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Validating age preferences for marriage market analysis[1]

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Abstract

The paper examines the validity of a set of age preference data, provided by a British dating agency, in several respects: (a) for measuring recent levels of partner supply in England and Wales; (b) for measuring partner availability in the USA; and (c) for assessing time trends in partner supply in the two countries. The mean preferences correspond well with observed age differences at marriage in the US in 1990 and in England and Wales in 1991. The assumption of relatively stable age preferences through the twentieth century in both countries is shown to be reasonable. The dating agency preferences perform better than alternative, conventional weighting schemes in predicting observed age differences at marriage in Britain and the US.

Investigation of the marriage market has long been hampered by the absence of direct information on age preferences. When explicitly stated age preference data become available, from however unusual a source, it therefore seems sensible to consider their potential value for demographic purposes. The data examined in this paper are the stated partner age preferences of a sample of 32,326 unmarried clients of a UK dating agency, collected in 1996. Being self-selected this is not a probability sample and the resulting data cannot be assumed to represent the preferences of the general population of unmarrieds. The purpose of the paper is to evaluate their validity for marriage market analysis. A first objective is to show that they can be taken as a valid representation of age preferences in England and Wales in recent decades. The preferences have been used in a comparative analysis of the marriage market in England and Wales and in the US (Ní Bhrolcháin and Sigle-Rushton, 2004) and so a second objective is to show that they are also valid in the US context. Finally, the preference information has been used also to study 20th century trends in the marriage market both in England and Wales and in the US: the third purpose of this paper is to demonstrate that the 1996 preferences can reasonably be used in the historical context.

The key points in what follows are these:

UK

- Mean preferences in the dating agency data show the same relationship to age, classified in single years, that actual age differences in the UK do in 1991, rising with female and declining with male age.
- Age-specific gender differentials in a partner supply measure, the Iterated Availability Ratio (IAR)[2], to which the preference data are a key input, are closely comparable to, and

[2] The IAR is a measure of partner supply and was proposed by Lampard (1993) as a refinement of the Goldman et al (1984) Availability Ratio; see also Ní Bhrolcháin et al (2002).

highly correlated with, age-specific gender differentials in marriage rates in 1991 in England and Wales.

- The fit between observed age-specific age differences and a measure of expected age differences, estimated on the basis of the dating agency preferences, is closer than with alternative, conventional weighting schemes.

US-UK

- Age differences are currently and have been throughout the 20th century comparable in average level in Britain and the US. The pattern of variation in mean age differences by age and specific by marital status of each partner is almost identical in the US and England and Wales.
- Observed mean age differences specific by age and sex are very similar in the two countries in recent years (1990, 1985). What differences occur could readily be accounted for by age-sex structure and error in the US marriage data.
- The fit between age-specific gender differentials in IAR, using the UK dating agency preferences, and gender differentials in marriage rates in the US in 1990 is very close.

Historical E&W

- Mean age differences in England and Wales in the 20th century have been fluctuating rather than displaying a long-run secular trend that might, if present, be interpreted as driven by social and cultural change. Fluctuations in age difference distributions have been shown elsewhere to be closely associated with variations through time in the supply of partners of varying ages. They are likely, therefore, to reflect mainly changing age-sex distributions.
- Time-trends in the mean age difference, and in the distribution of age differences, are consistent with the existence of a set of age preferences that has been relatively unchanging through time, albeit one which operates in an inherently flexible manner.

- There is a reasonably good correspondence between the age profile of gender differentials in IARs, using the preference data, and in age specific marriage rates in England and Wales at census years 1921-1991.
- Observed and expected age- and sex-specific age differences, estimated on the basis of the age preference information, agree well in each census year 1921-1991 in England and Wales. Correlations are in the range .67 to .94 (female) and .85 to .95 (male) at ages 17-59 and higher at ages 17-34. The root mean square error in expected vs. actual age differences is in the range 0.4 to 0.9 (female) and 1.0 to 2.4 (male) at ages 17-59, and lower at ages 17-34. The root mean square error is, furthermore, substantially smaller using the dating agency preferences as weights than under three alternative weighting schemes for preferences commonly used in the marriage market literature.

Historical US

- Mean age differences have varied within a relatively narrow range – 2 to 4 years – in the US during the 20th century.
- The correspondence between gender differentials in IAR, using the preference data, and in age-specific marriage rates at each census year 1950-90 is fairly good, at least as good as in the UK over that period.
- The age patterns of mean age differences in the US and in England and Wales in 1950 are very similar. Age-specific mean age differences for earlier dates in the US are not yet available to us.
- A good correspondence is found in the census years 1950, 1970, 1980 and 1990 between observed and actual age- and sex-specific age differences, estimated on the basis of the dating agency preferences.

General

- The use of the same preference data for comparative and historical purposes can be seen as a standardising procedure, allowing differentials and time-trends in the relevant aspects of age-sex structure to be quantified in a way which uses an approximately correct weighting procedure.
- There are many other uncertainties in making estimates of the marriage market: the precise nature of preferences, though important, is just one among many unknowns. While the estimates are almost certainly not exact, they are probably the best that can be produced currently and could serve to raise questions and stimulate further refinements.

Are the dating-agency preferences representative of those of the general population in the UK?

No direct evidence can be cited, since no other preference data for a general population sample exist. Indirect evidence must therefore be examined. Average male and female preferences by age behave exactly as age differences in actual marriages do[3]: they vary inversely with female age and directly with male age (Figure 1). The inverse/direct association between female/male (respectively) age and age difference is a standard finding in a wide range of settings, whether the UK and US (see e.g. Goldman et al 1984, Oppenheimer 1988, and also Figure 2) in the twentieth century or further back in history (e.g. 19th century France). In this respect, the Dateline data are a more realistic representation of age preferences than are sex ratios with a fixed age gap, commonly used in the marriage market literature.

Figure 1 shows also that the behaviour of the mean age preferences by age is close to the observed age differences by age and sex in England and Wales marriages of 1991. Of course

they do not correspond exactly, but at least two factors limit how exact the correspondence can be: (a) male and female preferences interact in practice in the marriage market (male actuals are affected by female as well as male preferences, and vice versa) and (b) actual age differences are influenced not only by preferences but also by age-sex structure[4]. A later section shows a good correspondence through time between observed and estimated expected age differences based on the dating agency preferences.

We show elsewhere that relative gender differentials in the Iterated Availability Ratio (IAR), to which the preferences are a key input, correspond closely with relative gender differentials in marriage rates, in England and Wales 1991 (Ní Bhrolcháin and Sigle-Rushton 2004, Figure 6). This is at one and the same time a validation of the IAR indicator itself and also of one of its key determinants – the age preference data. Such a close correspondence would not have been expected, at least in terms of level, even though the general pattern of age and sex differentials in the two types of measure probably would be expected. Validating information of this kind does not appear to be available in relation to other measures of partner supply currently used in the marriage market literature. While it cannot be assumed that gender differentials in partner availability are the key determinant of gender differentials in age-specific marriage rates, it seems reasonable to suggest that partner supply may be an

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[3] Throughout this paper, the age difference is defined as groom age minus bride age.

[4] Note that the discrepancies between preferred and actual age differences for each sex are consistent with the idea that each sex's preferences constrain the actual age difference of the other sex. At younger ages, women would prefer a larger age gap than they achieve and men would prefer a smaller one than actually occurs; at older ages the opposite holds. Since the preference data for each sex are entirely independent of those of the opposite sex, in a sampling and population sense, this is quite a strong result. These are two groups of people whose measured preferences are not interdependent, unlike the age-specific marriage rates for each sex in a given population which are necessarily related, though not in a simple way. Male and female age preferences may, of course, be related in a behavioural sense: members of each sex may take account of the anticipated or perceived preferences of potential partners, but that is a separate issue.

important contributory factor, though one whose significance could vary across time and place.

While the dating agency clients are not a probability sample of the general population of unmarrieds, this does not mean that their age preferences may not be representative of those of the wider population. As discussed in Ní Bhrolcháin and Sigle-Rushton (2004), the age-sex distribution of the client sample departs from that of the unmarried population in England and Wales in 1996. The departure is consistent with the picture presented by the age differentials in our partner supply measure, those with lower partner availability (young men, older women) being over-represented in the client sample. But the age preferences used are specific by age and sex and so this factor is not relevant. There is no obvious reason why clients' *age preferences* should differ from those of the generality. Since they have probably had difficulty finding a partner through informal means, clients might possibly specify as acceptable a broader range of ages than is usual. Against this is the possibility that a range that has to be specified in the abstract is narrower than what would be the acceptable age range in practice, since it does not allow for discovering, through actual real-life encounters, that an age difference outside the conventional could be entirely acceptable. Dating agency clients have an incentive to be realistic in specifying preferences, since the success of their search for a partner by this means will depend on being matched with potential partners with whom they are compatible in real-life terms, rather than simply on paper.

Some features of the age preference data reproduce quite clearly a very specific and little-known aspect of gender differentials in age-difference preferences that has been observed in a French general population survey (greater male interest in older women than generally assumed, distinct lack of female interest in younger men, in both cases at ages under about 30-35; see Bozon 1991).

Using a common set of preferences for the US and the UK

No comparative evidence on preferences is to hand, and so evidence is, of necessity, indirect. The assumption of similar preferences in Britain and the US is consistent with the correspondence between average actual age-gaps in the two countries. These were of a similar order during the twentieth century. From 1901-5 to 2000 the mean age difference in England and Wales fluctuated between 2.2 to 3.1. In the US it ranged between 2.4 and 3.0 from 1964 to 1990 (Clarke 1995, Table 9) and up to 4.0 in 1900 (Presser 1975; Mensch 1986).[5] Good quality age difference information for the US is not easy to obtain, since appropriate tabulations have not been published routinely. The problem is particularly acute for the earlier decades of the 20th century. A time-series of annual mean age differences for all marriages such as can be constructed from published vital statistics data for England and Wales from 1901-05 onwards (Ní Bhrolcháin 1992 and Figure 6 below) can be produced for the US only for the years 1964-1995. Before 1964, estimates vary in quality, with sources suffering from two problems: average age differences published in various sources are obtained as (a) the difference in median ages at any or at first marriage, which is not exact or (b) the difference in mean ages at first marriage, which again does not allow a correct mean

[5] Mean age differences among US women of the cohorts of 1931-33 to 1949-51 who married at ages under 25 are between 1.9 and 3.0 (Mensch 1986). Average age differences at first marriage of two to four years are given by Presser (1975) for selected dates between 1890 and 1974 in the US but these are based on the difference between median ages at male and female first marriage and so may not reflect either the mean or median age difference at those time points. In the US 1964-1989 the difference between the median ages at marriage of bride and groom was narrower by 0.5 years than the mean age difference (Clarke 1995: Table 9). Further historical sources on the US include: Fitch and Ruggles (2000), Table 4.1, difference between median ages at first marriage (native-born whites): ranges during 1900-1990 between 3.9 (1900), 3.5 (1910), and 1.7 (1970), rising to 2.2 in 1980 and 2.1 in 1990. Table 3 of Ní Bhrolcháin (1992): 2.2-4.1 (Spiegelman) and 1.9-3.6 (Schoen et al). Rele (1965): difference in median age at first marriage: 4.1 (1890) to 2.9 (1940) and 2.3 (1960). Monahan (1951): registered marriages in the state of Massachusetts 1845-1948, difference in mean ages at first marriage, 2.3-3.1.

age difference to be obtained[6]. The mean age difference figures based on Clarke (1995) for all marriages are, however, are defined correctly.

