The Decline in Marriage in Israel, 1960–2007: Period or Cohort Effect?

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Abstract Over the past four decades, the more developed countries have experienced a marked decline in the marriage rates of both men and women. The reasons for the decline remain a debated issue. Three explanations predict that the decline in marriage is a period effect, while two predict that it is a birth cohort effect. To determine whether the decline is a period or a cohort effect, this study performed an age–period–cohort analysis. Using data from Israel, our results show that both cohort replacement and period factors were important. Until 1990–1994 the decline in marriage was a period effect, whereas after 1990–1994 the decline was a cohort effect. We conclude with a discussion of the implications of our results for the three major explanations of the decline in marriage.

Keywords Marriage · Second demographic transition · Age–period–cohort model · Israel

1 Introduction

Over the past four decades the more developed countries have experienced a marked decline in the marriage rates of both men and women. Three explanations—two economic and one attitudinal—dominate the current debate over the decline in marriage (Billari et al. 2006; Kalmijn 2007). One economic explanation stresses the

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role of men and asserts that the decline in young men's labor market position caused marriage to decline (Oppenheimer 1988). A second economic explanation stresses the role of women and is based on the theory of gains from marriage, a theory closely associated with Becker (1991). It asserts that women's increased economic power has diminished their economic reliance on men and has made marriage less desirable (Bachrach et al. 2000; Sassler and Schoen 1999). Attitudinal change is a commonly invoked third explanation for changes in marriage patterns (Lesthaeghe and Van de Kaa 1986).

Besides these three period explanations, there are also two explanations that explicitly predict that the decline in marriage is a cohort effect. According to Easterlin (1978), a cohort of younger workers entering into the labor market—a large cohort relative to older ones—is what caused the decline in young men's labor market position, which in turn caused marriage rates to decline. Lesthaeghe and Surkyn (1988) argued that the major mechanism for attitudinal change is the demographic dynamic of cohort succession: when an older birth cohort enters the next phase of the life course, it is replaced by a new cohort that has different attitudes reflecting its unique historical experience. Ní Bhrolcháin (1992: 600), however, concluded that of the two dimensions of calendar time—period and cohort—period is the prime source of variation in marriage rates. Her conclusion, however, was based solely on a study by Rodgers and Thornton (1985) that only covers the first decade of the decline in marriage in the USA. In contrast, our analysis in this paper covers several decades in order to determine the extent to which the decline in marriage is a period or birth cohort effect.

In many developed countries, the census does not ask or has stopped asking questions about age at the time of one's first marriage, but the Israeli census is one of the few that still does so. In addition, marriage is still fairly universal in Israel, even though it has declined (Baloush-Kleinman and Sharlin 2004; Raz-Yurovich 2012). This provides us with a good opportunity to determine the extent to which the decline in marriage is a period or a cohort effect. Our empirical results show that both cohort replacement and period factors have been important. Until 1990–1994 the decline in marriage was a period effect, but after 1990–1994 it was a cohort effect.

2 Period and Cohort Explanations of Marriage Decline

We start with reviewing three major period explanations for the decline in marriage. This is followed by a discussion of theories and explanations for the decline in marriage through cohort effect.

2.1 Period Explanations of Marriage Decline

2.1.1 *Economic Instability and Recession*

The economic instability hypothesis asserts that marriage has become less feasible. It stresses the role of men and is based on the idea that marriage requires economic

resources and stability. It has long been recognized that marriage increases in periods of prosperity and declines in periods of recession (Bracher and Santow 1998: 275). Empirical studies generally support the view that unemployment and low earnings among men lead to delays in marriage (e.g., Ahn and Mira 2001; Bracher and Santow 1998; Kalmijn and Luijkx 2005; Kravdal 1999; Liefbroer and Corijn 1999; Lloyd and South 1996; Oppenheimer 2003; Raz-Yurovich 2010; Sassler and Goldscheider 2004; Sassler and Schoen 1999; Sweeney 2002; Xie et al. 2003). Part of the decline in marriage may have been offset by the increased prevalence of living together without being married (Bumpass and Sweet 1989; Bumpass et al. 1991; Haskey 2001; Leridon and Villeneuve-Gokalp 1988). The increasing popularity of unmarried cohabitation may thus be “an adaptation to the [...] growing uncertainties associated with young men’s deteriorating economic situation” (Oppenheimer 1994: 308). Several studies using data from the USA and Europe (Oppenheimer et al. 1997; Bukodi 2012; Kalmijn 2011) empirically confirmed the uncertainty hypothesis although other studies found no evidence that the shrinking pool of high-earning, young men would explain the decline in marriage (Wood 1995 on African-American marriage formation during the 1970s). High unemployment rates may cause a decline in marriage even among those who are not unemployed, by causing economic uncertainty. Regarding the effect of the national unemployment rate, study findings are mixed. Ekert-Jaffe and Solaz (2001), for example, reported that when individuals’ employment experiences are controlled for, the national unemployment rate has a negative effect on the likelihood of men getting married. Cooney and Hogan (1991), however, did not find that the national unemployment rate has any noticeable effects on the likelihood of marriage of men, even when controlling for individuals’ employment experiences.

