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2018
February 2018

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Timo Hener, Tanya Wilson

ifo INSTITUTE
Leibniz Institute for Economic Research
at the University of Munich

Impressum:

ifo Working Papers
Publisher and distributor: ifo Institute – Leibniz Institute for Economic Research at the University of Munich
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49(0)89 9224 0, Telefax +49(0)89 985369, email ifo@ifo.de
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ifo Working Paper No. 256

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Abstract

We investigate the impact of a compulsory schooling reform on marriage market matching using a regression discontinuity design. Our results imply that the formally gender-neutral educational reform has asymmetric impacts for men and women, owing to the pervasive marital age gap and the birthdate discontinuity. We show that treated women decrease the marital age gap to avoid marrying less qualified men. Treated men in contrast are able to marry similarly educated women without substantially changing the age gap. Our estimates indicate that the disruptions for cohorts around the introduction of the reform are economically significant.

JEL code: I28, J12

Keywords: Marital sorting, spousal age gap, compulsory schooling

Timo Hener
ifo Institute – Leibniz Institute for Economic Research at the University of Munich
Poschingerstr. 5
81679 Munich, Germany
hener@ifo.de

Tanya Wilson
Division of Economics
University of Stirling
FK9 4LA
Stirling, Scotland
tanya.wilson@stir.ac.uk

February 12, 2018

* Acknowledgements: The permission of the Office for National Statistics to use the Longitudinal Study is gratefully acknowledged, as is the help provided by staff of the Centre for Longitudinal Study Information, in particular Chris Marshall, Rachel Stuchbury and Wei Xun, as well as User Support (CeLSIUS). CeLSIUS is supported by the ESRC Census of Population Programme (Award Ref: RES-348-25-0004). The authors alone are responsible for the interpretation of the data. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland. Hener gratefully acknowledges financial support from the Fritz Thyssen Foundation.

1 Introduction

In the twentieth century, many industrialized nations have witnessed major educational reforms that have led to the expansion of compulsory schooling. An impressive literature has emerged around these institutional changes, showing that the lives of individuals have been positively, or at least non-negatively, affected. Compulsory schooling reforms imply that individuals born after a threshold date are exposed to the new minimum schooling requirement and exogenously increase their education. A number of studies have used this natural experiment to identify the causal effect of education on wage, income and wealth (Harmon and Walker, 1995; Oreopoulos, 2006; Devereux and Hart, 2010; Oreopoulos and Salvanes, 2011; Grenet, 2009; Pischke and Von Wachter, 2008; Meghir and Palme, 2005), health and mortality (Oreopoulos, 2007; Lleras-Muney, 2005; Clark and Royer, 2013), teen births (Black, Devereux, and Salvanes, 2008), and crime (Machin, Marie, and Vujić, 2011).[1] Yet, the literature has not considered the domain of marriage market matching and one aspect in particular that has far-reaching implications: formally gender-neutral compulsory schooling reforms affect the matching behavior of female and male cohorts around the reform threshold differently.

The reason for this gender-specific effect originates from two noticeable features in the majority of marriages. First, husbands are on average older than their wives. This age gap is prevalent in virtually every country in the world[2] and is typically found to be two years in western countries. Second, in general spouses have similar education levels. Schwartz and Mare (2005), with US data, show that the degree of positive assortative matching in education between spouses has increased since 1960, driven predominantly by increased homogamy in both tails of the marriage distribution: individuals with low educational attainment are more likely to have a low educated spouse, and similarly college graduates are increasingly likely to marry each other. As a consequence of the age gap preference, women born around the reform threshold would generally partner with untreated men, whereas the potential partners of men would be treated women. However, this implies that preferences for a positive age gap and those for educational homogamy are in conflict. In particular, a woman born after the threshold date of a compulsory schooling reform faces an exogenous increase in her education. As she would prefer to marry an older man, she faces untreated candidate partners with lower education. Thus, a treated woman has a harder time finding a homogametic spouse in terms of education who at the same time meets her age gap preferences. On the other hand, a man born just after the threshold date experiences an improvement of his prospects in the marriage market compared to untreated men. His candidate spouses are younger and all treated by the reform. When a

[1] The countries under consideration in these studies include Canada, France, Germany, Norway, Sweden, the United Kingdom and United States.

[2] The World Marriage Data, 2012, indicates that in all 218 countries for which data exists we observe a positive marital age gap, see Fig. S.1 in the Supplementary Material.

reform threshold divides two candidate spouses into different educational regimes, a gender-specific imbalance in the marriage market occurs that affects the decision who to marry. The result of which may be as important as own education for individual welfare.

In this paper we exploit an UK educational reform in a regression discontinuity framework to study its impact on marital matching along the oft-cited dimensions of spousal age and education. The Raising of the School Leaving Age (RoSLA) reform implemented in 1972 introduced exogenous variation in the probability that an individual born after a threshold date obtains an academic qualification. By inducing a permanent shift to the qualifications distribution in affected cohorts, the reform caused a temporary shock to the cross-cohort qualifications composition. For some individuals born in the neighborhood of the threshold date it becomes impossible to match according to both their age gap and educational preferences. This imbalance constitutes the natural experiment underlying our analysis.

We find that women who increase their qualification status in response to the reform also increase their probability of forming a marriage with a smaller age gap. The observed decrease in the marital age gap of 2.5 months is substantial compared to the sample mean. Our results indicate that treated women more frequently marry younger husbands who are born after the threshold date. On the other hand, many affected women are not able to achieve the same degree of educational homogamy. We show that more women choose to retain a positive age gap and accept a spouse with lower education than themselves, than to sacrifice the age gap to retain educational homogamy. For men, we find corresponding but weaker effects. Treated men tend to slightly increase the age gap compared to men just born before the threshold date, with the latter facing constrained options on the marriage market. Treated men also find homogametic matches more easily than their untreated counterparts. We find that men sacrifice an age gap to retain educational homogamy and accept wives from older untreated cohorts more often when their choices are constrained. In contrast, treated men are able to achieve matches with educational homogamy and a larger positive age gap.

Our results have two main implications. Although the reform benefits at the individual level through the positive shock to education, treated women are disadvantaged by fewer homogametic older candidate men in the marriage market, whereas treated men are favored by matching with abundant homogametic younger candidate women. This, in turn, means that a formally gender-neutral reform applied at the cohort level has asymmetric impacts for women and men via the marriage market. This channel may explain gender heterogeneity in the evaluation of such reforms. For effects on long-term and household level outcomes in particular, e.g., intergenerational effects of parental education (Doyle, Harmon, and Walker, 2005; Lindeboom, Llena-Nozal, and van Der Klaauw, 2009; Galindo-Rueda, 2003; Chevalier, 2004; Chevalier, Harmon, Walker, and Zhu, 2004), the marriage market channel may further the discussion. Second, we show that preferences for partner attributes play a significant role in marriage formation in a real world natural experiment. The related literature on spousal preferences is mostly based on speed-dating experiments (see, e.g., Fisman, Iyengar, Kamenica, and Simonson (2006); Belot and Francesconi (2013)) and partly doubts that preferences play a major role in comparison to the mere probability of meeting. Furthermore, we find different matching preferences for women and men. While women tend to mostly retain educational homogamy, or in particular avoid being more qualified than their spouses, men put more weight on a positive age gap.

The remainder of the paper is structured as follows. Section 2 outlines the institutional context and Section 3 explains the marriage market mechanisms. Section 4 describes the data and the empirical methodology. Section 5 presents the results. Section 6 concludes with a discussion of the implications of our analysis.

2 The Schooling Reform

Compulsory schooling has been a feature of the education system in England and Wales since the late nineteenth century. Children are required to start education no later than the beginning of the academic year (September 1st - August 31st) after which they turn 5, and are required to remain in education until they have reached the legislated minimum school-leaving age. There are two tiers[3] of school-age academic qualifications: the first level of examinations is taken at the end of the academic year in which an individual turns 16; for more academically able students a second tier of qualifications are sat after two years of further study.

[Figure 1]

Since the introduction of the first minimum school-leaving age legislation in 1880 there have been a number of increases to the age until which students are compelled to remain in full-time education.[4] We focus on one of these increases, the Raising of School Leaving Age (RoSLA), which raised the schooling requirement by one year, from age 15 to age 16. The intention to implement RoSLA was first

[3] Ordinary Levels (O'Levels), targeted towards academically inclined students and a prerequisite for participation in further education, were introduced in the 1950s as the main academic qualification achieved at school. With the establishment of comprehensive schools the Certificate of Secondary Education (CSE) qualification was introduced in 1965 to meet the needs of the less academically-able. Both these exams are taken at age 16 and constitute the first tier of school qualifications. O'Levels and CSEs were replaced by a single examination, the General Certificate of Secondary Education (GCSE), in 1988. The second tier of academic qualifications are Advanced Levels (A'Levels), sat at age 18.

[4] The first compulsory leaving age of 10 years was int-roduced by the Education Act (1880), raised to age 11 by the Elementary (School Attendance) Act (1893), increased again to age 14 in 1918 by the Fisher Act. The Butler Act (1944), initially raised the minimum leaving age to 15, but made provision for a subsequent rise in 1972 up to age 16. More recently the Education Act (2008) has introduced the Raising of Participation Age (RPA), which from September 2015 re-quires all individuals in England and Wales to remain in formal education or training until their 18th birthday.

announced by the UK Government in 1964 and enacted in September 1972, affecting the mandatory school-leaving age of all individuals born after September 1st 1957.