When examined in more detail, patterns of age differences in the two countries reveal remarkable structural similarities. Two types of detailed comparison can be made: (a) by marital status of both partners and (b) by age at marriage.

(a) Table 1 shows the mean age difference by marital status of each partner of all marriages in England and Wales and the US in the three US census years 1970-1990[7]. In all three cases, there is clearly a close correspondence between the two sets of figures, the correlation between them being .98 in each of these years. Agreement is so good that the data could easily be from different years in the same country.

(b) Figure 2 compares actual age differences in the US and England and Wales 1990. Clearly, the profile of age differences by age is very similar in the two countries. There are some discrepancies in level – particularly at the very youngest ages but by and large, agreement is excellent. Figure 3 shows the same type of plot for 1985 for the first marriages of both parties and Figure 4 the equivalent for 1950 but based on all marriages. Again, the age pattern of the age difference, both male and female, is very similar in the two countries. The differences in the size of the age-specific gaps in 1950 are, where they occur, somewhat larger than in later years but are nevertheless modest. The linear regression of husband's age on wife's age for 1950 is very similar in the two countries (US: $H= 3.99 + 0.98W$, $R^2=.76$; E&W: $H= 5.0 + .93W$, $R^2=.71$; standard errors of the regression coefficients being .02 and .03, respectively). Such differences as appear might be attributable to differences in age-sex structure and possibly also differences between the two countries in the age-sex specific

[6] This is because some men and women marrying for the first time marry a previously married partner and so the mean/median ages at first marriage of brides and grooms do not relate to the same sets of marriages.

propensities to marry[8]. They certainly do not suggest a systematic difference between the two populations in respect of age preferences.

Figure 5 plots the relative gender differentials in iterated availability ratios and age specific marriage rates for the US 1990 with 5-year age groups since single year of age marriage rates are not readily available for the US[9]. As in the case of the England and Wales comparison, there is a remarkable correspondence between the two types of gender differential. Again, this evidence appears to offer strong support for the use of the dating agency preference data to estimate partner supply in the US, in recent decades.

A substantive argument is that there is and has been a vast degree of cultural interchange between the US and the UK, both historically and in recent times. Historically, the direction of influence is likely to have been from Britain and Europe to the US through the large scale emigration from Europe to the US that continued well into the early decades of the 20th century. Marriage habits and expectations are likely to have been a significant part of the social and cultural baggage accompanying the mass immigration to the US from Europe. The consensus among historians is that although marriage was earlier in the United States than in the UK and Europe in the 19th and 20th centuries, American marriage has traditionally operated on the same underlying principles as the West European marriage system, including a relatively small spousal age difference (Smith 1993, Haines 1996). In more recent times Britain, along with much of the English-speaking industrialised world, has been heavily influenced by the diffusion of American culture – through the printed word, film, and the

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[7] Source: Marriage Detail Files 1968-1988 and Marriage and Divorce Data 1989-95 (NCHS CD-Rom Series 21 Nos. 6 and 34H).

[8] A further aspect (a) proportion of an age-sex group unmarried at each time-point and (b) marriage rates by age at that time since the age-specific age difference is a conditional quantity, conditional on a marriage occurring at that age.

mass media, facilitated particularly by a common language. Attitudes, values and preferences in relation to marriage and partnership are almost certainly an integral part of such cultural influence. Twentieth century marriage trends in the two countries have been very similar, though with decided differences also (e.g. earlier marriage for much of the 20th century, as in earlier times, and throughout higher divorce rates in the US). It would not be at all surprising in this historical and cultural context, if preferences in relation to partner age were very similar in the two countries.

Finally the use of the same preference data for the two countries could be seen as a standardising procedure, allowing comparisons to be made in relative terms between the marriage markets of the two countries. Any differences arising can then be attributed to age-sex structure which has a non-negligible influence at different time-points and cross-nationally because it can and does vary substantially.

Assumption of constancy of preferences through historical time

Previous studies of time-trends in partner availability have used standard age-matching criteria throughout, and so have assumed that partner age preferences are constant through historical time (Akers 1967; Goldman et al 1984; Heer and Grossbard-Schechtman 1981; Henry 1969; Hirschman and Matras 1971; Schoen 1983). No direct evidence exists either of stability or of change in age preferences and so, again, indirect evidence has to be sought for this assumption.

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First, although actual age differences certainly vary through time, it is possible that such variation is entirely due to changes in the age-sex structure of the unmarried population, which can be substantial. Quite sizeable shifts in mean age differences are perfectly

[9] The availability ratios for the US throughout the paper are based on age-sex distributions drawn from the Integrated Public Use Microdata Series (IPUMS) (Ruggles and Sobek 1997).

consistent, in a demographic sense, with age preferences that are constant through time. A previous paper has shown that there are instances of substantial change in elements of the distribution of age differences in association with varying sizes of the cohorts of potential partners (Ní Bhrolcháin 2001). However, such shifts are local in time, are short-lived and appear highly opportunistic. If tastes or preferences were changing from more traditional to modern, or some such long-run shift, we would expect long-run unidirectional changes. These are quite simply absent in England and Wales throughout the 20th century. Instead, the mean age difference *fluctuated* through the century, as is seen in Figure 6. In 1901-05 it was 2.2 years, in 1992 it was 2.5; in that 90 year period the maximum reached was 3.1 in 1946-50 and between 1970 and 2000 the mean gap was fluctuating within the range that it had occupied between 1901 and 1970 (though the mean gap for single men dipped lower than in earlier years). By far the most reasonable explanation for these fluctuations, particularly in the light of the evidence presented in Ní Bhrolcháin (2001) is a combination of changing age at marriage and change in the age-sex distribution of unmarrieds. They are perfectly consistent with a scenario of relatively fixed age preferences.

We saw earlier that the age profile of actual and preferred age differences in 1991/1996 were very similar. Figures 7A and 7B show further that the age pattern of mean age differences was also relatively stable during the 29-year period 1963-91, for both sexes. So, the assumption of relatively constant age-preferences over that period seems reasonable, in view of the close correspondence between 1991 actuals and mean age preferences. Figure 8 shows further that the age–sex pattern of observed age differences in England and Wales in 1921 and 1991 are closely similar. The mean difference between the age specific gaps at ages 16-29 is -0.5 (grooms) and 0.5 (brides). Beyond age 30 there is a progressive divergence among men and between ages 35-50 among women, with larger gaps in 1921 than in 1991. Nevertheless the underlying cause need not be a difference in age preferences. These data are

perfectly consistent with the existence of a set of age preferences that were substantially the same in 1921 and in 1991.

Figure 9 shows plots of the relative sex differentials in IAR and in age-specific marriage rates for each of the census years 1921, 1931, and 1951-81, corresponding to Figure 6 of Ní Bhrolcháin and Sigle-Rushton (2004)[10]. In each of these plots, the general pattern of age-specific differentials in the IAR is reproduced in the corresponding differentials in marriage rates, though in some cases, especially at ages under 40 in 1961 and 1971, the fit is a good deal worse than in 1991. However, the correspondence does not deteriorate progressively further back in time – in 1951, for example, the two types of differential agree remarkably well. In 1921 and 1931, there is essentially a difference in level between the two types of index, but remarkable agreement in age pattern. In view of the origin of the age-preference data, these are quite strong results, and provide good support for our use of the data in the historical series in England and Wales.

UNITED STATES

As noted earlier, a detailed assessment cannot be made of the precise time trends in the age difference in the US, at least with currently available data resources, though a time series can be constructed for more recent decades (Clarke 1995). There was a long-run, but modest, decline in the US in the twentieth century in average age differences, from an average of around 4 years around 1900 to 2.4 years in 1990 (Carter and Glick 1976; Presser 1975; Mensch 1986; Clarke, 1995; see also Table 1)[11]. As in England and Wales, this could be an effect of either or both structural and compositional change, including shifting marriage age,

[10] Age-specific marriage rates by single year of age were obtained by using the published totals of marriages by age and census denominators of the unmarried.

[11] Some sources estimate the gap as narrower than this in recent decades; for example, the difference between the median ages at first marriage estimated by Fitch and Ruggles (2000) from census data on marital status for 1970 is 1.7 years. However, the true mean age

and need not imply changing preferences. It can be shown that assuming constant (Dateline) preferences, the expected age difference in the US declines for women at each single year of age under 25 from the early decades of the twentieth century to 1970[12] (details of this calculation are given in a later section). This estimated change in expected age difference results, of course, purely from the changing age-sex structure of the unmarried since age preferences are held constant. Thus, even a long-run unidirectional trend (if such it was, and few intermediate years are available) in age differences is consistent with a schedule of joint age preferences that is constant through time. In fact, as noted, overall age differences in the US did indeed decline somewhat over that period.

Detailed historical data on age specific marriage rates for early decades of the century in the US appear not to be available, and so the comparison in Figure 10 of gender differentials in partner availability (using the UK preferences) and in marriage rates is confined to the census years 1950-1980 (the equivalent 1990 comparison is shown in Figure 5 above). The fits between the two sets of differentials are at least as good in these years as in the corresponding UK census years, though again there are larger discrepancies at younger ages in 1960 than in other years; in fact the US differentials by age in 1970 and 1980 fit better than in England and Wales 1971 and 1981. These findings suggest that the UK preference data are, if not perfectly valid, perfectly adequate for describing the marriage market in the US during this period. They constitute a strong justification for the use of the preference data in 1950-1990 in the US. The results negate the idea that the use of the UK preferences in the US historical (20th century) context is unreasonable.

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difference in all 1970 American marriages in 1970 was 2.7 years, based on registration data (Table 1).

[12] The weighted mean age difference between unmarried American women of 23 and their potential partners was 2.5 in 1900, 2.2 in 1950 and 1.8 in 1970; figures for 20-year olds are 2.8 in 1920, 2.4 in 1950 and 2.0 in 1970 and for women of 25 3.3 in 1900, 2.8 in 1950 and 2.5 in 1970.

As argued in relation to the US-UK comparison, the calculation of availability ratios with a fixed set of weights at successive historical time-points can be seen as a standardising procedure, allowing variation in relative numbers of the unmarried by age and sex across time to be quantified and compared within a consistent framework. Thus, time trends in IARs with a fixed set of weights can be seen as summarising the relevant changes in age-sex structure across time – though this approach to the issue would de-emphasize the absolute levels estimated in earlier decades, at least in the absence of further evidence.