2.1.2 *Economic Independence*

The economic independence hypothesis asserts that increasing educational attainment, better employment opportunities, and higher levels of labor force participation have diminished women’s economic reliance on men and have made marriage less desirable (Sassler and Schoen 1999). According to the independence argument, better educated women would be more economically independent and therefore see fewer benefits to marriage. Nevertheless, several studies showed that after leaving school, better educated women do not have a lower probability of marrying, other things being equal (Blossfeld and Jaenichen 1992; Oppenheimer et al. 1997; Raymo 2003; Raz-Yurovich 2010; Santow and Bracher 1994). In a similar way women with a greater degree of economic independence are not found to marry less (Bracher and Santow 1998). Only one study (Raz-Yurovich 2010) reported a female “independence” effect for women with the highest earnings.

2.1.3 *Attitudinal Change*

In many Western countries the decline in marriage is part of a wider set of changes in marriage and family-oriented behavior such as the increasing popularity of unmarried cohabitation, the rise in pre-marital sex, and fertility decline (Van de Kaa

1987) which has been argued to be the consequence of attitudinal change (Lesthaeghe and Surkyn 1988; Lesthaeghe and Neidert 2006). Whereas some view new technologies, such as the birth control pill, and the media as important determinants of attitudinal change (e.g., Goldin 2004; Andersen and Fetner 2008), others argued that law reforms may have contributed to it. The transformation in divorce law, for example, may have broadened the approval of marital dissolution (Thornton et al. 1995). And it is also possible that the rise in the divorce rate altered attitudes toward separation and divorce (Thornton 1985; Brooks and Bolzendahl 2004: 110–111). Scholars have overall argued that highly educated people are at the vanguard of the dissemination process of new attitudes toward marriage and family behavior.

2.2 Cohort Explanations of Marriage Decline

2.2.1 *Relative Cohort Size*

Easterlin (1978) argued that the sharp decline in the relative economic position of young males is caused by a cohort of younger workers—a larger cohort than the ones before it—entering into the labor market. This created unusually poor job prospects for these younger cohorts, which resulted in postponement of marriage compared to their parental cohort. Therefore, the economic instability hypothesis may also be interpreted as a variant of Easterlin's relative cohort size model (Ermisch 1979: 40). Easterlin first proposed his relative cohort size model as an explanation for the marriage boom of the 1950s and 1960s in the USA (which Rodgers and Thornton (1985) and Schellekens (2017), however, showed not to be the case). According to the relative cohort size model, there should be a rise in marriage as baby bust cohorts reach young adulthood. Although Trovato (1988) found support for the relative cohort size model in Canada, the observation window was not long enough to include baby bust cohorts.

Cohort size may not only influence the economic position of young males, but also the availability of mates. According to marriage squeeze theory, women born during a baby boom should experience a much less favorable marriage market than those born earlier, because of their outnumbering men in their age range (Goldman et al. 1984). While this may explain short-term trends, the availability of mates is unlikely to be the major explanation for the decline in marriage, because it has affected both men and women (e.g., Ben-Moshe 1989).

2.2.2 *Cohort Succession Model*

A central sociopsychological postulate is that cohorts tend to be marked for life by the attitudes prevalent in their youth (Ryder 1965: 851). Following Inglehart (1985), Lesthaeghe and Surkyn (1988: 17–23) asserted that a major mechanism for attitudinal change is the demographic dynamic of cohort succession: when an older cohort enters the next phase in the life course, it is replaced by a new cohort that holds different values reflecting its unique historical experience. Others, however, view attitudes as subject to change throughout the life course. They hold that

attitudes prevalent in adolescence may change at a later stage of life as a result of experiences both in the family and occupational domain (Liefbroer 2009).

While there is also strong evidence for period factors, several studies have found evidence for cohort replacement in changes in family-related attitudes, such as those toward pre-marital sex, voluntary childlessness, gender egalitarianism, and tolerance of homosexuality. Both Scott (1998) and Treas (2002) concluded that most of the attitudinal change toward pre-marital sex in the UK and the USA was due to a slow process of cohort replacement. Harding and Jencks (2003), however, found evidence for cohort as well as period effects in changing attitudes toward pre-marital sex in the USA. Noordhuizen et al. (2010) investigated change in attitudes toward voluntary childlessness in the Netherlands. They found that period factors were mainly responsible for the shift in the acceptance of childlessness between 1965 and 1980, whereas change in acceptance of childlessness between 1983 and 1996 was mainly due to cohort replacement. Brewster and Padavic (2000), Brooks and Bolzendahl (2004), and Cotter et al. (2011) estimated that cohort replacement can explain about half of the increasing egalitarianism in American gender attitudes. Andersen and Fetner (2008) studied attitudes toward homosexuality in Canada and the USA between 1981 and 2000. They found evidence for cohort replacement as well as period factors in trends of tolerance of homosexuality.

