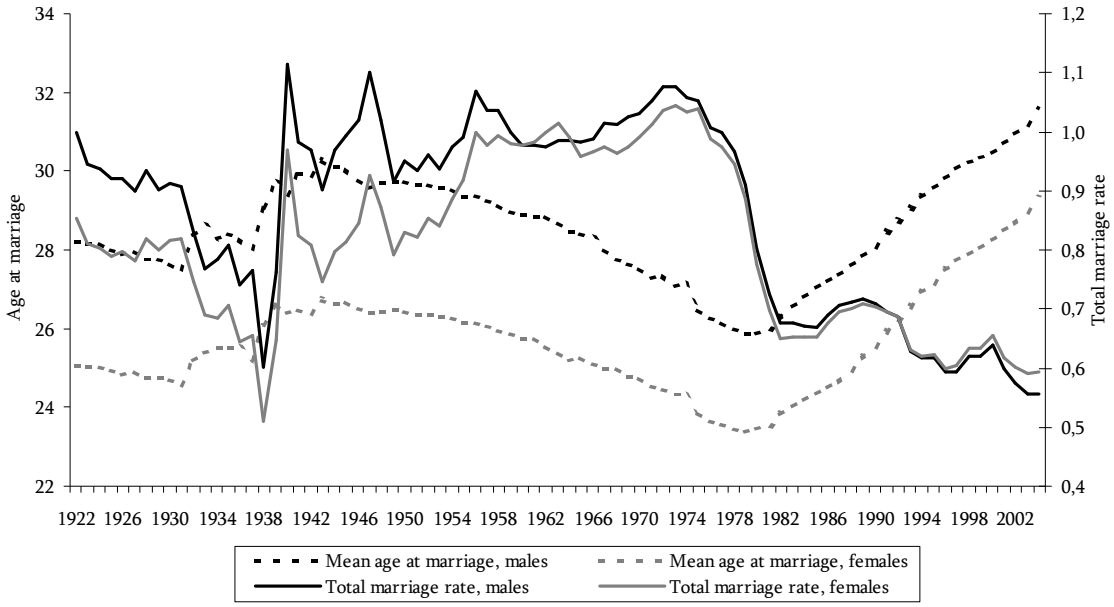
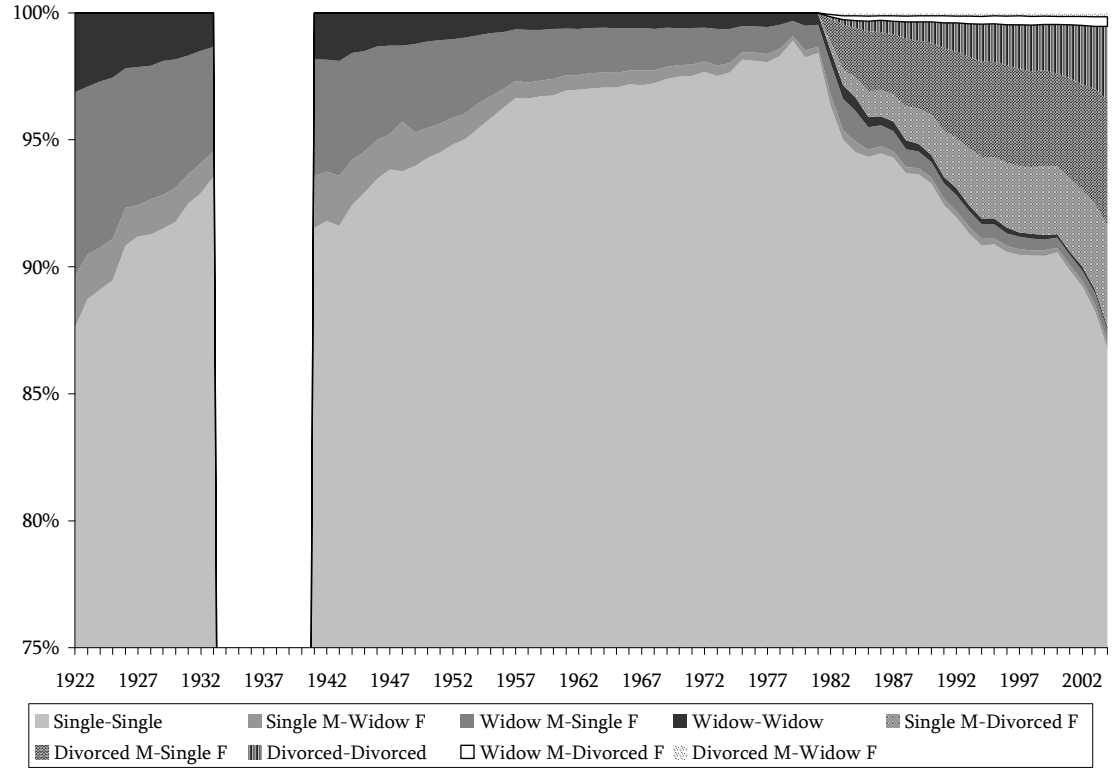
Figure 1. Total Marriage Rates and Mean Age at Marriage by Sex, Spain 1922-2004



