

## Assortative mating and divorce: evidence from Austrian register data

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**Summary.** We show that changes in assortative mating patterns along the dimensions of age, ethnicity, religion and education are *not* responsible for the increasing marital instability over the last four decades in Austria. Without the rise in the age at marriage, divorce rates would be considerably higher. Immigration and secularization, and the resulting supply of spouses with diverse ethnicity and religious denominations had no overall effect on divorce rates. Counter-vailing effects—in line with theoretical predictions—offset each other. The rise in the incidence of divorce is most probably caused by increased social acceptance of divorce.

**Keywords:** Assortative mating; Divorce; Immigration; Marital instability

### 1. Introduction

The family in the western world has been radically altered over the last few decades. Besides the drop in marriage rates and the increasing number of children born out of wedlock the increasing incidence of divorce which has been observed in most countries is sometimes considered as the most dramatic and far-reaching change (Amato, 2000).

A large body of research across academic disciplines has documented a strong negative correlation between divorce and a wide range of outcomes (Kitson and Morgan, 1990; Amato, 2000). For instance, compared with married individuals, divorced individuals have lower levels of economic wellbeing (e.g. Aassve *et al.* (2007)) and do worse along many psychological (e.g. Blanchflower and Oswald (2004)) and health dimensions (e.g. Richards *et al.* (1997)). Policy makers and scholars are especially concerned about negative consequences of divorce for affected children. Many references consistently show that children of divorced parents tend to fare worse compared with children from continuously married parents. For instance, Gruber (2004) found that they have lower educational attainment, lower incomes, marry earlier but separate more often and have higher odds for committing suicide.

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The potential negative consequences of divorce have spurred efforts to identify the causes for (increased) marital instability. However, since the dramatic increase in divorce rates came along with increased economic independence of women and radical changes in divorce laws the causal link between demographic, economic and legal changes is non-trivial. So far, the economic literature has mainly focused on changes in divorce (Peters, 1986, 1992; Allen, 1992, Friedberg, 1998; Wolfers, 2006; González and Viitanen, 2009) and custody law (Halla, 2012). These papers have furthered our understanding of the effect of family law on intrahousehold bargaining and explained part of the changes in family formation, dissolution and behaviour within marriage over the last few decades. However, a large part of the changing divorce behaviour over time is still unexplained.

Another strand of literature analyses whether certain combinations of spouses' characteristics can explain the likelihood of divorce. This question can be directly linked to economic theory, which regards marriage as a voluntary partnership for the purpose of joint production and joint consumption. The so-called marriage market determines the assignment of partners and the sharing of the gains of marriage (Becker, 1993; Ermisch, 2003). Traditionally, economists have emphasized the importance of joint production and have shown that an efficient marriage market is usually characterized by the match of spouses with similar characteristics (e.g. by intelligence and physical attractiveness); see, for instance, Stevenson and Wolfers (2007). This so-called *positive assortative mating* enhances complementarities in household production and may reinforce the intergenerational persistence of wealth, income, education and other economic outcomes. In contrast, *negative assortative mating* is optimal for traits that are substitutes in household production (e.g. wage earning power). Sociologists (e.g. Kalmijn (1998)) refer to the matching of homogeneous spouses as *endogamy* (marriage to the same type) or *homogamy* (marriage to a similar type). They study these phenomena to understand how societies change over time, and to illuminate important social processes, such as the family's ability to pass on group values.

Scholars in both disciplines have focused on four dimensions of spouses' characteristics:

- (a) age,
- (b) ethnicity,
- (c) religious denomination and
- (d) education.

As predicted by theory (Becker *et al.*, 1977) an empirical literature has shown that assortative mating along these dimensions is important for a successful duration of a marriage. A higher age at first marriage is known to decrease the likelihood of divorce and differences in religion and ethnicity are associated with a higher risk of divorce (e.g. Lehrer and Chiswick (1993) and Kalmijn *et al.* (2005)). The effect of education is theoretically ambiguous and empirical estimates vary across countries and time (Haerkoenen and Dronkers, 2006).

Others have looked at changes in assortative mating patterns over time. Most of the literature focuses on the USA (see, for instance, Kalmijn (1991a, b), Mare (1991), Pencavel (1998), Smits *et al.* (2000), Schwartz and Mare (2005), Bodenhorn (2006) and Gullickson (2006)). Most recently, Rosenfeld (2008) concluded that racial endogamy had declined sharply over the 20th century. Nevertheless, race is still the most powerful division in the US marriage market. The development of religious endogamy is diverse; whereas the division between Jews and Christians is still strong, the division between Catholics and Protestants has weakened over time (Rosenfeld, 2008). Educational homogamy has increased over recent decades. This uniform trend was driven by different portions of the education distribution in different periods (Schwartz and Mare, 2005). Finally, a sharp rise in the age at first marriage can be observed. Among member countries of the Organisation for Economic Co-operation and Development the average age

of women at first marriage has increased from 24.8 years in 1990 to 27.7 years in 2002–2003 (Organisation for Economic Co-operation and Development, 2007).

Despite the fact that pronounced changes in marriage patterns over time are documented, surprisingly no research on their effect on the incidence of divorce over time has been conducted. This paper is the first attempt to examine whether the increased marital instability is related to changing assortative mating patterns over time. For this, we employ *Austrian register data*. Our choice can be rationalized by two facts:

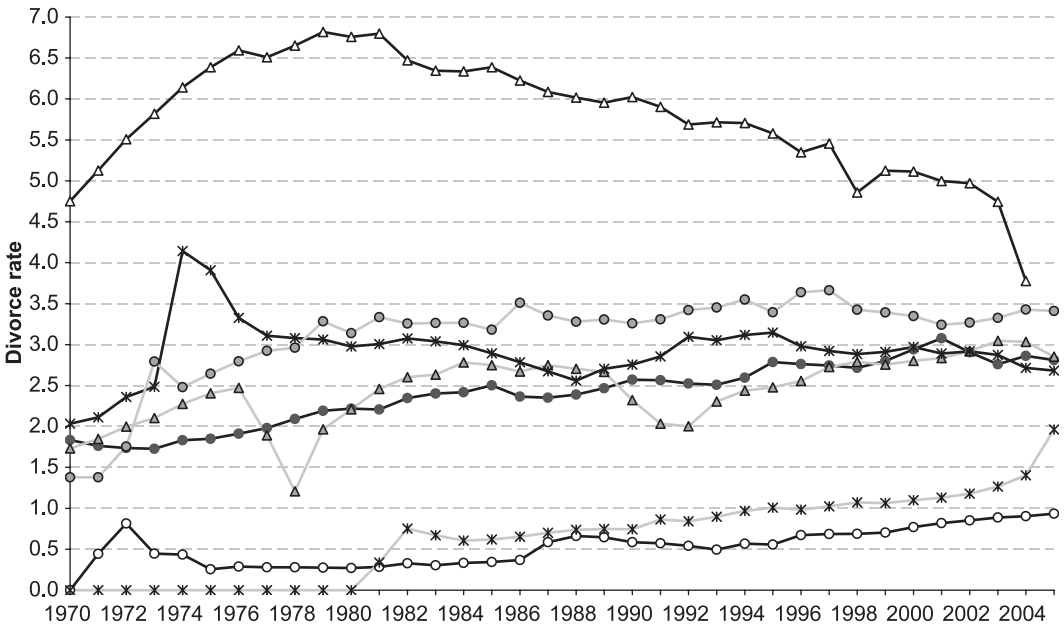
- (a) this unique data set covers the universe of all marriages and divorces in Austria between 1971 and 2007, and
- (b) the Austrian marriage market has been affected by several waves of labour immigration, that have increased the incidence of both mixed religious and/or ethnic marriages.

Furthermore, the sustained secularization of the native (traditionally Catholic) Austrian society has further altered the distribution of spouses' religious denominations. In addition, the rise in the age at first marriage has been pronounced in Austria. Since we observe all marriages that were formed over a period of four decades, we can analyse the patterns and changes of assortative mating over a longer period of time and can assess their contributions to the rise in divorce rates. Moreover, our data allow us to examine the stability of the different dimensions of assortative mating on the risk of divorce over time. The only drawback of the data is that we observe spouses' educational attainment only for those with children. We, therefore, conduct our main analysis with the representative sample with all marriages and complement the argumentation about education with the smaller sample of spouses with children.

It turns out that changes in assortative mating are not related to the rising divorce rate. Neither immigration nor secularization are related to the upward trend in divorce. This outcome is the net result of two countervailing effects: mixed couples have (compared with a homogeneous native couple) a higher risk of divorce, which is offset by a lower divorce hazard of (homogeneous) non-native couples. In the case of age at marriage, we even observe that, if spouses had continued to marry at a young age, divorce rates would have increased more sharply. These results are also robust in the smaller sample of spouses with children. Moreover, changes in assortative mating in terms of education do not contribute to the trend in divorce over time as well. Most of these effects change in size over time. For instance, the destabilizing effect of mixed ethnic couples has tremendously increased, and the stabilizing effect of a higher age has somewhat decreased over time. We offer some plausible explanations for these trends. Finally, we provide some evidence based on survey data that the rising trend in divorce may be the results of changing social norms.