Cohabitation is often associated with a change in attitudes (Clarkberg et al. 1995; Thornton et al. 1995). Thus, to the extent that attitudinal change is a cohort effect, the shift to cohabitation may also be a cohort effect. This is consistent with the finding that cohort replacement played a “dramatic role” in the shift to cohabitation in the USA, although increases within cohorts were also noted (Bumpass and Lu 2000: 32). If the spread of cohabitation is a cohort effect, then the decline in marriage may also be one.

3 Data and Variables

Our data derive from the 20% samples of the Israeli censuses of 1972, 1983, 1995, and 2008. The Palestinian Arab minority group has been omitted from the analysis as the demographic transition of the Palestinian minority and Jewish majority started at very different points in time. Furthermore, the very low rates of intermarriage also imply that this leaving the Palestinian group out of the analyses will not bias the results for the marriage patterns among the majority group.

Like all other developed countries, Israel has undergone changes in reproductive behavior in the last four decades, albeit not as dramatic as those that have occurred in other developed countries (Friedlander and Feldmann 1993; Okun 2013). In Israel most births still occur within marriage. Cohabitation in Israel is mainly a child-free prelude to marriage and not an alternative. This may be one reason why marriage is still fairly universal (Baloush-Kleinman and Sharlin 2004; Raz-Yurovich 2012). In 2010 almost 16% of men and 11% of women aged 25–29 reported that they were cohabiting (State of Israel 2012: 19).

We used the questions on the year of only and first marriage in each census to reconstruct trends in nuptiality among cohorts born between 1926 and 1987 and

model marriage between ages 20 and 35. Each census was used only for nuptiality in the period starting in the year of the previous census and ending before the year of the census, except for males in the 1995 Census. In the 1983 Census, males aged 18–24 were listed as being 21 years old. Hence, we used the 1995 Census to reconstruct trends in male nuptiality in 1979–1994 instead of 1983–1994.

Two explanations predict that the decline in marriage is a cohort effect: relative cohort size and second demographic transition theory. However, a marriage squeeze may also cause cohort differences. It may have contributed to a decline in marriage among women and to a rise in marriage among men in the late 1960s and early 1970s, when relatively large cohorts of women born in the late forties and early fifties entered the marriage market (Ben-Moshe 1989). Hence, we used a set of dummy variables to model the effects of cohorts. We divided the sample into thirteen 5-year birth cohorts, the reference category being 1960–1964. We estimated cohort effects in an age–period–cohort model. To control for period, we divided the years 1960–2007 into ten 5-year periods, the reference period being 1960–1964.

The economic instability hypothesis asserts that a decline in young men's labor market position is the major explanation for the decline in marriage. Unfortunately, we were unable to measure the annual employment status for each individual. Moreover, the series of unemployment rates for males aged 18–24 only starts in 1972. Instead, we used a series of unemployment rates that pools all ages and both sexes, which is available from 1960 (State of Israel 1981: 319; 1989: 325; and 2010: 516). Trends in the unemployment rate for men aged 18–24 and for the total population are very similar in the years for which both series are available.

To estimate the coefficients of unemployment, we need to control for confounding variables, such as income and the very high inflation in Israel in the late 1970s and early 1980s. High inflation may influence marriage by causing economic uncertainty. Schellekens and Gliksberg (2013) have shown that the very high inflation had a large negative effect on marriage rates, and hence, we included a measure of inflation. We measured inflation by the natural logarithm of the percentage change in the consumer price index (State of Israel 1989: 273, 2010: 597).

Empirical studies generally support the view that low earnings lead to delays in marriage. Unfortunately, we were unable to measure the annual income of each individual. Instead, we used the gross domestic product (hereafter GDP) per capita in thousands of 2005 NIS as a proxy for trends in average income (State of Israel 2010: 620–622).

The economic independence hypothesis asserts that increases in educational attainment have indirectly diminished women's economic reliance on men (Sassler and Schoen 1999). Two distinct education vectors were constructed for each person from information on the number of years of schooling. The first—educational status—charts yearly participation in education. The second vector—educational level—reflects actual attainment (Hoem and Kreyenfeld 2006; Santow and Bracher 1994: 478). Our assumption that all respondents followed an educational trajectory without interruptions, except for a few years of military or national service, is reasonable, considering that other types of interruption are less common (e.g., Raymo 2003; Zabel 2009). We converted educational level into two dummy

variables indicating 0–8 and 13 + years of education, with senior high school (9–12 years) being the reference category.

Most Jewish men serve in the army for 3 years from age 18 to 20. Our analysis starts at age 20. Hence, a dummy variable was added to indicate being in military service. There is no need to add a dummy variable for military or national service among women, who only serve for 2 years.