RoSLA impacted the school-leaving age of a substantial fraction of the population. Figure 1(a) shows that the proportion of individuals leaving education at age 16 or above increased approximately 25 percentage points in response to the new leaving age requirement (Chevalier et al., 2004). Furthermore, in comparison to other legislative increases to the minimum schooling requirement, RoSLA has the unique feature insofar that it raised compulsory schooling precisely up to the age at which the first tier of academic examinations are taken. Thus by compelling students to stay in school for an additional year, RoSLA induced an increase in the likelihood of them taking the examinations, and thereby the probability of achieving a qualification. Figure 1(b) indicates that the introduction of RoSLA increased the proportion of individuals obtaining an academic qualification increased by around 10 percentage points (Dickson and Smith, 2011). Chevalier et al. (2004) show that RoSLA's impact on qualifications was limited to the first tier of academic qualifications only, with no ripple-upward effects observed on higher qualifications.

3 Marriage Market Mechanism

The marital age gap and its roots have attracted some attention in the literature. The economic explanation proposed by Bergstrom and Bagnoli (1993) postulates that males and females differ fundamentally in terms of economic prospects. The male breadwinner reveals his attractiveness in terms of income later in life, whereas the female's desirability is known from the start. Grooms with higher prospects have an incentive to postpone marriage until their high attractiveness is revealed, in order to be accepted by highly attractive brides. This difference in economic prospects produces the age gap. In contrast, Díaz-Giménez and Giolito (2013) advance a biological interpretation which ascribes the age gaps to differences in life-time fecundity profiles between genders. As female fecundity diminishes earlier than that of males, brides are inclined to accept marriage proposals at a young age, while grooms take the liberty of waiting.

Assortative matching on education due to complementarities in marital output (Becker, 1973, 1974) has become a well-established phenomenon in the marriage literature. However, little is known regarding the relative strength of preferences over age and education in the formation of marital matches. Mansour and McKinnish (2013) argue that highly educated individuals meet similar-aged partners whilst in college and therefore ensuing marriages involve small age differences between spouses. Consequently, marriages with substantial age gaps are negatively selected as they are more likely to involve at least one spouse with low educational attainment. Holmlund (2006) analyses the impact on assortative mating and intergenerational mobility of a Swedish educational reform that not only increased the duration of compulsory education but also postponed ability tracking. She finds that although the reform led to sizeable increases in intergenerational income and educational mobility, the degree of positive sorting between spouses increased. Her results suggest that assortative matching on education is more important for women then men. Regarding educational homogamy, Fisman et al. (2006) show evidence that men prefer matches with women who are not more intelligent than themselves. While hypergamy, a partnership in which the husband has a higher education level than his wife, seems socially accepted, in contrast hypogamy, the husband is less educated than his wife, appears less favored.

A substantial tranche of the demography literature has examined the effect of the 'marriage squeeze' on marital matches. The intuition is that sustained population growth im-plies an increase in the size of cohorts over time. With a preferred age gap between spouses there is a gender-imbalance in the marriage market due to an excess supply of age-appropriate women in comparison to men. Bronson and Mazzocco (2012) present evidence that birth cohort size is positively related with marriage rates but negatively associated with the age difference between spouses. Bhaskar (2012) in a theoretical model, shows that the marital age gap does not respond to persistent population growth, but is the margin of adjustment to accommodate marriage market gender imbalances induced by transitory shocks to cohort size. Empirically, Abramitzky, Delavande, and Vasconcelos (2011) exploit male World War I mortality in France and find that the sex ratio influences assortative matching in many ways. They show that the male scarcity allowed men to marry women of lower social class less often and to reduce the age gap. Bergstrom and Lam (1989) find that changes in gender ratios due to substantial fluctuations in fertility rates in Sweden in the early 20th century were largely accommodated by movement in the age difference between spouses. The 1958-1961 famine in China reduced cohort sizes substantially, however Brandt, Siow, and Vogel (2009) find that marriage rates were largely unaffected due to adjustments in the marital age gap.

By being applied at the cohort level, the reform induced a temporary shock to the cross-cohort composition of qualifications by gender in the neighborhood of the RoSLA threshold date. With a prevailing age gap between spouses of more than one year this implies that individuals form matches across academic cohorts. Specifically, a typical woman matches with a man from an older cohort and a typical man matches with a women from a younger cohort. This implies that candidate spouses are from different educational regimes, as illustrated in Fig. 2. As RoSLA introduced a single threshold date applicable to all individuals regardless of gender, each side of potential matches in the neighborhood of the threshold are differentially affected. There is a higher proportion of qualified individuals in post-RoSLA compared to pre-RoSLA cohorts. To clarify the imbalance, we assess the potential age-qualifications matches in the vicinity of the threshold for each gender.

[Fig. 2]

Women born in the RoSLA cohort: In absence of the reform, women born in academic cohort 1957 or later would typically match with men born in 1956 or earlier. By increasing the fraction of individuals holding a qualification, RoSLA increases the ratio of qualified women to qualified men thereby creating a gender imbalance in the qualifications composition across cohorts. A woman maintaining the typical age gap will face an increased likelihood of matching with a man who has lower qualifications than herself. In contrast, a woman maintaining the typical sorting on qualifications will face an under-supply of appropriately qualified men in the usual cohort. Therefore, the attractiveness of younger men from post-RoSLA cohorts increases as they are proportionately more qualified than pre-RoSLA men such that they may become more acceptab-le as a potential match.

Men born in the RoSLA cohort: In absence of the reform, men born in academic cohort 1957 or later would typically match with women born in 1958 or later. As both cohorts are subject to the increased education requirement of RoSLA, there is no imbalance in the relative proportion of qualified men to qualified women. The imbalance materializes for the 1956 academic cohort of men as a mirror image of the imbalance of the RoSLA cohort of women. Men born in 1956 would typically match with women born in 1957 or later. By increasing the fraction of qualified women born after 1957, RoSLA creates a gender imbalance in the qualification composition for men born in 1956 and earlier. The effect of RoSLA on men, thus, is of the opposite nature compared to women: it removes the qualification imbalance across cohorts. Men born after the RoSLA threshold return to their typical match with women from later cohorts and similar qualifications. It is revealing, though, which matches men divest themselves from. A man who maintained the typical age gap has faced an increased likelihood of matching with a woman who had higher qualifications than himself. Thus, RoSLA affected men would reduce matches with higher qualified women. In contrast, a man who maintained the typical sorting on qualifications has faced an under-supply of appropriately qualified women in the post-RoSLA cohorts. Therefore, the attractiveness of older women from pre-RoSLA cohorts increases. RoSLA affected men of this sort would reduce matches with pre-RoSLA cohort women.

Bhaskar (2012) argues that the marital age gap is the margin of adjustment by which the marriage market accommodates gender imbalances. The degree of adjustment will depend on the relative preferences of individuals over the age and qualifications of their partner. The larger the preference for qualifications, the greater the proportion of individuals who marry outside of the typical partner-age cohort resulting in a large adjustment in the age gap in the directly affected cohort. On the other hand, if age considerations are more important, or if the adjustment is spread out over several cohorts, then the direct effect on the age gap will be small, and the imbalance will be accommodated through qualification differences between spouses.

4 Empirical strategy

We empirically investigate how the marriage market responded to the temporary gender imbalance induced by RoSLA and the prevailing age gap. We examine outcomes around the threshold of the reform using a regression discontinuity design. We use a sample which encompasses the typical age gap either side of the discontinuity, therefore the method essentially summarizes marriage market behavior across cohorts.

4.1 Estimation Method

RoSLA introduced a threshold date of birth, September 1st 1957, according to which the minimum length of compulsory schooling was determined. The reform can therefore be considered as a natural experiment, providing an exogenous source of variation to an individual's educational characteristics. As this variation was solely determined by an observable characteristic, the individual's time of birth, a regression discontinuity (RD) design is particularly suited as an estimation method in our analysis, where we explore responses to RoSLA in the marriage market.

In essence the RD approach is based on the simple intuition that individuals born in the neighborhood of September 1st 1957 are identical apart from which side of the threshold date they are born. In absence of the RoSLA 'treatment' these individuals would have similar outcomes. The estimate of interest is $E[Y_1 - Y_0 | X = x^*]$, the difference between the treated population Y_1 and the untreated population Y_0 calculated at the discontinuity $X = x^*$. Although the underlying distribution of the running variable is continuous, our dataset contains only discrete measures: month and year of birth. Thus, as the distance to the threshold e cannot be smaller than a month, we cannot apply a non-parametric limit $E[Y_1 - Y_0 | X = x^*] \approx \lim_{e \to 0} E[Y_1 | X = x^* + e] - E[Y_0 | X = x^* - e]$. Instead, we adopt a parametric estimation proposed by Lee and Card (2008) for our regression results:

$$Y_{ij} = \alpha_0 + D_j\beta_0 + P_j^l\gamma_0 + (D_j \times P_j^l)\delta_0 + a_j + \epsilon_{ij} \tag{1}$$

where Y_{ij} is the outcome for individual i born in month j; P_j^l is a vector of polynomial functions in the running variable, x_j, with $(l = 1, 2, 3)$; D is an indicator of whether the individual was subject to RoSLA which is interacted with the polynomial to allow these to be different left and right of the discontinuity. a_j is the Lee and Card (2008) specification error term that describes the differences of the true value at each x_j and the estimated polynomial function. We assume a_j to be random and orthogonal to X. This specification error is assumed to be identical for $E[Y_1 | X = 0]$ and $E[Y_0 | X = 0]$, meaning that the deviation does not depend on whether we are left or right of the discontinuity. The idiosyncratic error term

ϵ_{ij} is assumed to be independent and identically distributed. We receive robust standard errors with random, identical specification errors by clustering on x_j. We determine the appropriate window width of observations around the discontinuity to use in the estimation following the cross-validation procedure suggested by Ludwig and Miller (2007). A full description of the estimation techniques is presented in a technical annex. Visual depictions of the our results are, however, produced using local polynomial smooths.

