THE SURVEY OF INCOME AND PROGRAM PARTICIPATION

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This paper identifies and quantifies the social processes that account for the well-known relationship between chronological age and entry into marriage. Patterns of entry into marriage, broken down by sex, year of birth and level of schooling, are used to estimate year to year fluctuations in the available pool of marriage partners. Age-related variation in entry into marriage is then considered in light of changes in the marriage pool, as well as labor force integration--captured through current and lagged measures of employment and enrollment status. The analysis rests on data from the 1984 panel of the United States Census Bureau's Survey of Income and Program Participation (SIPP) and the German Socio-Economic Panel (SOEP).

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INTRODUCTION

Rarely does an empirical article withstand the test of time as well as Gudmund Hernes 1972 article, "The Process of Entry into First Marriage." Its longevity is well-deserved; nearly twenty years later the article remains a striking example of a simple yet elegant mathematical portrayal of social processes. Hernes primary theoretical insight concerned the social character of individual marital choice -- the social pressure to marry represented by one's peers' decisions to marry and a steadily shrinking marriage pool. However, the empirical expression of this approach is decidedly individualistic. Hernes and others who have built upon his work (Diekmann, Sørensen and Sørensen, Tuma and Wu), concentrate upon improving the fit of their models and elaborating upon functional form. In the process they lose sight of what may be the model's most important sociological feature -- the attention it pays to the link between social forces and individual choice.

Recognizing the valuable contribution made by Hernes, the purpose of this paper is to identify and redress the wide gap between the theoretical potential of this approach and its empirical implementation. After briefly discussing Hernes' main argument, the bulk of the article focuses on an alternative empirical operationalization of his theoretical argument. The analysis rests on data from the 1984 panel of the United States Census Bureau's Survey of Income and Program Participation (SIPP) and the German Socio-Economic Panel (SOEP).

Patterns of entry into marriage are broken down by sex, year of birth and level of schooling attained and are represented as survival functions for each subgroup. Assuming then that women tend to marry upwards (in terms of age and level of education) and men tend to marry down, these survival curves are used to estimate year to year fluctuations in the available pools of marriage partners. The survival functions for men are used to estimate changes in the pool of relevant partners for each woman, and those for women to estimate fluctuations in the pools of partners available to each man over time.

Age-related variation in entry into marriage is then considered in light of the degree of labor force integration and changes in the marriage pool. First, a base model including dummy variable terms representing age, period and cohort effects is estimated using logistic regression techniques. Other terms are then included in the model representing the process of labor force integration. It is expected that these additional variables, which are themselves age-graded, will further reduce the impact of variables representing simpler forms of time dependency. Adding a variable measuring rates of increase or decrease in the pool of marriage partners improves the overall fit of the model and reduces the size of the coefficients for the age, period and cohort terms, indicating that fluctuations in the marriage pool are an additional aspect of the observable time dependencies in entry into marriage. The continued significance of the coefficients representing the degree of labor force integration identifies this process as an independent source of variation in the rate of entry into first marriage.

MODELING ENTRY INTO MARRIAGE

The Hernes Model

The process described by Hernes' model for entry into marriage assumes the influence of two opposing pressures. On the one hand, the individual feels pressure to marry as the proportion of his or her cohort already married increases. This pressure may come from seeing the example set by peers of the same sex, as well as the perception that his or her own range of choice is narrowing as peers of the opposite sex enter marriage and leave the pool of available candidates.

Working in the opposite direction, are those factors that tend to limit the probability of

marriage as the individual ages. The decline in the marriage pool serves to limit variety and quality -- assuming that those with unique combinations of traits and the most desirable candidates marry relatively early -- such that the individual can not make a match that would improve his or her current situation. In addition, there are the effects of aging on personal attractiveness and "petrification of individual habits and idiosyncrasies that comes from an extended period of bachelorhood."

In the course of summing up his theoretical argument Hernes provides a crucial insight, though only parenthetically: "In short, the longer people stay unmarried, the less fit they seem for marriage. They may be past their prime, though this 'prime' may occur at different ages in different population subgroups, as in, for example, education groups." Hernes goes on to incorporate different levels of education into his model -- but in a limited and very individualistic manner. Initial marriageability and the rate at which it decreases proportionally over time are allowed to vary with an individual's race, sex and level of education.

The limitations of this approach become clear if we consider the formal specification of his model. Hernes models the individual probability of entry into marriage by looking at the instantaneous rates of change in the proportion of an individual's birth cohort remaining single. He then assumes that the rate of change in individual level probabilities is constant for all cohort members. He states that the rate of change in the proportion married is a function of the proportion already married ($1-P_t$), the proportion not yet married (P_t), and the parameter of conversion (Ab^t). This model can be written as:

$$(1) \quad Ab^t (1-P_t)P_t$$

Time dependency in the rate of change enters through the parameter of conversion -- the constants A and b, which express initial marriageability and the rate at which it decreases proportionally over time.

Hernes then argues that the resulting curve may be approximated by a Gompertz function and goes on to consider how well the resulting model fits the observed rates of entry into marriage for specific subgroups of the U.S. population. However, he never explicates why different subgroups have different parameters. The terms A and b are estimated and reported for different subgroups, but the model itself does not explain why these parameters vary. Furthermore, the social pressure rooted in the behavior of one's peers, in particular those of the opposite sex who define the pool of eligible partners, is confounded with characteristics of the individual -- his or her declining marriageability.

The model also includes terms to directly represent changes in the size of the marriage pool over time, the proportion already married ($1-P_t$) and the proportion not yet married (P_t). However, these proportions are derived from the behavior of the entire cohort, implying that the pool of eligibles for each individual contracts at the same pace. The alternative, developed in this paper, divides the marriage pool into distinct segments. Those segments that best represent the pool from which an individual is likely to choose a spouse are then used to represent temporal change in the social pressure to marry that results from fluctuations in the pool of potential partners.

Reworking the Hernes Model: An Alternative Implementation

The first step in modifying Hernes' approach is to develop a disaggregated measure of fluctuations in marriage pool size based on assumptions that break the marriage market into

relevant segments. It is assumed that women tend to marry men of the same age, or slightly older, and with similar, or slightly higher, educational qualifications. Information concerning educational enrollment and rates of entry into marriage is then used to estimate fluctuations in marriage pool size according to age, birth year and level of education. Thus, the measure of the pressure to marry is determined by the behavior of true eligibles -- not the behavior of like-aged persons, many of whom are statistically improbable partners.

Equally important, this measure in then incorporated in a wholly different modeling framework than that used by Hernes and others, who have gone to considerable effort to develop parametric models that capture the observed time dependency in rates of entry into marriage through the functional form of the model. Here, the intent is to get behind age effects, to understand the age-graded processes that lend chronological age, period and cohort effects their explanatory power. The goal is to develop a model that accounts for the observed time dependency, rather than precisely determining its functional form.

Within a continuous-time framework, proportional hazards models of the following form are often used as an alternative to parametric models:

$$(2) \quad \log \text{hazard rate}(t,\mathbf{x}) = \alpha(t) + \boldsymbol{\beta}'\mathbf{x}$$

where $\alpha(t)$ is an unspecified function of time. The vector $\boldsymbol{\beta}$ stands for the effects of the explanatory variables on the instantaneous probability of an event, whereby the effects are assumed to be constant over time.

In his discussion of discrete-time methods, Allison (1982) argues that the continuous time model presented described in equation (2) is closely approximated by the discrete-time hazard function

$$(3) \quad P_{it} = 1 - \exp[-\exp(\alpha_t + \boldsymbol{\beta}'\mathbf{x}_{it})]$$

because the coefficient vector $\boldsymbol{\beta}$ is identical in the two models. Moreover, Allison argues that the effects of the explanatory variables in equation (3) can be allowed to vary over time by substituting $\boldsymbol{\beta}_t$ for $\boldsymbol{\beta}$.

A further special case of the model would be to restrict the constant term such that $\alpha_t = \alpha$. As the emphasis here is on time-varying covariates and not on variation in the constant term, the models used are of the following type:

$$(4) \quad P_{it} = 1 - \exp[-\exp(\alpha + \boldsymbol{\beta}_t'\mathbf{x}_{it})]$$

Where age is included in the model, it is done by through a vector of dummy variables. In fact, this is equivalent to allowing the constant term to vary over time.

The distinction between continuous and discrete time methods and the relative advantages and disadvantages of each has been an important theme in the literature on methods to analyze processes of change. Well-reasoned arguments can be found on both sides of the discussion. (See, for example, Allison 1982; Tuma and Hannan 1984.) Rather than reiterating this discussion in the abstract, it is sufficient, here, to focus on the comparative advantages of a discrete-time approach for the question at hand. Entry into marriage, at least in Western culture, does take place in continuous time. Marriage can be entered any day of the year, quite literally around the clock. Certainly some degree of realism is lost by using a discrete framework to model a process that is essentially continuous.

But the continuous character of social processes is not necessarily mirrored in data

collection techniques. Individuals enter marriage at particular moments, but most event histories, including those in the SIPP and SOEP studies, employ a certain measure of time aggregation when events are recorded. A discrete-time approach does not necessarily imply a loss of information, relative to a continuous-time approach, if the intervals used to define the discrete units of observation employ the same level of precision used during data collection.

Moreover, for the problem at hand, the integration of data management and statistical analysis is more than a minor convenience. Evaluating the effects of labor force integration and fluctuations in the pool of eligibles on entry into marriage is essentially an argument about the effects of time-varying independent variables. Covariates of this sort may be easily incorporated in a discrete-time framework; measures of covariates, as well as lagged and lead variables, become attributes of a given time period and are available as possible explanatory variables.

Time-varying covariates may also be employed within a continuous-time approach. But their inclusion, through so-called spell-splitting, often entails far less flexibility than in a discrete-time framework. Spell-splitting means that the beginnings and ends of spells are defined by shifts in the time-varying covariates. Thus, the respecification of the model to add or delete a time-varying covariate may require that the entire data set be regenerated so that spells (the basic units of analysis) may be aggregated or split. Within the discrete-time framework, on the other hand, the basic data structure remains the same and variables or sets of variables representing measures of the time-varying covariates are added or deleted from the estimation procedure.