Israel is a country of immigration. Therefore, it is important to control for immigration and countries of origin where marriage tended to be at younger ages than Israel at the time of migration, such as the Near East and the Former Soviet Union (Scherbov and van Vianen 2001). Hence, we added a variable indicating Near Eastern origin and one indicating birth in the Former Soviet Union. The variable indicating Near Eastern origin includes respondents whose father was born in a Near Eastern country. Finally, since immigrants may have spent most of their formative years abroad, we only included immigrants who arrived before they were 10 years old.

Unfortunately, the census does not ask about cohabitation. To chart trends in cohabitation by cohort, we used the Israeli section of the European Social Survey (ESS) for 2010. The survey asks one question on cohabitation (“Have you ever lived with a partner, without being married?”).

After omitting individuals who were born before 1930 or after 1990, and those who immigrated after age ten, the ESS sample consists of 1081 Jewish men and women. We divided the sample into six 10-year birth cohorts: 1930–1939, 1940–1949, 1950–1959, 1960–1969, 1970–1979, and 1980–1989.

4 Analytic Approach

The census lists only the calendar year of marriage. Hence, a discrete-time hazard model is used to assess the effects of the independent variables on the probability of marrying. We have assumed that the hazard for a marriage is constant within annual intervals. We estimate discrete-time event history models using logistic regression. This kind of analysis can accommodate two common features of event histories: censored data and time-varying variables, such as age and educational status and attainment (Allison 2010).

The logistic regression model assumes that the observations are independent, but since observations from the same subject are likely to be correlated, this is not usually a reasonable assumption. We do not model the probability that an individual will marry in year t , however, but the *conditional* probability that an individual will marry in year t given that the individual is single in year $t - 1$. In such a case there is no need to correct standard errors for clustering in individuals (Singer and Willett 2003: 384).

The dependent variable in the statistical model is the annual log odds of marrying in Israel. The unit of analysis is the “person-year”; that is, each person contributes as many units to the analysis as the number for which he/she is observed. Person-years below age 20 were omitted from the analysis, thus excluding most of the years spent in military and national service. Records were right-censored at age 35 or at

the beginning of the year of the census, whichever came first. After left-truncation at immigration to Israel and the beginning of 1960, whichever came last, Jewish men and women contributed 1,384,559 and 1,011,589 person-years, respectively, to the analysis.

Two explanations predict that the decline in marriage is a cohort effect. Age–period–cohort models are particularly useful for detecting the distinct impacts of age, period, and cohort on some outcome of interest. Disentangling the distinct effects of age, period, and cohort, however, involves a methodological problem, because the three are perfectly correlated. There are at least three conventional strategies for dealing with this identification problem: (1) constraining two or more of the age, period, or cohort coefficients to be equal; (2) transforming at least one of the age, period, or cohort variables so that its relationship is nonlinear; and (3) assuming that the cohort or period effects are proportional to certain measured variables (Yang and Land 2006).

Following Raftery et al. (1995) and Yang (2008) we used the second strategy and chose to use a polynomial to model the effect of age. Whereas the use of a polynomial solves the problem of the arbitrary choice of the identifying constraint, this approach is still not very informative about the mechanisms by which period-related changes and cohort-related processes act on the dependent variable of interest.

“Period” is a poor proxy for some set of contemporaneous influences, and “cohort” is an equally poor proxy for influences in the past. When these influences can themselves be directly measured, there is no reason to probe for period or cohort effects (Hobcraft, Menken, and Preston 1982). Hence, a third strategy is to constrain the effects of period and/or cohort to be proportional to some other substantive variable. Heckman and Robb (1985) termed this the “proxy” variable approach because period and cohort are represented by some other variable. The “proxy” variable approach also has its drawbacks, however. Although replacing an accounting dimension with measured variables solves an identification problem, it leaves room for specification errors (Smith et al. 1982). Thus, replacing the period dummy variables by proxy variables may lessen the rigorosity of the control for the period effects on cohort differences (O’Brien 2000: 125).

5 Results

The decline in marriage may be the result of marriage being forgone or delayed. Non-marriage in Israel is still limited. In 2012, only 6.9% of Jewish women and 7.9% of Jewish men aged 50–54 had never married (State of Israel 2014: 98; Okun 2013: 487). Hence, as far as the cohorts born before 1960 are concerned, the analysis presented below is mostly one of delayed marriage.

Figures 1 and 2 present first marriage rates per 1000 person-years for Jewish women and men at ages 20–24, 25–29, and 30–34 for every single year between 1960 and 2007 as estimated from the 1972, 1983, 1995, and 2008 censuses. Whereas the largest decline in marriage rates among women occurred between ages 20–24, among men the largest decline occurred between ages 25–29. In the analysis,

Fig. 1 Female first marriage rates per 1000 person-years by age, 1960–2007

we pool age groups and model the odds of marriage at ages 20–34. Table 1 presents descriptive statistics of the variables used in the analyses.