A crucial assumption of the RD setting is non-manipulation of the running variable. Sorting into or out of treatment in the neighborhood of the discontinuity would violate the assumption. Knowledge of the treatment assignment rule is a typical threat to the non-manipulation assumption. In our case, RoSLA was decided upon years after the birth of the affected cohorts, such that deliberate manipulation of the birth date cannot be caused by the reform. However, we check whether the there is sorting around the threshold in our data. First, we follow McCrary (2008) in testing the density around the threshold and find no indication of manipulation of birth months, figures can be found in the supplementary material. Second, we check the balancing of age and ethnicity and find no indication of balancing problems either. The corresponding figures can be found in the supplementary material.

4.2 Data

The Labour Force Survey (LFS) is the largest representative survey undertaken in the UK, with around 11,000 private households interviewed each wave. The survey contains detailed information on each individual within the household, such as their marital status, ethnicity, date of birth (measured by month and year), education, nationality and country of birth, as well as the relationships between each of the household members. We pool data from the 1975-2006 surveys, the latter being the last data for which date of birth information is publicly available.

[Table 1]

We define an individual's academic birth cohort by whether the individual was born between September 1st of year t and August 31st of year $t + 1$. Thus the first individuals subject to RoSLA, aged 15 when they started the school year in September 1972, were born in academic cohort 1957. The marital age gap is calculated as the linear difference between the husbands' and wives' ages, measured in months, at the time of the survey. As RoSLA did not induce an impact on educational achievement beyond the first tier of academic qualifications (Chevalier et al., 2004), we can, without loss of generality, focus on the binary outcome of whether an individual has an academic qualification or not. Respondents in the LFS are asked to record their qualifications according to their equivalence in a categorization of English qualifications. From this information we are unable to ascertain whether individuals were educated in England and Wales. Therefore, to mitigate the inclusion of individuals not subject to the relevant schooling system, we restrict the sample to those individuals born in the UK, but resident within England or Wales at the time of survey. As with the marital age gap, we construct the marital qualification gap as the difference between the binary indicators of whether each spouse has a qualification. This variable is therefore equal to 1 for hypergamy (if the husband has a qualification and the wife does not), is equal to 0 for homogamy (if both spouses have the same qualification status), and -1 for hypogamy (if the wife has a qualification and the husband does not).

Table 1 presents descriptive statistics of a sample of men and a sample of women that are used to analyze responses around the RoSLA threshold. In each sample we retain only prime-age individuals (aged 20-50) within academic cohorts of birth close to the RoSLA implementation (cohorts 1951-1962) and exclude the small number of couples where the age difference is above or below 10 years. Our sample consists of 128,853 (143,108) dyads where the man (woman) is born in relevant period. As detailed information regarding the level of qualifications held by an individual has been measured in the LFS only since 1984 the male and female samples used in the qualification gap analysis is reduced to 108,965 and 116,709 couples respectively.

5 Results

We maintain that in the presence of preferred age gaps between partners, RoSLA induced a temporary imbalance in the proportion of qualified individuals across cohorts, and show evidence that this imbalance significantly impacted the composition of marital matches in the RoSLA-neighborhood cohorts. We expect that qualified women from the first RoSLA cohorts would more frequently marry unqualified men, i.e., increase the incidence of hypogametic matches, or reduce the marital age gap in comparison to their counterparts born prior to the RoSLA threshold. The imbalance around the RoSLA threshold implies that they are unable to maintain both the typical age gap and qualifications sorting. In contrast, we hypothesize that RoSLA treated men, compared to pre-RoSLA men who are constrained in their choice, form homogametic and hypergametic matches more often, or increase the age gap by marrying younger post-RoSLA women.

Our analysis is structured as follows. First, we verify the effect of RoSLA on an individual's qualification status. Second, we present our main results of how the marital age gap responds at the threshold. Third, we examine the marital qualifications gap. Fourth, we analyze changes in match types around the discontinuity to assess the trade-off between a positive age gap and educational homogamy. Fifth, we test the robustness of our assertion in two ways. We first examine another institutional rule in the English education system which induced exogenous variation in the propensity to receive a qualification within rather than across a cohort. We then investigate between-cohort thresholds in non-RoSLA years to confirm that our observed results are unique to the RoSLA discontinuity.

5.1 Own qualifications

[Fig. 3]

Fig. 3 shows the proportion of (a) married women and (b) married men who hold academic qualifications by each individual's distance of birth, in months, to the RoSLA threshold date which has been normalized to zero. The reform was associated with a substantial increase in the likelihood of obtaining a qualification. The impact for married women, 11.4 percentage points, is slightly larger than that for married men, 10.2 percentage points[5] This result is comparable to Dickson and Smith (2011) who find an impact of 9.5 percentage points in their estimation for working-age men.

5.2 Marital Age Gap

Fig. 4 displays the marital age gap for women and men. The estimates are produced using the optimal bandwidth of 24 months, as indicated by the Ludwig and Miller (2007) cross-validation procedure, and a quadratic polynomial of the running variable. The figure confirms the basic hypothesis: At the RoSLA threshold, we see a clear reduction in the age gap of just above 2 months for women. In contrast, for men there is a small but insignificant increase in the age gap.

[Fig. 4]

Table 2 presents the regression analogue of Fig. 4. We first present the results of the estimation using our preferred bandwidth of 24 months for each gender, and we explore the robustness of these estimates to using half and double our preferred bandwidth. We also use a linear, quadratic and cubic polynomial in the running variable over columns 1-3 respectively. In columns 4-6, we add a set of basic covariates (age and ethnicity) to the base specifications. We report the Lee and Card (2008) G-statistic along with the Akaike (AIC) information criterion to test the goodness of fit of the polynomial used. The upper part of Table 2 displays the estimates for women. For a given bandwidth the G-statistic does not clearly suggest a polynomial degree, but tends to favour a more complex polynomial. Conversely, the AIC generally indicates that the smallest (linear) polynomial is appropriate. Gelman and Imbens (2014) find that RD estimators for causal effects using higher-order polynomials can be misleading, and suggest that, in absence of conclusive evidence in favor of using a complex polynomial, a linear or quadratic polynomial in the running variable yields more credible results. Thus, a second degree polynomial seems sensible as a compromise of the inconclusive

[5] The regression results associated with Fig. 3 are presented in the Supplementary Material, Table S.1.

test results. The G-statistic is even less suggestive in the lower part of Table 2 for married men, and according to the AIC a linear polynomial is preferred. However, we note that there is no significant difference in the coefficients obtained using either a first or second degree polynomial with the optimal bandwidth.

[Table 2]

The RD estimate for women in our preferred specification (column (2) of the upper panel), which uses the optimal bandwidth of 24 months and a 2nd-order polynomial, indicates that RoSLA induced a negative and statistically significant response of the age gap of 2.5 months, 10% relative to the sample mean. With other bandwidth choices the effect is somewhat amplified, a reduction of 3.9 (3.0) months for half (double) the optimal bandwidth, both statistically significant.[6] Including basic controls does not alter the results significantly, indicating there are no discontinuities in the covariates around the threshold. In the lower part of Table 2, the estimates for married men using a 2nd-order polynomial reveal a consistent but statistically insignificant response to RoSLA of 1.1 months over all bandwidth choices, 6% relative to the sample mean. With a linear polynomial the magnitude of the estimates increases somewhat and gains significance for non-optimal bandwidths, but remain significantly lower in magnitude than the response for women.

As the LFS does not record the parity of marriage, a potential concern is that the results would be biased if spouses in higher parity marriages have different sorting patterns over qualifications and age than spouses in first marriages. We explore robustness to this by mitigating the inclusion of higher parity marriages through applying upper age bounds (40, 45 and 50) to individuals included in the LFS sample, see Table S.2 in the Supplementary Material. We find no significant differences in the estimates for males over the different samples. For females, we see qualitatively similar results between the age-restricted samples and the main analysis, with the magnitude of the response increasing as the upper age bound decreases. Second, we perform a parallel analysis on a 1% sample from the census, where we are able to constrain the sample to include first marriages only, yielding results consistent with those obtained from our LFS samples, see Fig. S.5 in the Supplementary Material. Furthermore, we show that our results are not biased or driven by sorting into or out of marriage. Fig. S.4 shows the proportion of females and males aged 35 and older who are married. The following analysis is restricted to married couples as the selection into marriage does not seem to bias the match types at the discontinuity.

[6] We explore the sensitivity of the estimates to the choice of bandwidth further by performing the analysis for all bandwidths between 12 and 60 months, with results suggesting that the estimates are qualitatively robust and stable over a wide range of bandwidth choice. These results are available in the Technical Annex.

5.3 Marital qualifications gap

Fig. 5 displays the spousal qualifications gap around the RoSLA discontinuity.[7] As described in Section 4.2, a qualifications gap equal to 1 indicates hypergamy (a qualified husband and an unqualified wife), a gap of 0 indicates homogamy (equally qualified spouses) and a gap of -1 indicates hypogamy (an unqualified husband and a qualified wife). For married women, RoSLA clearly increase their qualification relative to their husbands, reflected in the negative shift of the spousal qualification gap. The mass of relative qualification distribution moves from homogametic matches towards hypogametic matches. The magnitude of the difference declines over subsequent cohorts before leveling off, after which the post-RoSLA qualifications difference is greater than the pre-RoSLA difference, consistent with the increase in qualifications at RoSLA being larger for women as indicated by Fig. 3. In contrast, the response in the qualifications difference for married men happens in the immediate cohorts prior to RoSLA. As their younger spouses are increasingly likely to be born after the threshold and therefore are proportionately more qualified, pre-RoSLA men form more hypogametic matches. For men born after the RoSLA threshold, the qualifications difference is restored close to homogamy as their younger potential partners are also subject to the increased schooling requirement, thus ending the marriage market imbalance.