Observed and expected age differences, assuming dating agency preferences

A final form of validation is by comparing the observed age difference by age and sex with its expected value given the age preference weights and age-sex structure of the unmarried population in a given year. The expected age difference between women of age *i* and their potential partners is defined as the weighted mean age of unmarried men minus *i*, that is, $\left(\sum_j j w_{i,j} M_{j,t} \Big/ \sum_j w_{i,j} M_{j,t} \right) - i$, where $M_{j,t}$ is the number of unmarried men aged *j* in year *t*., and the $w_{i,j}$ are a set of weights expressing the joint preference of women aged *i* and men aged *j*. The expected male age difference is defined correspondingly. The calculation assumes that departures from random mating by age occur only through the $w_{i,j}$ weights. Two versions of the expected age difference have been obtained: the first, referred to as "expected 1", weights simply by the joint preferences[13] (i.e. $w_{ij} = \lambda_{i,j}$) while the second ("expected 2") weights also by the age specific marriage rates of the opposite sex, that is $w_{ij} = \lambda_{i,j} a_{j(o)}$ where $a_{j(o)}$ is the age specific marriage rate at age j of the opposite sex (in the case of women aged i

[13]The dating agency preference data were collected by asking clients to specify the minimum and maximum age of partner that they would find acceptable. From these data, the proportions by age of each sex who would accept a member of the opposite sex as a potential partner were calculated. The joint preference, $\lambda_{i,j}$, between women aged i and men aged j is the product of the proportion of women aged i who would accept a man aged j and the proportion of men aged j who would accept a woman aged i. For further details, see Ní Bhrolcháin et al (2002) and Ní Bhrolcháin and Sigle-Rushton (2004).

above, $a_{j(o)}$ is the age specific marriage rate of men aged j). Expected age difference are calculated assuming four further weighting schemes: a gap of 2 years at each age, a fixed gap of 3 years, the weighting scheme devised by Goldman et al (1984), and random assignment, given the number of brides and grooms of each age in each year. In the Goldman et al scheme, any combination of bride age *i* and groom age *j* is considered acceptable if the number of (i,j) marriages in the year in question is at least 2% of the number of marriages of brides aged *i* or of grooms aged *j* in that year, and hence this is referred to as the "2% rule". In applying this procedure originally, Goldman et al smoothed the resulting matrices but no smoothing has been carried out in the present case, largely because the dating agency preferences themselves have not been smoothed.

Note that this test of the validity of the age preference weights cannot be any more than indicative. The expected age difference as calculated here assumes that encounters between men and women are essentially random by age and that the weights applied are the only influence through which the resulting matrix of (i,j) marriages departs from random mating. In particular, the predicted age difference assumes that the age-structure of meetings between the sexes is independent of their preferences, an assumption decidedly lacking in realism. We do not yet know how to predict the annual pattern of marriages by age of each partner from the age-sex distribution of the population at risk and a set of preference weights. To do so, we would need a precise model of how the marriage market operates and no such model is yet available. In the light of the crudity of the underlying model, the fits to be presented between observed and expected age differences based on the dating agency preferences seem remarkably good.

ENGLAND AND WALES

Table 2 shows the correlations between observed and expected age-differences in each census year 1921-1991 for England and Wales[14]. Better results are obtained with the weighting scheme incorporating both dating agency preference weights and age-specific marriage rates ("expected 2") and so tabulated results are based on these; however, for the 2% rule, the addition of the age-specific marriage rates often worsens the fit and so both sets of results are shown for this weighting scheme. The correlation coefficients for expected age differences based on the dating agency preferences are substantial, in the range .67 to .94 (female) and .85 to .95 (male) at ages 17-59 and higher when confined to the age range 17-34 . Correlations in the male case are substantially higher than the female, and the very high values even under random assignment reflects essentially the fact that under all schemes the expected male age difference, like the observed, rises almost monotonically with age. This is seen in Figure 12, which plots the observed and expected age differences, using dating agency preferences, for 1921-1991 for men, Figure 11 showing the comparable plots for women.

The root mean square error is a better measure of the fit in absolute terms between observed and expected and is shown in Table 3 for ages 17-59 and Table 4 for ages 17-34. Table 3 shows that the dating agency preferences, combined with age specific marriage rates, give a closer fit to observed age differences than do any of the other weighting schemes in all cases except 1921 and 1991 grooms at ages 17-59. The correspondence is less good among men than women, and it is seen in Figure 12 that the main reason is the systematic under-prediction of the age difference at older male ages. Table 4 shows that the fits are better at younger ages (17-34), the improvement being particularly marked for men. While the effect

[14] Observed mean age differences by age and sex for England and Wales are obtained from matrices of bride age by groom age for single years of age to 69 in 1921-1930, for single years of age to 24 and 5 year age-groups thereafter for 1931-1962, and for single years of age

at older male ages is more substantial in 1921-1931 than in more recent years, we need not infer that the corresponding age preferences have changed. A number of factors could be responsible other than changing age preferences. In all, the fit is not only better with the dating agency weights than with other schemes, it is also remarkably good in absolute terms, considering the crudity of the calculation. These figures appear to give a solid basis for considering the dating agency preferences as a usable and realistic representation of age preferences in England and Wales through the 20th century. They are almost certainly not exact, but they would appear on this evidence, along with the evidence presented in earlier sections, to be an acceptable basis for obtaining initial estimates of marriage market conditions through the century.

UNITED STATES

A similar analysis has been carried out for the United States for the years 1950, 1970, 1980 and 1990, census years for which matrices of bride age by groom age are available[15]. Correlations and root mean square errors are shown in Tables 5-7 and plots of expected and observed age differences are shown in Figures 13 (female) and 14 (male). The fits are not as good for the US census years examined as for England and Wales, but there are several difficulties with the US data. First, the pattern of observed age differences by age of bride is quite unusual in 1970 in rising with age from the early 20s into the 30s, whereas the age difference by female age usually declines or is stable at these ages. All of the expected female age differences are negative correlated with observed in 1970 (apart from that based on random mating, ages 17-60). Second, the US data for 1970-90 are subject to a good deal of error as can be seen from the jagged lines representing observed age differences at older ages in Figures 13 and 14, in contrast with the rather smoother lines for England and Wales 1971-

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to 59 and 5-year age-groups thereafter for 1963-1988, and for single years of age with no top coding from 1989 onwards.

91 which are also in single years of age (see footnotes 11 and 12). Considered in this light, the results of Tables 6 and 7 seem quite satisfactory. In three of the four male comparisons of Table 6 (ages 17-60), and 6 of the 8 comparisons of Table 7 (ages 17-34) the root mean square prediction error is at a minimum using the dating agency preferences by comparison with other schemes. Furthermore, the absolute values of the RMSE for the expected values based on the dating agency preferences are modest, particularly in the younger part of the age range. It seems that an assumption of a 2- or 3-year gap gives a better fit to the US female age differences at ages 17-60, but this may simply reflect that there is a large amount of error in the US mean age differences, particularly at older ages. Besides, a 2- or 3-year gap cannot be taken seriously as an expectation for several reasons: (a) it corresponds very poorly to male age differences by age; (b) there is sizeable variation in the age difference by age; and (c) it has been found repeatedly that the variance in age-difference distributions is very substantial. An assumption of a 2- or 3-year gap as an exclusive preference is clearly unrealistic, and its prominence is almost certainly due to the fact that mean age differences in recent times in Britain and the US have been close to 2-3 years. Again, mean age differences are systematically under-predicted at older male ages. As noted earlier, this need not result from a systematic error in the preferences. Lack of knowledge as to how exactly the preferences of each sex and the age-sex structure at a given time interact in generating marriage market outcomes hampers interpretation of this finding. It could be, for example, that since marriage markets tend to be favourable for older men, they are in a better position to satisfy their preferences. In taking the product of male and female preferences to obtain estimates of joint acceptability, equal weight has been given to male and female preferences at each age. However, male and female preferences may perhaps not be equally weighted in marriage market processes and/or their relative importance may vary with age. In all, the dating agency

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[15] The 1950 US marriage matrix is in single years to 34 and 5 year age groups thereafter (Source: Vital Statistics of the United States 1950, Volume 2, Table 2). Data for 1970-90 are

preferences would seem to perform sufficiently adequately during this period in the United States for it to be reasonable to use them as weights in estimating marriage market conditions.

Further difficulties with measuring partner supply

Beyond the realism or otherwise of any given set of preferences, other difficulties arise in marriage market analysis that do not stem from the validity of preference weights, but which hamper attempts to assess the suitability of any particular set of weights.

One argument is that preferences are influenced by opportunities. This objection applies to *any* measure of relative numbers that incorporates some allowance for age preferences, as any defensible index of partner supply must do. It applies to sex ratios in their many and varied forms and to availability ratios and so is not specific to the set of preferences employed here. If individuals' preferences are influenced by their perception of available opportunities, then that is an aspect of real-world social processes, though one on which, in relation to the marriage market, no empirical evidence is available. If age-matching in marriage is responsive to conditions in the marriage market – and I have shown elsewhere that there is such a relationship between age differences and the age distribution of available partners (Ní Bhrolcháin 2001) - that does not imply that preferences change in response to opportunities. Three concepts should be distinguished here: preferences, opportunities (age-sex structure in combination with preferences) and actual behaviour (age-matching in marriage/partnership). While behaviour (actual age differences) may respond to opportunities, underlying preferences can remain unaffected by such opportunities. If we infer from changes in behaviour that preferences have changed correspondingly, we assume essentially that the social world never constrains people from satisfying their preferences – clearly a utopian proposition. A more tractable idea – that preferences are inherently flexible, incorporating a good deal of indifference as between potential partner ages, and can usefully be thought of in

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in single years throughout the age range; see footnote 7 above for the source.

probabilistic terms – was proposed in Ní Bhrolcháin (2001). This means that *an adaptive response to changing age-sex structure (opportunities) need not entail a change in preferences because these are not highly focused but rather sufficiently diffuse within certain limits that a fair amount of substitutability exists regarding partner ages.* Thus the proposition that preferences have been relatively constant through historical time, while nevertheless being inherently flexible in structure, is both coherent and consistent with observed trends in actual age differences in Britain, and probably in the US also.

Age-structure-induced change in age preferences is an assumption, not empirically established fact. If preferences alter somewhat in relation to opportunities, it would make the estimation of marriage market conditions rather more difficult than current demographic thinking assumes. There are, besides, more serious difficulties in measuring the marriage market than the possibility that preferences may be influenced by opportunities. These are fourfold. First, a definitive measure of relative numbers cannot yet be specified because we lack information on, and a formal model of, the behavioural specifics of the marriage market. To be able to assess the state of the marriage market we need to know the following: (a) how does marriage candidacy work? (b) what are male and female preferences by age? (c) how do male and female preferences interact with each other? (d) what is the process of pair formation? and (e) how does each of these factors interact with age-sex structure? Second, even if we had detailed information on these factors it seems probable in the light of the inherent flexibility of preferences that for any given time and place, the number of potential partners available to men or women of a given age is not in fact a single number: it is more likely that a true measure of availability would represent relative numbers as a range, or a quantity that is fuzzy. At the same time, it is unlikely that the state of the marriage market is indeterminate and unquantifiable. A further difficulty is that individuals with given characteristics are probably heterogeneous with respect to potential partner supply,

regardless of how specific an availability indicator is with respect to partners' attributes. Such heterogeneity could in principle influence the accuracy of any aggregate measure, whether based on national or local populations. Finally, we tend to assume that individual preferences for partners of particular ages are either the sole or the primary origin of non-random mating by age. But this need not be the case. Other possible mechanisms can be suggested for the phenomenon, such as social arrangements giving rise to e.g. the marriage circles proposed by Henry (1972), or age-earnings profiles or age-patterns of career entry and stabilisation (Oppenheimer et al 1997).