5.1 Age–Period–Cohort Model: Women

Table 2 presents three logistic regression models of the odds of marriage among women. Coefficients are presented as odds ratios or exponents of the raw logistic coefficients. The odds ratios are multiplicative effects on the odds of marrying in any 1-year interval.

The first model is an age–period model. It shows that marriage among women has been declining since 1960–1964. The second model adds cohort dummy variables to determine the extent to which the decline in marriage is a cohort effect. All cohort dummy variables have a very significant effect on the probability of marriage. Thus, there are cohort influences, but this does not necessarily imply that the decline is a cohort effect. To determine the extent to which the decline in marriage is a cohort effect, we need to compare the coefficients of the period dummy variables in the first two models.

Figure 3 presents period trends in marriage in terms of odds ratios in the first two models. In the age–period model, marriage in terms of odds ratios (solid line) declines almost continuously. When cohort dummies are added to the model,

Fig. 2 Male first marriage rates per 1000 person-years by age, 1960–2007

however, marriage in terms of odds ratios (dashed line) declines until 1990–1994, after which it increases. Thus, until 1990–1994, the decline is a period effect, whereas after 1990–1994 the decline is a cohort effect. If not for cohort influences, after 1990–1994 marriage would not have continued to decline and by 2005–2007 marriage would have returned to the level of 1970–1974.

To determine which cohorts contributed to the decline in marriage, we now take a closer look at the coefficients of the cohort dummy variables. Women born in 1960–1964 had the highest odds of marriage. The odds of marriage started to decline among women born in 1965–1969.

Under the independence argument, educational attainment will lower the odds of marriage through a decline in women's economic reliance on men. Our results indicate, however, that educational attainment increases the odds of marriage. Thus, the independence argument does not seem to be consistent with the Israeli data, as has already been observed by Raz-Yurovich (2010). Perhaps higher education provides greater access to more attractive marriage markets (Oppenheimer and Lew 1995: 118).

Our results indicate that educational attainment increases the odds of marriage, net of enrollment. This does not necessarily imply, however, that more educated women marry at an earlier age than less educated ones, because our results also show that enrollment lowers the odds of marriage (see also Raz-Yurovich 2010). As

Table 1 Descriptive statistics (percentages)

Variable	Women	Men
Near Eastern origin	46.79	49.09
Born in the Former USSR	1.41	1.68
Enrollment	42.01	19.75
Years of education		
0–8 years	4.71	7.26
9–12 years	46.11	51.25
13 + years	49.18	41.49
Army service (= age 20)	–	14.58
Birth cohort		
1926–1929	0.04	0.06
1930–1934	0.21	0.35
1935–1939	0.95	1.45
1940–1944	3.39	4.37
1945–1949	7.36	7.97
1950–1954	9.78	10.25
1955–1959	9.60	10.37
1960–1964	9.90	10.72
1965–1969	12.03	12.54
1970–1974	15.82	15.17
1975–1979	15.60	13.95
1980–1984	12.15	10.20
1985–1987	3.18	2.60
Period		
1960–1964	2.18	3.01
1965–1969	4.59	5.72
1970–1974	7.64	8.46
1975–1979	9.21	9.56
1980–1984	9.87	9.28
1985–1989	10.15	10.69
1990–1994	12.97	13.14
1995–1999	14.55	13.71
2000–1904	16.90	15.57
2005–1907	11.94	10.86
Person-years	1,011,589	1,384,559

Percentages of person-years

predicted, women of Near Eastern origin and immigrants from the Former Soviet Union have higher odds of marriage.

Perelli-Harris et al. (2010: 775) suggested that an educational gradient in new behavior “can provide information on how and why a particular behavior increases over time.” Hence, we have added interactions between the cohort dummies and education variables to the second model. Although likelihood ratio tests show that there are significant interaction effects for both men and women (p value = 0.000),