[Fig. 5]

So far, the results have shown that the marriage market adjusts along both the age gap and the qualifications gap. For women passing the RoSLA threshold, the chances of forming a homogametic or hypergametic match with a man from an older cohort decrease. Correspondingly, men born before the threshold find fewer women in younger cohorts suitable for homogametic or hypergametic matches and passing the threshold relieves this constraint.

5.4 Trade-off between Age and Qualification

In order to reconcile our findings with regard to the responses of the marital age and qualifications gaps, we examine how the two characteristics are played out against each other. We summarize the marriage responses around the RoSLA threshold into binary variables indicating the relative qualification level between spouses and whether an individual's spouse is from the pre- or post-RoSLA regime.

[Fig. 6]

Fig. 6 considers the characteristics of partners around the discontinuity with regard to qualifications and age separately. The proportion of women with pre-RoSLA husbands drops considerably at the threshold (Fig. 6(a)). The proportion of men with post-RoSLA wives distinctly increases at the discontinuity (Fig. 6(c)).

[7] The analytical results associated with Fig. 5 are presented in the Supplementary Material, Table S.3.

There is a marked decrease of matches characterized by hypergamy and homogamy for females (Fig. 6(b)). Conversely, for males the proportion of these matches increases (Fig. 6(d)). While women affected by the reform decrease the typical match types, men increase them, highlighting the inverse effect of the marriage market imbalances by gender.

To examine the trade-off, we combine the binary indicator of whether an individual has a spouse from a pre- or post-RoSLA cohort with the indicators of relative qualification. The combination of these indicators yields a choice set of six options for each spouse at the discontinuity: 1) a hypergamy match with a pre-RoSLA spouse, 2) a homogamy match with a pre-RoSLA spouse, 3) a hypogamy match with a pre-RoSLA spouse, 4) a hypergamy match with a post-RoSLA spouse, 5) a homogamy match with a post-RoSLA spouse and 6) a hypogamy match with a post-RoSLA spouse.

[Fig. 7 and 8]

Fig. 7 and 8 show the marriage market matches of women and men around the RoSLA threshold. For both genders, the predominant matchings occur between spouses with equal qualifications ((b) and (e)), women with older pre-RoSLA husbands and men with younger post-RoSLA wives. As shown in Fig. 3 at the discontinuity the proportion of women obtaining an academic qualification increases. Therefore, unsurprisingly, we observe that the match between a wife and a pre-RoSLA husband who is more or equally qualified clearly drops at the discontinuity (Fig. 7 (a) and (b)). However, the corresponding increase in hypogamy matches with pre-RoSLA husbands (Fig. 7 (c)) is not large enough to fully compensate the decrease, indicating that adjustment on the qualification dimension alone does not adequately explain the observed sorting patterns. We see small but significant increases in the proportion of women matching with younger post-RoSLA men, with the largest positive effect on homogamy matches (Fig. 7 (e)) and smaller changes for hypergamy and hypogamy matches (Fig. 7 (d) and (f)). RoSLA affected women thus react to the shortage of hypergametic or homogametic partners from pre-RoSLA cohorts with either a hypogametic match with an older husband, or a matching with a younger post-RoSLA husband.

The response of men at the discontinuity, depicted in Fig. 8, mirrors the observed behavior of women. The most pervasive match type is post-RoSLA spouse homogamy (Fig. 8 (e)), which clearly increases at the threshold. As the proportion of men with an academic qualification rises at the threshold, this increase is driven by an increase in matches where both spouses hold an academic qualification. There is also a marked increase in the proportion of hypergamy matches, which is consistent with Fisman et al. (2006), who find in a speed-dating experiment that men prefer women with a level of intelligence that does not exceed their own.

The regression results associated with Fig. 7 and 8 are displayed in Table 3. The upper left quadrant characterises the matches of women with older spouses, who are not subject to RoSLA and in absence of the reform would constitute the typical partner for a woman born in academic year 1957. At the discontinuity the proportion of women holding a qualification increases relative to pre-RoSLA men, and therefore the proportion of hypergametic and homogametic matches decreases mechanically. These supposedly preferable match types, which cannot be retained because of the imbalance induced by RoSLA, decrease by 10.1% points (0.039+0.062). However, the corresponding increase in hypogamy matches with pre-RoSLA husbands is not large enough to fully compensate the decrease, indicating that adjustment on the qualification dimension alone does not adequately explain the observed sorting patterns. In addition, an insignificant 1.1% points decrease in hypergamy matches with younger post-RoSLA spouses occurs. Thus, a total of 11.2% of match types have to be substituted. We see small but significant increases in the proportion of women matching with younger post-RoSLA men, with the largest positive effect on homogamy matches. RoSLA affected women thus react to the shortage of hypergametic or homogametic partners from pre-RoSLA cohorts with either a hypogametic match with an older husband, or a matching with a younger post-RoSLA husband. The estimates suggest that 53% (0.059/0.112) of the affected women choose to retain the positive age gap in a hypogamy match, whereas 35% (0.039/0.112) sacrifice the age gap in order to maintain homogamy in education. We also observe that 13% (0.014/0.112) of women at the threshold retain neither the preferred age nor qualifications match, which may reflect general equilibrium effects or other unobserved factors which gain importance if a husband of the preferred age-qualification type is not available.

[Table 3]

The corresponding estimates for men are presented in the right hand side of Table 3, where the upper quadrant would in absence of the reform represent the typical matches for early RoSLA-treated men, and mirror the observed behavior of women. At the threshold, the proportion of men with qualifications increases, restoring the typical hypergamy and homogamy matches with post-RoSLA women. Compared to untreated men, the relieved imbalance allows treated men to increase these match types by 9.2% points (0.030+0.062). Men also increase hypergamy matches, which become easier to achieve with older pre-RoSLA wives, by 1.7% points. This is consistent with the findings of Fisman et al. (2006), who show in a speed-dating experiment that men prefer women with a level of intelligence that does not exceed their own. RoSLA affected men increase their preferred match types by a total of 10.9% points that have to be substituted by other match types. 41% (0.045/0.109) of men decrease hypogamy matches with young post-RoSLA wives. Homogamy matches with older pre-RoSLA wives are decreased by 35% (0.038/0.109), hypogamy matches with pre-RoSLA wives by 23% (0.025/0.109).

This analysis indicates that women care slightly more about the age gap than educational homogamy. 53% of choice-constrained women choose hypogametic pre-RoSLA partners, implying their husbands have no qualification while they themselves are qualified. Instead of taking a younger partner they abstain from the real benefits of a more qualified partner. Put differently, their willingness to pay for an older husband is equal to a 6% wage premium (Grenet, 2009) and a 40% point lower unemployment risk (Dickson and Smith, 2011) of their husband. For men, the relative importance seems more balanced as the increase in the preferred match by RoSLA-affected men originate to only 41% from younger women in hypogamy matches. Men seem to put more weight on hypergametic or homogametic matches than on marrying a post-RoSLA woman. This finding contrasts with Belot and Francesconi (2013) who examine partner choices in a speed-dating context and find that women and men put comparable weights on physical attributes in the dating process. However, these dissimilarities may be driven by the differences in partner selection in the dating as opposed to the marriage market. Furthermore, the authors show that preferences for similar age and education of the partner become more important for the decision to propose, a situation more closely related to our marital matches. Our results suggest accordingly that match outcomes are not entirely determined by the probabilities of meeting certain candidate spouses. Preferences for spousal characteristics play a substantial role in forming marital matches and even have the power to change the traditional age gap in the neighborhood of a reform threshold.

5.5 Robustness

We apply two checks of the robustness of our results. First, to assess the validity of our argument that the response is induced by an imbalance in age-qualification types across cohorts, we examine the Easter Leaving Rule (ELR), which increased the probability of qualifications within an academic cohort, but not across cohorts. Second, we verify that our analysis is unique to the RoSLA threshold rather reflecting typical between-cohort effects. We repeat the analysis with a placebo discontinuity, examining the threshold four years earlier (1952/1953) where there is no cross-cohort gender imbalance in qualification as both pre- and post-threshold cohorts were subject to the pre-RoSLA schooling regime. Furthermore, we apply a difference-in-difference approach in the context of the regression discontinuity design (RD-DID), using the placebo cohorts to form counterfactual observations.

5.5.1 A within-cohort increase in qualifications

To examine the robustness of our finding that the marriage market responded to a temporary gender-age-qualifications imbalance induced by RoSLA we examine another institutional rule in the English education system which induced exogenous variation in the propensity to receive a qualification *within* a cohort rather than *across* cohorts. The Education Act (1962) introduced the Easter Leaving Rule (ELR) in response to concerns that if school-leaving eligibility is determined by the precise birth date alone, individuals born at the beginning of the academic year may not complete as much secondary education as later-born individuals, and therefore may be disadvantaged in the labor market due to the lower investment in human capital. The ELR imposed that persons born between September 1st and January 31st should remain in education until the end of the Spring term of the academic year in which they reached the compulsory school-leaving age. Those born between February 1st and August 31st were required to stay in school until the end of the Summer term.

[Fig. 9]

For post-RoSLA cohorts, who are required to remain in school until 16,[8] this implies that individuals within the same cohort have different probabilities of obtaining a qualification. Those born towards the beginning of the academic cohort could leave school before the examination period, whereas persons born in the latter part of the year, through the requirement to stay in school until the end of the Summer term, have a higher probability of sitting the examination, and consequently up to a 5 percentage point higher propensity of obtaining a qualification, see Fig. 9.