DATA

The analysis of recent marital patterns presented in this paper looks at persons born between 1952 and 1967 and is based on data from the Survey of Income and Program Participation (SIPP) and the German Socio-Economic Panel (SOEP).[1] The retrospective components of the panels assure that event history information is collected for all respondents, even if the event occurred decades ago. The primary constraint on intercohort comparisons is found in the right-censoring among the younger birth cohorts.

The SOEP data used for the analysis -- created from the first six yearly panel waves (beginning in the spring of 1984) -- presented in this chapter illustrate this point quite nicely. The original SOEP sample contained 3,871 respondents born between the years 1952 and 1967. Processes of attrition, through natural causes such as death or emigration as well as panel non-response, left only 2,497 persons in 1989 who had participated in all six waves of the study. Using this data set for the discrete time analysis presented below would produce 21,085 observations (years of persons' lives at risk of entry into marriage) with an event occurring 1,535 times or in 7.3% of the intervals (61.9% of all individuals).

However, a careful consideration of the available data and a proper understanding of the units of analysis yield the data set described in Table 1. This data set contains 27,708 observations on 3,356 individuals with events occurring 1,883 times or in 6.8% of the intervals (56.1% of all individuals).

The large increase in sample size is possible because the retrospective marital history was collected relatively early in the panel (in 1985 during wave 2). The relevant information (and thus the number of observations) for those already married at this point in time is fixed, regardless of his or her further participation in the panel. Clearly, there is no reason to throw away this information because these individuals become nonrespondents later in the study. The same is true of those who report entry into marriage later in the study, but before dropping out of the panel -- they have contributed all relevant information, regardless of their continued participation in the panel. Likewise, the information contained in the knowledge that a person did not enter marriage during a particular interval is not influenced by whether or not the individual remains a

respondent throughout the study. The only members of the original sample who can not contribute information to the analysis are those who dropped out of the SOEP between the first and second wave. Yearly education and employment histories were already gathered in the first wave, but individual marital histories were collected as part of the second wave interviews.[2]

The SIPP data come from the "1984 SIPP Full Panel Longitudinal Research File" prepared by the Bureau of the Census. This file covers a 32 month period and includes a record for each person who was a member of an interviewed household at any time during the panel. From this group only persons who were present in the first month and had a positive interview status for all succeeding months are included in the analysis. Retrospective education, employment and marital histories for these persons, collected as part of the third and eighth topical modules, were then merged with the core information found in the 32 month research file.

In the SIPP 1984 panel, on the other hand, there is no alternative but to rely on those persons present for all 32 months of the study. Retrospective educational and employment data was obtained relatively early in the 1984 SIPP panel. But marital histories were only collected in the 8th round of interviewing -- after most of those who were destined to drop out of the panel already did so. However, due to the larger initial sample size the available SIPP data set (see Table 2) contains a larger number of individuals (5,869), intervals (41,230) and events (3,277).

THE SEGMENTED MARRIAGE MARKET

Entry Into Marriage by Sex, Birth Cohort and Education Level

The most general features of recent marital behavior patterns of men and women in the two countries are well known from other studies, including vital statistics for the two countries.[3] These patterns are clearly discernible in survival functions describing the panel respondents' marital histories as well: throughout the years of early adulthood, the greatest proportion of persons remaining single is found among West German males, followed by US males, West German females and US females. During these years, in each country, more females are married than males and, for males as well as females, more Americans are married than West Germans. In the more recent birth cohorts the proportion of persons remaining single longer increases. This occurs uniformly for men and women in both countries, so that West German males remain the slowest to enter marriage while American females marry most quickly.

As a first step in estimating fluctuations in marriage pool size, survival functions describing patterns of entry into marriage for subgroups of West German males, West German females, US males, and US females were estimated. The three birth cohort groups (1952 - 1955, 1956 -1959, 1960 - 1963) of West German men and women were divided into three classes based on each individual's highest level of education (without formal vocational education, with formal vocational education, attended university.) In the US the same three birth cohort groups are used and each is then subdivided into three classes based on level of education (without a high school diploma, with a high school diploma, attended college.)

The nine survival functions for West German males clearly show that at all educational levels teenage marriage is rare, but thereafter the rate of entry into marriage is inversely related to the level of education. Moreover, the trend toward later marriage among more recent birth cohorts is not confined to those with the most education, but is found in all three educational categories. West German women tend to marry earlier than West German men across all three educational categories. Relatively early marriage is most likely among those without vocational education and least likely among women who attended the university. The trend toward later marriage among more recent birth cohorts can also be seen for women at all three educational levels.

As was the case in West Germany, among American men and women the tendency to marry later cuts across educational levels. Among American women in each birth cohort group, it is also clearly the case that entry into marriage slows as the level of education increases. Among American men, however, it is those with the least education who tend to marry latest. Moreover, it is only in the most recent birth cohort group that college educated males enter marriage significantly more slowly than those with a high school diploma.

These results are important because they show that it is not only those with high levels of education who postpone marriage. Thus, the popular notion that increases in average age at first marriage may be attributed to people remaining in school longer is by itself insufficient. Moreover, once these survival functions are combined with information about cohort size and the distribution of educational achievement across cohorts, one may estimate the number of single men and women with particular levels of education in any year.

Education Specific Marriage Pools

After the number of available men and women of certain ages and educational levels is estimated for each year, assumptions can be made for each individual to define his or her pool of potential partners at any point in time. On average, in both countries, men tend to marry down with regard to age and education, while women tend to marry up. These simple assumptions are used in the following way to define each person's marriage pool:

1) At any point in time each man's marriage pool is defined by all single women who are the same age or no more than three years younger *and* have the same or the next lowest level of education.

2) At any point in time each woman's marriage pool is defined by all single men who are the same age or no more than three years older *and* have the same or the next highest level of education.

This is not to say that all or any one individual will necessarily select a partner from his or her pool. Moreover, the pool could certainly be more precisely defined -- for example, by considering more narrowly defined subgroups or accounting for variation between local markets.

The intent, here, is to provide a rough approximation of pool size to suggest the social pressure felt by individuals as their pool of potential partners declines and how this varies over time and between subgroups of the population of young adults. Moreover, it provides a means to account for changing birth cohort size and increasing levels of education on the size of the pool.

Figures 1 through 4 capture the extent to which these estimates of marriage pool size vary over the life course and the extent to which these patterns depend upon birth cohort and education. As a rule, the slopes are negative, indicating a shrinking pool of eligibles. The exception occurs among males in their late teens when their pool of eligibles is actually increasing from year to year as younger potential partners reach the age of legal marriage. Generally, however, an individual's pool decreases as potential partners marry others. The greatest decrease in the pool of partners occurs when the slope is most strongly negative and is presumed to increase the pressure to marry.[4]

Figure 1, for example, shows little intercohort variation: in each of the three birth cohorts of American males, the most highly educated are presumably under the least pressure to marry, in part because their pool of partners is made up of women with relatively high levels of education. Highly educated women tend to enter marriage more slowly causing the pool to shrink less rapidly to the advantage of men who tend to marry relatively well-educated women. After age nineteen

the pattern of variation according to education is similar in all three cohorts. The surprisingly sharp increase in pool size for all males in the 1952 birth cohort illustrates the impact of changes in cohort size. Born before the peak of the US baby boom, males born in 1952 found themselves under disproportionately lower pressure to marriage as their pool of eligible partners grew at a relatively greater rate as the larger birth cohorts of younger women reached the age of legal first marriage.

Figure 2 presents the opposite side of the same story. American women born in 1952 and 1956, regardless of their level of education, experience greater pressure to marry at an earlier age. Women born in the 1960 birth cohort, on the other hand, are on the downslope of the boom. Given the propensity for women to marry older men, the initially larger pool of slightly older men and the decreasing rate of entry into marriage among their male peers of the same ages combine to produce relatively favorable marriage market conditions for women born in 1960 regardless of their level of education. In all three birth cohorts, up until the age of twenty-one, the estimated marriage pools for the least educated women shrink most rapidly from year to year. In their middle and late twenties, however, their marriage pool is relatively stable in size. In fact, during these years the pool of eligible candidates of more highly educated women is decreasing at a faster rate and these women may feel themselves under greater pressure to marry.[5]

As Figure 3 shows, since the baby boom peaked somewhat later in Germany than in the US, males in both the 1956 and 1960 birth cohorts regardless of level of education benefit from the comparative advantage produced by large cohorts of women of the same age or slightly younger. This variation in cohort size, combined with the slower rate of marriage found among West German women of all educational levels, would limit the pressure to marry attributable to a shrinking marriage pool. This result is most noticeable for the youngest cohort of West German males who experienced a relatively steady, yet gradual decline in the pool of marriage candidates throughout their twenties. Accordingly, it is likely that fluctuations in the marriage pool produced less pressure to marry for West German males in this cohort.

Finally, Figure 4 describes fluctuations in the estimated marriage pool for West German women. As with American women, until their mid-twenties the estimated marriage pools for West German women with higher education levels decrease less rapidly than those for women with the least education. Regardless of level of education those born in 1960 are under less pressure to marry from a shrinking pool of eligibles than their slightly older sisters.

These estimates of marital pool size are then used as time-varying independent variables to assess the relative influence of fluctuations in the marriage pool on the timing of entry into marriage. To show that the influence attributed to marriage pool size is not confounded with other explanations -- including age, period and cohort effects, as well as other age-graded phenomena such as employment and enrollment status -- a series of base models capturing these effects is presented. The base models then serve as a means to statistically test the significance of fluctuations in marital pool above and beyond these other explanations.

MODELS INCLUDING MINORITY STATUS, AGE, PERIOD AND COHORT EFFECTS

Results from a series of baseline logistic regression models are reported in Table 3. Here, as throughout the analysis, separate models are estimated for men and women in each country. The age coefficients in these models distinguish the peak ages of entry and marriage (age 20 to 29) from those before and after for men and women in the US and from earlier ages (age 22 or younger) for men and women in the FRG. Table 3 uses age effects of this type to present a comprehensive picture of time dependencies in entry into marriage for men and women. These base models also include period effects -- to indicate the years where entry into marriage was least likely unadjusted for other factors -- as well as cohort effects.[6] Due to the different degrees of

time aggregation used for periods, cohorts and age groups, each measure of time is not a linear function of the other two. For this reason, this model is particularly useful: it captures each of the major types of time dependency, but does not lead to the problem of over-specification that may result when age, period and cohort are all included within the same model.