In all, uncertainty in marriage market estimation goes well beyond the accuracy or otherwise of a particular set of preference weights, though clearly some weights will be a good deal less appropriate than others for any particular application. The key question about the dating agency preferences investigated here is not whether they are entirely accurate but whether they are of the right general shape and level, and can be of value in giving an initial indication of a number of aspects of the marriage market, both in recent decades and across the twentieth century. It should not be regarded as surprising that a single set of age-preferences, collected in the 1990s in Britain, performs well through historical time and in both Britain and the US. While little is known about the origin and role of partner age-preferences, it seems reasonable to suppose that they reflect a mix of psychological and social factors that are relatively stable through time and comparable between broadly similar cultures, particularly age differentials between the sexes in physical and psychological maturity.

Converging lines of evidence indicate that the mean age difference has been relatively stable over long periods of time in England and Wales, and probably in the US also, and that the structure of age differences is and has been similar in Britain and the US. Time trends are

consistent with the existence of a stable but flexible underlying set of age preferences in each country. Two distinct lines of evidence suggest that the dating agency preferences can reasonably be used to represent age preferences in both England and Wales and in the US:

1. Gender differentials by age in availability ratios, to which the age preferences are a key input, are closely similar to differentials in age-specific marriage rates. This provides strong indirect validation of both the age preference weights and of the marriage market measure employed here.
2. The age preferences perform better than alternative, conventional weighting schemes in predicting observed age differences at marriage across virtually the entire century in England and Wales, and in more recent decades in the US, particularly at younger ages. The fit is in some cases not very exact, but the expected age difference calculation is crude and assumes that the age preference weights alone are responsible for the non-randonmness of the matching of partners ages. The findings thus suggest that the dating agency preferences can be used as a reasonable working hypothesis regarding general age preferences both in England and Wales and in the US in the twentieth century.

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Table 1 Mean age difference between partners by marital status of bride and groom. England and Wales and US (Marriage Registration Area), 1970, 1980 and 1990[16].

1970		Marital status of groom			
Marital status of bride	Country	Single	Divorced	Widowed	All grooms
Single	E&W	2.1	7.8	10.7	2.5
	US	2.1	6.6	10.6	2.5
Divorced	E&W	-0.8	4.0	7.7	2.0
	US	0.3	4.2	7.7	3.2
Widowed	E&W	-2.3	1.0	4.0	1.9
	US	-1.0	1.7	5.4	2.9
All brides	E&W	1.9	5.8	6.6	2.5
	US	1.9	4.8	7.0	2.7

1980		Marital status of groom			
Marital status of bride	Country	Single	Divorced	Widowed	All grooms
Single	E&W	2.2	7.8	11.1	3.0
	US	2.0	6.9	11.3	2.8
Divorced	E&W	-1.4	3.6	7.9	1.9
	US	-0.7	4.1	9.0	2.8
Widowed	E&W	-2.6	1.1	3.6	1.6
	US	-2.0	2.1	5.1	2.8
All brides	E&W	1.8	5.2	6.4	2.7
	US	1.6	4.9	7.4	2.8

[16] Sources: E+W: Marriage and Divorce Statistics Series FM2; US: NCHS Marriage and Divorce Data, CD-Rom Series 21 no. 6 and 34H.

Table 1 continued

1990 Marital status of bride	Country	Marital status of groom			
		Single	Divorced	Widowed	All grooms
Single	E&W	2.0	8.0	11.6	2.9
	US	1.9	6.5	11.9	2.6
Divorced	E&W	-2.1	3.5	7.4	1.5
	US	-1.3	3.5	8.6	2.0
Widowed	E&W	-2.8	1.5	3.6	1.7
	US	-1.9	1.8	5.0	2.5
All brides	E&W	1.5	5.2	6.4	2.5
	US	1.4	4.4	7.5	2.4

Table 2 Correlations between observed and expected age-specific age differences, various specifications of preferences. England and Wales 1921-1991

Sex	**Year**	**Ages 17-59**				**Ages 17-34**			
		Dating agency	**2% rule**	**2% rule, asmrs omitted**	**Random**	**Dating agency**	**2% rule**	**2% rule asmrs omitted**	**Random**
Female	1921	.70	.76	.48	-.04	.93	.91	.17	.91
	1931	.82			.12	.96			.97
	1951	.94			.50	.96			.96
	1961	.75			.57	.93			.94
	1971	.70	.78	.70	-.63	.86	.69	.42	.70
	1981	.83	.83	.02	.23	.98	.95	.77	.97
	1991	.67	.92	.42	.66	.98	.96	.80	.97
Male	1921	.88	.97	.88	.99	.95	1.0	.97	1.0
	1931	.93			1.0	.97			.99
	1951	.95			.98	.97			1.0
	1961	.95			.94	.98			.99
	1971	.86	.75	.31	.90	.99	.99	1.0	1.0
	1981	.91	.92	.44	.95	.98	.99	.99	1.0
	1991	.85	..96	.85	.99	.91	1.0	.98	1.0

Table 3 Root mean square error, observed vs. expected age-specific age differences, with various specifications of preferences, ages 17-59. England and Wales 1921-91.
Minimum value in each row is highlighted in bold.

Sex	Year	Specification of preferences					
		Dating agency preferences	**2-year gap**	**3-year gap**	**2% rule**	**2% rule, asmrs omitted**	**Random**
Female	1921	**0.8**	1.1	0.9	2.1	1.9	17.3
	1931	**0.8**	1.8	1.2			14.0
	1951	**0.6**	1.6	0.9			13.5
	1961	**0.6**	1.2	0.6			13.9
	1971	**0.6**	1.0	0.6	2.7	2.3	18.6
	1981	**0.4**	0.7	0.8	1.8	2.3	16.7
	1991	**0.9**	1.1	1.5	2.0	1.3	14.7
Male	1921	2.4	5.1	4.5	3.9	**1.8**	10.7
	1931	**1.9**	4.2	4.1			13.2
	1951	**1.2**	3.4	3.2			13.5
	1961	**1.0**	2.9	2.6			13.7
	1971	**1.2**	3.5	2.7	3.7	3.5	13.6
	1981	**1.4**	3.8	3.2	2.8	3.0	12.0
	1991	1.9	4.1	3.6	2.5	**1.8**	10.4

Table 4 Root mean square error, observed vs. expected age-specific age differences, with various specifications of preferences, ages 17-34. England and Wales 1921-91.
Minimum value in each row is highlighted in bold.

Sex	**Year**	**Dating agency preferences**	**2-year gap**	**3-year gap**	**2% rule**	**2% rule, asmrs omitted**	**Random**
Female	1921	**0.5**	1.1	1.2	1.9	1.2	4.4
	1931	**0.4**	1.8	1.3			4.6
	1951	**0.6**	1.8	1.1			4.9
	1961	**0.6**	1.4	0.7			4.5
	1971	**0.6**	**0.6**	0.8	3.5	1.4	4.9
	1981	**0.3**	0.9	0.7	2.1	0.9	4.7
	1991	**0.8**	1.4	1.2	1.6	0.9	4.9
Male	1921	**0.9**	2.0	2.4	1.6	**0.9**	4.0
	1931	**0.7**	2.2	3.0			5.2
	1951	**0.5**	2.0	2.6			5.5
	1961	**0.5**	1.8	2.2			5.0
	1971	**0.7**	1.9	1.9	2.5	1.6	3.8
	1981	**0.7**	1.7	2.0	1.9	1.3	4.5
	1991	1.6	2.2	2.8	1.4	**0.9**	5.2

Table 5 Correlations between observed and expected age-specific age differences, with various specifications of preferences. US 1950, 1970-1990.

Sex	Year	Ages 17-60				Ages 17-34			
		Dating agency	2% rule	2% rule, asmrs omitted	Random	Dating agency	2% rule	2% rule, asmrs omitted	Random
Female	1950	.50			-.17	.62			.44
	1970	-.56	-.21	-.17	.31	-.55	-.70	-.14	-.60
	1980	.49	.46	.53	.04	.88	.91	.86	.97
	1990	.12	.33	.70	.29	.79	.66	.52	.98
Male	1950	.90			.98	.99			.99
	1970	.81	.75	.37	.96	.98	.99	.99	.99
	1980	.89	.93	.68	.97	.95	1.0	1.0	1.0
	1990	.90	.98	.94	.99	.95	.99	.88	.99

Table 6 Root mean square error, observed vs. expected age-specific age differences, with various specifications of preferences, ages 17-60. US 1950, 1970-1990. Minimum value in each row is highlighted in bold.

Sex	Year	Dating agency preferences	2-year gap	3-year gap	2% rule*	2% rule, asmrs omitted	Random
Female	1950	1.1	1.4	**0.5**			12.1
	1970	1.1	0.8	**0.7**	2.6	1.7	18.9
	1980	**0.6**	0.7	**0.6**	2.3	1.3	17.7
	1990	1.1	0.9	1.3	1.5	**0.8**	17.2
Male	1950	**1.4**	3.2	2.7			8.4
	1970	**1.4**	3.4	2.7	3.0	2.6	14.2
	1980	**1.8**	4.2	3.6	2.6	2.3	12.3
	1990	1.6	3.9	3.4	2.2	**1.2**	11.0

Table 7 Root mean square error, observed vs. expected age-specific age differences, with various specifications of preferences, ages 17-34. US 1950, 1970-1990. Minimum value in each row is highlighted in bold.