[Fig. 10]

The exogenous source of variation in qualifications induced by ELR is independent of variation in the duration of schooling. Anderberg and Zhu (2014) analyze outcomes of married women and find that ELR induced an unambiguous increase in the probability of obtaining an academic qualification. Furthermore, they find that women born after the ELR threshold are more likely to have qualified husbands relative to women born earlier in the academic year. In order to examine the qualification effect independent of the age effect for both spouses we examine the outcomes for individuals from post-RoSLA cohorts (1959-1966) only. Then, with the prevailing age gap both partners would be subject to the RoSLA treatment and therefore there should be no imbalance in age-qualifications types. Fig. 10 displays the marital age gap by each spouse's distance of birth, in months, to the ELR January-February threshold, normalized to 0. The graph confirms that the within-cohort variation in qualifications induced by ELR does not result in a discontinuity in the age gap of spouses around the January-February threshold, see Fig. 10, which supports our assertion that qualifications do not exert an impact on the marital age gap in absence of cross-cohort variation in qualifications.

5.5.2 Robustness to inherent between-cohort differences

When using the regression discontinuity design approach the crucial identifying assumption is that individuals in the neighborhood of the discontinuity are identical in characteristics. At the limit the comparison is between individuals born at the end of one academic cohort and the beginning of the next, and there may

[8] Age 16 is the precise age at which the first-tier academic examinations are available.

be an inherent degree of marital sorting across cohort thresholds that occurs in all years. To verify that our results are unique to the RoSLA threshold, we repeat the analysis using a placebo year threshold, four years prior to the actual reform implementation.

[Fig. 11]

Fig. 11 displays the marital age and qualifications gap by each spouse's distance of birth, in months, to the threshold (September 1953). As with the main results presented in Sections 5.2 and 5.3 the estimates are produced using the optimal bandwidth of 24 months and a quadratic polynomial of the running variable. The figures indicate no discontinuities in the qualifications difference between spouses, however there is evidence that the age gap adjusts at the threshold, although the difference at the threshold is not statistically significant.

In order to account for any inherent between-cohort differences at the August-September threshold in a regression we use a difference-in-difference procedure similar to the idea in Danzer and Lavy (2016). Instead of separately looking at a placebo year, we use the placebo cohorts as a control group in the estimation. We estimate the following specification:

$$Y_{ij} = \alpha_0 + \beta_0 After_j + \beta_1 RC_i^* After_j + \psi RC_i + \gamma_0 P_j^l + \delta_0 (After_j \times P_j^l) + a_j + \epsilon_{ij} \tag{2}$$

where, RC is an indicator for the cohorts around the RoSLA reform, which is zero for the control group cohorts around the placebo threshold; $After$ is an indicator variable denoting the individual is born after either the RoSLA or the placebo threshold in the respective group; $RC^* After$ is a dummy equal to 1 if the observation is after the threshold for the cohorts around the RoSLA discontinuity. Therefore, the treatment effect is described by β_1. Everything else is equal to specification in equation (1).

[Table 4]

Table 4 compares the results using the regression discontinuity around RoSLA to those produced in the difference-in-difference approach. The upper panel shows estimates from the baseline RD approach, the lower panel displays the results of the difference-in-difference estimation. Considering the marital age gap, the comparison reveals that there are no significant disparities between the estimates produced by either procedure, whereas with the qualifications gap the effect of RoSLA is slightly muted but remains significantly different from zero.

[Fig. 12]

The binary indicators we used to describe the different match types as shown in Fig. 6 might also be subject to recurring effects at the August-September threshold. In Fig. 12 we repeat the analysis using the placebo threshold again and find no relevant discontinuous jump in the matching proportions. Thus, the trade-off analysis in Section 5.4 is also robust to inherent between-cohort differences.

6 Discussion & conclusion

In this paper we have examined the impact of a compulsory schooling reform on marriage market matching behavior. We find that the reform induced a decrease in the marital age gap of women. The estimated reduction of 2.5 months is substantial compared to an average age gap of 24.8 months. Furthermore, affected women are not able to achieve the same degree of positive sorting on qualifications and are forced to accept atypical matches. In particular they mainly choose hypogametic matches with a preferred age gap and in fewer cases homogametic matches with younger husbands from treated cohorts. We find a corresponding but reversed effect for treated men, who are able to return to the prevailing sorting patterns as their potential partners in the ideal age are from younger cohorts and would therefore also be subject to the increased schooling requirement. In contrast, men born just before the threshold face the transitory imbalance across cohorts. As with women born after the RoSLA threshold, these men cannot achieve the typical match characteristics as women in their ideal age range have been exposed to the reform. In consequence, men born just before the threshold who have to deviate from the typical match more frequently choose women from older cohorts than higher qualified women with the preferred age gap. The observed imperfect substitution of age gaps and assortative educational matching indicate that people care about both the biological characteristics and the economically relevant factors when choosing a spouse. This is consistent with theories that do not rely on deterministic explanations of age gaps but rather on preferences for match characteristics, e.g., Bergstrom and Bagnoli (1993). Our results also accommodate the findings of Belot and Francesconi (2013), who acknowledge that besides the probability of meeting preferences play some role in the matching decision. However, our results emphasize the role of preferences in real world applications. Understanding the mechanisms of assortative mating is important, because it can explain substantial fractions of intergenerational inequality (Greenwood, Guner, Kocharkov, and Santos, 2014).

Our results have potential implications for analyses that use changes to compulsory school leaving age legislation to elicit causal effects of education. RD estimations require that at the threshold there is no other discontinuity than the treatment. However, due to the age gap, any cohort specific reform that is beneficial individually implies gender heterogeneity via the marriage market. Treated women are disadvantaged compared to their untreated counterparts because of the positive age gap and their tendency to marry men from not yet affected cohorts. In an RD setting these women are compared to those just before the threshold who can achieve the typical match. In contrast, treated men can achieve the typical match on the marriage market as their potential younger partners are already treated and they benefit from the reform at the same time. Compared to men born just before the threshold they are advantaged both by the reform and via the marriage market. Thus, for individual level outcomes the marriage market effect could be understood as another channel of the educational effect. For household level outcomes, the marriage market effect should be taken into consideration when justifying the identifying assumption. Moreover, any observed gender heterogeneity in reform effects may be driven through the marriage channel and implied changes in intra-household bargaining. This may explain stronger wage effects for males than for females from educational reforms, e.g., Devereux and Hart (2010) find a positive wage return of about 4% for men but none for women from the 1947 SLA reform. Moreover, the marriage market channel is especially important for long-term outcomes that are more heavily dependent on the household environment rather than on the individual characteristics alone such as intergenerational effects.

One important caveat to our analysis is that by estimating the effects through a regression discontinuity design, our estimates are applicable only to those individuals in the neighborhood of the reform's implementation. In reality the full impact of the reform will be smoothed over a number of cohorts. Understanding the full dynamic impact on matching behavior would entail looking at the reform in a general equilibrium, which is beyond the scope of this paper, but a promising avenue for future research.

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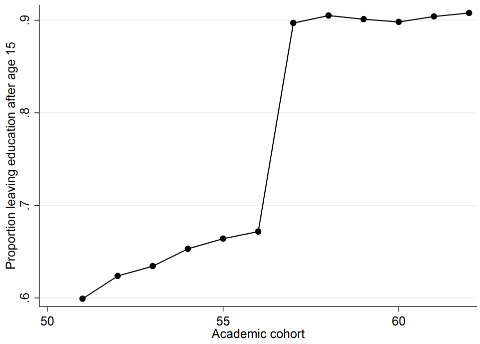
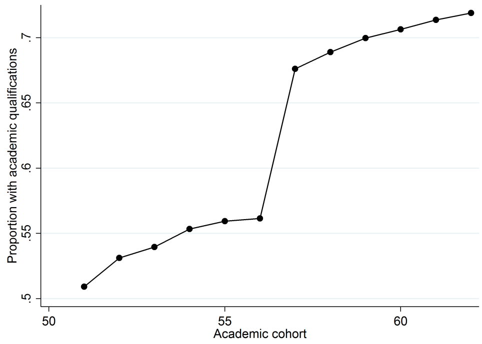
Figures & tables in order of appearance

Fig. 1: RoSLA effect on schooling



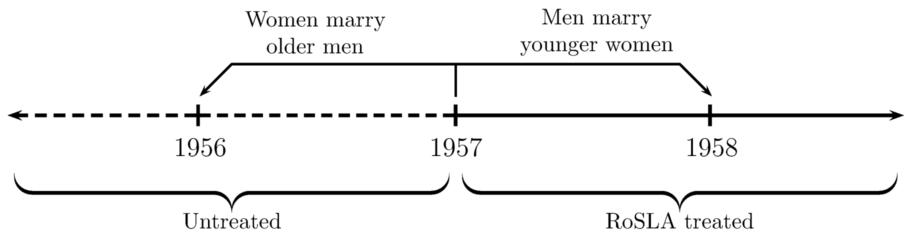
(a) Participation



(b) Academic Qualifications

Notes: The graphs show the proportion of individuals a) participating in education after age 15 and b) with an academic qualification by academic cohort of birth (Sept-Aug). RoSLA affected individuals born after after September 1st 1957.

Fig. 2: Illustration of candidate spouses around RoSLA threshold



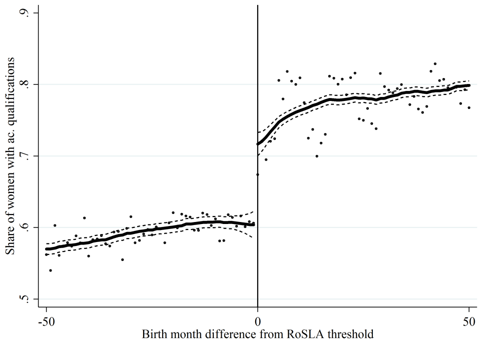
Notes: The graph illustrates the candidate spouses and their educational regime on a timeline of academic cohorts, with September 1957 being the threshold date for the RoSLA treatment.