Table 2 Logistic regression models of the odds of marriage: women 1960–2007

Variables	Age–period model		Age–period–cohort model (1)		Age–period–cohort model (2)	
	e^b	p value	e^b	p value	e^b	p value
Age	1.995	0.000	2.160	0.000	2.043	0.000
Age squared	0.986	0.000	0.984	0.000	0.986	0.000
Near Eastern origin	1.076	0.000	1.051	0.000	1.051	0.000
Born in former USSR	1.077	0.002	1.127	0.000	1.132	0.000
Enrollment	0.597	0.000	0.638	0.000	0.620	0.000
Years of education						
≤ 8	0.654	0.000	0.687	0.000	0.690	0.000
9–12	1.000	–	1.000	–	1.000	–
13 +	1.088	0.000	1.042	0.000	1.072	0.000
Period						
1960–1964	1.000	–	1.000	–		
1965–1969	0.846	0.000	0.625	0.000		
1970–1974	0.747	0.000	0.421	0.000		
1975–1979	0.641	0.000	0.284	0.000		
1980–1984	0.532	0.000	0.197	0.000		
1985–1989	0.555	0.000	0.197	0.000		
1990–1994	0.445	0.000	0.182	0.000		
1995–1999	0.433	0.000	0.225	0.000		
2000–2004	0.387	0.000	0.281	0.000		
2005–2007	0.328	0.000	0.331	0.000		
GDP per capita					0.981	0.000
Unemployment					0.957	0.000
Inflation					0.876	0.000
Birth cohort						
1926–1929			0.325	0.000	0.501	0.087
1930–1934			0.211	0.000	0.345	0.000
1935–1939			0.287	0.000	0.466	0.000
1940–1944			0.360	0.000	0.543	0.000
1945–1949			0.492	0.000	0.596	0.000
1950–1954			0.687	0.000	0.773	0.000
1955–1959			0.911	0.000	0.919	0.000
1960–1964			1.000	–	1.000	–
1965–1969			0.907	0.000	0.933	0.000
1970–1974			0.671	0.000	0.803	0.000
1975–1979			0.498	0.000	0.704	0.000
1980–1984			0.293	0.000	0.455	0.000
1985–1987			0.237	0.000	0.420	0.000
Constant	0.000	0.000	0.000	0.000	0.000	0.000

Fig. 3 Period trends in marriage in terms of odds ratios: women, 1960–2007

a comparison of the cohort effects by educational group did not reveal large differences (results not shown but available upon request).

5.2 Age–Period–Cohort Model: Men

Table 3 presents three logistic regression models of the odds of marriage among men. The first model is an age–period model. It shows that marriage increased until 1965–1969, after which it started to decline. The second model adds cohort dummy variables to determine the extent to which the decline in marriage is a cohort effect. Figure 4 presents period trends in marriage in terms of odds ratios in the first two models. It shows that among men the decline is a period effect until 1990–1994, and a cohort effect thereafter. Thus, as far as the timing of the cohort influences is concerned, the results for men and women are identical. If not for cohort influences, after 1990–1994 marriage would not have declined and by 2005–2007 marriage would have returned to the level of 1975–1979.

Figure 4 also shows that marriage among men increased in the 1960s. After controlling for cohort influences, however, little remains of the increase, suggesting that the increase in marriage among men in the 1960s was mostly a cohort effect. Perhaps this cohort effect is the result of a marriage squeeze (Ben-Moshe 1989).

To determine which cohorts contributed to the decline in marriage, we now take a closer look at the coefficients of the cohort dummy variables. Men born in 1955–1959 have the highest odds of marriage. Figure 5 compares cohort trends in marriage in terms of odds ratios among men and women. Trends among men and women born in the 1940s and 1950s are very similar. Marriage started to decline among men born in 1960–1964—that is, one cohort before women. Among the youngest cohort of men, born in 1985–1987, the decline seems to have come to a

Table 3 Logistic regression models of the odds of marriage: men 1960–2007

Variables	Age–period model		Age–period–cohort model (1)		Age–period–cohort model (2)	
	e^b	p value	e^b	p value	e^b	p value
Age	4.065	0.000	4.312	0.000	4.167	0.000
Age squared	0.976	0.000	0.975	0.000	0.975	0.000
Near Eastern origin	1.016	0.010	1.002	0.809	1.002	0.721
Born in Former USSR	1.094	0.000	1.135	0.000	1.128	0.000
Enrollment	0.783	0.000	0.807	0.000	0.801	0.000
Years of education						
≤ 8	0.732	0.000	0.746	0.000	0.746	0.000
9–12	1.000	–	1.000	–	1.000	–
13 +	0.983	0.021	0.972	0.000	0.980	0.007
Army service	0.508	0.000	0.506	0.000	0.505	0.000
Period						
1960–1964	1.000	–	1.000	–		
1965–1969	1.208	0.000	0.975	0.299		
1970–1974	1.158	0.000	0.816	0.000		
1975–1979	0.934	0.000	0.611	0.000		
1980–1984	0.745	0.000	0.480	0.000		
1985–1989	0.626	0.000	0.430	0.000		
1990–1994	0.536	0.000	0.426	0.000		
1995–1999	0.487	0.000	0.471	0.000		
2000–2004	0.444	0.000	0.546	0.000		
2005–2007	0.387	0.000	0.576	0.000		
GDP per capita					0.991	0.000
Unemployment					0.973	0.000
Inflation					0.918	0.000
Birth cohort						
1926–1929			0.494	0.000	0.620	0.000
1930–1934			0.488	0.000	0.637	0.000
1935–1939			0.661	0.000	0.871	0.005
1940–1944			0.779	0.000	1.041	0.283
1945–1949			0.926	0.000	1.190	0.000
1950–1954			1.043	0.000	1.244	0.000
1955–1959			1.083	0.000	1.161	0.000
1960–1964			1.000	–	1.000	–
1965–1969			0.853	0.000	0.865	0.000
1970–1974			0.675	0.000	0.735	0.000
1975–1979			0.520	0.000	0.598	0.000
1980–1984			0.388	0.000	0.453	0.000
1985–1987			0.459	0.000	0.542	0.000
Constant	0.000	0.000	0.000	0.000	0.000	0.000