## 2. Data and estimation strategy

Over the last few decades the incidence of divorce has increased sharply throughout the western world. Yet considerable variation in the base level and the pace in the increase in divorce rates can be observed across countries; Fig. 1. Southern European countries such as Italy or Spain, which traditionally have had very low levels of divorce rates, experienced the strongest increase. In fact, in both countries divorce has been legalized quite recently (Italy, 1971; Spain, 1982). Austria, similarly to other central European countries (e.g. Germany), shows a middle ranking among member countries of the Organisation for Economic Co-operation and Development and exhibits a divorce rate which is on average four times higher compared with the south of Europe. Scandinavian countries (e.g. Sweden) and Great Britain used to have slightly higher rates, but they have been converging to central European levels recently. The USA has by far the



**Fig. 1.** Divorce rates for selected countries, 1970–2005 (number of divorces per 1000 of the population 15 years of age or older; the figures for the European countries are the authors' own calculations based on data from Eurostat; the figures for the USA are the authors' own calculation based on data from several editions of the *National Vital Statistics Reports* published by the National Center for Health Statistics and the 'Reading survey of epidemiology and end results' US county population data provided by the National Bureau of Economic Research): —●—, Austria; —△—, Germany; —○—, Italy; —\*—, Spain; —x—, Sweden; —□—, Great Britain; —△—, USA

highest divorce rates in the world and shows exceptional patterns over time. US divorce rates rose sharply starting in the mid-1960s, peaked in the early 1980s and have been declining since then.

In this paper we focus on Austria, where the quality of the available administrative data is exceptional. Surprisingly, these data have not been used so far. The only exceptions we are aware of are Diekmann and Mitter (1984) and Prioux (1992, 1993). Divorce was introduced in Austria in 1938. This legislation was based on the principle of fault but also provided divorce on the ground of irretrievable breakdown. We combine data from the *Austrian Marriage Register*, covering all marriages from 1971 to 2007, with the *Austrian Divorce Register*, covering all divorces for the same time period. Our sample is based on all 1 643 103 marriages which took place between 1971 and 2007. During our sample period two major reforms of the divorce law took place. A reform in 1978 widened divorce on the ground of irretrievable breakdown and introduced divorce by mutual consent. In 1999 the principle of fault was further attenuated. In principle, each reform may have altered the stability of existing marriages and may also have changed the selection into marriage, an issue which we discuss in more detail below.

To obtain information on mortality and out-migration we match information from the *Austrian Death Register* and the *Austrian social security database* (Zweimüller *et al.*, 2009). We presume that if a person is still alive, but has no records in the database, then she or he left Austria. This results in 126 529 right-censored observations due to death, and 13 384 due to out-migration.

The marriage register includes information on the date of marriage, the spouses' former family status, place of residence, age at marriage, religious denomination and ethnicity. Since 1984

information on the spouses' country of birth and the number, age and sex of any premarital children is also recorded. We enhance our data set with information on community size, which is based on the decennial *Austrian census* until 2002, where we impute for missing years by linear interpolation. From 2002 onwards yearly data are derived from the newly launched electronic *Austrian Population Register*.

After cleaning our data set we are left with 1 598 682 marriages for our main estimates. From these marriages, 373 960 were divorced by the end of 2007. For couples with children we obtain information on the spouses' educational attainment through the *Austrian Birth Register*. For this important subsample we can examine the effect of education. Even more importantly, we shall show that the exclusion of information on education has no effect on the other results.

To examine the effect of assortative mating on the probability of divorce over time we present non-parametric Kaplan–Meier estimates to obtain a first picture of changes in marital stability. The Kaplan–Meier estimator is a non-parametric estimate of the probability of staying married until at least time  $t$ . For observed divorce periods  $t_1, \dots, t_k$  this survivor function is given by

$$\hat{S}(t) = \prod_{j|t_j \leq t} \frac{m_j - d_j}{m_j} \tag{1}$$

with  $m_j$  as the number of married couples at the beginning of period  $t_j$  and  $d_j$  as the number of divorces in period  $t_j$  (Cleves *et al.*, 2008).

Subsequently, to analyse the contributions of assortative mating on the duration of marriage we use Cox proportional hazard models (Cox, 1972). In such a model, the hazard rate at time  $t$ —i.e. the risk that a marriage dissolves at time  $t$ , provided that it lasted that long—is explained by a non-parametric baseline hazard  $h_0(t)$  which is augmented because of the influence of covariates  $\mathbf{X} = (X_1, X_2, \dots, X_n)$ :

$$h(t|\mathbf{X}) = h_0(t) \exp\left(\sum_{i=1}^n X_i \beta_i\right). \tag{2}$$

A Cox model is flexible, because the baseline hazard remains unspecified. The coefficients are estimated by maximizing the partial likelihood function

$$L = \prod_{k=1}^K \frac{\exp\left(\sum_{i=1}^n \beta_i X_{ik}\right)}{\sum_{j:t_j \geq t_k} \exp\left(\sum_{i=1}^n \beta_i X_{ji}\right)}. \tag{3}$$

Our results are presented as hazard ratios, i.e. the hazard rate of spouses with characteristics  $\mathbf{X}^*$  relative to the hazard rate of the base group with characteristics  $\mathbf{X}$ ,  $h(t|\mathbf{X}^*)/h(t|\mathbf{X})$ . We performed graphic and formal tests for the proportional hazard assumption with some mixed results, in particular with respect to the year when the union was formed. Owing to the numeric difficulty of alternative specifications (Royston and Lambert, 2011)—specifically with such a large data set as ours—and the ease of interpretation (given many covariates) we stick to the proportional hazard model. However, we shall considerably relax these problems in Section 3.4, where we present results for specific decades separately.

We use all important dimensions of assortative mating. In particular, we look at age, ethnicity, religious denomination and educational attainment (Table 1). We consider the effect of the spouses' age, as well as the importance of the spouses' age difference. To study ethnicity we first run a simple specification (covering the years 1971–2007) where we utilize the information on

**Table 1.** Assortative mating over time: descriptives

|                                       | <i>Results for the following years:</i> |       |       |       |       |
|---------------------------------------|---|-------|-------|-------|-------|
|                                       | 1971                                    | 1981  | 1991  | 2001  | 2007  |
| <i>Age and age difference (years)</i> |   |       |       |       |       |
| Average age of bride                  | 21.6                                    | 22.1  | 24.6  | 27.3  | 28.8  |
| Average age of groom                  | 24.4                                    | 24.7  | 26.8  | 30.0  | 31.6  |
| Average age difference                | 2.71                                    | 2.67  | 2.25  | 2.68  | 2.80  |
| <i>Citizenship (%)</i>                |   |       |       |       |       |
| Both are Austrian                     | 94.06                                   | 91.83 | 84.48 | 74.89 | 76.92 |
| One spouse is foreigner               | 5.24                                    | 6.57  | 11.89 | 20.88 | 18.19 |
| Both have same foreign citizenship    | 0.54                                    | 1.89  | 3.17  | 2.82  | 2.87  |
| Mixed foreign citizenship             | 0.15                                    | 0.15  | 0.46  | 1.41  | 2.01  |
| <i>Religious denomination (%)</i>     |   |       |       |       |       |
| Both Catholic                         | 82.37                                   | 79.94 | 69.28 | 55.95 | 52.43 |
| Catholic, undenominational            | 3.92                                    | 5.52  | 8.90  | 13.64 | 15.34 |
| Both undenominational                 | 0.85                                    | 1.58  | 4.53  | 9.00  | 11.32 |
| Catholic, other denomination          | 9.83                                    | 9.57  | 11.40 | 10.75 | 8.90  |
| Other denomination, undenominational  | 0.70                                    | 1.00  | 1.98  | 3.57  | 3.56  |
| Both have same other denomination     | 2.22                                    | 2.21  | 4.53  | 6.43  | 7.77  |
| Mixed other denomination              | 0.11                                    | 0.18  | 0.51  | 0.66  | 0.68  |
| <i>Education† (%)</i>                 |   |       |       |       |       |
| Both have same education level        |   |       | 66.21 | 66.30 | 65.17 |
| Husband has higher education          |   |       | 21.93 | 17.63 | 16.58 |
| Wife has higher education             |   |       | 11.86 | 16.07 | 18.25 |

†Information on education is available for only the subsample of spouses with children from 1984–2007. See also Figs A.2, A.3 and A.4 in the on-line appendix.

citizenship only. In a further step we additionally exploit information on the country of birth (available since 1984), which finally gives us nine different combinations relative to our base group. Given the Austrian institutional setting this allows us to draw conclusions about the effects of intermarriage between natives, first- and further generation immigrants, as well as the effect of naturalization of foreign-born people. With respect to religious denomination we distinguish between the two quantitatively most important religious affiliations in Austria (see the Austrian census from 2001): Catholic (73.6%) and no religious denomination (12.0%). All other religions—mainly Protestants (4.7%) and Muslims (4.2%)—are lumped together. Since these other denominations are quite diverse groups, we distinguish between couples with the same and with different denominations from the residual group. This gives rise to seven possible combinations, where the marriage between two Catholics will serve as the base group. Educational attainment is captured by four categories: compulsory schooling, apprentice training, secondary school and university degree. On the basis of that scaling we code whether one of the spouses has higher education than the other.