Other data sources are certainly better suited for more precisely considering the effects of age and birth cohort on entry into marriage. For the purposes at hand, however, these measures are adequate. A set of models is now available to serve as a baseline to assess the extent to which measures of labor force integration and fluctuations in marriage pool size can be used to construct better fitting models. Furthermore, the models developed below are designed to undermine the various patterns of time dependency found in the base models. To the extent that they succeed, coefficients representing the processes involved should lead to models that are less dependent on the "black boxes" of age, period and cohort effects.

MODELS INCLUDING CURRENT MEASURES OF LABOR FORCE INTEGRATION

The base models in the previous section are presented to introduce the discrete time framework and to illustrate the interpretation of the logistic regression results. They are also useful as they show that the SIPP and SOEP data sets produce plausible results and reliably capture the age, period and cohort effects described in the literature. Their principle purpose, however, is to provide a baseline to consider the extent to which the overall fit of the model, as well as the significance of the observed time dependencies, can be explained by other factors, in particular the process of labor force integration and fluctuations in marriage pool size.

Entry into marriage is promoted by labor force integration through two analytically distinct processes:

1) Occupational Roles

- The extent to which one is tied (at least at a given moment) into a relatively fixed career plan that defines current and future occupational status.

- The issue, here, is the extent to which of labor force integration contributes to identity formation based on role behavior related to occupational status. This additional sense of identity should lead to clearer preferences as to what one seeks in a spouse and, in turn, what one has to offer a spouse.

2) Financial Resources

- The extent to which one is locked into a relatively stable income stream.

- In this case, the issue is the extent to which integration in the labor force provides an adequate and sufficiently secure source of income for establishing and maintaining residential and financial independence.

With this model in mind, the increasing age at first marriage for those in more recent birth cohorts is presumably tied to the relative difficulty they have had in the early years of their work lives. Average later entry into marriage for members of these cohorts, in part, may be attributed to the financial consequences of their initially insecure positions in the labor force, as well as the impact of educational and labor market experience on the process of identity formation.

Developing this argument depends on distinguishing between the two aspects of labor force

integration introduced above: occupational roles and financial resources.

Employment and Enrollment Status in Relation to Different Aspects of Labor Force Integration and Their Combined Impact on Entry into Marriage

Current Enrollment and Employment Status	Achieved Aspects of Labor Force Integration	Probability of Marriage
Not enrolled and employed	occupational roles financial resources	high
Enrolled and employed	financial resources	medium
Not enrolled and not employed	occupational roles	medium
Enrolled and not employed	neither	low

Assuming that employment status primarily captures the financial resource aspect of labor force integration and enrollment status principally measures the occupational role aspect, marriage should be most likely to occur when individuals have found a secure place in the labor force with regard to both aspects of labor force integration. However, integration with respect to either aspect, financial resources *or* occupational roles should be sufficient to improve the odds that an individual enters marriage. Thus, once either school is finished or employment has begun, the rate of entry into marriage should be greater than those instances when neither of these indicators of labor force integration is present.

Gender-related differences in the relationship between labor force integration and entry into marriage will be an important subtheme throughout the analysis. In both countries, increasing rates of female labor force participation, particularly in employment that implies occupational prestige and a degree of career commitment, places the traditional marriage arrangement in a different light. For increasing numbers of women, and for increasing periods in the life course of individual women, employment is a viable substitute for marriage. In other words, the relationship between labor force integration and the probability of entry into marriage, as depicted above may well represent a male model of entry into marriage. For women, the positive correlation should be weaker and the link with each of the two aspects of labor force integration may be different than that found among men.

Moreover, based on the different vocational education systems in the two countries, there should be cross-national differences in the impact of those combinations of employment and enrollment status indicative of incomplete labor force integration -- those cases where the probability of marriage is labeled medium. In the US, where on the job training plays an important role, entry into marriage should be more common if the individual is employed yet remains within the educational system, than if an individual is not employed but is no longer enrolled and is presumed to have completed his or her education. In the FRG, exactly the opposite is to be expected: one would expect, marriage is more likely if the individual is not regularly employed but is outside the educational system.

The series of models in column [1] of Tables 4 through 7 measure these interaction effects using three dummy terms.[7] Before discussing each of these tables in detail it should be noted that for each of the four groups, as defined by gender and nationality, a positive and significant coefficient is associated with all three dummy terms. *In general, the inclusion of these terms goes a long way toward diminishing and, in some instances eliminating the observed pattern of time dependency (age, period and cohort effects).*

Turning first to **American men**, the effects of including terms representing current enrollment and employment status can be seen by comparing the model presented in the first column of Table 4 with the base model for this group in Table 3. To begin with, the overall fit of the model is improved dramatically: the inclusion of these terms decreases the likelihood ratio X^2 by 435.97 at a cost of only 3 degrees of freedom -- well above the .001 threshold value with 3 degrees of freedom of 16.268.[8] This suggests that one ought to reject the hypothesis that the simpler model fits the data as well as the model including the coefficients reflecting current enrollment and employment status.

Since all variables in the model share the same metric (they are all dummy-coded) the relative magnitude of each variable's contribution to the predicted log of the odds of entry into marriage is directly reflected in the estimated coefficient. In absolute terms, the three coefficients associated with measures of labor force integration are the largest. Among these, a markedly higher coefficient is obtained for the combination presumed to be associated with the highest predicted probability of entry into marriage (employed and not enrolled).[9] All three coefficients are also large relative to their standard errors -- between 9.5 and 17.5 times as large.

Comparing the coefficients for the other terms in the model to the base model addresses the question of the extent to which age, period and cohort effects are explained by directly looking at the underlying social processes. For example, among American men, the absolute value of the negative coefficient associated with ages 20 and younger falls from -.588 to -.384 (with little change in the standard error). That is, the lower rate of entry into marriage among younger males, in part, may be accounted for by the relatively low levels of labor force integration commonly found during this phase of the life course.

The other age effect in the base model is found for those age 32 or older. Here, too, the effect is negative -- American males at age 32 or older are less likely to marry than those between the ages of 21 and 31. However, this coefficient changes little in the model that takes labor force integration into account -- declining slightly in absolute size from -.637 to -.623. Presumably, by this age most men are in the labor force and out of school, thus there is insufficient variation in these measures of labor force integration to explain why some marry and other do not.

The base model for American men also includes a significant period effect -- the predicted probability of marriage is lower during the period 1969 through 1978 across the three broad age categories regardless of an individual's birth cohort. But once enrollment and employment status are included in the model, the statistical significance of the period effect vanishes all together (see Model [1] Table 4).

The cohort effects described in Table 3 also shrink appreciably once current enrollment and employment status are included in the model. Though the three birth cohort groups remain statistically distinguishable from the reference category (1952 through 1955), the absolute value of the coefficients for the cohort groups 1960 through 1963 and 1964 through 1967 are only two-thirds of their former size. Moreover, one begins to find overlap in the confidence intervals surrounding the three estimated coefficients.

Finally, it is noteworthy that the coefficient representing the lower predicted probability of marriage among nonwhite males remains relatively unaffected after these measures of labor force integration are included in the model.

The base model for **American Women** (in Table 3) contains roughly the same pattern of

age, period and cohort effects, though somewhat less pronounced -- the absolute value of the ratios of the coefficients to their standard errors tends to be smaller. Indeed, even in the base model the absolute values of these ratios for the marriage bust period and the 1956 to 1959 birth cohort group are too small to conclude that the coefficients are different than zero.

When the effects of current enrollment and employment status are included in the model for American women (see Table 5), the overall fit of the model improves greatly. The resulting decrease in the likelihood ratio X^2 relative to the base model (394.60) is not quite as great as with American men, but is well above the .001 critical value.

With women, as with men, the coefficients for those combinations of employment and enrollment indicating increasing levels of labor force integration are all significantly greater than zero (i.e., from the omitted category, "not employed and enrolled," representing the lowest degree of labor force integration).

However, the rank order of the three coefficients and the extent to which they can be statistically distinguished varies between men and women. Among American men, the coefficient for "employed and not enrolled" was greatest and was significantly larger than those representing "employed and enrolled" and "not employed, not enrolled." Moreover, the latter two coefficients are indistinguishable from one another. Among women, on the other hand, the coefficients for "not employed, not enrolled" and for "employed, not enrolled" are statistically indistinguishable -- but both are significantly greater than the coefficient for "employed and enrolled."

When using these coefficients to consider how the influence of particular combinations of enrollment and employment status varies according to gender, one must keep in mind that the models were estimated separately. As a result, the coefficients for other explanatory variables and, in particular, the constant will vary between men and women. Converting the results into predicted probabilities illustrates this point and puts the coefficients in Tables 4 and 5 in a more familiar metric. For example, for a white man and a white women both born in 1952, the predicted probability of marriage during their mid-twenties would be roughly the same, regardless of sex, if both were employ and not enrolled in school, -- despite very different male and female coefficients for "employed, not enrolled."[10] *In other words, completing school or entering regular employment increases the likelihood of marriage for both men and women. However, for men, the maximum effect requires both, whereas for women simply leaving school is the critical event.* If an American woman is outside the educational system, the fact that she is or is not engaged in regular employment does not affect the odds of her entering marriage.

It is also true, for American women, that the addition of these variables to the base model appreciably alters the magnitude and significance of the coefficients attached to the age, period and cohort effects. Most noticeably, once current enrollment and employment status are taken into account, the effects associated with being age 20 or younger shrink to approximately one-third of their previous size. The coefficient for the period effects also changes radically. Once enrollment and employment status are taken into account, the coefficient not only changes sign, but is also large enough (relative to its standard error) to be considered to be statistically significant.[11]

In the base models, the cohort effects among American women were not as strong as those found for American men. Including current enrollment and employment status in the model weakens these effects for American women even further. As Table 5 shows, these indicators of labor force integration reduce the cohort effects such that only the coefficient for the youngest group (1964-67) can be considered to be significantly different than that of the omitted category (1952-55).