Sex	Year	Dating agency preferences	2-year gap	3-year gap	2% rule	2% rule, asmrs omitted	Random
Female	1950	**0.4**	2.0	1.2			5.1
	1970	1.1	1.0	**0.5**	2.8	1.3	5.7
	1980	**0.3**	0.7	0.6	1.4	0.9	4.8
	1990	**0.7**	0.9	**0.7**	1.6	**0.7**	4.7
Male	1950	**1.1**	1.8	2.1			4.1
	1970	**0.8**	1.6	1.5	2.6	1.6	4.0
	1980	**0.8**	1.5	1.8	1.8	1.2	4.5
	1990	1.2	1.4	2.1	1.0	**0.6**	6.0

Figure 1

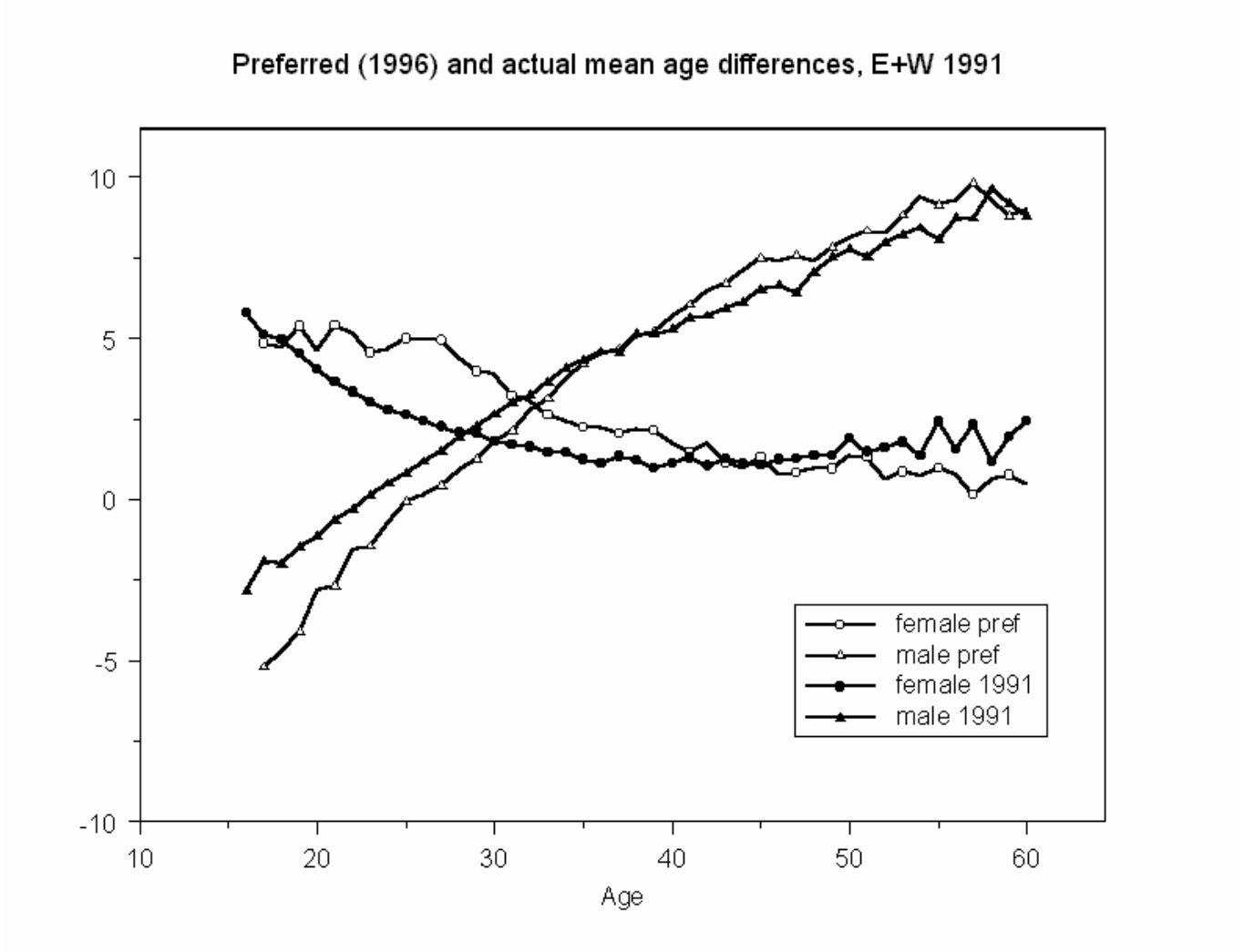

Preferred (1996) and actual mean age differences, E+W 1991
10
5
0
-5
-10
10
20
30
40
50
60
Age
female pref
male pref
female 1991
male 1991

Figure 2

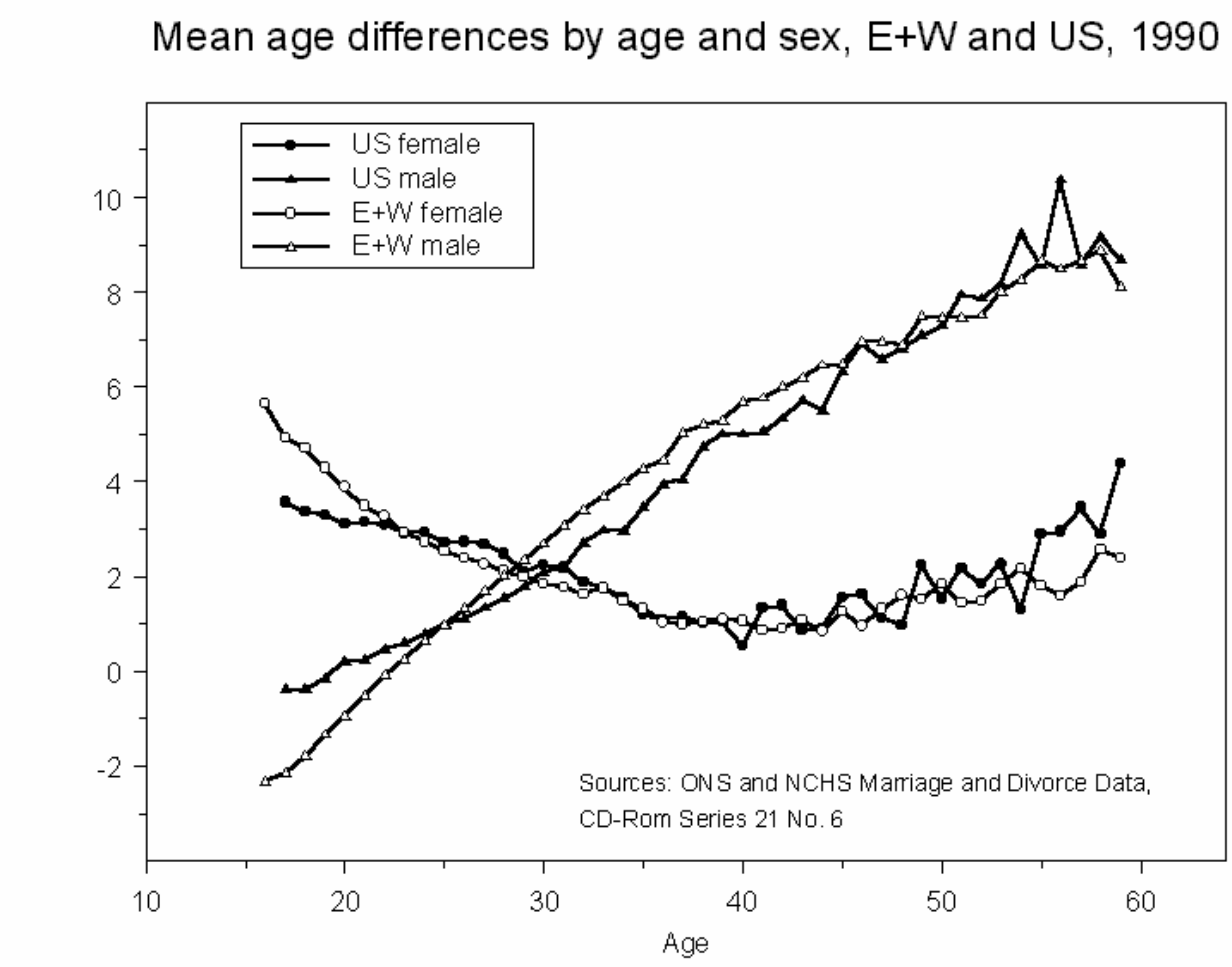

Mean age differences by age and sex, E+W and US, 1990
US female
US male
E+W female
E+W male
10
8
6
4
2
0
-2
10
20
30
40
50
60
Age
Sources: ONS and NCHS Marriage and Divorce Data,
CD-Rom Series 21 No. 6

Figure 3


Mean age difference by age of bride and of groom, US and E+W 1985
First marriage of both parties, both countries
4
2
0
-2
-4
14.5
17.0
19.5
22.0
24.5
27.0
29.5
Age
US female
US male
E+W female
E+W male
Sources: ONS and Vital Stats of the US 1985, v3, Table 2.

Figure 4

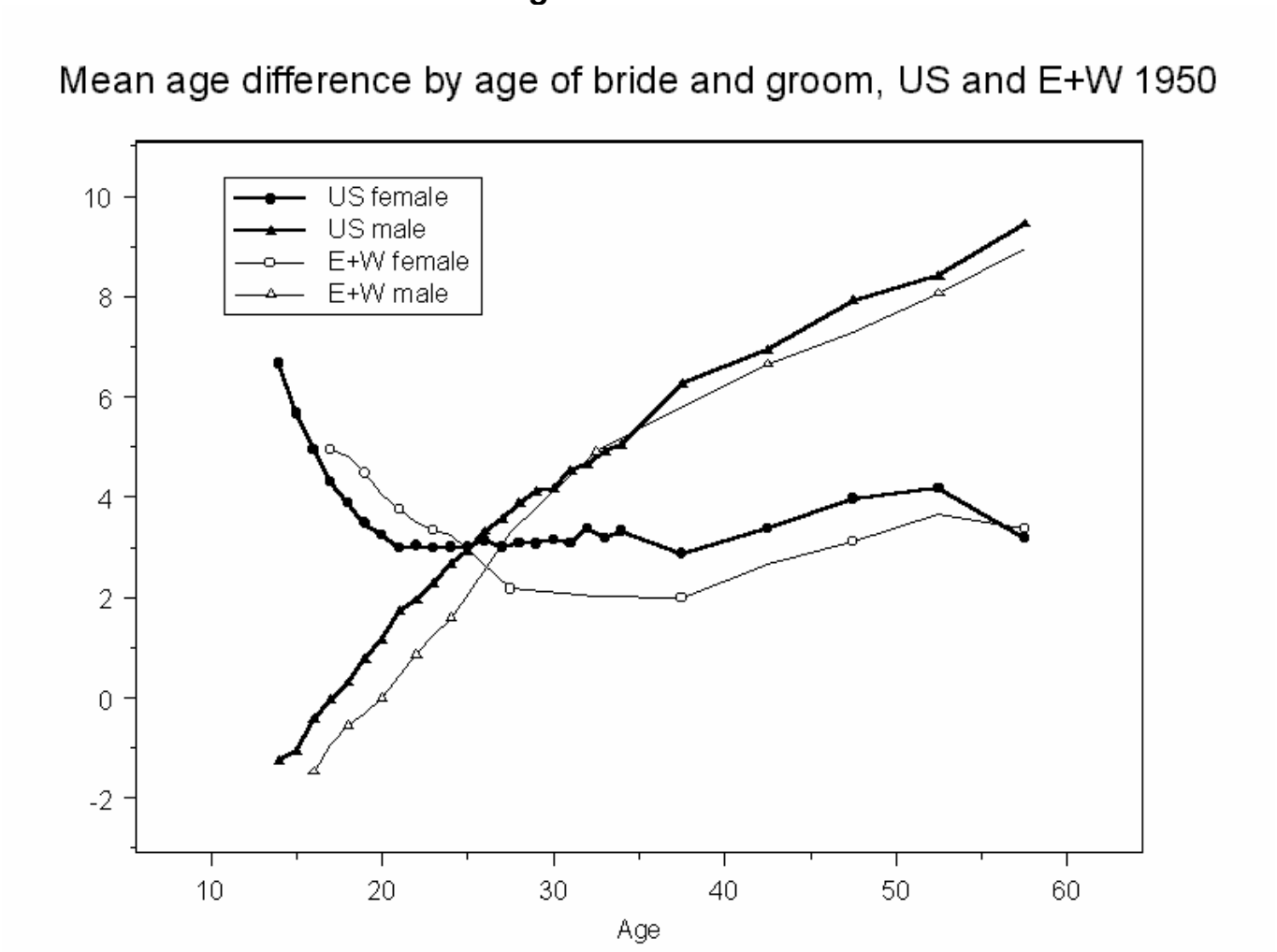

Mean age difference by age of bride and groom, US and E+W 1950
US female
US male
E+W female
E+W male
10
8
6
4
2
0
-2
10
20
30
40
50
60
Age