As additional control variables we include only exogenous factors (i.e. predetermined at the time of marriage): the number of premarital female and male children and the size of the spouses' communities (at the time of marriage), as well as month and 115 district fixed effects. It can be argued that all other factors which might also have an important effect on the risk of divorce are endogenous with respect to the viability of the marriage, e.g. the number of post-marital children, labour supply of either partner or marital satisfaction. If the quality of the marriage

is bad and the risk of divorce is relatively high, it can be expected that both partners might invest less in marriage-specific capital, like joint children or joint enterprises of any kind, and that specialization in the household might be different with corresponding changes in labour supply. For these reasons we refrain from using such potentially endogenous regressors.

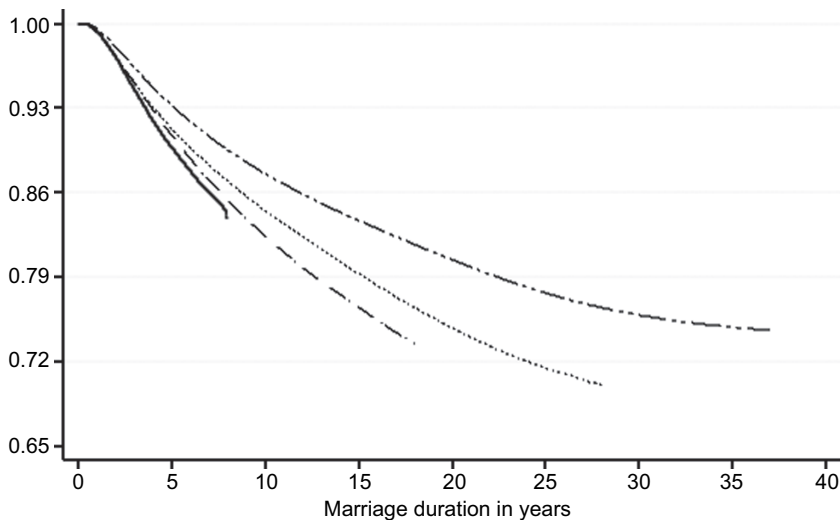
Administrative data allow us actually to measure the three dimensions of assortative mating at the time of marriage. It is well known that spouses become more alike during marriage—i.e. partners may change religious denomination (Glenn, 1982) or acquire new citizenship. Using changing or current information about these characteristics might therefore overestimate the degree of endogamy.

### 3. Results

Our analysis is based on two sample periods (1971–2007 and 1984–2007), since starting from 1984 additional information on the spouses is available. Further we distinguish between first and further marriages, but we concentrate on the former. First marriages are couples where both spouses are in their first marriage. All other marriages are denoted as further unions. Approximately 72% of all marriages are first marriages. In a further step we estimate separate models for each decade. This allows us to test whether the effect of the different dimensions of assortative mating has changed over time.

#### 3.1. Assortative mating and the increasing marital instability

The Kaplan–Meier estimates for first marriages (Fig. 2) show survival probabilities for marriages formed in the decades from the 1970s to the 2000s. We see monotonically declining survival probabilities over time. For instance, 84% of marriages that were formed in the 1970s are still intact after 15 years; this value is only 77% for marriages that were formed in the 1990s. For further marriages—which as expected have a lower survival probability in the first place—a similar (however, less pronounced) pattern can be observed (see Fig. A.1 in the on-line supporting information appendix).



**Fig. 2.** Kaplan–Meier estimators for the duration of first marriage by decade: ----, 1970s; ·····, 1980s; — · —, 1990s; —, 2000s.

**Table 2.** Determinants of risk of divorce: 1971–2007†

|  | <i>Results for first marriages</i> |             |             | <i>Results for further marriages</i> |                  |              |              |              |
|--|------------------------------------|-------------|-------------|--------------------------------------|------------------|--------------|--------------|--------------|
|  | <i>Share (%)</i>                   | <i>(Ia)</i> | <i>(Ib)</i> | <i>(Ic)</i>                          | <i>Share (%)</i> | <i>(IIa)</i> | <i>(IIb)</i> | <i>(IIc)</i> |
| <i>Decade fixed effects</i>                  |                                    |             |             |                                      |                  |              |              |              |
| 1970s (base group)                           | 27.35                              | 1           | 1           | 1                                    | 21.43            | 1            | 1            | 1            |
| 1980s  | 31.65                              | 1.332‡      | 1.466‡      | 1.479‡                               | 26.19            | 1.288‡       | 1.339‡       | 1.312‡       |
| 1990s  | 25.28                              | 1.493‡      | 1.954‡      | 2.016‡                               | 28.67            | 1.541‡       | 1.776‡       | 1.663‡       |
| 2000s  | 15.72                              | 1.497‡      | 2.136‡      | 2.136‡                               | 23.71            | 1.710‡       | 2.220‡       | 1.947‡       |
| <i>Age of wife</i>                           |                                    |             |             |                                      |                  |              |              |              |
| 15–20 years (base group)                     | 16.90                              |             | 1           | 1                                    | 1.95             |              | 1            | 1            |
| 21–25 years                                  | 45.67                              |             | 0.615‡      | 0.601‡                               | 12.94            |              | 0.706‡       | 0.712‡       |
| 26–30 years                                  | 25.29                              |             | 0.392‡      | 0.371‡                               | 20.63            |              | 0.496‡       | 0.502‡       |
| 31–35 years                                  | 8.60                               |             | 0.281‡      | 0.257‡                               | 19.95            |              | 0.366‡       | 0.374‡       |
| 36–40 years                                  | 2.41                               |             | 0.212‡      | 0.191‡                               | 15.27            |              | 0.289‡       | 0.293‡       |
| ≥ 40 years                                   | 1.13                               |             | 0.168‡      | 0.148‡                               | 29.26            |              | 0.177‡       | 0.181‡       |
| <i>Age difference</i>                        |                                    |             |             |                                      |                  |              |              |              |
| Same age or husband is older:<br>0–3 years   | 38.33                              |             | 1           | 1                                    | 16.17            |              | 1            | 1            |
| Husband is older: 3–6 years                  | 26.53                              |             | 0.932‡      | 0.933‡                               | 15.57            |              | 0.882‡       | 0.884‡       |
| Husband is older: 6 or more years            | 15.70                              |             | 0.952‡      | 0.931‡                               | 38.92            |              | 0.753‡       | 0.745‡       |
| Wife is older: 0–3 years                     | 14.66                              |             | 1.252‡      | 1.248‡                               | 12.09            |              | 1.131‡       | 1.114‡       |
| Wife is older: 3 or more years               | 4.78                               |             | 2.019‡      | 1.937‡                               | 17.25            |              | 1.720‡       | 1.591‡       |
| <i>Citizenship</i>                           |                                    |             |             |                                      |                  |              |              |              |
| Both are Austrian (base group)               | 89.85                              |             |             | 1                                    | 80.72            |              |              | 1            |
| Husband is Austrian and wife is<br>foreigner | 4.00                               |             |             | 1.261‡                               | 9.28             |              |              | 1.296‡       |
| Husband is foreigner and wife is<br>Austrian | 3.31                               |             |             | 1.469‡                               | 7.52             |              |              | 1.817‡       |
| Both have same foreign citizenship           | 2.35                               |             |             | 0.376‡                               | 1.79             |              |              | 0.452‡       |
| Mixed foreign citizenship                    | 0.49                               |             |             | 0.586‡                               | 0.69             |              |              | 0.665‡       |
| <i>Religious denomination</i>                |                                    |             |             |                                      |                  |              |              |              |
| Both Catholic (base group)                   | 78.62                              |             |             | 1                                    | 53.08            |              |              | 1            |
| Catholic, undenominational                   | 5.43                               |             |             | 1.393‡                               | 16.48            |              |              | 1.086‡       |
| Both undenominational                        | 2.51                               |             |             | 1.221‡                               | 9.02             |              |              | 0.985        |
| Catholic, other denomination                 | 8.54                               |             |             | 1.264‡                               | 13.13            |              |              | 1.153‡       |
| Other denomination, un-<br>denominational    | 1.03                               |             |             | 1.430‡                               | 3.65             |              |              | 1.233‡       |
| Both have same other denomination            | 3.64                               |             |             | 0.804‡                               | 3.97             |              |              | 0.995        |
| Mixed other denomination                     | 0.23                               |             |             | 1.405‡                               | 0.67             |              |              | 1.403‡       |
| <i>Community size§</i>                       |                                    |             |             |                                      |                  |              |              |              |
| Inhabitants of husband's community           |                                    |             |             | 1.146‡                               |                  |              |              | 1.030‡       |
| Inhabitants of wife's community              |                                    |             |             | 1.020‡                               |                  |              |              | 1.012‡       |
| <i>Month fixed effects</i>                   |                                    |             |             |                                      |                  |              |              |              |
| District fixed effects                       |                                    | No          | No          | Yes                                  |                  | No           | No           | Yes          |
|  |                                    | Yes         | Yes         | Yes                                  |                  | Yes          | Yes          | Yes          |
| Observations                                 |                                    | 1160212     | 1160212     | 1160212                              |                  | 438470       | 438470       | 438470       |

†Estimated by using a Cox (proportional hazard) model. Columns (Ia)–(Ic) are based on first marriages and columns (IIa)–(IIc) on further marriages.