Finally, as was the case with men, the relatively lower rates of entry into marriage among non-white women are apparently not explained by a lower degree of labor force integration among non-white women. Indeed, after controlling for current enrollment and employment

status, the absolute value of the coefficient indicating minority status actually increases and the predicted rate of entry into marriage decreases.

Adding measures of current enrollment and employment status in the base model for West German men (Table 3) yields model [1] in Table 6. In this case, too, the loss of 3 degrees of freedom appears quite justifiable given the resulting difference in the likelihood ratio X^2 (148.46), which is well above the .001 critical value.

However, compared to American men and women, the absolute size and significance of the age, period and cohort effects present in the base model for West German men change little with the inclusion of these measures of labor force integration. The estimated coefficients for the combinations of enrollment and employment status among West German men follow approximately the same pattern as among American men: as expected, the likelihood of marriage is greatest once a man is outside the educational system (vocational education as well as regular secondary and university schooling) and in the labor force. Moreover, either one of these steps toward labor force integration brings about a significant increase in the probability of marriage.

On the other hand, the relative ranking of the coefficients for the various combinations of current employment and enrollment status among West German women, resembles that found among American women.[12] Regardless of employment status, the likelihood of marriage increases sharply once a woman is outside the education system. As with American women, the probability of marriage increases significantly if a woman is employed while still enrolled in school instead of being outside the labor force while in school. Nonetheless, among West German women, it also remains significantly lower than if a woman is not enrolled. In addition, the overall fit of the model for West German women significantly improves due to the three coefficients capturing the influence of current enrollment and employment status.

The results for West German women also resemble those found for American women in that including current enrollment and employment status diminishes the absolute size and significance of the coefficients associated with relatively young ages. In fact, as Table 7 shows, once the influence of current employment and enrollment is taken into account, West German women are apparently no less likely to marry between the ages of 16 and 22 than at later ages. However, the absolute size of the coefficients for the period and cohort effects present in the base model for West German women are altered relatively little by the additional terms in the model.

Finally, the West German results do differ from those for American men and women in the degree to which variation in rates of entry into marriage according to minority status decreases once current enrollment and employment are terms in the model. These measures do little to alter the influence of race in the US. However, the faster rate of entry into marriage among resident alien men and women in the FRG may be attributed, in part, to the shorter period of time spent within the educational system and their tendency to enter regular employment at younger ages.

LAGGED TERMS MEASURING PAST EDUCATION AND EMPLOYMENT STATUS

Relying on current enrollment and employment status to predict the probability of marriage in a given year is not to say that the process or marital decisionmaking is presumed to fit within the same timeframe. Even if completing one's education and entering the labor force are strongly linked to entering marriage, the event need not necessarily follow in the same year. A longer period of regular employment may be needed before financial security and a strong sense of identity are achieved. Nor can one assume that finding a willing partner is an instantaneous process. In addition, social conventions such as an appropriate period of engagement or the logistics of wedding arrangements may act to weaken the temporal link.[13]

The models presented in columns [2] and [3] of Tables 4 through 7 take advantage of the

longitudinal character of the SIPP and SOEP data sets. Individual years remain the basic units of analysis, but the time frame is broadened by including measures of prior years' employment and educational status, along with attributes of the current year.

Turning first to the results for **American men** (see Table 4) the case for the importance of lagged measures of enrollment and employment status appears weak. Adding three lagged terms, representing the degree of labor force integration in the previous year, has very little impact -- the reduction in the likelihood ratio X^2 (7.13) falls below the .05 threshold needed to consider this reduction, at the cost of three degrees of freedom, to be a significant improvement in the model. Adding an additional three terms to extend the lag period yet another year is somewhat more convincing -- the reduction in the likelihood ratio X^2 exceeds the critical value at the .01 level of significance.

Nonetheless, if one considers the absolute values of the individual coefficients associated with the lag terms, only one of the three in the former model and none of the six in the latter are sufficiently large enough (relative to their standard errors) to confidently conclude that they are different than zero.

The relative insignificance of the lagged terms also may be noted in the fact that their inclusion has only minor effects on the other coefficients; i.e., the estimates for race, age, period and cohort effects differ little from those obtained with model [1]. The coefficients representing current enrollment and employment effects do decrease somewhat with the addition of the first set of lagged terms, but then remain essentially unchanged when a second year of lagged terms is added in model [3].

In the case of **American women**, adding lagged terms to model [1] in Table 5 leads to significant improvements (at the .001 level) in models [2] and [3]. There are clear-cut improvements in overall fit and several of the individual coefficients for the lagged terms are marginally significant. Among the lagged terms, the strongest positive impact on the probability of marriage is found when a woman was both in school and in the labor force in at least one of the two previous years.

With regard to current enrollment and employment status, however, it is this same combination that most closely resembles the omitted category with its relatively low predicted probability of entry into marriage. Moreover, once the lagged terms are included in the model, the coefficient for the variable indicating current enrollment combined with current employment decreases even further to the point that it is statistically indistinguishable from zero. These results suggest a tendency for American women to enter the labor force while still engaged in formal education during the years immediately prior to marriage. Marriage itself, however, does not take place until after leaving school.

The results for women are also similar to men in that the impact of the lagged variables on other coefficients in the model -- those representing race, age, period and cohort effects -- is relatively slight. Finally, as was also true of American men, current enrollment and employment effects decrease somewhat with the addition of the first set of lagged terms, but vary little when a second year of lagged terms is added in model [3]. However, the latter set of variables, in turn, tends to diminish the importance of measures for the year immediately prior to the current.

The models for **West German men** differ from those for American males in that introducing lagged measures of enrollment and employment status decidedly improves the overall fit of the model -- the likelihood ratio X^2 falls by 41.97 at a cost of three degrees of freedom with the first year of lagged terms (see Model [2] in Table 6) and by a total of 59.42 with six degrees of freedom when terms for two years are included (Model [3] in Table 6).

The addition of these lagged terms for West German men tends to reduce the absolute value of the coefficients representing alien resident status, as well as age, period and cohort effects -- though, just as with American males, the changes from Model [1] are by no means

extraordinary. The models for German and American males are also similar in the manner in which the lagged terms affect the current measures of labor force integration: the first set of lagged variables noticeably reduces the coefficients representing the influence of current enrollment and employment status; these are, in turn, relatively unaffected by the second set of lagged terms, though these tend to diminish the absolute value of the first set of lagged term coefficients.

These similarities aside, a further difference remains: while the coefficients for the lagged measures of enrollment and employment status for American men were generally not significantly different than zero, nearly all of these coefficients for West German males (Models [2] and [3] in Table 6) have absolute values equal to at least two times their standard errors. *Once a West German man leaves school or enters regular employment and begins the process of labor force integration, the probability that he will marry in the next two years increases significantly relative to persons still in school and outside the labor force. In the US, however, the link between the degree of labor force integration and the probability of marriage is more immediate -- current enrollment and employment status matters for entry into marriage, but not the degree of labor force integration a year or two earlier.*

The relative importance of the lagged measures in the FRG suggests patterns of behavior that one would expect with a well-organized vocational training system tightly structuring the process of labor force integration. The orderliness and predictability of the process guarantees a relatively certain labor force future -- once the initial threshold has been crossed. During most of the period in question, it may have taken West German men longer to begin the process of labor force integration, but thereafter it proceeded smoothly.

Among **West German women** the effects of lagged measures of enrollment and employment status on entry into marriage reflect this structural difference as well. Whether one includes only three lagged terms to consider enrollment and employment status in the prior year or all six terms to extend the lag period to two years, the overall fit of the model is significantly improved relative to the cost in degrees of freedom. However, with women the contrast is not quite as distinct: the lagged terms tend to play a slightly stronger role in the models for American women than American men and a slightly weaker role for West German women than West German men. Nevertheless, comparing the results for women from Models [2] and [3] in Tables 5 and 7, the effects of labor force integration in the US are more immediately tied to the present than in the FRG.

The effects on other coefficients in the model are similar to those found for other groups: the coefficients attached to alien resident status and age, period and cohort effects are altered little; the coefficients associated with current enrollment and employment status are strongly influenced by adding the first set of lagged terms, but then change little when the effects of enrollment and employment status from two years earlier are included.

Finally, it is worth noting that in both countries the male-female differences in the relative importance of the various combinations of enrollment and employment status remain unchanged after including the lagged terms. For males the probability of marriage increases upon leaving school or entering regular employment, but reaches its maximum if an individual is outside the educational system and in the labor force. For women, on the other hand, leaving the educational system remains the crucial step. In both countries, once a woman is no longer enrolled in school-based or occupational training, her employment status has little bearing on her predicted probability of marriage.

INCORPORATING MEASURES OF CHANGING MARRIAGE MARKET CONDITIONS

To begin with, it should be emphasized that the use of estimates of fluctuations in the pool of eligibles amounts to more than introducing another form of time dependency divorced from a concrete social process -- it amounts to more than simply sneaking age in the back door. The size of an individual's pool of eligibles is certainly age-graded, but people of the same age will have very different marriage market conditions depending on their level of education and the relative size of the their own and adjacent birth cohorts. The expected result is that changes in pool size will have an inverse effect on entry into marriage. Sharp declines in the pool of eligibles relative to the previous year (indicated by a large negative slope) should be associated with higher rates of entry into marriage.

Tables 8 and 9 present results indicating the considerable effect of pool size on entry into marriage among young adults in the US and the FRG.[14] A base model is presented for men and women in each country. These base models include terms representing minority status, age, period and cohort effects, as well as the measures of current and lagged enrollment and employment status as used above. In each case the model is then estimated again taking the influence of changes in pool size into account. Coefficients present in the base model are all attached to dummy-coded variables, while the pool variable is an interval level measure. Changes in the marriage pool are standardized to have a mean of zero and a standard deviation of one, however, so that the rough comparison of the absolute value of coefficients remains a plausible indication of the relative importance of the variables used.

Regardless of gender or nationality, the estimated coefficient is quite large relative to its standard error -- between six and ten times as large. Furthermore, in each case the addition of the marriage pool variable produces a significant improvement in the model's overall fit -- in each case the decrease in the likelihood ratio X^2 exceeds the critical value with one degree of freedom at the .001 level by a wide margin.