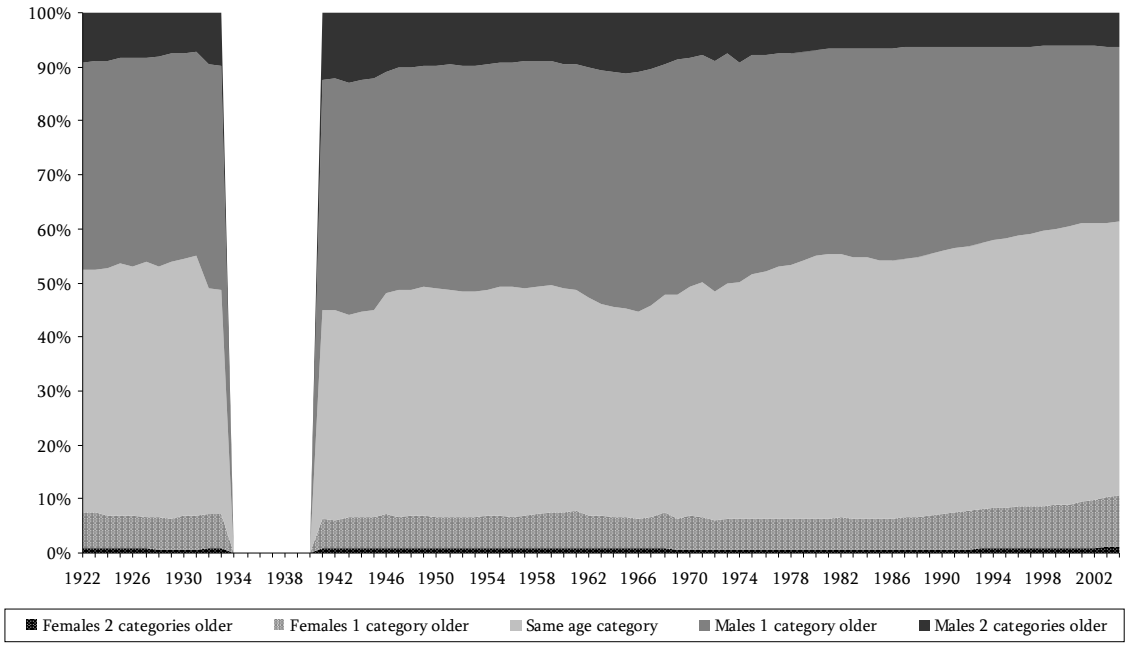
Source: Miret 2002 and authors own work based on vital statistics and population censuses

Figure 2. Distribution of Marriages by Marital Status of Spouses, Spain 1922-2004