‡Hazard ratio statistically significant at the 1% level.

§Inhabitants are measured in 10000s.



To estimate how the likelihood of divorce would have evolved over time if assortative mating patterns had not changed, we start with a parsimonious model and enrich it stepwise. Columns (Ia) and (IIa) in Table 2 replicate the descriptive life tables by only including dummy variables for the different decades in a Cox model along with district dummy variables. In the case of first marriages we see that marriages that were formed in the 1980s have a 33.2% higher risk of divorce—compared with marriages in the 1970s, our base group. The equivalent values for marriages that were formed in the 1990s and in the 2000s are equal to 49.3% and 49.7% respectively. Thus, we see an increase in the risk of divorce in the 1980s and in the 1990s, but not in the 2000s. For further marriages (see column (IIa)), the risk of divorce has increased to a similar extent in the 1980s and in the 1990s; however, it continued to increase also in the 2000s (71.0%).

It is interesting to see whether developments in assortative mating are related to the trend towards higher divorce rates over time in Austria. It turns out that, if the model is extended by either controlling for spouses' age, ethnicity or religion, only the inclusion of age can affect the estimated decade effects significantly. Controlling for changing patterns of assortative mating along the dimensions of ethnicity or religion has basically no effect on the estimated decade effects. Just in the case of further marriages would the divorce rate be somewhat lower in the absence of changing assortative mating along the dimensions of ethnicity; details are provided below. All results from estimations where we introduce our different measures of assortative mating step by step are available on request. Given these results, we present detailed estimation output for specifications where we first add binary indicators for groups of wife's age and spouses' age difference in columns (Ib) and (IIb), and we include then all other variables together in columns (Ic) and (IIc).

During the last few decades, Austria witnessed a sharp increase in the age at first marriage (see Table 1). Whereas in 1971 the average age at first marriage was 21.6 years for women and 24.4 years for men, it increased to 24.6 years for women and 26.8 years for men until 1991. By 2007, the average age at marriage reached 28.8 years for women and 31.6 years for men. In the period from 1971 to 2007 husbands were on average 2.6 years older than their wives. The variation in the difference in age was less pronounced over time. However, we can observe a modest decrease starting in the 1970s until the 1990s, and an equivalent increase thereafter.

Partialing out the effects of age and age difference at the time of marriage in the estimates summarized in columns (Ib) and (IIb) increases the measured risk of divorce. Controlling for these age effects the decade effects would have increased to 46.6% (the 1980s), 95.4% (the 1990s) and 113.6% (the 2000s) for first marriages. Therefore, compared with the effects estimated above, estimated divorce hazards in the 1990s have doubled and those in the 2000s even more so. This pattern is similar for further marriages: taking age and age differences into account increases the rising trend in dissolution of marriage. A simulation in Fig. 3 illustrates how divorce rates would have evolved if the age of the wife at her first marriage had been constant at its level in 1971. Note that this simple simulation assumes that keeping wives' age groups constant has no effect on other marriage behaviour; this might not necessarily be true, since this affects the pool of never-married partners on the marriage market.

Accordingly, we find that, compared with a marriage with wife's age below 20 years at the time of her first marriage and her further marriage, marrying between 20 and 25 years of age reduces the risk of divorce by respectively 38.5% and 29.4%. For the age group above 40 years the risk of divorce is reduced by respectively 83.2% and 82.3%. The increment in the reduction of the risk of divorce declines with the age of the wife. Lehrer (2008) explains the negative relationship between age and the risk of divorce by the so-called maturity effect, describing that individuals marrying relatively young are less informed about themselves, their spouses and the marriage market. Further, it is beneficial for the stability of the marriage if the husband is

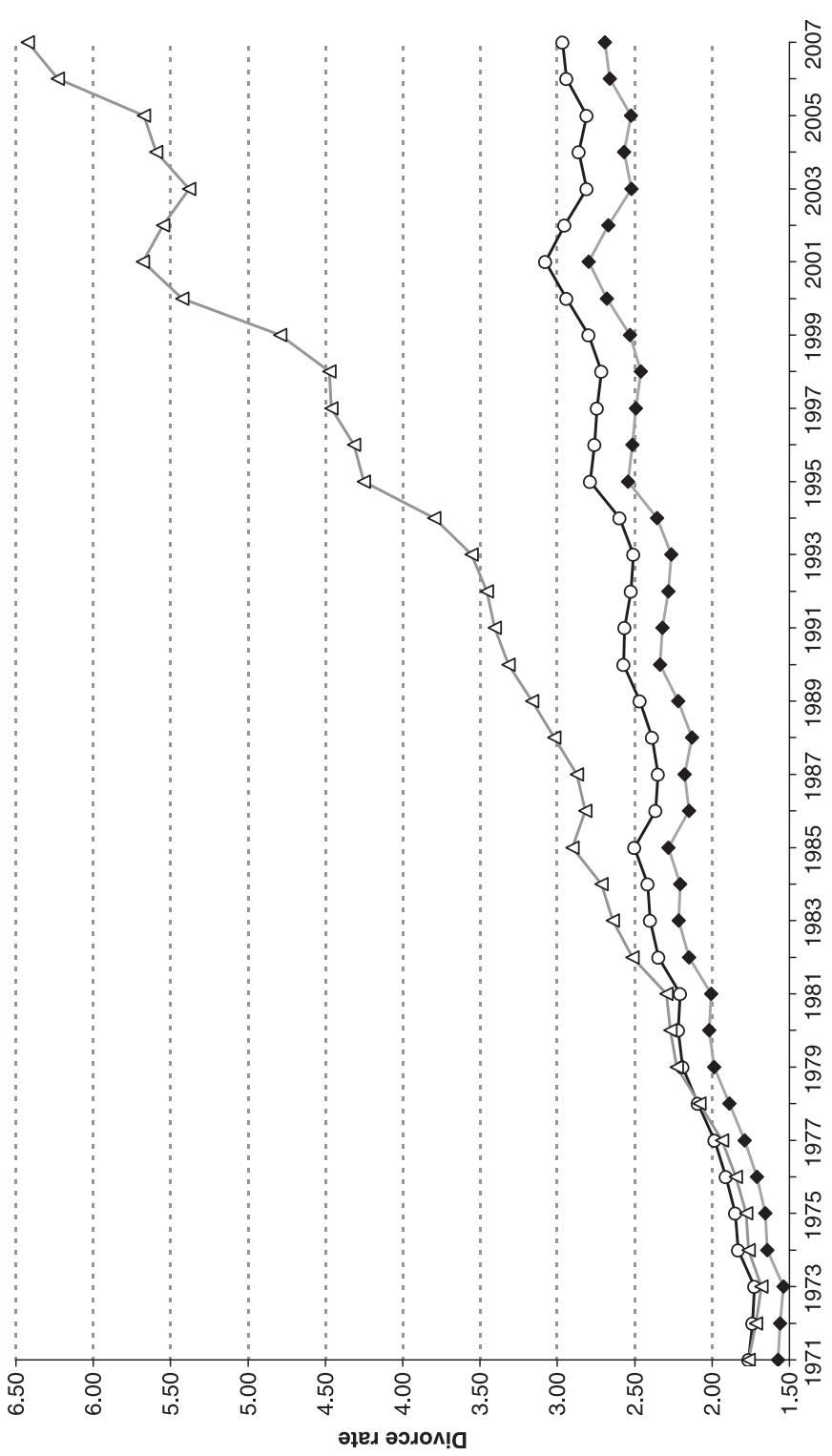


Fig. 3. Actual and simulated divorce rates (number of divorces per 1000 of the population 15 years of age or older): —○—, actual rate; △, hypothetical rate (constant age); ◆, hypothetical rate (equal hazard between first and further marriages)

older. Compared with the base group (same age, or the husband is 0–3 years older), a husband between 3 and 6 years older leads to a small reduction in the risk of divorce of 6.8%. Compared with the same base group, a marriage with a wife being up to 3 years older has a 25.2% higher risk of divorce. If this age difference is larger than 3 years, the risk of divorce more than doubles.