The significance of fluctuations in the marriage pool aside, it is also important to consider the extent to which adding this variable affects other terms in the model. In this regard, the impact of the marriage pool variable is relatively slight. It does explain away a good deal of the estimated coefficient for the term "under age 20/22" for men in both countries. Otherwise, however, including the influence of fluctuations in marriage pool tends to further erode the importance of the various forms of time dependency -- but only slightly.

In particular, the effects attributed to the process of labor force integration -- as indicated by current and lagged measures of enrollment and employment status -- remain essentially unchanged with the addition of the marriage pool variable. The coefficients tend to decrease slightly, but rarely is the change large enough to push the coefficient below the significance threshold. It is never large enough to fundamentally challenge the interpretation of the relationship between enrollment and employment status offered above.

Indeed, the only notable change takes place in the coefficients indicating an increased rate of entry into marriage among American women no longer enrolled in school -- these drop by 25% and 40% once fluctuations in the marriage pool are included in the model. In this case, some of the influence attributed to further labor force integration is apparently explained away by the relatively poor marriage market prospects of well-educated women. But even here, the coefficients remain quite large relative to their standard errors.

SUMMARY AND CONCLUSION

This paper examines the fundamental age-graded social processes responsible for the well-known relationship between chronological age and entry into marriage. This is done by first

developing a base model that demonstrates the significance of age, period and cohort effects on entry into marriage among men and women in the US and the FRG. These results, presented in Table 3, are then used as a baseline to evaluate the gains to be made by using a model that additionally considers the import of labor force integration and fluctuations in the pool of eligible partners.

To begin with, one sees in the models found in the first columns of Tables 4 through 7 that taking into account the influence of current enrollment and employment status works to significantly improve the overall fit of the model for each of the subgroups -- for men and women in both countries. In all cases, either indication of labor force integration (either being outside the educational system or inside the labor) force acts to increase the rate of entry into marriage beyond that of the reference group (those who are both inside the educational system and outside the labor force.

Including these measures of labor force integration tends to reduces the magnitude and significance of age, period and cohort effects, especially in the US. This, then, supports the contention that, to a certain extent, the observable forms of time dependency are in fact spurious. Adding a measure of fluctuation in the size of the marriage pool tended to further reduce the magnitude of the various measure of time dependency. The measures of labor force integration, on the other hand, retain their explanatory power after adding the marriage pool term to the model.

These findings also tend to hold cross-nationally, i.e. there is a good deal of similarity in the observable age, period and cohort effects, and enrollment and employment status tend to effect the rates of entry into marriage for men and women similarly in both countries. Furthermore, these measures of labor force integration tend to consistently undercut the observable time dependencies, but are themselves fundamentally unaffected by fluctuations in the marriage pool.

The main cross-national difference is the viability of the lag terms in models for both men and women in the FRG, while these terms are only weakly associated with rates of entry into marriage in the US. If one knows whether a German man or woman was in the labor force or in school during the past two years, then one can better predict rates of entry into marriage. For Americans, however, it is simply current educational and enrollment status that is associated with entry into marriage. This suggests that the greater degree of temporal structure and organization in the process of labor force integration in West Germany also leads to a greater degree of structure and organization in the process of entry into marriage.

The results presented here also elaborate on the gender-based differences in the relationship between labor force integration and entry into marriage. Moreover, these findings indicate that the differences cut across national boundaries. In both countries the higher rate of entry into marriage among men is found among those who are both out of school and in the labor force. On the other hand, the measures of labor force integration used here indicate that once the enrollment status of women is taken into account, labor force participation is unimportant. Put another way: the probability of marriage increases for men once they are employed, regardless of enrollment status. For women, however, entering regular employment on top of leaving the educational system does not boost the probability of marriage.

Furthermore, the absence of a positive labor force effect for women appears to be only part of the story, indicated by preliminary analyses using monthly data (including earnings data). For women in both countries, there is an inverse relationship between earnings and entry into marriage. This suggests a substitution effect similar to that found by Hannan and Tuma in their studies of divorce: for women, labor force integration may not only fail to produce positive effects on the rate of entry into marriage as it does with men, but also may have a negative effect -- employment as an alternative to marriage.

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NOTES

(1) Detailed information regarding the SIPP and SOEP studies may be found in their respective user guides (see references). An overview of both and their use in comparative research may be found in Witte (1989.)

(2) Unfortunately, it is characteristic for panel studies that nonresponse peaks after the first wave. Thus, there is no way to include any information from the 515 young adults who dropped out of the SOEP sample before the second round of interviews.

(3) A summary of these findings and a detailed discussion of the survival curves presented below may be found in Witte (1990.)

(4) For those born in 1960, in Figures 1 through 4 the estimated number of eligible partners after age 25 in the US and after age 28 in the FRG are predicted based on observation of the next younger groups of birth cohorts.

(5) It should be emphasized that pressure to marry discussed here concerns only those pressures stemming from yearly reductions in the pool of eligibles. At this age, a larger proportion of the pool of eligible males available to less educated women will have already married. These women may still wish to marry or feel themselves under other pressures to marry, however the remaining males may be particularly unwilling or ill-suited for marriage. At this point, a more complete model would have to include the possiblity that women in this position would attempt to expand the pool of eligibles (consider previously married men, younger men or those much older.)

(6) In this case the oldest birth cohort serves as the omitted category in each group.

(7) The combination hypothesized to lead to the lowest predicted probability of entry into marriage (not employed and enrolled) is used as the omitted category.

(8) This means, given a table (based upon variables measuring age at the time of observation, the year of observation and the indvidual's birth cohort as well as current and previous two years employment and enrollment status) that the sum of the absolute differences between observed and predicted proportions of persons entering marriage in each cell of the table summed across all cells in the table (where the cells are defined by the combinations of values for the independent variables) is significantly increased, if table cells are collapsed ignoring individuals current enrollment and employment status.

(9) Differences between coefficients may be tested by building a confidence interval around each coefficient equal to $\pm$ 2 times the standard error. If the intervals surrounding two coefficients do not overlap, then one can be 95% confident that the parameters are in fact different. Using this method, here, allows one to conclude that the coefficient representing the effects of the highest level of labor force integration (employed, not enrolled) is significantly different from the coefficients for the other two measures of labor force integration (.667 -- employed and enrolled; .678 -- not employed and not enrolled). However, the gap between these two other coefficients is so small relative to their standard errors (.059 and .071) that one is unable to reject the hypothesis of no difference between these two coefficients. This does not alter the conclusion that all three coefficients are significantly greater than zero, indicating that marriage is more likely given any degree of labor force integration than if an individual is currently in school and not in the labor force.

(10) The predicted probabilities based on the models in column 1 of Table 4 and 5 are:

Employment status	Enrollment status	Predicted Probability of marriage	
		American men	American women
YES	NO	9.9%	10.2%
YES	YES	7.5%	6.9%
NO	NO	7.5%	10.8%
NO	YES	4.0%	5.9%

(11) This apparently results from the fact that in the birth cohorts involved (1952-1961) most of the individuals were still relatively young during this period (1968-1977). The age categories 16-20; 21-31 and 32-34 were used as controls when defining the marriage bust period, but it seems that a considerable number of women in the 21-31 age group were still within the educational system.

(12) The predicted probabilities of entry into marriage by West German men and women based on the models in column 1 of Table 6 and 7 are:

Employment status	Enrollment status	Predicted Probability of marriage	
		W. German Men	W German Women
YES	NO	9.1%	13.7%
YES	YES	7.6%	9.6%
NO	NO	8.1%	15.1%
NO	YES	4.7%	7.1%

(13) The number of intervals used is smaller than in previous tables because the youngest three birth cohorts are excluded from the analysis. This is done because of difficulties associated with estimating the pool size for the youngest three birth cohorts of men in the two countries (1965 - 1967). The marriage pools for these men include women born in 1968, 1969 and 1970 -- but since these women are not in the sample, their survival curves for entry into marriage can not be estimated. Other sources are available (e.g. Statistisches Bundesamt estimates on vital statistics) but these are not broken down by educational level.

Table 1: Data Set for the Analysis of Entry into Marriage Among West Germans born between 1952 and 1967 Using Yearly Data from the German Socio-economic Panel

		Birth Year Cohort Groups			
	Total	1952-55	1956-59	1960-63	1964-67
Persons in Waves 1 and 2					
N of individuals	3,356	775	820	800	961
N of intervals	27,708	7,190	7,799	6,706	6,005
N of events	1,883	674	611	415	183
% ind. with event	56.1	87.0	74.5	51.9	19.0
% int. with event	6.8	9.4	7.8	6.2	3.0
% right-censored individuals	43.9	13.0	25.5	48.1	81.0

Table 2: Data Set for the Analysis of Entry into Marriage Among Americans born between 1952 and 1967 Using Yearly Data (1968 - 1985) from the Survey of Income and Program Participation.