Figure 5

F/M and M/F ratios of IARs and of age-specific marriage rates, US 1990
(Source: Marriage rates: Monthly Vital Statistics Report vol 43 no. 12, Supplement, 1995)

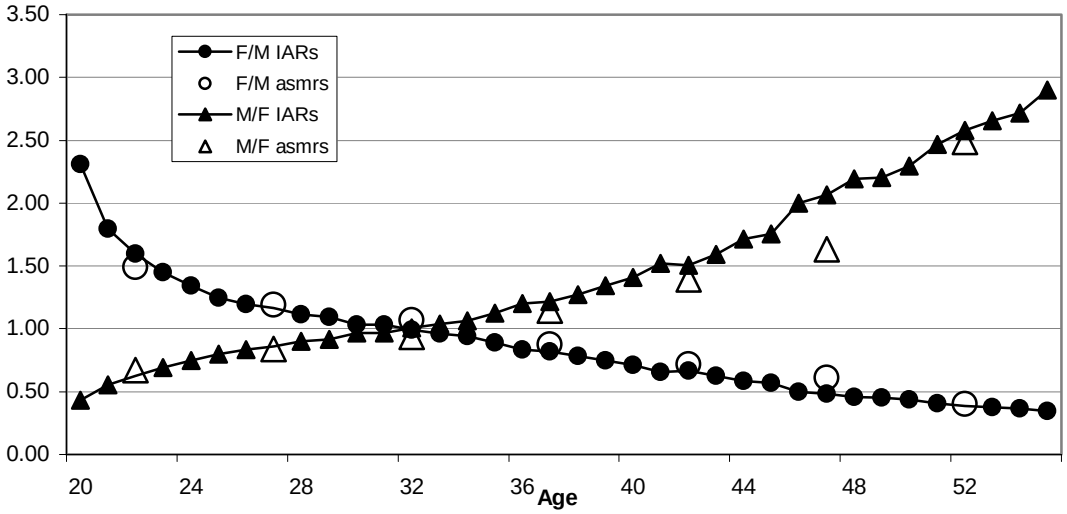
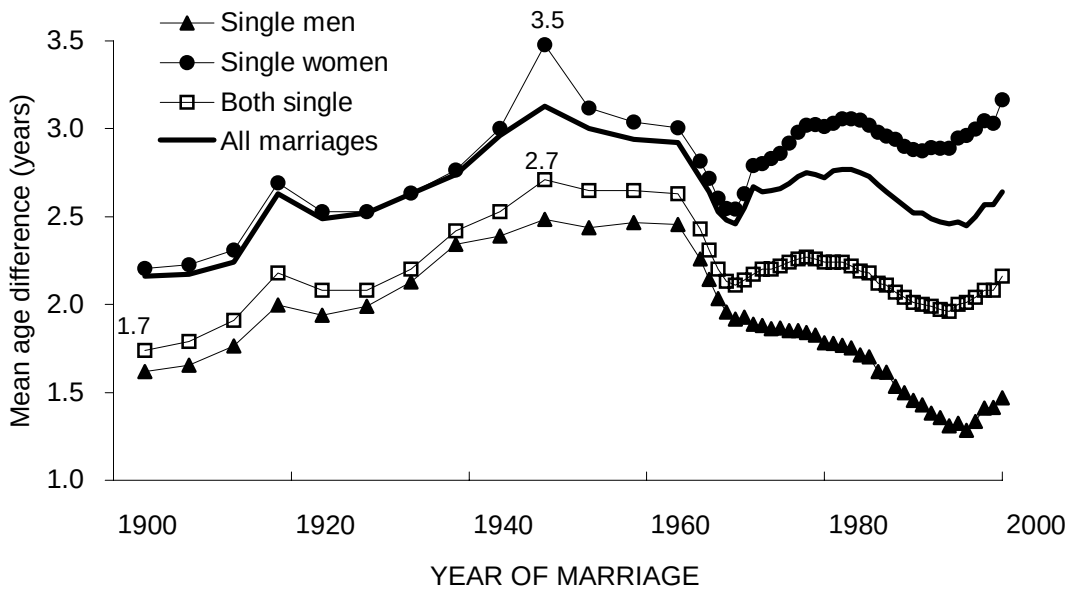


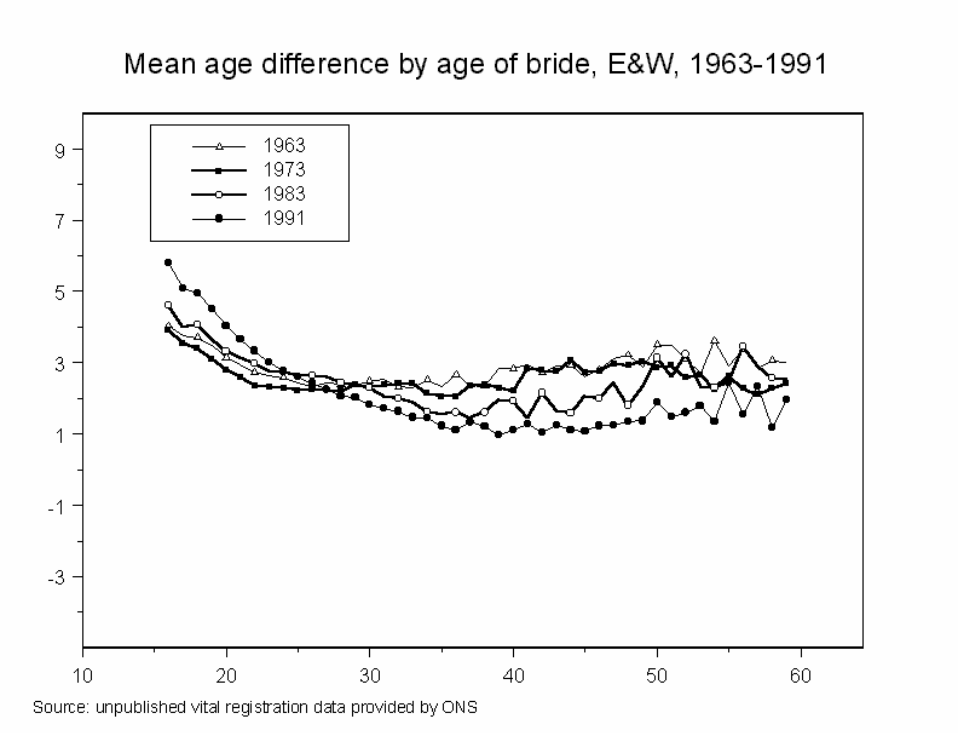
FIGURE 6

MEAN AGE GAP IN FIRST MARRIAGES BY SEX AND MARITAL STATUS
ENGLAND AND WALES 1901-5 TO 2000



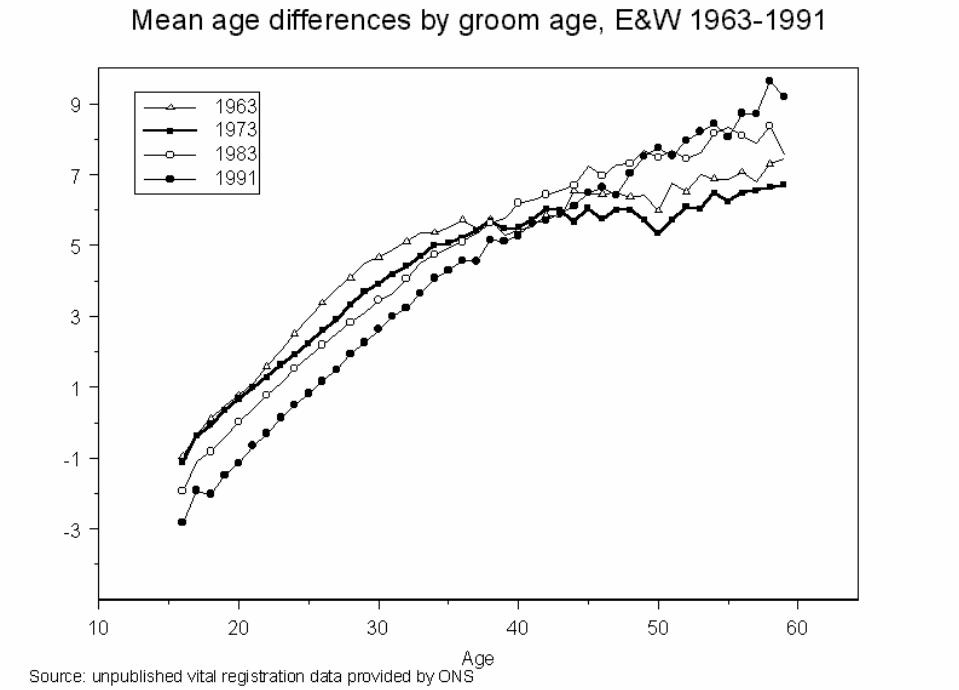
Source: Figure 1 of Ní Bhrolcháin (1992), updated to 2000.