In a further step we study the effect of ethnicity. Austria's economic boom after World War II led to several waves of labour immigration. Whereas in 1961 only 1.4% of the resident population were foreign citizens, this share doubled by 1971, steadily increased over time and amounted to 8.9% in 2001. The two main recruitment regions were former Yugoslavia and Turkey. Though active labour recruitment was stopped by the late 1980s it had clearly lasting effects on subsequent migration inflows (e.g. due to the political crisis in the disintegrating Yugoslavia in the early 1990s) and on the current composition of the foreign resident population in Austria. In 2001, 63.2% of the total foreign resident population came from former Yugoslavia (45.3%) and Turkey (17.9%). Other important immigrant groups were Germans (10.2%) and Asians (4.9%). These immigration flows had a clear effect on the Austrian marriage market. Whereas in 1971 about 94% of all marrying couples marrying in that year consisted of two Austrian spouses, this number decreased over time (see Table 1) and was equal to 76.9% in 2007. Couples with one foreign and one native spouse accounted for 18.2%, and the remaining 4.9% were marriages between two foreigners. To study the effect of interethnic marriages we start with a simple specification where we distinguish between couples, where the wife is a foreign citizen the husband is a foreigner, where both spouses have the same foreign citizenship or where both have a different foreign citizenship, and we compare them with the hazard of two Austrian spouses.

As said before, including the rising participation of foreigners on the Austrian marriage market in the regressions has only negligible effects on the decade effects of first marriages and is therefore not related to the increasing incidence of divorce over time. In the case of further marriages we find some effects. Controlling for immigration in the regressions decreases the measured decade effects in columns (IIa) to 25.1% (the 1980s), 42.2% (the 1990s) and 48.4% (the 2000s); detailed results are available on request.

In substance, our results corroborate what theory predicts (Becker, 1973, 1974; Becker *et al.*, 1977) and confirm earlier studies (Kalmijn *et al.*, 2005): a discrepancy between the spouses' ethnic background increases the probability of divorce. Since spouse's ethnicities are complements in the household production—i.e. it is optimal to have the same ethnic background—comparably lower gains from mixed marriages increase the risk of divorce. For instance, in the case of first marriages, compared with an Austrian couple, a mixed couple has, depending on whether the wife or the husband is a foreign citizen, a 26.1% or 46.9% higher risk of divorce. In contrast, a couple where both spouses are foreigners has a 62.4% or 41.4% lower risk of dissolution compared with a native couple, depending on whether they share the same foreign citizenship or not. This is in line with what we would expect on the basis of a more traditional value orientation among Yugoslav and Turkish citizens. For further marriages, we observe quite similar qualitative and quantitative effects. It seems that these two countervailing effects—the larger risk of divorce of mixed couples and the lower risk of divorce of a foreign couple—are almost balanced, and in sum we observe no overall effect of immigration on marital stability in Austria over time.

Two developments have changed the distribution of religious denominations in Austria. Firstly, the outlined waves of labour immigration have increased the share of residents with religious affiliations other than Roman Catholic. The majority of immigrants from Turkey are Muslim. Immigrants from former Yugoslavia comprise Muslim, Orthodox Christians and Catholics. German immigrants are more likely to be Protestants. For instance, whereas in 1971

only 0.3% of the population of Austria were Muslim, this pattern has increased over time and amounted to 4.2% in 2001. Secondly, owing to a high degree of secularization the share of Roman Catholics (1971, 87.4%; 2001, 73.6%) decreased in favour of residents without any religious affiliation (1971, 4.3%; 2001, 12.9%). Accordingly, we observe a changing composition of couples marrying in a given year over time (see Table 1), with a decrease in marriages between Catholic spouses and an increase for all other combinations. The increase in the incidence of these mixed marriages may also reflect a downward trend in religiosity, which we can measure with our administrative data only to the extent that is captured by the rising share of spouses without denomination. Notably, in our data we find that for all combinations of husband's and wife's ethnicities all combinations of religious denominations are present, which ensures a proper identification of ethnicity and religion.

Changes in religious composition as well as the increasing prevalence of mixed religion couples cannot explain the rising trend in divorce rates. Again, countervailing effects are almost balanced and in sum we observe no overall effect of changes in religious composition on marital stability over time. People who marry outside their religion are much more likely to dissolve the marriage. Again, this is in line with theory and previous studies (Lehrer and Chiswick, 1993). Compared with the base group (a Catholic couple), a marriage between a Catholic spouse and a spouse with a different (or without any) denomination has a 26.4% (or 39.3%) higher risk of divorce. Similarly, we observe a higher likelihood of divorce (40.5%) for mixed marriages within the group of other denominations. Marriages between spouses without any religion are also less stable (22.1%). Marriages between spouses who both belong to the same other denomination (predominantly Muslims and Orthodox Christians) are the most stable (−19.6%). This might be due to a stability increasing influence of religion on family life. In the case of further marriages we find the same qualitative but quantitatively less pronounced effects.

Our additional control variables show consistent results across different specifications. The larger the spouses' communities of residence (at the time of marriage) the higher the risk of divorce is. This may show different family values, a higher social stigma of divorce in rural areas compared with in large cities or simply an effect of a larger supply of potential partners in a big city.

Summarizing, we see a clear downward trend in marital stability in Austria across the last four decades; in the absence of changes in assortative mating, divorce rates would have been even higher. On top of that, decreasing marriage rates over this period might have led to a positive selection of couples: those who refrain from marrying now may be the ones with lower quality of match. Our estimates of the declining trend in stability of marriage (i.e. our period effects) capture these effects. Taking this positive selection formally into account—which is beyond the current paper—would make this observed trend even stronger. Finally, our decade effects may comprise a changing selection into marriage due to two divorce law reforms attenuating the principle of fault (in 1978 and 1999). Whether the decade effects would be more or less pronounced in the absence of these two reforms is unclear, since such divorce law reforms may increase or decrease the average quality of match of marrying couples (Rasul, 2006). Moreover, it is not clear whether such reforms should be considered as exogenous interventions, or rather as endogenous outcomes determined by societal forces reflecting the state of the marriage market.

### *3.2. Ethnicity and country of birth*

For marriages after 1983 the spouses' country of birth is available as well. In the previous estimates we could only observe their citizenships; because of the possibility of naturalization, this specification would mix up Austrian-born individuals with foreign-born immigrants who

already acquired Austrian citizenship. With this additional information we can now distinguish between four types of individual, which gives rise to 10 different pairings that allow us to look at ethnicity and origin of birth separately, and to distinguish between natives, first- and second- (or further) generation immigrants. In particular, we distinguish between a native Austrian (born in Austria, with Austrian citizenship), a second-generation immigrant without citizenship (born in Austria, without Austrian citizenship), a first-generation immigrant with citizenship (not born in Austria, with Austrian citizenship) and a first-generation immigrant without citizenship (not born in Austria, without Austrian citizenship). It must be said that we potentially misclassify second- or further generation immigrants who have already gained Austrian citizenship as a native Austrian. In this case, these misclassified people married a native spouse—with a corresponding higher probability of divorce—our estimates of a higher risk of divorce of mixed couples are potentially downward biased.

We rerun our analysis with this more elaborate specification of ethnic background and include also some additional control variables that are available for this sample period. As before, we use two native Austrians as our base group. Looking at Table 3, this specification confirms the basic results from above and provides further insights. Again, we find that including the rising share of spouses with migration background has little overall effect on long-run divorce trends and homogeneous couples have a lower risk of divorce compared with mixed couples. Relative to the base group, we see that couples with a joint migration background fare better in terms of stability of marriage, whereas those of a mixed background fare worse. Within immigrants, those ‘closer’ to the Austrian society—either those in the second generation or those having gained Austrian citizenship over time—are also closer to the Austrians in terms of marital stability: we see that the lowest risk of divorce is encountered by two first-generation immigrants without Austrian citizenship (–59%).

Among mixed couples, consisting of a native Austrian and an immigrant, the more dissimilar they are, the higher their relative risk of divorce is; a native Austrian and a first-generation immigrant without Austrian citizenship have the highest likelihood of divorce (50.5%). Table A.2 in the on-line appendix rearranges the results to highlight the added value of this specification. For further marriages, we observe similar qualitative and quantitative effects.

Further control variables in Table 3 concern the effect of premarital joint children, which are found to increase the risk of divorce of first marriages. The effect is more pronounced for girls *versus* boys (2.4% *versus* 0.1%).

Finally, it can be noted that our results are robust to controlling for whether the spouses were living together before marriage (information available since 1989; the results are not presented in the paper). This premarital cohabitation itself is correlated with a higher risk of divorce in the 1990s and with a lower risk in the 2000s, though the latter effect is small. Such varying effects over time are in line with other research (Reinhold, 2010). To what extent this result is driven by self-selection or is a true causal effect is difficult to assess (Svarer, 2004; Mazzucco, 2009).