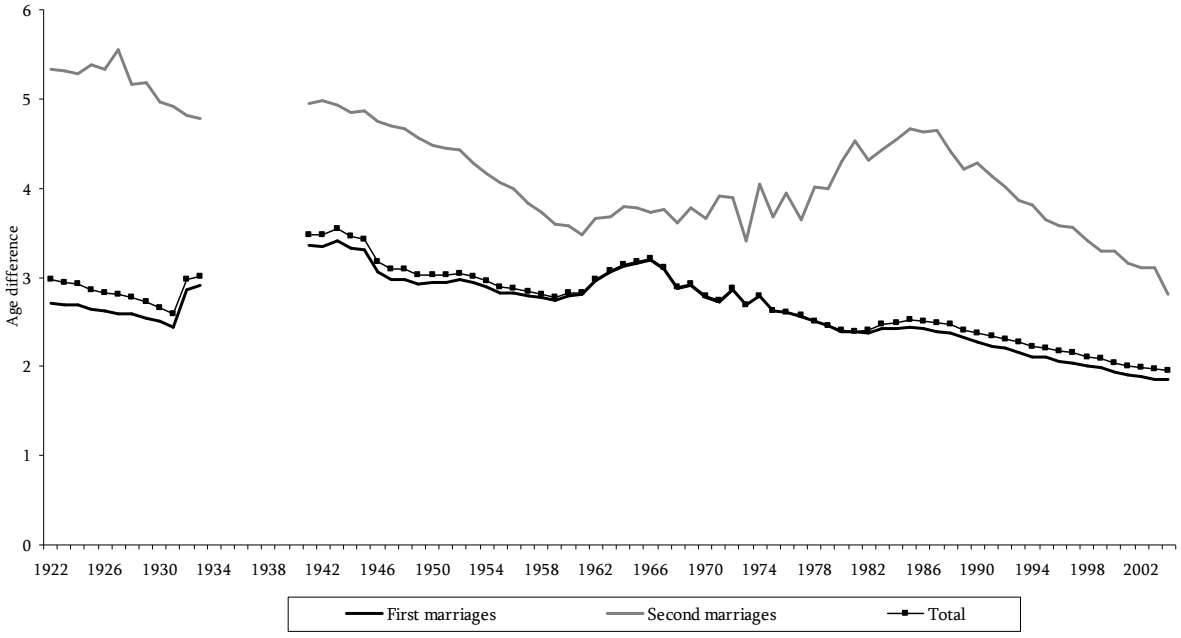
Source: Spanish Vital Statistics, 1989-2004

Figure 3. Distribution of Marriages by Age Difference between Spouses, Spain 1922-2004



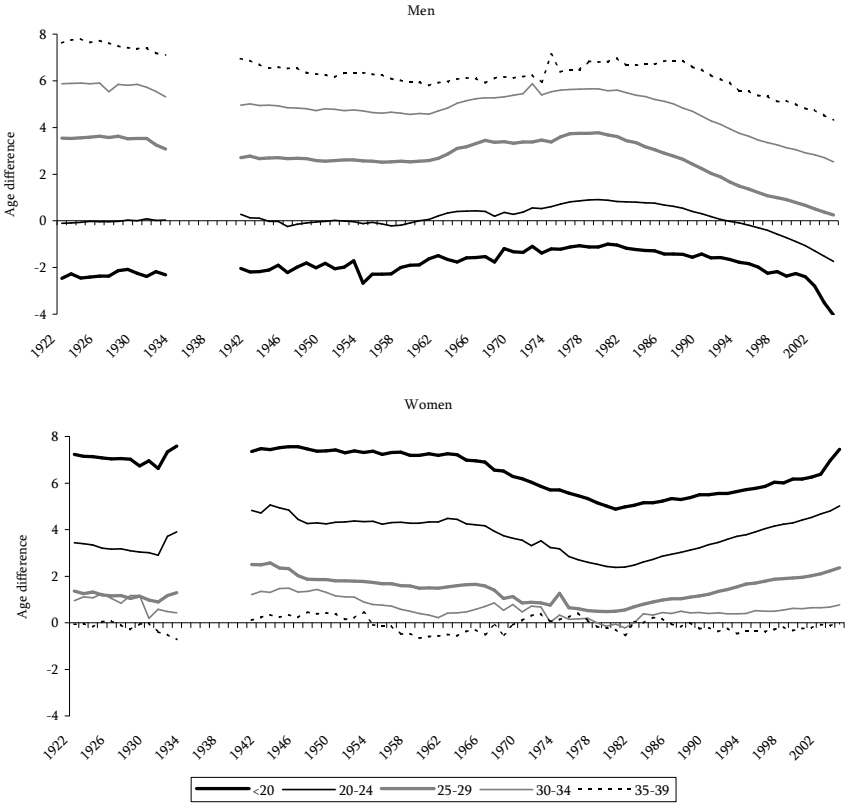
Source: Spanish Vital Statistics, 1989-2004

Figure 4. Average Age Difference between Spouses by Marriage Order, Spain 1922-2004



