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## **An Evaluation of Three Ways of Measuring Marriage Rates**

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# An Evaluation of Three Ways of Measuring Marriage Rates<sup>\*†</sup>

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## Abstract

In this paper, we evaluate the ability of three measures to describe the evolution of marriage rates. We find that the two measures commonly used to study changes in marriage rates, the number of new marriages per population and the share of individuals currently or ever married within an age range, generally lead to incorrect inference. A third measure, the share of individuals ever married by a given age in a given cohort, is better suited to analyze changes in marriage rates.

## 1 Introduction

A large number of papers have studied marriage decisions and their evolutions.<sup>1</sup> A good understanding of the main factors underlying the variation in marriage rates over time and across localities is important because a large body of evidence suggests that marriage rates have significant implications for many economic and demographic variables. Such variables include fertility rates, children's welfare, children's education, labor force participation, hours of work, income inequality, the fraction of individuals on government aid, population growth, and workers' productivity.<sup>2</sup>

To study changes over time in marriage rates, the existing literature has used one the following two measures: the number of new marriages per population; and the share of individuals currently or ever married within some age range, e.g. between the ages of 18

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<sup>1</sup>Some examples of studies in this literature are Akers (1967), Becker (1973), Cherlin (1981), Schoen (1983), Easterlin (1987), Wilson (1987), Bergstrom and Lam (1989), Ellwood and Crane (1990), Pampel and Peters (1995) and, more recently, Goldin and Katz (2002), Angrist (2002), Abramitzky, Delavande, and Vasconcelos (2011), Knowles and Vandenbroucke (2016), Bronson and Mazzocco (2016)

<sup>2</sup>See for example Killingsworth and Heckman (1986), Moffitt (2000), Angrist and Lavy (1996), Gruber (2004), McLanahan and Percheski (2008), and Doepke and Tertilt (2016).

and 30. We will refer to these measures as the population-based measure and the cross-sectional measure. The first contribution of this paper is to provide evidence that these two measures will generally lead to misleading conclusions when used to analyze the evolution of marriage rates. The second contribution is to provide evidence that an alternative measure, the share of individuals ever married by a given age in a given cohort, is not affected by the limitations that characterize the first two measures. It is therefore better suited to examine the changes in share ever married. We will denote the alternative measure as the cohort-based measure.

The paper proceeds as follows. In Section 2, we describe the data used to construct the three measures. In section 3, we provide the empirical evidence. Section 4 concludes.

## 2 Data

In this section we describe the data used to construct the three measures employed to document the evolution of marriage rates. Throughout the paper we rely on three datasets: the National Vital Statistics (1909-1980), the Census total population counts (1910-1980), and the Integrated Public Use Microdata Series Current Population Survey (IPUMS CPS) (1962-2011).

The population-based measure is the easiest variable to construct since it is readily available from the U.S. Vital Statistics. This is a possible reason for its popularity.

The cross-sectional and cohort-based measures must be constructed using microdata. In this paper, we employ a combination of the CPS, which covers the period 1962-2011, and of the decennial Censuses. In the CPS, we observe the age and the marital status of each respondent. For the sample period covered by the CPS, we can therefore easily compute the share ever married using the cross-sectional measure for any age interval. For cohort considered in the CPS, we can as easily calculate the cohort-based measure for different age cutoffs.

For years and cohort not considered by the CPS, the cross-sectional and cohort-based measures can be computed using the decennial Censuses, which contain information on the marital status and the age at first marriage, a recall variable. Using those variables the cross-sectional measure can be constructed for the years 1940, 1950, and 1960. To calculate the cohort-based measure, we consider all individuals who in a given Census are between the ages of 30 and 45. We use a maximum cutoff age of 45 to avoid potential measurement errors due to differential mortality rates of married and non-married individuals.

## 3 Different Measures of Changes in the Marriage Rate

In this section we compare the behavior of the population-based, cross-sectional, and cohort-based measures. We will provide evidence that, when used to study changes over time in the

marriage market, the first two measures are problematic because they confound different effects and can potentially lead to incorrect inference about overall marriage behaviors.

Figure 1 graphs the three measures: the number of marriages per 1,000 individuals; the share ever married in a cross-section of women between the ages of 18 and 30; and the share of women ever married by 30 in a given cohort. We obtain similar results when using 40 as the age cutoff. The first two measures are based on the calendar-year, whereas the third one is based on the cohort's year of birth. To make them comparable, we add 25 years to the cohort's birth year and plot the cohort-based measure together with the other two. It is immediately evident from Figure 1 that the three measures give very different pictures of how marriage rates in the U.S. have evolved over time. It is worthwhile to discuss why they behave differently and the main problems with each measure.