Fig. 4 Period trends in marriage in terms of odds ratios: men, 1960–2007

Fig. 5 Cohort trends in marriage by sex in terms of odds ratios: 1926–1987

halt, whereas among women it seems to have slowed down. Our estimate of the effect of the cohort born in 1985–1987 needs to be treated with caution, however, because it is only based on observations until age 23. Since the majority of marriages are expected to occur after that age, we may have underestimated the odds of marriage for that birth cohort.

As among women, our results show that enrollment lowers the odds of marriage among men. After leaving school, men who did not attend senior high school have the lowest odds of marriage. Unlike for women, however, post-secondary education does not increase the odds of marriage for men. Army service has a negative effect on the odds of marriage. As predicted for those born in the Former Soviet Union, both men and women are more likely to marry than natives of Israel. Whereas women of Near Eastern origin are more likely to marry than natives of Israel, men of Near Eastern origin are not.

5.3 Identification of Cohort Effects

A marriage squeeze is unlikely to explain the cohort effects after 1990–1994, because marriage declined among men as well as women. Following Macunovich's example using Easterlin's relative cohort size model to predict cohort effects (2012: 634), we measure relative cohort size as the number of young adults (aged 20–24) of both sexes, relative to the number of prime-age adults (aged 45–54). Figure 6 presents estimates of relative cohort size computed from published annual statistics (State of Israel 1962–2008). Easterlin predicted that marriage will increase when relative cohort size declines. Figure 6 shows that relative cohort size declined in the 1990s and remained low until the end of the period under investigation. At the same time, however, marriage continued to decline. Thus, the cohort influences observed after 1990–1994 are unlikely to be the result of changes in relative cohort size.

Second demographic transition theory predicts an increase in cohabitation that is associated with the decline in marriage. In other words, those cohorts responsible

Fig. 6 Relative cohort size among Israeli Jews, 1960–2007

Fig. 7 Percentage of people who “have ever lived with a partner without being married to them” among Israeli Jews by birth cohort. *Source:* European Social Survey (2010). *Note:* The figure only includes Jewish women and men born in Israel or who immigrated before age ten. The number of cases for each cohort is 134 (1940–1949), 203 (1950–1959), 183 (1960–1969), 254 (1970–1979), 246 (1980–1989)

for the decline should also be the ones to have adopted cohabitation on a wider scale. This prediction is consistent with evidence from the Israeli section of the ESS. Figure 7 shows that the proportion of women and men ever having cohabitated started to increase among those born after 1960, the same cohorts that are responsible for the decline in marriage after 1990–1994. The proportion ever having cohabitated reached over 40% for those born between 1970 and 1979 (see also Bystrov 2012: 277). Eventually the proportion ever having cohabitated among those born between 1980 and 1989 may be even higher, but so far the proportion is much lower because the survey censors observations in 2010.

5.4 Identification of Period Effects

In this section we aim to determine the extent to which the economic instability hypothesis is able to account for period influences. The third model in Table 2 replaces the period dummy variables in the second model by three proxies in an attempt to identify period effects: the unemployment rate, GDP per capita, and inflation. Figure 8 compares observed and predicted first marriage rates per 1000 women aged 20–24 to show the extent to which the third model is able to predict trends in marriage. The relatively close fit suggests that few potentially important determinants of *trends* are missing from the model.

All three macro-economic variables have a significant effect on marriage. While the effects of unemployment and inflation are in the predicted negative direction, the effect of GDP per capita is not in the predicted positive direction, suggesting that it does not measure the economic feasibility of marriage, but serves as a proxy for omitted variables.

Fig. 8 Observed, predicted, and counterfactual-predicted first marriage rates assuming no unemployment: women aged 20–24

Schellekens and Gliksberg (2013) had shown that there would not have been a decline in marriage before 1980 in the absence of the episode of very high inflation. To what extent does an increase in economic instability account for the decline in marriage after 1980? To illustrate the impact unemployment had on marriage rates, we computed a predicted series of first marriage rates between ages 20–24, assuming there was no unemployment. For each year t , first marriage rates were simulated by computing for each woman the predicted probability that she will marry in year t . These probabilities were summarized to obtain the predicted number of marriages for women aged 20–24 in year t . To obtain predicted first marriage rates, the number of marriages was divided by the observed number of years that single women aged 20–24 were at risk in year t . Figure 8 compares the predicted series with the counterfactual-predicted series. On the one hand, it shows that more women would have been married if not for unemployment. On the other hand, even if there were no unemployment, marriage would still have declined before 1990–1994.