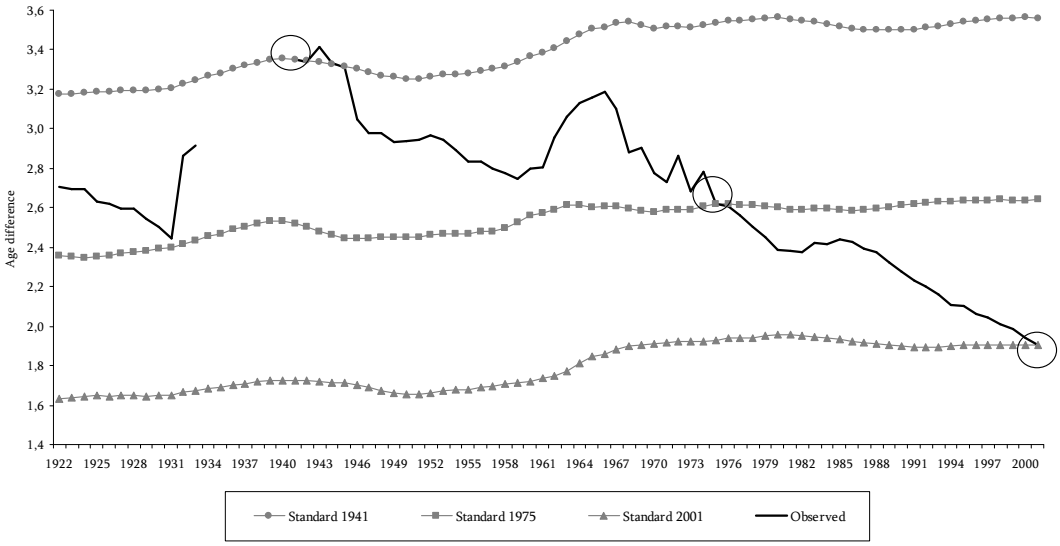
Source: Spanish Vital Statistics, 1989-2004

Figure 5. Average Age Difference between Spouses by Sex and Age at Marriage, Spain 1922-2004



Source: Spanish Vital Statistics, 1989-2004

Figure 6. Observed average age difference between spouses and expected difference according to three standards of underlying age preferences, Spain 1922-2001



Appendix 1

We use the distribution of first marriages (both spouses single) by age of the groom and by age of the bride and the counts of single population by sex, age and year to compute forces of attraction. Since statistical sources do not provide this information directly, we have used data from the Spanish vital statistics on marriages and from the population censuses and registers to estimate it.

First marriages by age of the groom and by age of the bride, 1941-1975.- From 1941 to 1975, first marriages cannot be distinguished from the total. We used linear interpolation to estimate the proportion of first marriages in each combination of spouse ages using the proportions observed in the years before 1941 and after 1975 as known values, where first marriages can be identified. The known values were not those of the immediate year for which we had data before and after the gap (1933 and 1975), but were the mean of the proportions observed during the five years before and after the gap. The estimated coefficients for the 1941-1975 period were later applied to the distribution of total marriages to obtain final counts of first marriages for each combination of ages of both spouses. The assumption of linearity is based on two previous assumptions. First, the proportion of first marriages decreased constantly defining a linear trend over those periods in which first marriages can be identified and the divorce law had not yet been passed, i.e. 1922-1934. Second, between 1941 and 1975 mortality in Spain improved following an increasing but constant trend. With this method we obtained a gradual reduction in the proportion of second and later order marriages for each combination of spouse ages, even if this reduction did not reflect exceptional historical episodes which could either encourage or restrain remarrying.

Intercensus estimates of single population by sex and age, 1922-2001.- The following procedure has been implemented to estimate counts of single populations by sex and age:

1. Population counts by sex, simple age and marital status for the decennial censuses published between 1900-2001 and from the population registers of 1975 and 1986[3] have been used as reference values for interpolation. For each of these years, we calculated the proportions of singles for each combination of sex and age between 15 and 49 years old.

[3] Data from the population register of 1996 have not been used because it contains no information on marital status.

2. The 1900, 1910 and 1920 censuses do not provide figures on the number of persons by sex and marital status and by single age. Moreover, age groups differ significantly within and between the three censuses and from the conventional age groups used in contemporary demography. We used Karup-king multipliers (Schryock, Siegel 1976) to estimate single age counts from the five and ten year age groups found in the original publications.