Figure 7A



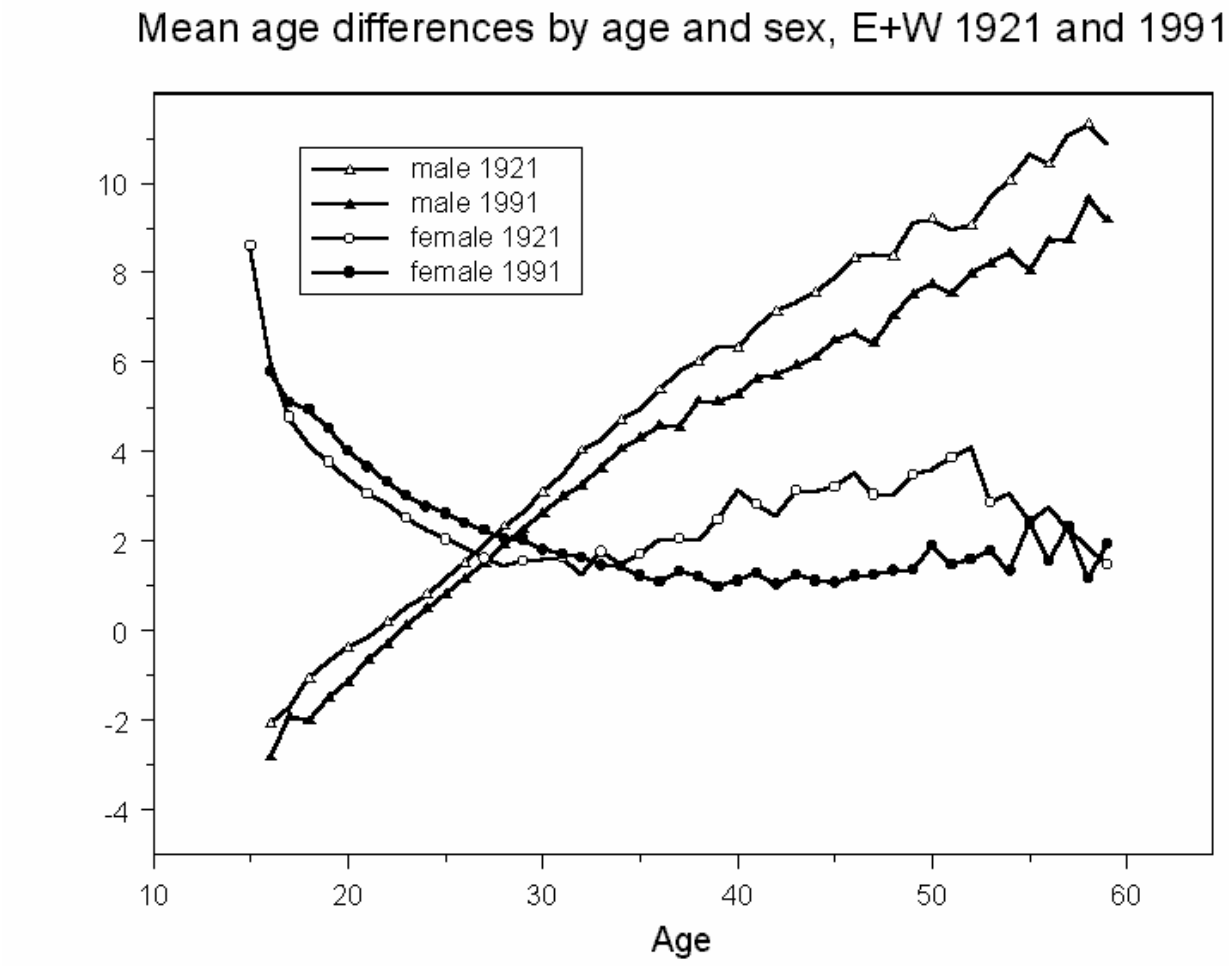
Source: unpublished vital registration data provided by ONS

Figure 7B



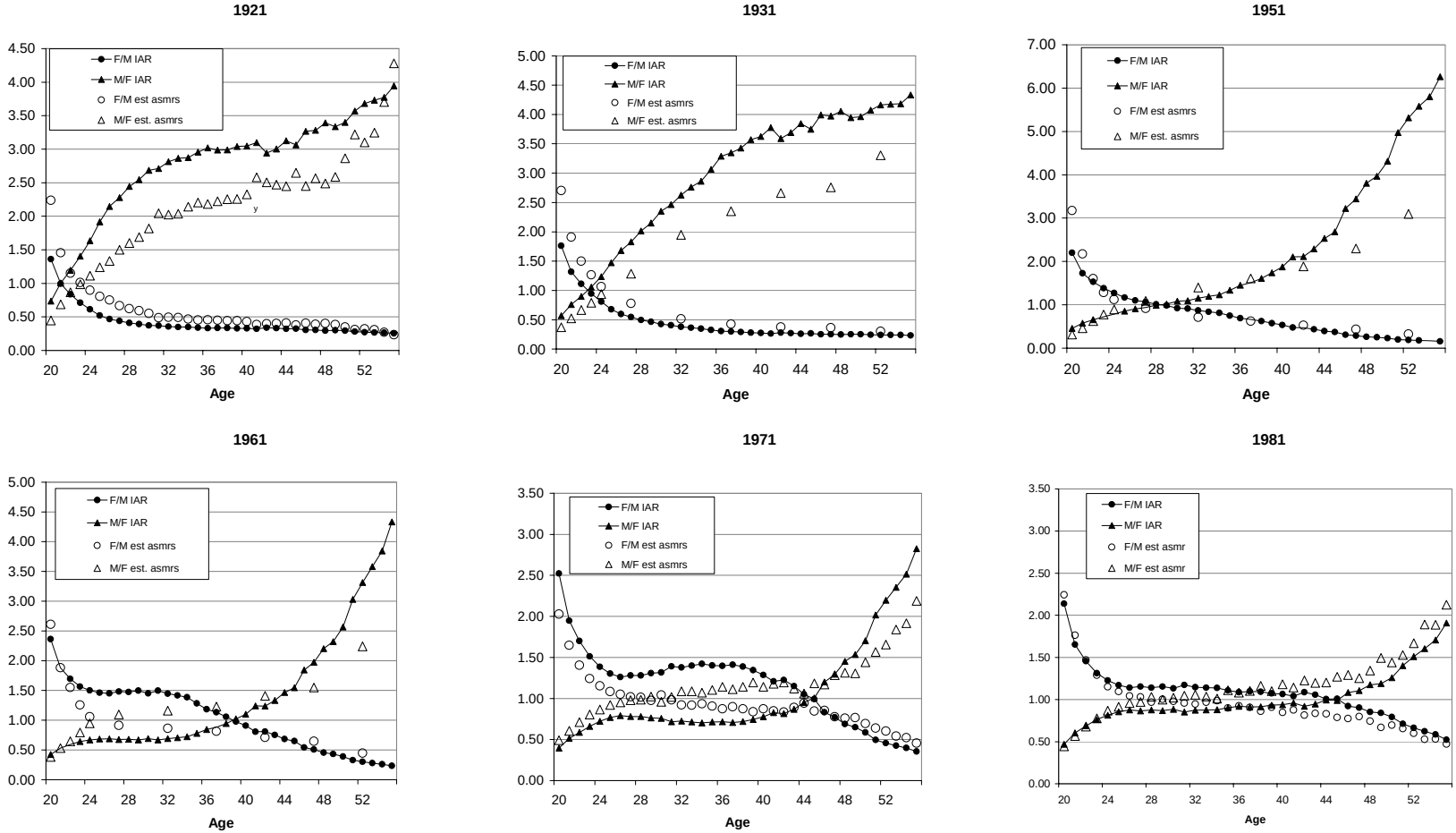
Source: unpublished vital registration data provided by ONS

Figure 8



Sources: Registrar General's Statistical Review of England and Wales 1921 and unpublished tables provided by ON

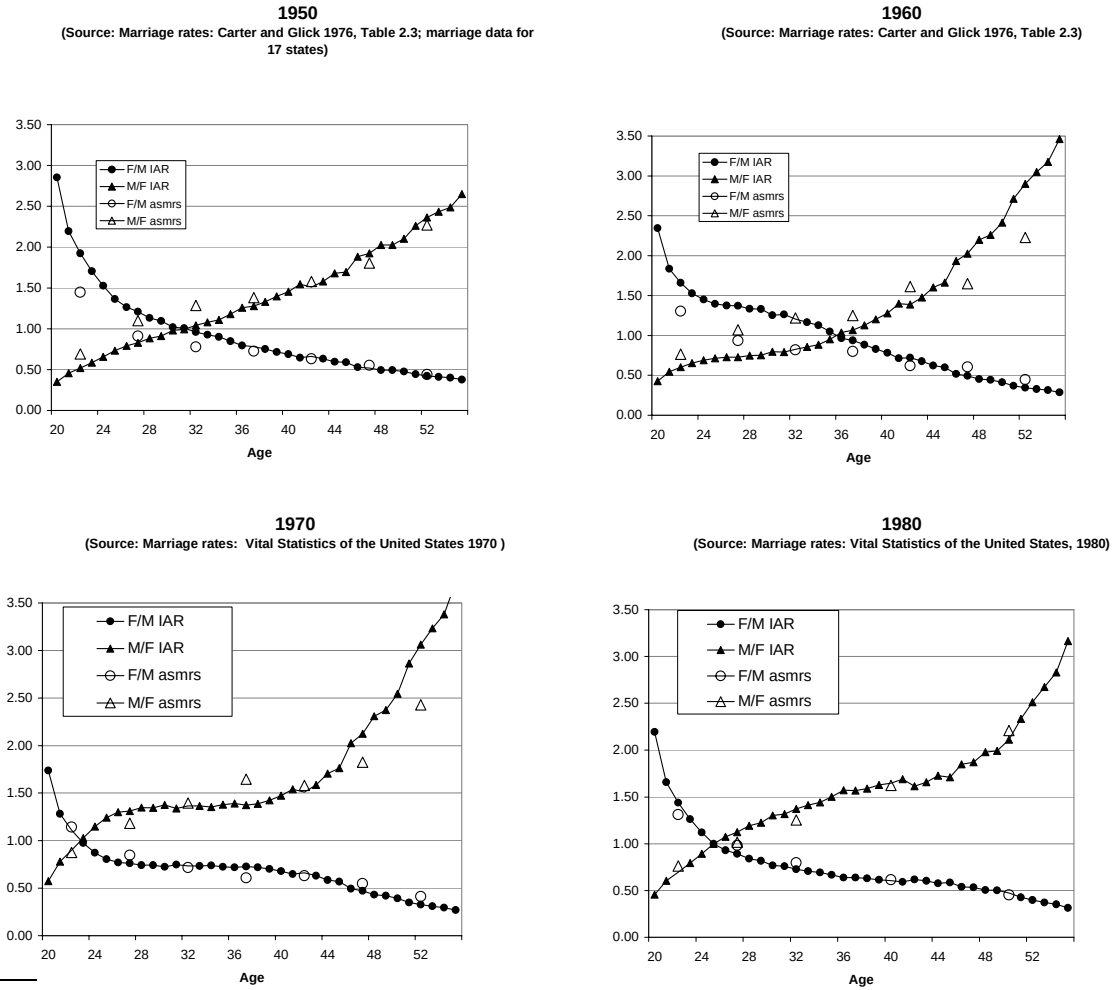
Figure 9 Comparisons of female/male and male/female ratios of IARs and age-specific marriage rates, England and Wales 1921-1981[17].



ASMRS: estimated from all marriages by age and sex together with census counts of the unmarried by age and sex

[17] Source: IARs: Ní Bhrolcháin and Sigle-Rushton (2004) and forthcoming; age-specific marriage rates: unpublished data provided by ONS

Figure 10 Comparisons of female/male and male/female ratios of IARs and age-specific marriage rates, US 1950-1980[18]



[18] Source: IARs: Ní Bhrolcháin and Sigle-Rushton (2004) and forthcoming; age-specific marriage rates: various, as indicated.