For men we obtained similar results. The third model in Table 3 replaces the period dummy variables by the unemployment rate, the GDP per capita, and inflation. Figure 9 compares observed and predicted first marriage rates per 1000 men aged 20–24 to show the extent to which the third model is able to predict trends in marriage. Again, the relatively close fit suggests that few potentially important determinants of *trends* are missing from the analysis.

To illustrate the impact that unemployment had on marriage rates, we computed a predicted series of first marriage rates between ages 20–24, assuming there was no

Fig. 9 Observed, predicted, and counterfactual-predicted first marriage rates assuming no unemployment: men aged 20–24

unemployment. Figure 9 compares the predicted series with the counterfactual-predicted series and shows that more men would have married if not for unemployment. But even if there were no unemployment, marriage would still have declined before 1990–1994.

6 Conclusion and Discussion

In the last four decades more developed countries, including Israel, have experienced great decline in the marriage rates of both men and women. Three explanations predict that the decline in marriage is a period effect, whereas two predict that it is a cohort effect. To determine which explanation holds more weight, this study performed an age–period–cohort analysis. Our analysis shows that until 1990–1994 the decline in marriage is a period effect. After 1990–1994, however, the decline is a cohort effect. Below we discuss the implications of our results for the three explanations of the decline in marriage.

The economic independence hypothesis asserts that increases in educational attainment, a rise in rates of labor force participation, and increased earnings have diminished women's economic reliance on men and have made marriage less desirable (Sassler and Schoen 1999). Like Raz-Yurovich (2010), we also found no evidence for the decline in marriage in Israel being the result of increases in female educational attainment. Moreover, after controlling for educational enrollment and attainment, cohort influences remain, even though there are differences in education

between cohorts (Wilson et al. 2011). Thus, the economic independence hypothesis is unlikely to account for the cohort influences.

The economic instability hypothesis stresses the role of men and is based on the idea that marriage requires economic resources and security. Virtually all micro-level studies find that low earnings and unemployment decrease marriage among men (Kalmijn 2007). Our analysis also shows that unemployment has a negative effect on marriage rates, but trends in unemployment do not explain the period influences in the decline in the Israeli context under study. Unfortunately, we were unable to test the hypothesis that low earnings among young men explain the decline in marriage. Future studies should try to estimate the contribution of low earnings to the *decline* in marriage.

Easterlin (1978) presented what in fact is a cohort version of the economic instability hypothesis. His relative cohort size model predicts that the decline in the relative economic position of young males, and hence the decline in marriage, is a cohort effect. Relative cohort size, however, declined in the 1990s. Hence, the relative cohort size model would not seem to be able to account for the cohort influences after 1990–1994. Thus, the explanation for the cohort influences is to be found elsewhere.

The second demographic transition theory attributes a major role to attitudinal change, possibly associated with an increase in cohabitation. According to Lesthaeghe and Surkyn (1988), education is of major importance in the dissemination process of new attitudes. This part of their hypothesis is not consistent with our data. However, another part of their hypothesis is consistent with our data.

Lesthaeghe and Surkyn (1988) argued that the major mechanism for attitudinal change is cohort replacement. Our results seem to indicate that after 1990–1994, cohort replacement was the major factor in the decline in marriage among Jewish women and men in Israel. We were unable to determine whether this cohort effect was the result of attitudinal change since no attitudinal data were included in the census. We were only able to show that the proportion of women and men ever having cohabitated started to increase among those born after 1960, the same cohorts that are responsible for the decline in marriage after 1990–1994. Of course, a coincidental rise in cohabitation is not evidence for attitudinal change.

Even if it can be shown that the cohort effect is correlated with attitudinal change, the question remains whether this change is endogenous or not. Attitudinal change may primarily be an effect, rather than a cause, of the decline in marriage (e.g., Liefbroer and Corijn 1999: n. 1; Choe et al. 2014). However, the explanation that the decline in marriage is the result of attitudinal change is consistent with the decline being a cohort effect.

Our results indicate that period factors explain the decline before 1990–1994. Schellekens and Gliksberg (2013) had already shown that very high inflation accounts for much of the decline between the middle of the 1970s and the middle of the 1980s. Among women, however, marriage already started to decline before the middle of the 1970s. The fact that marriage among men did not decline at the time and even increased suggests that there was a marriage squeeze (Ben-Moshe 1989).

Even though other developed countries witnessed similar declines in marriage at about the same time, it is not clear to what extent it will be possible to replicate the

results from Israel in other countries. Like all other developed countries, Israel has undergone changes in reproductive behavior in the last four decades, albeit not as dramatic as those that have occurred in other developed countries (Friedlander and Feldmann 1993; Okun 2013). However, there are also differences. Thus, in Israel most births still occur within marriage. In addition, marriage is still fairly universal (Baloush-Kleinman and Sharlin 2004; Raz-Yurovich 2012).

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