### 3.3. Effect of education

The estimates that we have presented so far did not control for the spouses’ education. Fortunately, we can use the important subsample of spouses with children—which account for more than 65% of all couples—to check whether the exclusion of this information is innocuous. To control for education we include the wives’ educational attainment (with four binary variables: compulsory schooling; apprentice training; high school; university degree) and binary variables capturing whether the spouses have a similar level of educational attainment (base group), and whether the husband or the wife has a higher level. As Table 1 shows the share of spouses with

**Table 3.** Determinants of risk of divorce: 1984–2007†

|   | Results for baseline sample |        |        | Results for education sample |           |        |                  |        |                  |
|---|-----------------------------|--------|--------|------------------------------|-----------|--------|------------------|--------|------------------|
|   | Share (%)                   | (Ia)   | (Ib)   | (Ic)                         | Share (%) | (Ib')  | (Ib'+ education) | (Ic')  | (Ic'+ education) |
| <i>Decade effects</i>                   |                             |        |        |                              |           |        |                  |        |                  |
| 1980s (base group)                      | 31.15                       | 1      | 1      | 1                            | 36.17     | 1      | 1                | 1      | 1                |
| 1990s                                   | 42.46                       | 1.080† | 1.236† | 1.267†                       | 45.21     | 1.220† | 1.223†           | 1.279† | 1.298†           |
| 2000s                                   | 26.39                       | 1.111† | 1.426† | 1.381†                       | 18.62     | 1.236† | 1.248†           | 1.269† | 1.304†           |
| <i>Age of wife</i>                      |                             |        |        |                              |           |        |                  |        |                  |
| 15–20 years (base group)                | 8.69                        | 1      | 1      | 1                            | 9.81      | 1      | 1                | 1      | 1                |
| 21–25 years                             | 41.11                       |        | 0.628† | 0.600†                       | 46.03     | 0.555† | 0.600†           | 0.528† | 0.577†           |
| 26–30 years                             | 33.09                       |        | 0.394† | 0.365†                       | 32.83     | 0.336† | 0.393†           | 0.306† | 0.367†           |
| 31–35 years                             | 12.30                       |        | 0.285† | 0.244†                       | 9.53      | 0.241† | 0.296†           | 0.210† | 0.267†           |
| 36–40 years                             | 3.41                        |        | 0.216† | 0.189†                       | 1.65      | 0.184† | 0.227†           | 0.158† | 0.203†           |
| ≥ 40 years                              | 1.40                        |        | 0.194† | 0.163†                       | 0.15      | 0.142† | 0.174†           | 0.121† | 0.152†           |
| <i>Age difference</i>                   |                             |        |        |                              |           |        |                  |        |                  |
| Same age or husband is older: 0–3 years | 37.92                       | 1      | 1      | 1                            | 39.47     | 1      | 1                | 1      | 1                |
| Husband is older: 3–6 years             | 25.08                       |        | 0.971† | 0.968†                       | 26.01     | 0.963† | 0.961†           | 0.967† | 0.966†           |
| Husband is older: 6 or more years       | 15.26                       |        | 1.051† | 1.004                        | 14.32     | 1.040† | 1.034†           | 1.023§ | 1.018            |
| Wife is older: 0–3 years                | 16.11                       |        | 1.258† | 1.247†                       | 15.84     | 1.336† | 1.305†           | 1.334† | 1.299†           |
| Wife is older: 3 or more years          | 5.63                        |        | 2.112† | 1.977†                       | 4.36      | 2.072† | 1.913†           | 2.038† | 1.848†           |
| <i>Education</i>                        |                             |        |        |                              |           |        |                  |        |                  |
| Same education level (base group)       | 66.67                       |        |        |                              | 66.67     |        | 1                |        | 1                |
| Husband has higher education            | 20.27                       |        |        |                              | 20.27     |        | 0.896†           |        | 0.830†           |
| Wife has higher education               | 13.06                       |        |        |                              | 13.06     |        | 1.245†           |        | 1.264†           |
| Compulsory school—wife (base group)     | 12.58                       |        |        |                              | 12.58     |        | 1                |        | 1                |
| Apprenticeship—wife                     | 59.54                       |        |        |                              | 59.54     |        | 0.748†           |        | 0.649†           |
| High school—wife                        | 15.31                       |        |        |                              | 15.31     |        | 0.593†           |        | 0.494†           |
| University—wife                         | 12.57                       |        |        |                              | 12.57     |        | 0.453†           |        | 0.369†           |

(continued)

Table 3 (continued)

|  | Results for baseline sample |      |      | Results for education sample |           |       |                   |        |                   |
|--|-----------------------------|------|------|------------------------------|-----------|-------|-------------------|--------|-------------------|
|  | Share (%)                   | (Ia) | (Ib) | (Ic)                         | Share (%) | (Ib') | (Ib' + education) | (Ic')  | (Ic' + education) |
| <i>Country of birth and citizenship</i>  |                             |      |      |                              |           |       |                   |        |                   |
| Two native Austrians (base group)  | 84.34                       |      |      | 1                            | 87.59     |       |                   | 1      | 1                 |
| Two second- (or further) generation immigrants, no citizenship   | 0.12                        |      |      | 0.553‡                       | 0.13      |       |                   | 0.480‡ | 0.425‡            |
| Two first-generation immigrants, citizenship   | 0.24                        |      |      | 0.877                        | 0.17      |       |                   | 0.941  | 0.948             |
| Two first-generation immigrants, no citizenship  | 3.33                        |      |      | 0.410‡                       | 3.18      |       |                   | 0.419‡ | 0.360‡            |
| Native Austrian and second- (or further) generation immigrant, no citizenship                            | 0.68                        |      |      | 1.241‡                       | 0.54      |       |                   | 1.222‡ | 1.167‡            |
| Native Austrian and first-generation immigrant, citizenship  | 2.37                        |      |      | 1.130‡                       | 2.18      |       |                   | 1.180‡ | 1.216‡            |
| Native Austrian and first-generation immigrant, no citizenship   | 6.85                        |      |      | 1.505‡                       | 4.61      |       |                   | 1.316‡ | 1.272‡            |
| Second- (or further) generation immigrant, no citizenship and first-generation immigrant, citizenship    | 0.10                        |      |      | 0.826§                       | 0.08      |       |                   | 0.946  | 0.861             |
| Second- (or further) generation immigrant, no citizenship and first-generation immigrant, no citizenship | 0.44                        |      |      | 0.508‡                       | 0.46      |       |                   | 0.467‡ | 0.411‡            |
| First-generation immigrant, citizenship and first-generation immigrant, no citizenship                   | 1.52                        |      |      | 1.134‡                       | 1.06      |       |                   | 0.801‡ | 0.735‡            |
| <i>Religious denomination</i>  |                             |      |      |                              |           |       |                   |        |                   |
| Both Catholic (base group)   | 74.08                       |      |      | 1                            | 78.72     |       |                   | 1      | 1                 |
| Catholic, undenominational   | 7.23                        |      |      | 1.400‡                       | 5.64      |       |                   | 1.412‡ | 1.397‡            |
| Both undenominational  | 3.76                        |      |      | 1.216‡                       | 2.46      |       |                   | 1.117‡ | 1.127‡            |
| Catholic, other denomination   | 8.52                        |      |      | 1.340‡                       | 7.60      |       |                   | 1.321‡ | 1.321‡            |
| Other denomination, undenominational   | 1.41                        |      |      | 1.479‡                       | 0.95      |       |                   | 1.359‡ | 1.350‡            |
| Both have same other denomination  | 4.69                        |      |      | 0.810‡                       | 4.44      |       |                   | 0.760‡ | 0.730‡            |
| Mixed other denomination   | 0.31                        |      |      | 1.592‡                       | 0.19      |       |                   | 1.408‡ | 1.378‡            |

(continued overleaf)

Table 3 (continued)

|                                    | Results for baseline sample |        |        | Results for education sample |           |        |                   |        |                   |
|------------------------------------|-----------------------------|--------|--------|------------------------------|-----------|--------|-------------------|--------|-------------------|
|                                    | Share (%)                   | (Ia)   | (Ib)   | (Ic)                         | Share (%) | (Ib')  | (Ib' + education) | (Ic')  | (Ic' + education) |
| <i>Community size</i>              |                             |        |        |                              |           |        |                   |        |                   |
| Inhabitants of husband's community |                             |        |        | 1.164‡                       |           |        |                   | 1.217‡ | 1.235‡            |
| Inhabitants of wife's community    |                             |        |        | 1.019‡                       |           |        |                   | 1.021‡ | 1.023‡            |
| <i>Premarital children</i>         |                             |        |        |                              |           |        |                   |        |                   |
| Number of joint male children      |                             |        |        | 1.001                        |           |        |                   | 0.986  | 0.915‡            |
| Number of joint female children    |                             |        |        | 1.024‡                       |           |        |                   | 0.998  | 0.926‡            |
| Month fixed effects                |                             | No     | No     | Yes                          | No        | No     |                   | Yes    | Yes               |
| District fixed effects             |                             | Yes    | Yes    | Yes                          | Yes       | Yes    |                   | Yes    | Yes               |
| Observations                       |                             | 690509 | 690509 | 690509                       | 451552    | 451552 | 451552            | 451552 | 451552            |

‡ Estimated by using a Cox (proportional hazard) models. Columns (Ia)–(Ic) are based on the full sample of first marriages and columns (Ib')–(Ic' + education) are based on the subsample of first marriages with marital children. Equivalent estimation output for the full sample of further marriages is provided in Table A.1 of the on-line appendix.