		Birth Year Cohort Groups			
	Total	1952-55	1956-59	1960-63	1964-67
Persons in all Waves 1 through 8					
N of individuals	5,869	1,537	1,541	1,398	1,393
N of intervals	41,230	13,041	12,390	9,761	6,038
N of events	3,277	1,310	1,151	654	162
% ind. with event	55.8	85.2	74.7	46.8	11.6
% int. with event	7.9	10.0	9.3	6.7	2.7
% right-censored individuals	44.2	14.8	25.3	53.2	88.4

Figure 1: Relative Fluctuations in Pool of Partners

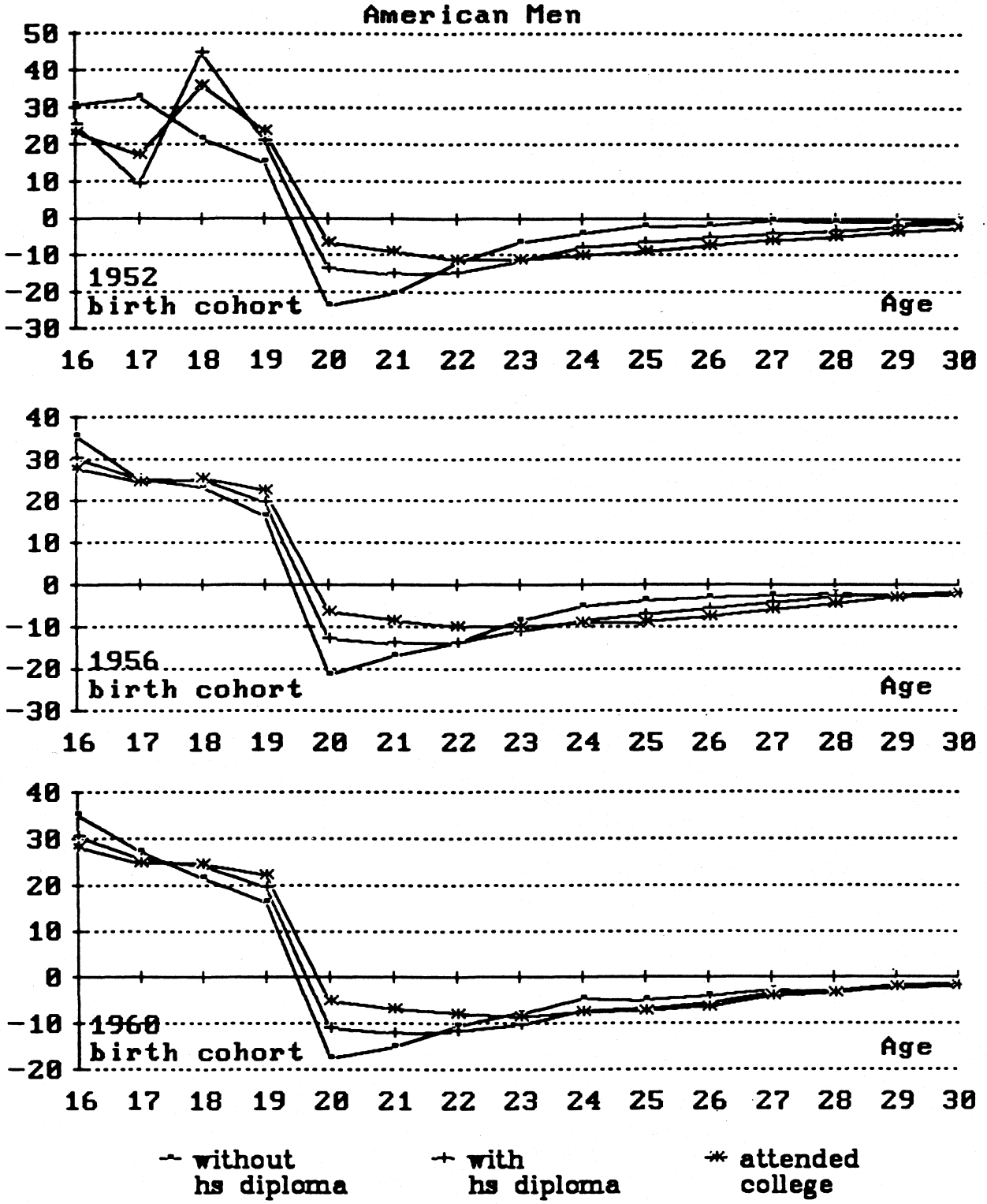

Figure 2: Relative Fluctuations in Pool of Partners

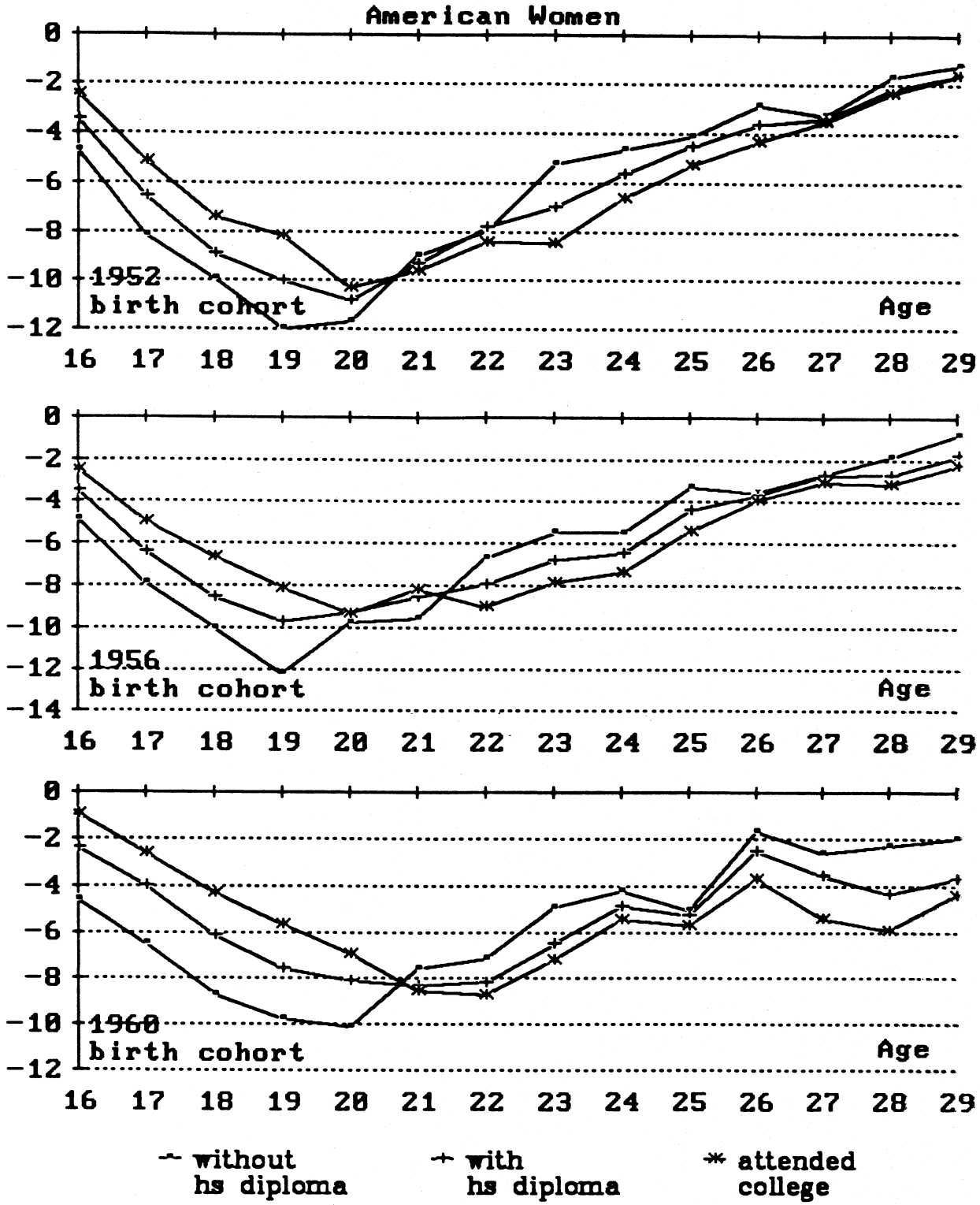

Figure 3: Relative Fluctuations in Pool of Partners

West German Men]