The first measure, the number of marriages per 1,000 individuals, is based on the number of new marriages that take place in a given year. This measure can be useful to detect years that experience an unusual growth or decline in marriage rates. For example, it captures well the rapid rise in the number of marriages in the immediate post-war years. However, this measure is not as well suited to study the evolution of the share ever married for two main reasons. First, using the population-based measure it is impossible to distinguish between first, second, or later marriages. This distinction is important if the researcher is interested in evaluating the fraction of people who choose to marry, since the second and later marriages should not be included in a measure designed to describe the evolution of the share ever married. The second and more serious problem for evaluating marriage trends is that this measure conflates changes in the numerator, new marriages, with changes in the denominator, population. As a result, if the population undergoes any substantive growth or decline due, for instance, to changes in fertility or migration patterns, one may draw the wrong inference. For example, starting from 1946 this variable drops steeply for about fifteen years. One might infer that marriage rates were falling steadily in the forties and fifties, but both the cross-sectional measure and the cohort-based measure show that marriage rates were flat or rising during this time. Part of the explanation for the large decline in the population-based measure is that during those years the U.S. experienced a sharp increase in population with the baby boom. Similarly, during the sixties and the first half of the seventies, the population-based variable displays rapid growth which can be interpreted as a big increase in marriage rates. The cross-sectional and cohort-based measure, however, show that this interpretation is misleading. During this period, marriage rates experienced a slight decline. A first potential explanation for the rise in the population-based measure is that the U.S. population declined during the baby bust that characterized the U.S. in the sixties. A second possible explanation for the increase in the population-based measure in the 1970s is that the large baby boom cohorts were coming of age. Even though these individuals were marrying at lower rates, their large overall number generates an increase

in the number of registered marriages, the numerator.

The second measure illustrated in Figure 1 is the share ever married in a cross-section of women between the ages of 18 and 30. It follows closely the cohort-based measure for most of the period. It is only during the second half of the eighties and the nineties that the two variables diverge. The cross-sectional measure would suggest a sustained drop in marriage rates during this period, whereas the cohort-based measure documents a mild increase in the share ever married. The reason for the divergence is that the cross-sectional measure is strongly affected by changes in the age at first marriage: when examining the share of people ever married within an age range, one cannot determine whether individuals are simply delaying marriage or whether they choose not to marry. In the 1980s and 1990s the age at first marriage increased significantly, which explains why the cross-sectional measure declines during this period whereas the cohort-based measure does not.

An increase in the age interval used in the computation of the cross-sectional measure, for instance from 18-30 to 18-35, is only a partial solution to the described problem. The cross-sectional measure considers the marriage decisions of all individuals of age 18, 19, 20, etc. If there is an increase in age at first marriage, the fraction of individuals who choose to marry at age 18, 19, 20, declines. Over time, these individuals will show up as married at older ages. But the cross-sectional measure will account for this shift with a delay, potentially leading to incorrect inference.

The cohort-based measure may also be affected by changes in the age at first marriage if the age cut-off is too low. It is therefore important that one chooses the proper age cut-off. If one believes that an age cut-off of 30 is too low, an age cut-off of 35 or 40 should be used.

## 4 Conclusions

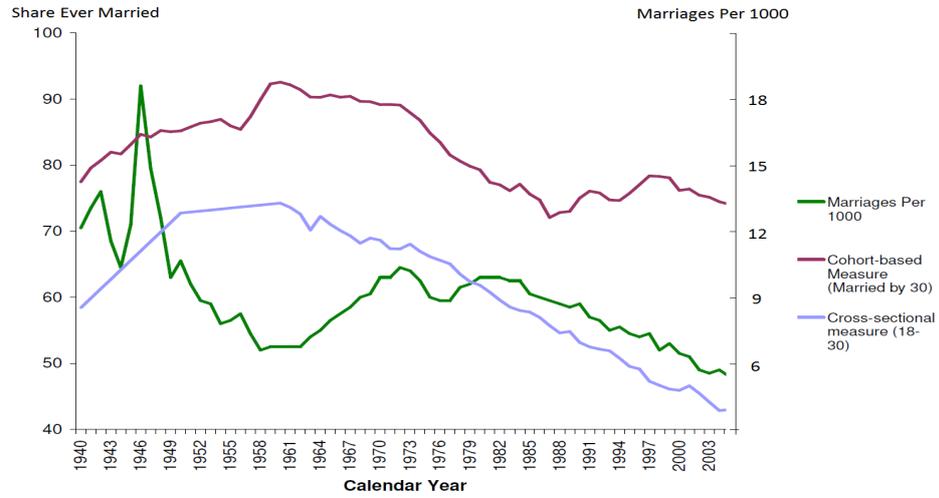
In this paper, we consider three different measures of the share ever married in a given region and provide evidence that the two measures typically used in the literature, the population-based and cross-sectional measures, generally lead to misleading inference when used to study the evolution of marriage rates. Lastly, an examination of the data indicates that the alternative, cohort-based measure is not affected by the limitations that characterize the first two variables. It is therefore a better choice for researchers interested in studying changes in the share ever married.

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**Figure 1: Different Measures of Marriage Rates**



The left vertical axis marks the percentage of individuals ever married for the cohort-based and cross-sectional measures; the right axis corresponds to marriages per thousand. Sources: Vital Statistics of the United States; IPUMS CPS, 1962-2005; IPUMS USA, 1940-1960.