Table 1: Descriptive statistics of LFS graph sample

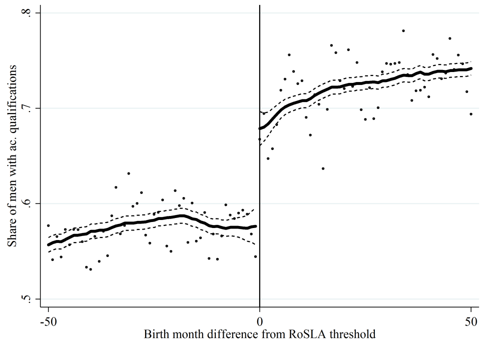
	N	Mean	S.D.	Min	Max
		Married Women			
Qualifications	116,709	0.68	0.47	0	1
White	138,133	0.99	0.09	0	1
Age	143,108	33.74	7.57	20	50
Survey year	143,108	91.11	7.67	75	106
Age gap	143,108	24.89	37.28	-120	120
Diff. qualif.	115,089	-0.08	0.53	-1	1
		Married Men			
Qualifications	108,965	0.65	0.48	0	1
White	126,020	0.99	0.09	0	1
Age	128,853	34.55	7.29	20	50
Survey year	128,853	91.86	7.45	75	106
Age gap	128,853	18.66	37.02	-120	120
Diff. qualif.	107,966	-0.07	0.53	-1	1

Notes: The table shows descriptive statistics of key variables. Sample restrictions: age gap is within 120 months to either side; own age is between 20 and 50 years; individuals born within academic cohorts 1951-1962.

Fig. 3: RD on own academic qualification by month of birth



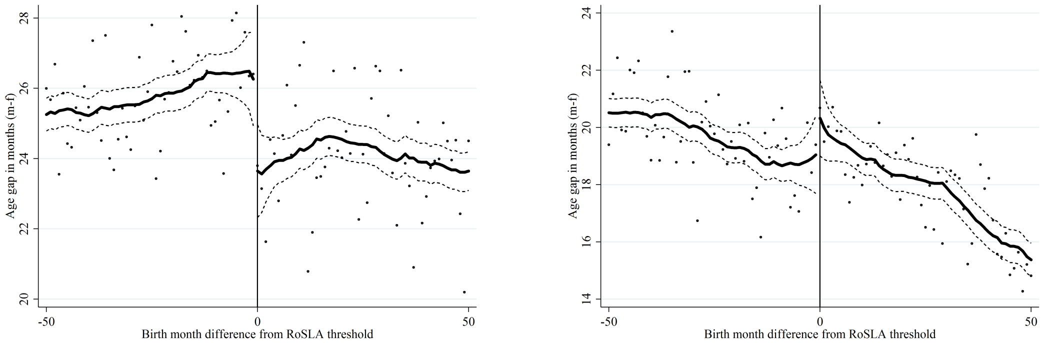
(a) Married Women



(b) Married Men

Notes: The graphs show local polynomial smooths indicating the likelihood an individual has obtained an academic qualification. The dots reflect means by each bin on the abscissa. The solid line is the local polynomial smooth with the bandwidth and degree as shown using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

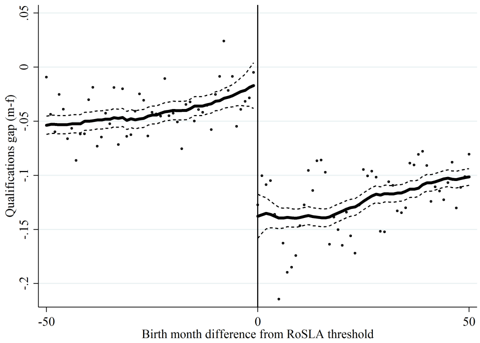
Fig. 4: Marital age gap at RoSLA threshold



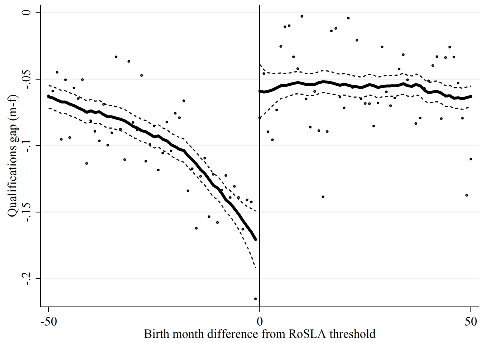
(a) Married Women (b) Married Men

Notes: The graphs show local polynomial smooths of marital age gaps in months (male-female). The dots reflect mean age gaps by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

Fig. 5: Marital qualifications gap at RoSLA threshold



(a) Married Women



(b) Married Men

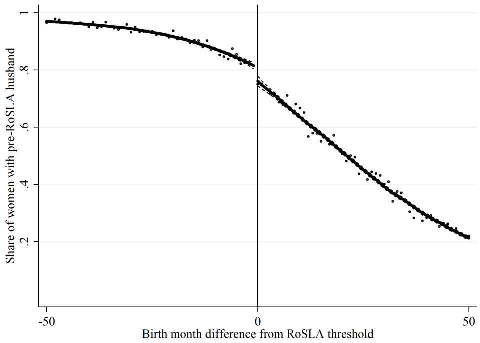
Notes: The graphs show local polynomial smooths of difference in qualifications between spouses (male-female). The dots reflect mean qualifications difference by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

Table 2: Change in marital age gap at RoSLA threshold

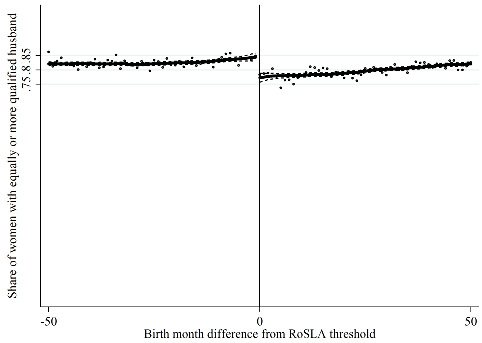
	(1)	(2)	(3)	(4)	(5)	(6)
	Married Women					
Optimal Bandwidth (24)	-3.054***	-2.537**	-5.836***	-2.882***	-2.598**	-5.757***
	(0.695)	(0.825)	(1.326)	(0.683)	(0.797)	(1.300)
N	48,657	48,657	48,657	48,104	48,104	48,104
G-statistic (p-value)	0.022	0.016	0.089	0.018	0.011	0.059
AIC	491,926	491,929	491,922	486,128	486,132	486,125
½ x Optimal B. (12)	-4.595***	-3.898**	-0.674	-4.544***	-3.859**	-0.692
	(0.790)	(1.057)	(1.264)	(0.772)	(1.027)	(1.191)
N	24,273	24,273	24,273	24,116	24,116	24,116
G-statistic (p-value)	0.493	0.451	0.619	0.374	0.325	0.463
AIC	245,358	245,361	245,360	243,639	243,642	243,641
2 x Optimal B. (48)	-2.410***	-2.989***	-3.238***	-2.305***	-2.977***	-3.056***
	(0.548)	(0.711)	(0.775)	(0.546)	(0.703)	(0.754)
N	96,657	96,657	96,657	94,320	94,320	94,320
G-statistic (p-value)	0.013	0.012	0.011	0.011	0.010	0.010
AIC	975,294	975,297	975,299	951,731	951,733	951,736
	Married Men					
Optimal Bandwidth (24)	1.170	1.160	2.040*	1.216*	1.066	2.036*
	(0.594)	(0.697)	(0.855)	(0.597)	(0.710)	(0.846)
N	44,466	44,466	44,466	44,239	44,239	44,239
G-statistic (p-value)	0.823	0.871	0.850	0.734	0.804	0.782
AIC	446,900	446,901	446,904	444,292	444,292	444,295
½ x Optimal B. (12)	2.087**	1.066	-1.302	2.019**	1.019	-0.978
	(0.691)	(0.817)	(1.158)	(0.695)	(0.812)	(1.125)
N	22,373	22,373	22,373	22,314	22,314	22,314
G-statistic (p-value)	0.814	0.826	0.872	0.695	0.732	0.744
AIC	224,543	224,545	224,547	223,791	223,793	223,795
2 x Optimal B. (48)	1.668***	1.083	1.485*	1.704***	1.145	1.416*
	(0.443)	(0.646)	(0.712)	(0.445)	(0.645)	(0.712)
N	87,187	87,187	87,187	86,106	86,106	86,106
G-statistic (p-value)	0.456	0.430	0.449	0.462	0.433	0.451
AIC	876,672	876,675	876,677	865,532	865,535	865,536
Polyn. degree	1	2	3	1	2	3
Basic controls	No	No	No	Yes	Yes	Yes

Notes: The table shows estimates from local parametric estimation of equation (1) as described in Section 4.1 using different bandwidths, over rows, and polynomial degrees 1 to 3 over columns. The dependent variable is the spousal age gap measured in months (male-female). Controls include own age and ethnicity. The bandwidth reflects the number of values of the running variable (month of birth) on each side of the discontinuity. Standard errors are robust and allow for random and identical specification errors. Below the estimates the p-value of the Lee and Card (2008) G-statistic and the Akaike Information Criterion indicate goodness of the polynomial fit. Robust standard errors reported in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

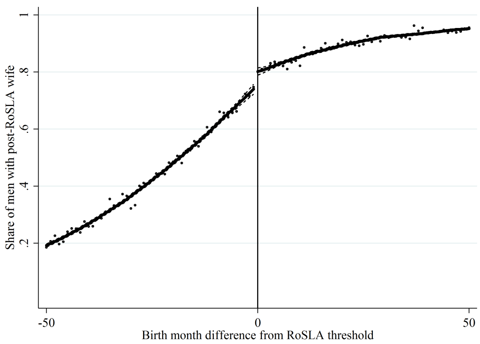
Fig. 6: Spouse characteristics around RoSLA



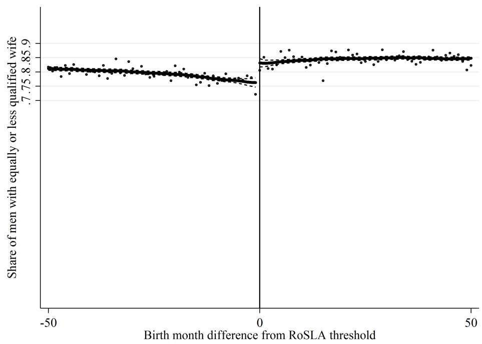
(a) Pre-RoSLA husband (by female m.o.b.)