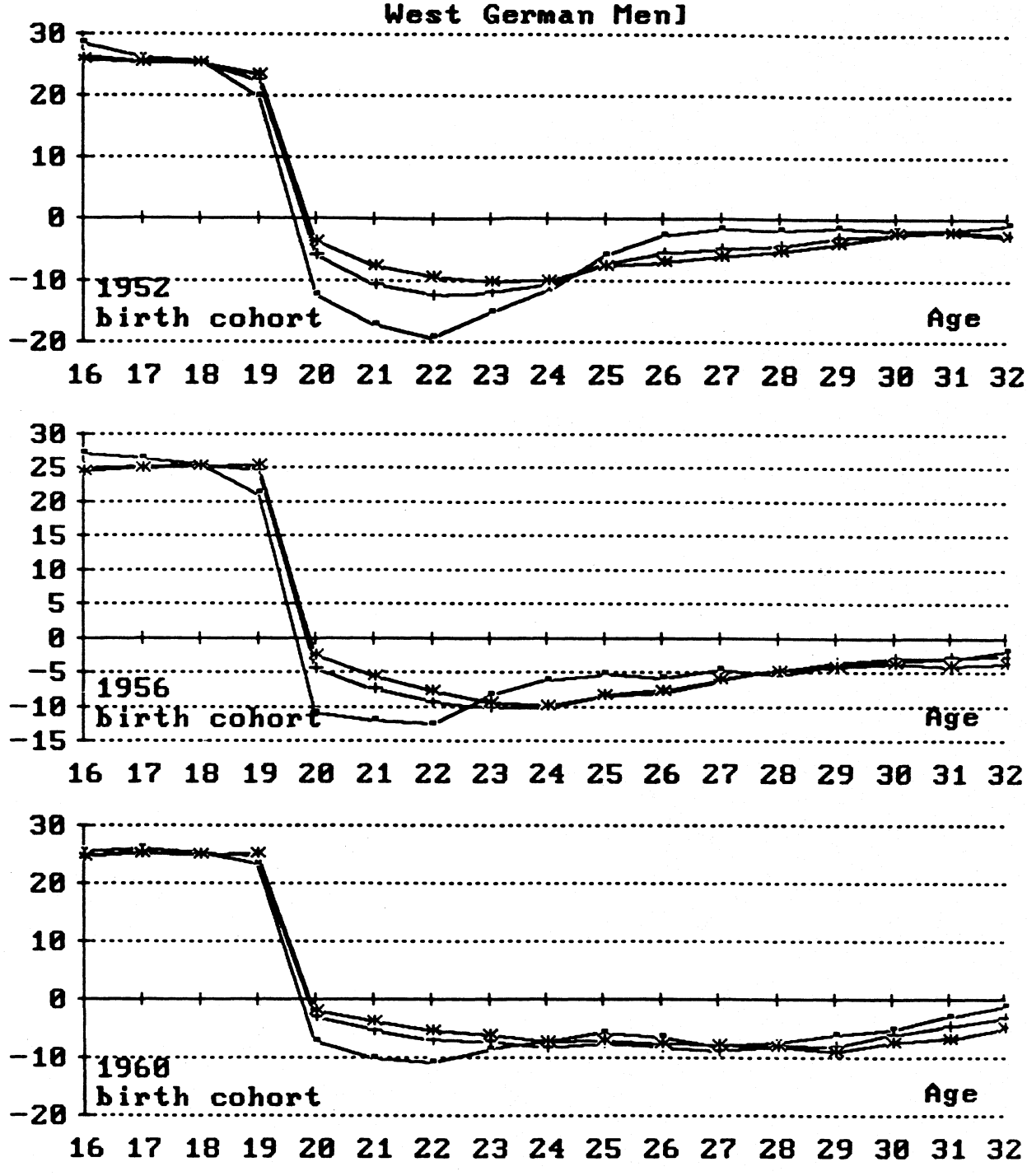

Figure 4: Relative Fluctuations in Pool of Partners

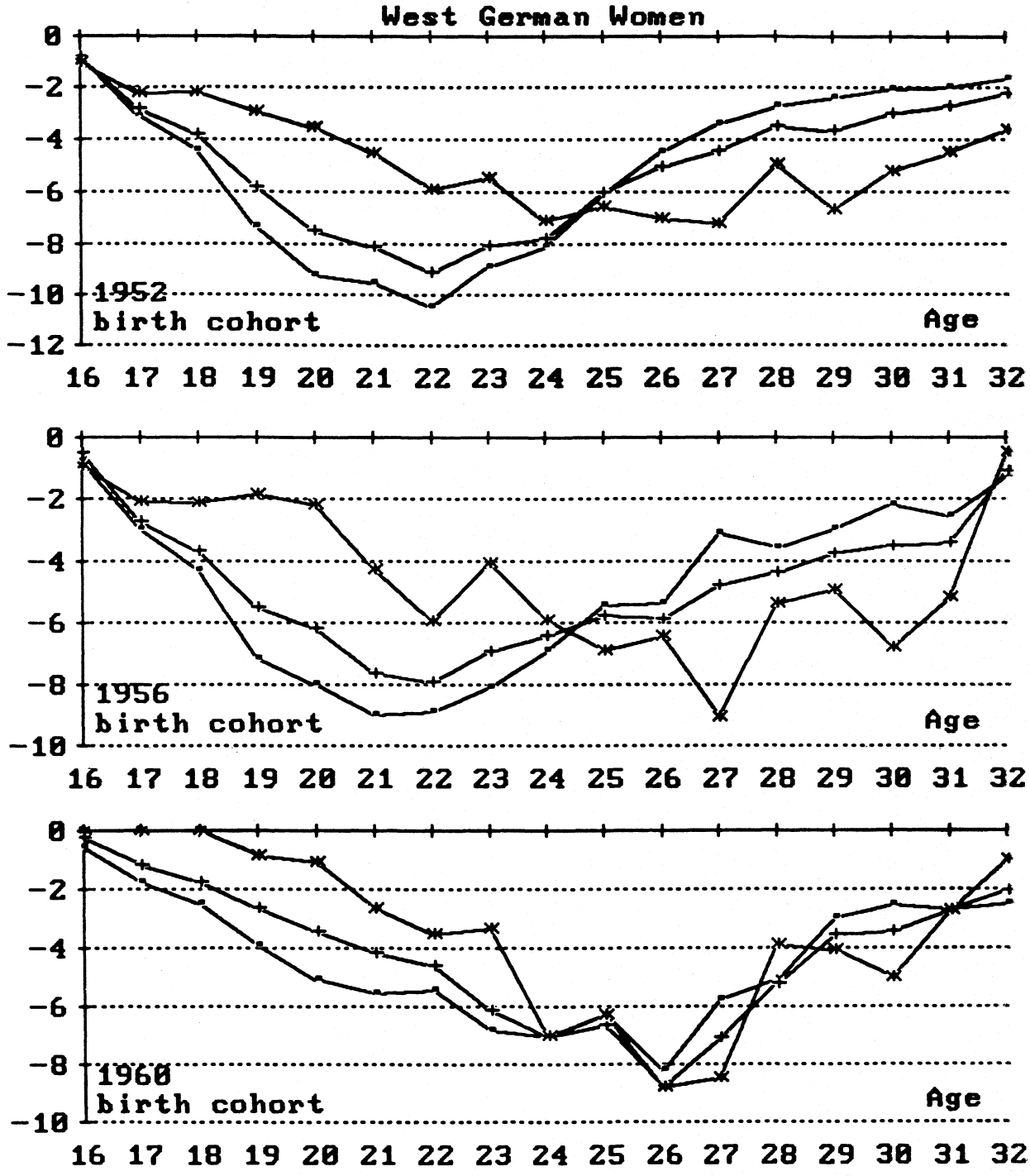

Table 3: Logistic Regression Coefficients for Models Summarizing Age, Period and Cohort Effects[1] on Entry into Marriage by Young Adults Born between 1952 and 1967 in the United States and the Federal Republic of Germany

	US		FRG	
	Men	Women	Men	Women
Constant	-4.470	-3.615	-3.904	-3.261
	(.287)	(.311)	(.138)	(.127)
Race/Alien resident status	-.363	-.349	.382	.352
	(.052)	(.040)	(.041)	(.036)
Age Effects[2]				
Age 20/22 or younger	-.588	-.291	-.532	-.173
	(.036)	(.031)	(.045)	(.037)
Age 32 or older	-.637	-.675	--	--
	(.258)	(.296)		
Period Effects[3]				
Marriage bust years	-.081	-.006*	-.605	-.562
	(.037)	(.035)	(.087)	(.084)
Birth Cohort Effects[4]				
1956 - 1959	-.094	-.030*	-.199	-.187
	(.034)	(.030)	(.046)	(.043)
1960 - 1963	-.320	-.131	-.422	-.269
	(.047)	(.040)	(.056)	(.045)
1964 - 1967	-.758	-.448	-.664	-.639
	(.091)	(.063)	(.076)	(.060)
Overall Model:				
N of intervals	20757	20473	15261	12423
Log Likelihood	-4662	-6030	-2844	-3473
Likelihood Ratio X2	1063.79	1179.17	789.91	908.80
D.F.	676	677	615	483

1) Here, the overidentification problem associated with models including age, period and cohort effects is not a problem due to variation in the degree of time aggregation used to measure each type of effect. 2) 20 or younger in the US, 22 or younger in the FRG. Age 32 or older is not used for the FRG as the predicted probability of entry into marriage at these ages is not significantly different than that predicted for the peak years. 3) Marriage bust years are years where, controlling for age and birth year the predicted probabilities for of marriage are significantly lower than in other years: US men 1969-78; US women 1968-77; FRG men 1968-74 and; FRG women 1968-71. 4) Here, the oldest birth cohort group (1952-1955) is used as the omitted category. * indicates that the ratio of a variable's coefficient to its standard error is less than 2.00.

Table 4: Logistic Regression Model Coefficients for the Effect of Current and Lagged Employment and Enrollment Status on Entry into Marriage by American Men Born between 1952 and 1967

	Model[1]		
	[1]	[2]	[3]
Constant	-3.177	-3.098	-3.133
	(.298)	(.302)	(.307)
Race	-.349	-.347	-.343
	(.053)	(.053)	(.053)
Age 20 or younger	-.384	-.370	-.398
	(.038)	(.039)	(.042)
Age 32 or older	-.623	-.621	-.609
	(.259)	(.259)	(.259)
Marriage bust period	.010*	.013*	.012*
	(.039)	(.039)	(.039)
Birth Cohort			
1956 - 1959	-.075	-.075	-.075
	(.035)	(.035)	(.035)
1960 - 1963	-.208	-.206	-.210
	(.049)	(.049)	(.049)
1964 - 1967	-.508	-.498	-.501
	(.092)	(.093)	(.093)
Currently:			
Employed, not enrolled	.986	.900	.903
	(.056)	(.072)	(.072)
Employed and enrolled	.667	.578	.577
	(.059)	(.070)	(.070)
Not employed not enrolled	.678	.636	.644
	(.071)	(.083)	(.083)
1 Year Before:			
Employed, not enrolled	--	.109*	.141*
		(.061)	(.075)
Employed and enrolled	--	.142	.071*
		(.055)	(.064)
Not employed not enrolled	--	.062*	.103*
		(.075)	(.085)
2 Years Before:			
Employed, not enrolled	--	--	-.075*
			(.063)
Employed and enrolled	--	--	.101*
			(.052)
Not employed not enrolled	--	--	-.084*
			(.079)
Overall Model			
N of intervals	20757	20757	20757
Log Likelihood	-4445	-4441	-4434
Likelihood Ratio X2	627.82	620.69	607.64
D.F.	673	670	667

1) Model 1 adds the effects of employment and enrollment status to the Base Model developed in Table 3; Model 2 then includes the effects of employment and enrollment status in the previous year, while Model 3 also considers employment and enrollment status two years before. * indicates that the ratio of a variable's coefficient to its standard error is less than 2.00.

Table 5: Logistic Regression Model Coefficients for the Effect of Current and Lagged Employment and Enrollment Status on Entry into Marriage by American Women Born between 1952 and 1967

	Model[1]		
	[1]	[2]	[3]
Constant	-2.767	-2.792	-2.826
	(.316)	(.319)	(.324)
Race	-.384	-.363	-.356
	(.041)	(.041)	(.041)
Age 20 or younger	-.101	-.098	-.127
	(.033)	(.034)	(.036)
Age 32 or older	-.732	-.714	-.699
	(.297)	(.297)	(.297)
Marriage bust period	.103	.110	.113
	(.036)	(.039)	(.036)
Birth Cohort			
1956 - 1959	-.011*	-.013*	-.016*
	(.031)	(.031)	(.031)
1960 - 1963	-.046*	-.049*	-.055*
	(.041)	(.041)	(.042)
1964 - 1967	-.316	-.314	-.315
	(.065)	(.066)	(.066)
Currently:			
Employed, not enrolled	.590	.493	.491
	(.035)	(.050)	(.050)
Employed and enrolled	.161	.027*	.023*
	(.038)	(.048)	(.048)
Not employed not enrolled	.661	.723	.726
	(.043)	(.050)	(.050)
1 Year Before:			
Employed, not enrolled	--	.105	.121*
		(.051)	(.065)
Employed and enrolled	--	.209	.123
		(.045)	(.052)
Not employed not enrolled	--	-.189	-.162
		(.062)	(.070)
2 Years Before:			
Employed, not enrolled	--	--	-.085*
			(.060)
Employed and enrolled	--	--	.138
			(.044)
Not employed not enrolled	--	--	-.070*
			(.074)
Overall Model			
N of intervals	20473	20473	20473
Log Likelihood	-5833	-5809	-5797
Likelihood Ratio X2	784.57	737.99	712.66
D.F.	674	671	668

1) Model 1 adds the effects of employment and enrollment status to the Base Model developed in Table 3; Model 2 then includes the effects of employment and enrollment status in the previous year, while Model 3 also considers employment and enrollment status two years before. * indicates that the ratio of a variable's coefficient to its standard error is less than 2.00.