3. Several approaches were examined to estimate the intercensus proportions of single populations by age, 15-49. Interpolation based on counts of the single population was ruled out. Instead, we decided to interpolate proportions of the single population by age and sex and apply them to the estimated intercensus total population counts. Taking a cohort perspective did not yield a satisfactory fit. We used Coale and McNeil's nuptiality model to estimate proportions of the single population by sex, age and cohort. The fitted values did not offer reliable results due to a lack of sensitivity to exceptional historical episodes[4]. Finally, we smoothly interpolated proportions of single population across ages. We used two known proportions of single population at age x and year t and year t+10, to interpolate the values for this age between the years in between t and t+10. The estimated proportions are later used to obtain counts of the single population by sex and age.

There is no ideal method to validate the consistency of the approach adopted to estimate counts of the single population by age and sex. However, we developed an indirect procedure to evaluate the reliability of our approach. We compared the number of marriages resulting from the estimated counts to the number published in the official statistics. The expected marriages resulted from comparing the number of single population at age x in year t to the number at age x+1 and year t+1, considering that the difference between year t and year t+1 can also be the result of mortality and migration. To control for that, we adjusted the expected number of marriages by a factor resulting from a comparison of the total number of persons, not only single persons, at age x and year t to the number of persons at age x+1 and year t+1. The estimated number of marriages is then compared to official figures provided by the Spanish civil register. Differences between expected and observed figures for first marriages for ages 15-49 are relatively small and correlation coefficients between both series are relatively high (0.9 for men, and 0.83 for women). By

[4] Moreover, not having enough known values made it difficult to apply Coale and McNeil's nuptiality models. As a result, the selection of parameters was often too arbitrary.

age, the larger discrepancies are observed among older ages, while for younger ages, where most marriages occur, there is almost no difference.

Appendix 2

Schoen's harmonic mean results from a two sex nuptiality model that, in contrast to other nuptiality indicators, approaches marriages taking into consideration both men and women at the same time. As a result, we obtain a single marriage rate for each combination of ages of spouses, called force of attraction (Le Bras 2005, Schoen 1981, 1988). The force of attraction has the advantage of including the population at risk, that is, the marriageable population. Most research on assortative mating has excluded the population at risk and limited itself to existing marriages. Conclusions regarding union formation patterns based on existing marriages may often be misleading if the characteristics of the population at risk are not properly included in the models. The success of the force of attraction (Qian, Preston 1993, Qian 1998) lies in its ability to connect the actual number of marriages between men and women at a given age to a harmonic mean of the male and female population at risk at the same ages. The mathematical expression of Schoen's force of attraction is the following:

$$\alpha_{ij} = \frac{m_{ij}}{\frac{H_i \cdot F_j}{(H_i \cdot n) + (F_j \cdot n)}}$$

where m_{ij} identifies marriages between males aged i and women aged j; H_i the number of eligible men at age i; F_j the eligible women at age j; n length of the male age group; m length of the female age group. As seen in the previous expression, the number of marriages in the numerator is connected to the number of potential encounters between eligible men and women at ages i and j respectively. Quoting Qian and Preston (1993, p.494) the force of attraction "reflects both the rate of encounters and the proportion of such encounters that lead to marriage". Schoen's model has been criticized for not considering spillover or competition effects (Choo 2005). In spite of that, for the purpose of this paper, the use of force of attractions as indicators of the underlying age preferences for a given period of time remains undamaged.

Forces of attraction were calculated for each combination of male and female ages at marriage. The complete set of forces of attraction for a given year is supposed to reflect the

underlying age mating preferences for that year. For every year we constructed two summary indicators of these preferences, which are the degree of homogamy and the level of asymmetry in female hypergamic marriages (women marry older men) versus female hypogamic marriages (women marry younger men). Figures for both indicators are given in the following graph. The selection of the standards of preferences that were used to estimate the expected average age difference under no change of such preferences took into consideration the figures shown by both indicators. Therefore, 1941 represents the lowest level of homogamy and the highest level of asymmetry of the whole period. At the opposite extreme, 2001 represents the highest level of homogamy combined with the lowest level of asymmetry. Finally, 1975 is somehow in between of 1941 and 2001 in terms of age homogamy and age asymmetry but maintains the distinctiveness of being the year when marriage rates peaked at their maximum level for the whole period.

Homogamy and Asymmetry Indicators of Forces of Attraction, 1922-2001