‡ Hazard ratio statistically significant at the 1% level.

§ Hazard ratio statistically significant at the 5% level.

§§ Inhabitants are measured in 10000s.



a similar level of educational attainment has been quite stable over time (about 65%). However, the share of couples where the husband has more education has decreased in favour of couples with relatively better educated wives.

In Table 3 in columns (Ib') and (Ic') we first show estimation results for spouses with children based on the previous specifications (without controlling for education). A comparison with the respective columns (Ib) and (Ic) from the same table shows that the decade effects are the same across parents and non-parents in the 1990s; however, the values are a little smaller for parents in the 2000s. This suggests that the increase in marital instability in the 2000s is to a larger extent driven by couples without children. The effect of assortative mating along most dimensions is also quite similar between these two groups. In a second step we add the information on the spouses' education; see columns (Ib' + education) and (Ic' + education). We can see that the inclusion of this information has practically no effect on the aforementioned results. The quantitative effect of the decade of marriage and the spouses' characteristics is almost unchanged. Therefore, we are confident that the exclusion of spouses' education in the basic results discussed above does not introduce an omitted variable bias.

Theoretically, there are two different effects of education on the risk of divorce. On the one hand, education typically reduces the degree of the division of labour between spouses and thus lowers the gains from marriage. On the other hand, highly educated spouses have greater gains of marriage—at any given division of labour—because of their high level of market and non-market skills (e.g. communication skills) (Becker *et al.*, 1977). Moreover, spouses with higher education may select their partners more carefully. For Austria we find that highly educated spouses are less likely to divorce. For instance, a couple where the wife has a university degree is (compared with a wife with compulsory schooling only) *ceteris paribus* less likely to divorce by 63.1%. This is in line with the prediction that higher education increases the gains from marriage at any level of specialization.

Our results for assortative mating confirm traditional views about division of labour. Couples where the husband has higher educational attainment are—compared with spouses with a similar level—less likely to divorce (−17%). The reverse can be observed for couples with relatively better educated wives (26.4%). That means that any combination of spouses' educational attainment that would imply a specialization that deviates from the traditional division of labour decreases marital stability.

### 3.4. Effect of assortative mating over time

Because of our long data set, covering four decades, we can look at patterns and consequences of assortative mating over time. It is *a priori* not clear whether the overall decrease in homogamy should increase or decrease the penalty for a mixed religious or ethnic marriage in terms of risk of divorce. On the one hand, one could think that increased immigration and sustained secularization have reduced the importance of ethnicity and religion in social life, and one would expect a convergence of homogeneous and heterogeneous couples in terms of marital stability. On the other hand, compositional effects might work in the other direction: mixed marriages now may be composed of people from cultures which are—on average—farther apart. Moreover, secularization which is prevalent among Christian denominations might be less prevalent among Muslims. In sum, it remains an empirical question whether and how the overall decrease in homogamy affects the relative divorce hazard of mixed couples.

In general, there has been little research on the stability of determinants of divorce over different marriage cohorts. Teachman (2002) analysed marriages that were formed between 1950 and

1984 on the basis of US retrospective survey data and found that with the exception of race (convergence of divorce hazards of whites and blacks) the effects of major sociodemographic predictors have not changed over time. De Graaf and Kalmijn (2006), also employing retrospective survey data (Dutch marriage cohorts from 1942 to 1999), corroborate the basic results of Teachman (2002). They found in general no changes in divorce risk factors over time; the only exception is educational attainment. The effect of education has changed from a positive to a negative effect. However, De Graaf and Kalmijn admitted that larger data sets may be necessary to identify trends in determinants of divorce over time.

Our estimates, separately done for each decade, are summarized for first marriages in Table 4 (and for further marriages in Table A.3 in the on-line appendix). The results reveal that the

**Table 4.** Determinants of risk of divorce for first marriages by decades: 1971–2007†

|   | (Ia),<br>1970 | (Ib),<br>1980 | (Ic),<br>1990 | (Id),<br>2000 |
|---|---------------|---------------|---------------|---------------|
| <i>Age of wife</i>                        |               |               |               |               |
| 15–20 years (base group)                  | 1             | 1             | 1             | 1             |
| 21–25 years                               | 0.581‡        | 0.611‡        | 0.602‡        | 0.635‡        |
| 26–30 years                               | 0.367‡        | 0.392‡        | 0.371‡        | 0.335‡        |
| 31–35 years                               | 0.259‡        | 0.276‡        | 0.271‡        | 0.219‡        |
| 36–40 years                               | 0.178‡        | 0.217‡        | 0.200‡        | 0.166‡        |
| ≥ 40 years                                | 0.107‡        | 0.126‡        | 0.179‡        | 0.158‡        |
| <i>Age difference</i>                     |               |               |               |               |
| Same age or husband is older: 0–3 years   | 1             | 1             | 1             | 1             |
| Husband is older: 3–6 years               | 0.888‡        | 0.956‡        | 0.953‡        | 0.987         |
| Husband is older: 6 or more years         | 0.834‡        | 0.944‡        | 1.023         | 1.074‡        |
| Wife is older: 0–3 years                  | 1.265‡        | 1.249‡        | 1.232‡        | 1.265‡        |
| Wife is older: 3 or more years            | 1.882‡        | 1.878‡        | 1.883‡        | 2.343‡        |
| <i>Citizenship</i>                        |               |               |               |               |
| Both are Austrian (base group)            | 1             | 1             | 1             | 1             |
| Husband is Austrian and wife is foreigner | 1.165‡        | 1.281‡        | 1.269‡        | 1.486‡        |
| Husband is foreigner and wife is Austrian | 1.114‡        | 1.415‡        | 1.548‡        | 2.002‡        |
| Both have same foreign citizenship        | 0.303‡        | 0.342‡        | 0.426‡        | 0.488‡        |
| Mixed foreign citizenship                 | 0.620‡        | 0.547‡        | 0.541‡        | 0.852§        |
| <i>Religious denomination</i>             |               |               |               |               |
| Both Catholic (base group)                | 1             | 1             | 1             | 1             |
| Catholic, undenominational                | 1.348‡        | 1.376‡        | 1.460‡        | 1.422‡        |
| Both undenominational                     | 1.379‡        | 1.174‡        | 1.260‡        | 1.266‡        |
| Catholic, other denomination              | 1.194‡        | 1.213‡        | 1.347‡        | 1.572‡        |
| Other denomination, undenominational      | 1.290‡        | 1.359‡        | 1.463‡        | 1.679‡        |
| Both have same other denomination         | 0.879‡        | 0.881‡        | 0.744‡        | 0.732‡        |
| Mixed other denomination                  | 1.029         | 1.378‡        | 1.483‡        | 1.706‡        |
| <i>Community size§§</i>                   |               |               |               |               |
| Inhabitants of husband's community        | 1.211‡        | 1.285‡        | 1.202‡        | 1.131‡        |
| Inhabitants of wife's community           | 1.021‡        | 1.022‡        | 1.016‡        | 1.015‡        |
| Month fixed effects                       | Yes           | Yes           | Yes           | Yes           |
| District fixed effects                    | Yes           | Yes           | Yes           | Yes           |
| Observations                              | 317681        | 366789        | 293283        | 182459        |

†Estimated by using a Cox (proportional hazard) model.

‡Hazard ratio statistically significant at the 1% level.

§Hazard ratio statistically significant at the 5% level.

§§Inhabitants are measured in 10000s.

stabilizing effect of a higher age at the time of marriage has somewhat decreased over time. Whereas in the 1970s a wife of age 20–25 years has 41.9% lower risk of divorce compared with the age group of below 20 years, the effect slightly decreased to 39.8% in the 1990s and 36.5% in the 2000s. Marriages with wives who were older than 40 years at their first marriage were 5 percentage points less stable in the 2000s than in the 1970s. Overall the pattern of effects across age groups does not change over time. If a positive selection into marriage is, in particular, preventing very young couples from marrying, our trend may also be explained by this selection effect.

The effect of age difference between husband and wife for first marriages changes for some age difference groups. Compared with the base group, a 3–6-years-older husband reduces the risk of divorce by 11.2% in the 1970s but there is no significant difference in the 2000s. Whereas a husband who is more than 6 years older in the 1970s is associated with a 16.6% lower risk of divorce, the effect turns into a 7.4% higher risk of divorce in the 2000s. The higher risk of divorce for couples with a wife who is at least 3 years older increased from 88.2% in the 1970s to 134.3% in the 2000s. Similar but less pronounced trends can be observed for further marriages. Stevenson and Wolfers (2007) have argued that production complementarities are increasingly less relevant for marriage in the western world, and consumption complementarities and the insurance motive gain importance. Given that, our findings could indicate that a higher age (difference) at marriage is important to realize production complementarities (such as specialization), but it is detrimental with respect to consumption complementarities (i.e. enjoying certain hobbies together or shared social ties) and risk sharing.