Table 6: Logistic Regression Model Coefficients for the Effect of Current and Lagged Employment and Enrollment Status on Entry into Marriage by West German Men Born between 1952 and 1967

	Model[1]		
	[1]	[2]	[3]
Constant	-3.009	-2.848	-2.563
	(.182)	(.207)	(.216)
Alien resident status	.307	.287	.281
	(.041)	(.042)	(.042)
Age 22 or younger	-.427	-.375	-.347
	(.046)	(.046)	(.048)
Marriage bust period	-.509	-.468	-.441
	(.088)	(.088)	(.089)
Birth Cohort			
1956 - 1959	-.166	-.155	-.148
	(.046)	(.047)	(.047)
1960 - 1963	-.357	-.335	-.319
	(.057)	(.058)	(.058)
1964 - 1967	-.597	-.572	-.549
	(.080)	(.078)	(.079)
Currently:			
Employed, not enrolled	.707	.405	.403
	(.065)	(.089)	(.089)
Employed and enrolled	.505	.419	.395
	(.116)	(.124)	(.126)
Not employed not enrolled	.580	.250	.240
	(.070)	(.091)	(.092)
1 Year Before:			
Employed, not enrolled	--	.409	.209
		(.078)	(.095)
Employed and enrolled	--	.075*	-.070*
		(.134)	(.142)
Not employed not enrolled	--	.450	.325
		(.082)	(.096)
2 Years Before:			
Employed, not enrolled	--	--	.258
			(.071)
Employed and enrolled	--	--	.367
			(.105)
Not employed not enrolled	--	--	.156
			(.077)
Overall Model			
N of intervals	15261	15261	15261
Log Likelihood	-2770	-2749	-2740
Likelihood Ratio X2	641.45	599.98	582.03
D.F.	612	609	606

1) Model 1 adds the effects of employment and enrollment status to the Base Model developed in Table 3; Model 2 then includes the effects of employment and enrollment status in the previous year, while Model 3 also considers employment and enrollment status two years before. * indicates that the ratio of a variable's coefficient to its standard error is less than 2.00.

Table 7: Logistic Regression Model Coefficients for the Effect of Current and Lagged Employment and Enrollment Status on Entry into Marriage by West German Women Born between 1952 and 1967

	Model[1]		
	[1]	[2]	[3]
Constant	-2.577	-2.338	-2.007
	(.177)	(.196)	(.209)
Alien resident status	.229	.219	.218
	(.038)	(.038)	(.038)
Age 22 or younger	-.032*	.083	.132
	(.039)	(.040)	(.042)
Marriage bust period	-.459	-.400	-.357
	(.086)	(.087)	(.087)
Birth Cohort			
1956 - 1959	-.153	-.141	-.132
	(.043)	(.044)	(.044)
1960 - 1963	-.219	-.199	-.186
	(.047)	(.047)	(.047)
1964 - 1967	-.688	-.675	-.663
	(.063)	(.063)	(.063)
Currently:			
Employed, not enrolled	.734	.543	.547
	(.053)	(.070)	(.070)
Employed and enrolled	.335	.294	.284
	(.117)	(.120)	(.121)
Not employed not enrolled	.853	.603	.591
	(.056)	(.073)	(.073)
1 Year Before:			
Employed, not enrolled	--	.264	.078*
		(.058)	(.073)
Employed and enrolled	--	.112*	.048*
		(.105)	(.108)
Not employed not enrolled	--	.348	.161
		(.064)	(.077)
2 Years Before:			
Employed, not enrolled	--	--	.249
			(.059)
Employed and enrolled	--	--	.260
			(.095)
Not employed not enrolled	--	--	.278
			(.065)
Overall Model			
N of intervals	12423	12423	12423
Log Likelihood	-3311	-3292	-3280
Likelihood Ratio X2	584.56	548.51	522.67
D.F.	480	477	474

1) Model 1 adds the effects of employment and enrollment status to the Base Model developed in Table 3; Model 2 then includes the effects of employment and enrollment status in the previous year, while Model 3 also considers employment and enrollment status two years before. * indicates that the ratio of a variable's coefficient to its standard error is less than 2.00.

Table 8: Logistic Regression Coefficients for the Effect of Fluctuations in the Marriage Pool, Labor Force Integration and Age, Period and Cohort Effects[1] on Entry into Marriage by Young Adults Born between 1952 and 1967 in the United States

	Men		Women	
	Base	with Pool	Base	with Pool
Constant	-2.602	-2.724	-2.394	-2.766
	(.180)	(.180)	(.151)	(.156)
Race	-.359	-.355	-.354	-.363
	(.055)	(.055)	(.051)	(.051)
Age 20 or younger	-.352	-.110	-.033*	.006*
	(.042)	(.053)	(.044)	(.044)
Marriage bust period	.001*	-.021*	.007*	-.103
	(.040)	(.040)	(.048)	(.050)
Birth Cohort				
1956 - 1959	-.085	-.092	-.017*	-.033*
	(.036)	(.036)	(.047)	(.048)
1960 - 1963	-.223	-.230	-.106*	-.098*
	(.051)	(.051)	(.058)	(.059)
1964 - 1967	-.470	-.463	-.405	-.326
	(.125)	(.126)	(.079)	(.080)
Currently:				
Employed, not enrolled	.349	.818	.440	.264
	(.074)	(.074)	(.059)	(.061)
Employed and enrolled	.566	.555	-.061*	-.067*
	(.073)	(.073)	(.058)	(.058)
Not employed not enrolled	.550	.527	.617	.471
	(.087)	(.087)	(.059)	(.061)
1 Year Before:				
Employed, not enrolled	.048*	-.065*	.056*	-.010*
	(.077)	(.078)	(.075)	(.076)
Employed and enrolled	-.033*	-.029*	.071*	.071*
	(.067)	(.067)	(.060)	(.061)
Not employed not enrolled	.019*	-.096*	-.187	-.238
	(.088)	(.089)	(.081)	(.082)
2 Years Before:				
Employed, not enrolled	-.034*	.065*	-.064*	-.064*
	(.064)	(.065)	(.069)	(.070)
Employed and enrolled	.109	.064*	.125	.103
	(.053)	(.053)	(.050)	(.050)
Not employed not enrolled	-.039*	.046*	-.074*	-.097*
	(.080)	(.080)	(.088)	(.080)
Change in Marriage Pool[2]	--	**-.411**	--	**-.389**
		(.061)		(.037)
Overall Model				
N of intervals	16310	16310	13411	13411
Log Likelihood	-4204	-4181	-3035	-3034
Likelihood Ratio X2	2968.28	2921.48	2835.05	2719.68
D.F.	3950	3949	3035	3034

1) See Table 3 for an explanation of the measures of age period and cohort effects used. 2) The change in the estimated pool of eligible partners since the previous year (see text). The measure is standardized with a mean of zero and a standard deviation of 1.0. * indicates that the ratio of a variable's coefficient to its standard error is less than 2.00.

Table 9: Logistic Regression Coefficients for the Effect of Fluctuations in the Marriage Pool, Labor Force Integration and Age, Period and Cohort Effects[1] on Entry into Marriage by Young Adults Born between 1952 and 1967 in the Federal Republic of Germany

	Men		Women	
	Base	with Pool	Base	with Pool
Constant	-2.582	-3.054	-1.817	-2.062
	(.236)	(.239)	(.223)	(.226)
Alien resident status	.230	.298	.169	.198
	(.044)	(.045)	(.040)	(.040)
Age 22 or younger	-.371	-.270	.157	.166
	(.049)	(.048)	(.042)	(.042)
Marriage bust period	-.429	-.292	-.362	-.225
	(.089)	(.090)	(.087)	(.089)
Birth Cohort				
1956 - 1959	-.141	-.130	-.137	-.108
	(.047)	(.046)	(.044)	(.044)
1960 - 1963	-.298	-.284	-.188	-.162
	(.058)	(.058)	(.047)	(.047)
1964 - 1967	-.460	-.428	-.405	-.383
	(.116)	(.116)	(.089)	(.089)
Currently:				
Employed, not enrolled	.417	.329	.579	.570
	(.093)	(.091)	(.072)	(.072)
Employed and enrolled	.391	.313	.306	.260
	(.131)	(.131)	(.123)	(.123)
Not employed not enrolled	.233	.175*	.632	.658
	(.097)	(.094)	(.076)	(.077)
1 Year Before:				
Employed, not enrolled	.237	.158*	.083*	-.034*
	(.100)	(.097)	(.076)	(.077)
Employed and enrolled	-.030*	-.070*	.043*	-.065*
	(.144)	(.143)	(.110)	(.110)
Not employed not enrolled	.323	.230	.136*	-.009*
	(.102)	(.098)	(.082)	(.083)
2 Years Before:				
Employed, not enrolled	.209	.158	.239	.226
	(.074)	(.072)	(.062)	(.061)
Employed and enrolled	.291	.228	.213	.207
	(.110)	(.109)	(.099)	(.098)
Not employed not enrolled	.056*	-.003*	.263	.241
	(.082)	(.079)	(.070)	(.069)
Change in Marriage Pool[2]	--	**-.771**	--	**-.631**
		(.101)		(.106)
Overall Model				
N of intervals	12857	12857	10432	10432
Log Likelihood	-2529	-2493	-3009	-2980
Likelihood Ratio X2	2841.15	2768.39	2890.42	2831.82
D.F.	4880	4879	3354	3353

1) See Table 3 for an explanation of the measures of age period and cohort effects used. 2) The change in the estimated pool of eligible partners since the previous year (see text). The measure is standardized with a mean of zero and a standard deviation of 1.0. * indicates that the ratio of a variable's coefficient to its standard error is less than 2.00.