(b) Homogamy or hypergamy (by female m.o.b.)



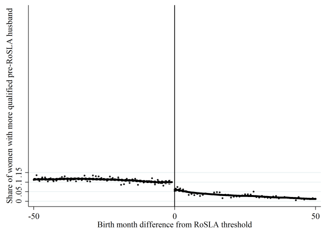
(c) Post-RoSLA wife (by male m.o.b.)



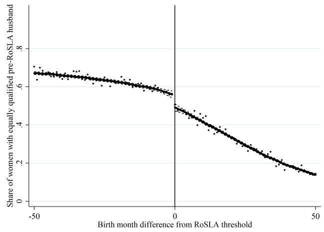
(d) Homogamy or hypergamy (by male m.o.b.)

Notes: Graphs (a) and (c) show local polynomial smooths of whether a spouse is from a pre- or post-RoSLA cohort; graphs (b) and (d) display the proportion of marriages involving equally qualified partners. The dots reflect mean qualifications difference by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

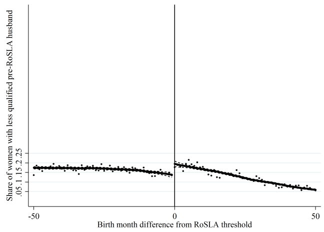
Fig. 7: Match types of married women



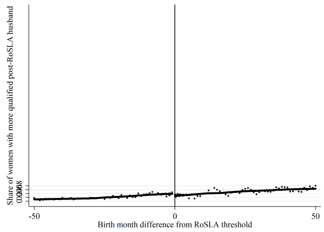
(a) Pre-RoSLA husband, hypergamy



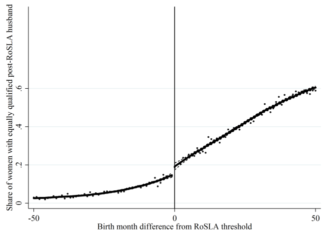
(b) Pre-RoSLA husband, homogamy



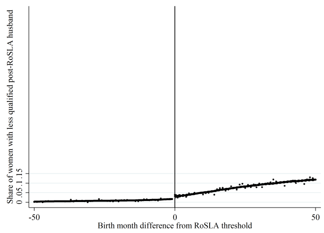
(c) Pre-RoSLA husband, hypogamy



(d) Post-RoSLA husband, hypergamy



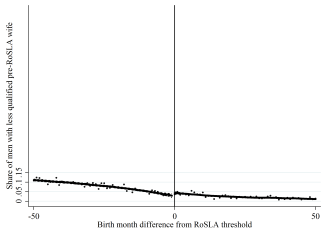
(e) Post-RoSLA husband, homogamy



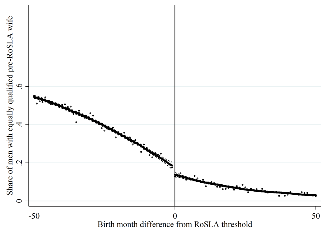
(f) Post-RoSLA husband, hypogamy

Notes: The graphs show local polynomial smooths of match types with regard to spousal characteristics. The dots reflect mean age gaps by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

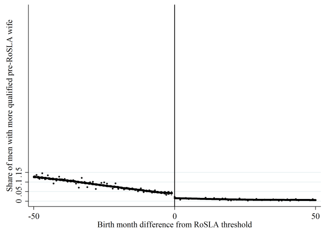
Fig. 8: Match types of married men



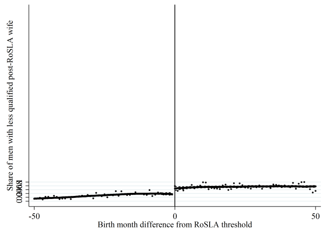
(a) Pre-RoSLA wife, hypergamy



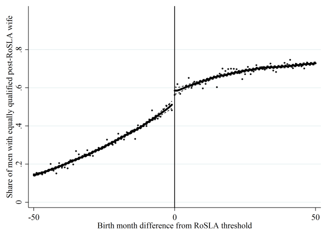
(b) Pre-RoSLA wife, homogamy



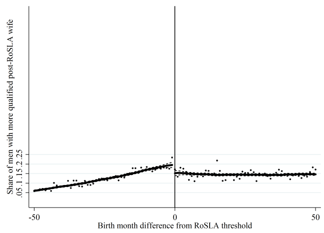
(c) Pre-RoSLA wife, hypogamy



(d) Post-RoSLA wife, hypergamy



(e) Post-RoSLA wife, homogamy



(f) Post-RoSLA wife, hypogamy

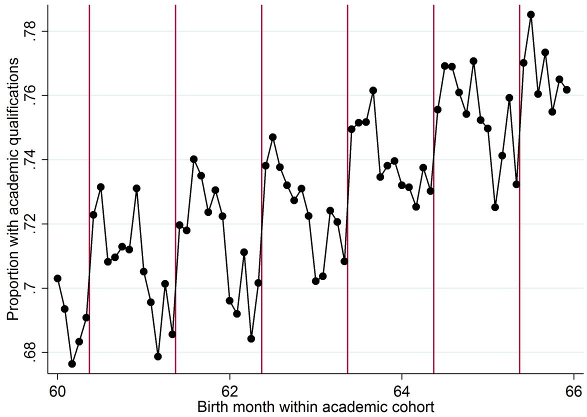
Notes: The graphs show local polynomial smooths of match types with regard to spousal characteristics. The dots reflect mean age gaps by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

Table 3: Change in match types around the discontinuity

	Women			Men		
	Pre-RoSLA husband			Post-RoSLA Wife		
	Hypergamy	Homogamy	Hypogamy	Hypergamy	Homogamy	Hypogamy
Discontinuity	-0.039***	-0.062***	0.059***	0.030***	0.062**	-0.045**
	(0.008)	(0.009)	(0.011)	(0.007)	(0.020)	(0.021)
N	39,764	39,764	39,764	38,041	38,041	38,041
	Post-RoSLA husband			Pre-RoSLA Wife		
	Hypergamy	Homogamy	Hypogamy	Hypergamy	Homogamy	Hypogamy
Discontinuity	-0.011	0.039***	0.014**	0.017**	-0.038***	-0.025***
	(0.007)	(0.009)	(0.005)	(0.005)	(0.009)	(0.004)
N	39,764	39,764	39,764	38,041	38,041	38,041

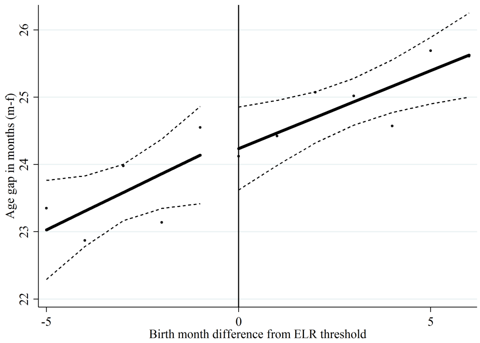
Notes: The table shows estimates from local parametric estimation of equation (1) as described in Section 4.1 using the preferred specification (bandwidth of 24 months and a quadratic polynomial in the running variable. The dependent variable is the relative qualification level of the spouse, over columns, estimated separately for pre-and post-RoSLA partners, over rows. Controls include own age and ethnicity. Standard errors are robust and allow for random and identical specification errors. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Fig. 9: ELR effect

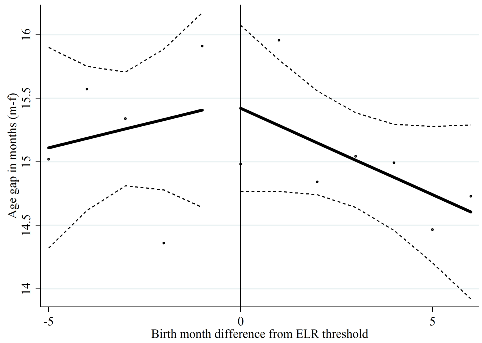


Notes: The graph displays the proportion of individuals holding an academic qualification by month of birth within an academic cohort. The vertical lines indicate the threshold of the Easter Leaving Rule (February within each academic cohort).