In terms of nationality, we find that the destabilizing effect of marriages between natives and immigrants has tremendously increased over time; this applies both to first as well as to further marriages and is particularly severe if a non-Austrian husband is involved. If the wife is a foreign citizen, the couple faces a 16.5% higher risk of divorce—compared with an Austrian couple—in the 1970s, this difference increases up to 48.6% for marriages formed in the 2000s. If the husband is a foreign citizen, the couple's risk of divorce is 11.4% higher than for a native couple in the 1970s; the difference increases to about 100% in the 2000s. These patterns are even stronger in the case of further marriages. Several reasons could explain this development. For instance, it might be that mixed ethnic marriages in the 1970s were formed with different partners from those in the 2000s. Looking at the evolution of mixed marriages over time, we see that in the 1970s almost 40% of all mixed marriages of Austrians were with ethnically similar Germans and Swiss, who speak the same language. Indeed, this share went down to about 11% after 2000. During this time, the share of Austrian mixed marriages with immigrants from former Yugoslavia and Turkey increased considerably. This development offers a very plausible explanation for our empirical findings. In the case of marriages between foreigners, we see for couples with the same and with different non-Austrian citizenship that their initially relatively low risk of divorce is rising over time. However, for each group we still observe in the 2000s a (compared with an Austrian couple) significantly lower risk of divorce (–51.2% and –14.8%).

For mixed marriages in terms of religion, the patterns are similar; however, in most of the cases they are less pronounced. For both first and further marriages, we observe an increase in the relative risk of divorce of all four types of mixed couples (with the strongest increase for spouses with mixed other denominations). It seems that—though religious endogamy is declining—the integration of different religious denominations is still challenging. The relative risk of divorce of spouses without religious denomination is slightly decreasing for first marriages and quite stable for further marriages. The former effect may reflect the attenuation of the negative selection of this group due to an increasing secularization. For

first marriages between spouses from the same other denomination, we find increasing marital stability.

Estimation results based on the sample period from 1984 to 2007 including information on the spouses' country of birth and joint premarital children show that couples with mixed immigration background experienced the strongest increase in hazards of divorce since the 1980s: the relative risk of divorce of a native Austrian and a first-generation immigrant without Austrian citizenship increased by 38.8 percentage points. However, at the same time some convergence of couples with a joint migration background (e.g. two first-generation immigrants without Austrian citizenship, or a second- and a first-generation immigrant, both without Austrian citizenship) to Austrian couples in terms of higher levels of marital instability can be observed. Detailed estimation output is available in Table A.4 of the on-line appendix.

Concerning previous joint children these results show a remarkable change over time: whereas, in the first periods, the existence of premarital children was detrimental for marital stability, this pattern has reversed later on. This result can be explained by a changing process of self-selection. Traditionally, cohabitation and in particular out-of-wedlock births have been deemed morally wrong and were very uncommon in Austria. Unmarried expectant parents, were usually—irrespective of the length of their relationship or their quality of match—expected to marry before childbirth. That means that spouses with premarital children used to be a very selective group, supposedly with non-traditional family values and inherently low marital stability. Over time, however, the incidence of cohabitation with or without subsequent marriage has increased, and it became an increasingly accepted social institution, even in the presence of children. Accordingly, the self-selection process in premarital births may have changed, the group with premarital children has become less selective and the correlation with an inherent low marital stability should have attenuated over time. The stabilizing effect of premarital children in the 2000s can be explained by the increasing dominance of a true causal effect of premarital children on marital stability, i.e. due to an increase in marital-specific capital and/or other dimensions of self-selection. An example for the latter is a correlation of the presence of premarital children with a high quality of match.

Our results are in line with other studies finding a different effect of male and female children on the likelihood of divorce (see, for instance, Bedard and Deschenes (2005)). The destabilizing effect in the 1980s and in the 1990s was higher for girls compared with boys, and the stabilizing effect in the 2000s was more pronounced for boys. Given that Dahl and Moretti (2008) pointed out that the sex of the first child may influence subsequent fertility behaviour, in a robustness check we have restricted our estimation sample to spouses with only one premarital child; the sex differences remain. The estimation results (which are not presented in the paper) show that the risk of divorce is slightly higher if the child is female.

Finally, to study the baseline hazard of further marriages in more detail, we pool first and further marriages and control for the presence of one or two spouses with divorce experience with a binary variable. Untabulated results show that further marriages are on average twice as likely to end in divorce compared with first marriages. Equivalent estimates by decade show that this higher baseline hazard has even increased over time. Whereas further marriages faced a 83.1% higher risk of divorce—compared with first marriages—in the 1970s, the effect increased to 95.5% in the 2000s (detailed results are available on request). The overall contribution of the higher hazard of divorce of further marriages to the rise in the divorce rate is, however, modest. In another simulation in Fig. 3 we assume that the decade-specific hazards of divorce of further marriages equal that of first marriages. The resulting hypothetical divorce rate is significantly lower than the actual rates; however, the difference is only modest.

### 3.5. Attitudes towards divorce

Our analysis so far has shown that the steady increase in the risk of divorce cannot be attributed to changing assortative mating patterns over time. It must be due to changes in behaviour, most likely triggered by social changes. Divorce is nowadays a more acceptable way to solve a marriage crisis than it was several decades ago.

Survey data could provide one way to test this supposition. Unfortunately, we are not aware of any survey that provides consistent information on Austrians' attitudes towards divorce over the whole time period under consideration. Still, the *European and World Values Survey* at least provides information on the attitude towards divorce of Austrian respondents for the years 1990 and 1999. In particular, respondents are asked to evaluate on a 10-point scale whether they think that 'divorce can always be justified, never be justified, or something in between'. The data show that from 1990 to 1999 divorce became more acceptable among all subgroups of the Austrian population (see Fig. A.5 in the on-line appendix). For married respondents we observe an increase in the average score by 18.9% from 4.6 to 5.5. At both points in time divorced respondents consider divorce to be more justifiable than their married counterparts (1990, 7.2; 1999, 7.8), but the increase over time is relatively smaller: 9.3%. The strongest increase (24.4%) can be observed among respondents with other family status (i.e. single, widowed and separated people).

This strong increase in the acceptance of divorce over time is robust when we control for some socio-economic characteristics within a regression framework based on individual data; detailed regression output is provided in Table A.5 in the on-line appendix. The acceptance of divorce increases *ceteris paribus* by about 0.70 points from 1990 to 1999. If we additionally include an indicator for individual religiosity, this effect even increases to about 0.75 points. For Germany, which is culturally quite similar to Austria, the European and World Values Survey provides data on the same question starting already in 1981. An equivalent regression analysis for West Germany shows that acceptance of divorce increases *ceteris paribus* by about 0.74 points from 1981 to 1990. This is a good indication that in Austria at least since the 1980s an increase in the acceptance of divorce took place.

## 4. Conclusions

Several developments, such as increased economic independence of women, waves of immigration and on-going secularization, have hit marriage markets in the western world over the last few decades and have altered assortative mating patterns considerably. Over the same time period a sharp increase in divorce rates could be observed. On the basis of the universe of all Austrian marriages since 1971 we have documented that changes in assortative mating along the dimensions of age, ethnicity and religion or education are, however, not responsible for the increased marital instability. Without the rise in age at marriage, the incidence of divorce would have been even higher. Immigration, secularization and the resulting supply of spouses with diverse ethnicity and religious denominations had no overall effect on divorce rates. Two countervailing effects equalize each other: mixed couples have—compared with homogeneous native couples—a higher risk of divorce, which is offset by a lower hazard of divorce of homogeneous non-native couples. As a residual explanation for the increase in marital instability, we suggest changing social norms. Indeed, available survey data show that the acceptance of divorce has increased among all subgroups of the population.

Note that we concentrate in our analysis of assortative mating only on—at the time of marriage—predetermined variables, like age, ethnicity and religion. We deliberately refrain from looking at other indicators that are typically used to predict the stability of marriage like the number of children or labour market participation, because for those cases endogeneity problems

abound. A further step in future analysis should be to look at determinants of marriage behaviour to cover issues of selection into certain types of marriages.

To what extent can these findings be generalized to other countries? Many other Organisation for Economic Co-operation and Development member countries have experienced very comparable socio-demographic developments, and similar trends in marriage and divorce (see, for instance, Organisation for Economic Co-operation and Development (2007)). Moreover, our estimated determinants of divorce in Austria are quite comparable with results from other countries found in the literature. This suggests that similar results could be found in other Organisation for Economic Co-operation and Development member countries as well, if similar analyses were conducted on comparable data. In general, we hope that our research stimulates the debate on the causes of the drastic rise in divorce rates. The interrelationship of demographic changes and social norms seems to be a particularly promising route to understand this socially very important pattern.

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Additional 'supporting information' may be found in the on-line version of this article:

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