Figure 11 Observed and expected age differences, female, E+W 1921-1991

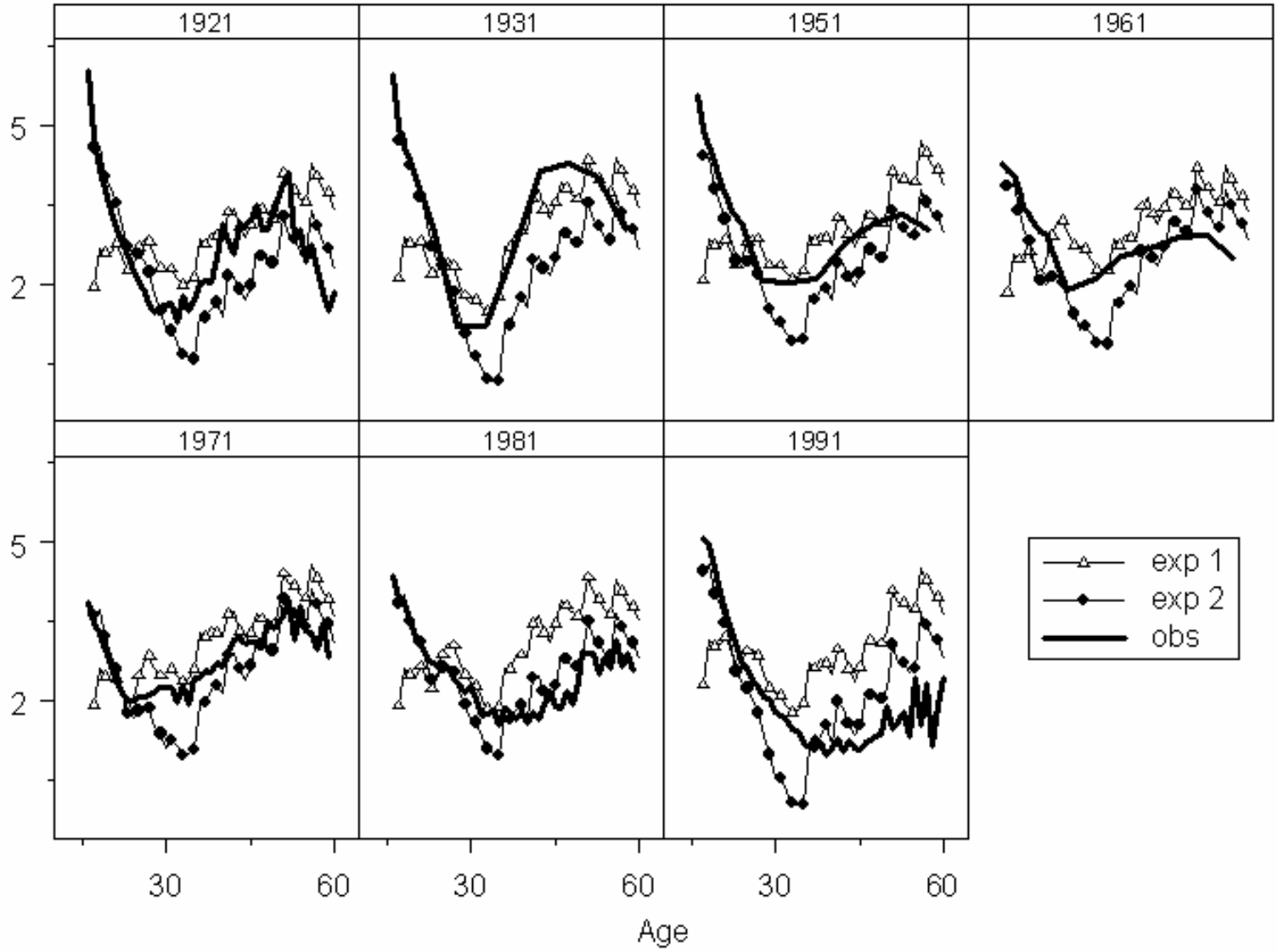


Figure 12 Observed and expected age differences, male, E+W 1921-1991

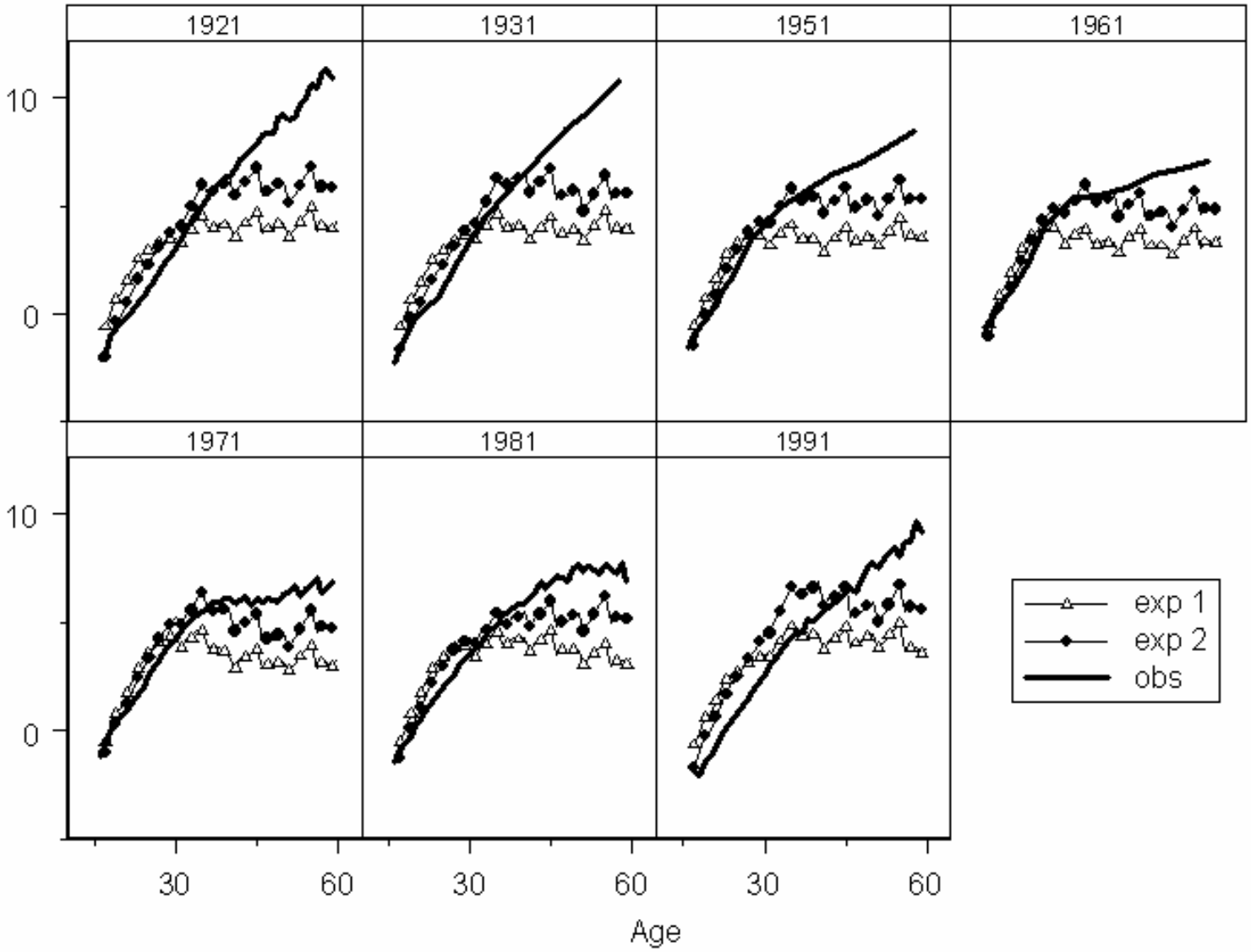


Figure 13 Observed and expected age differences female US 1950-1990

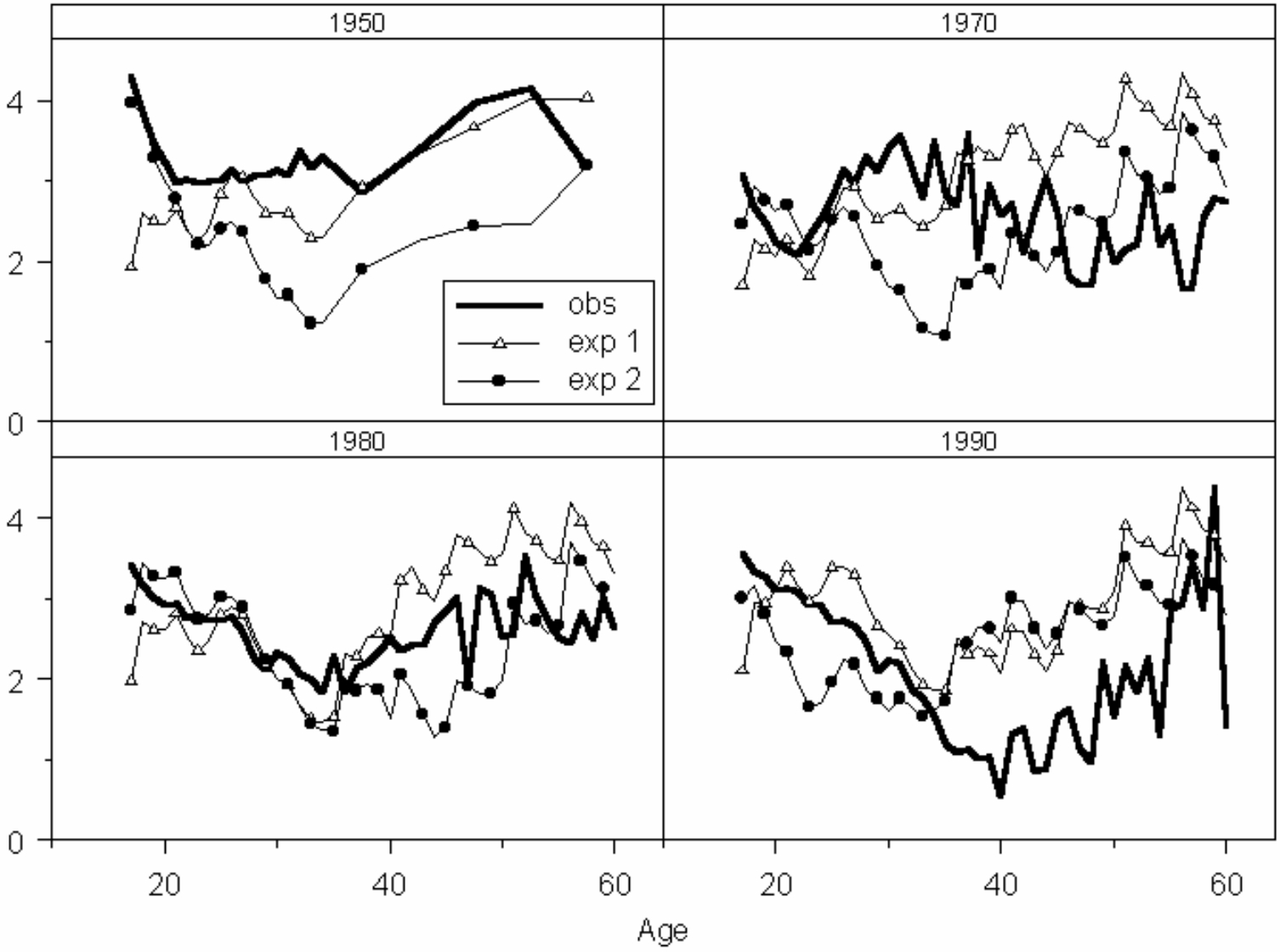


Figure 14 Observed and expected age differences, male US 1950-1990