Fig. 10: Placebo test of education reform w/o scarcity of types



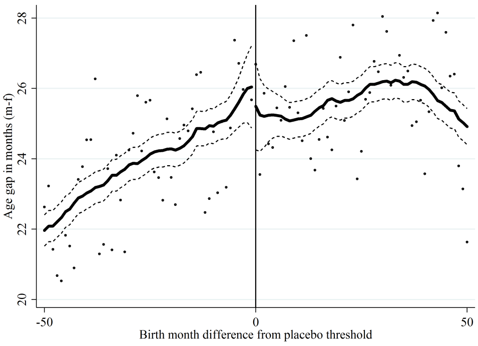
(a) Married women



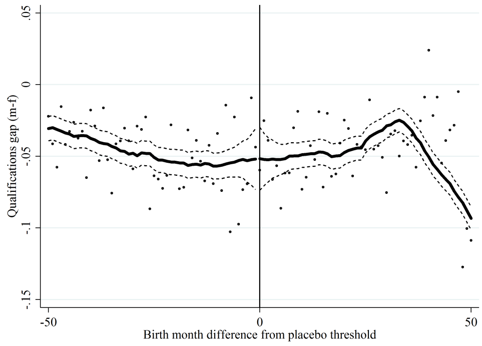
(b) Married men

Notes: The graphs show local polynomial smooths of age gaps in months (husband-wife). The running variable is calendar month of birth. The dots reflect means by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 1 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

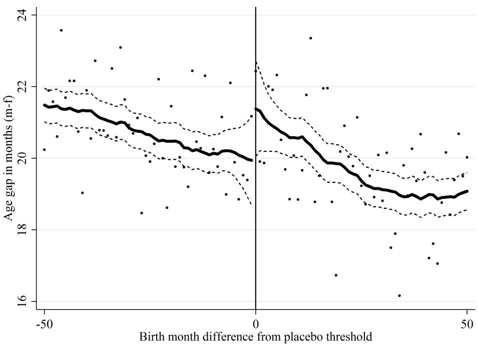
Fig. 11: Age gap and qualifications gap around placebo threshold



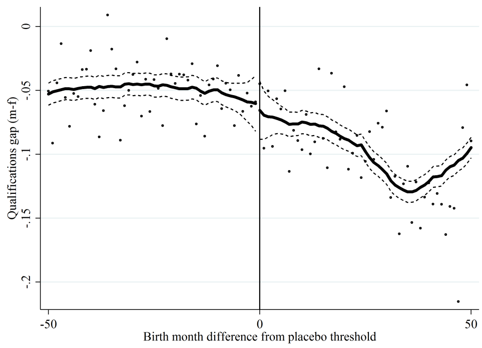
(a) Marital Age Gap (by female m.o.b.)



(b) Qualifications Gap (by female m.o.b.)



(c) Marital Age Gap (by male m.o.b.)



(d) Qualifications Gap (by male m.o.b.)

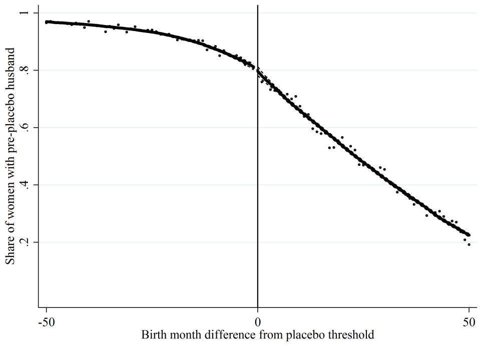
Notes: Graphs (a) and (b) show local polynomial smooths of the marital age and qualifications gap by female month of birth relative to the placebo threshold, four years prior to RoSLA. Graphs (c) and (d) display the analogous plots for males. The dots reflect mean qualifications difference by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

Table 4: Difference-in-Difference: Age and Qualifications

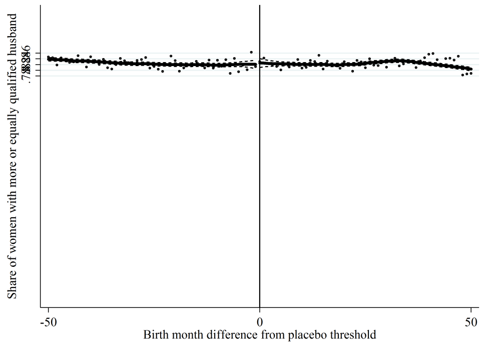
	Women		Men	
	Age Gap	Quals Gap	Age Gap	Quals Gap
RoSLA RD	-2.534**	-0.123***	1.159	0.117***
	(0.825)	(0.019)	(0.698)	(0.025)
N	48,668	39,775	44,475	38,050
RD-DiD	-2.800***	-0.109***	0.123	0.103***
	(0.514)	(0.009)	(0.447)	(0.011)
N	104,966	80,099	95,941	76,936

Notes: The upper panel shows estimates from local parametric estimation of equation (1) as described in Section 4.1 around the RoSLA threshold, using the preferred specification (bandwidth of 24 months and a quadratic polynomial in the running variable). The lower panel displays estimates from the regression discontinuity difference-in-difference procedure as described by equation 2 in Section 5.5.2. Controls include own age and ethnicity. Standard errors are robust and allow for random and identical specification errors. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

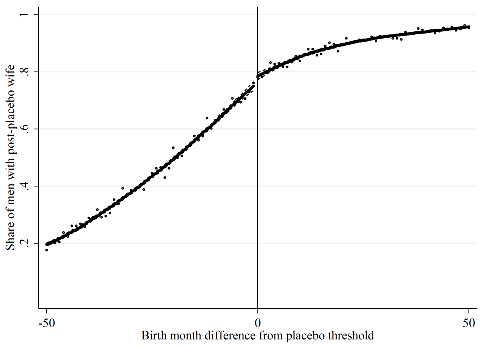
Fig. 12: Spouse characteristics around placebo threshold



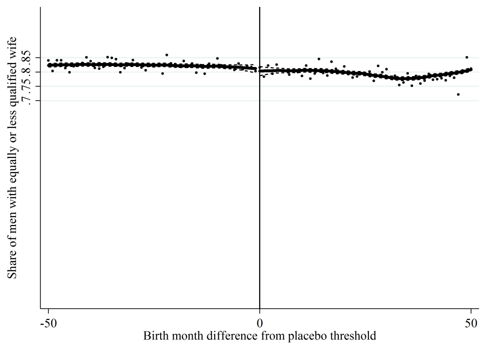
(a) Pre-placebo husband (by female m.o.b.)



(b) Homogamy or hypergamy (by female m.o.b.)



(c) Post-placebo wife (by male m.o.b.)

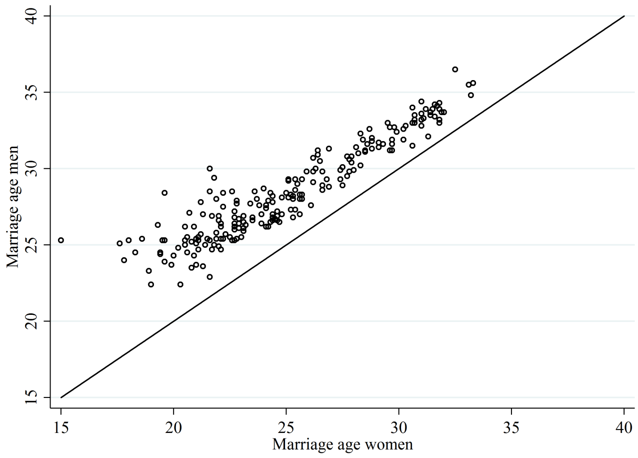


(d) Homogamy or hypergamy (by male m.o.b.)

Notes: Graphs (a) and (c) show local polynomial smooths of whether a spouse is from a pre- or post-placebo cohort, four years prio to RoSLA; graphs (b) and (d) display the proportion of marriages involving equally qualified partners. The dots reflect mean qualifications difference by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

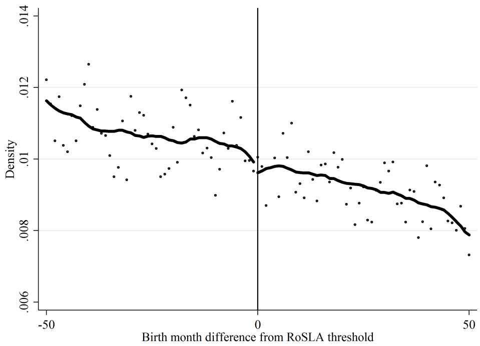
Supplementary Material

Fig. S.1: Age at marriage

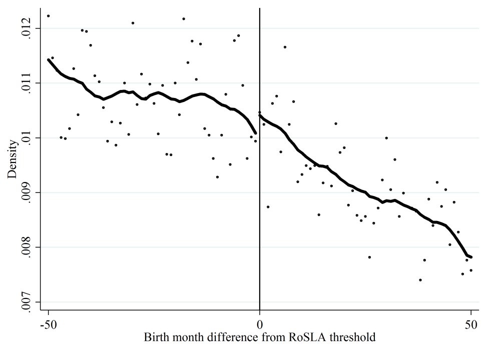


Notes: The graph shows mean age at marriage for women and men for all 218 countries for which marriage age data is available. Most recent figures, different years between countries. Source: UN.

Fig. S.2: Density test



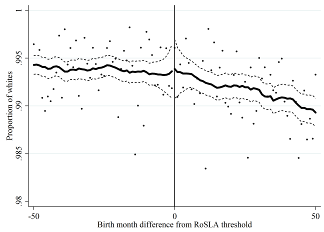
(a) Married Women



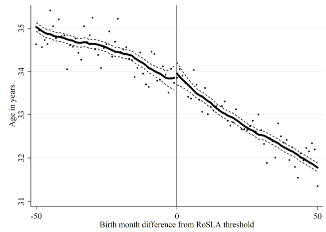
(b) Married Men

Notes: The graphs show local polynomial smooths of the density of observations in the sample per birth month. The dots reflect means by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa.

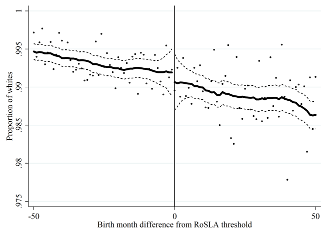
Fig. S.3: Balancing of control variables



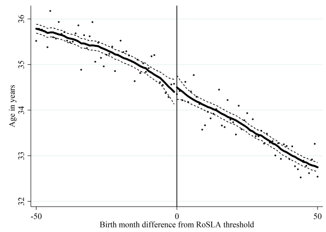
(a) Married Women



(b) Married Women



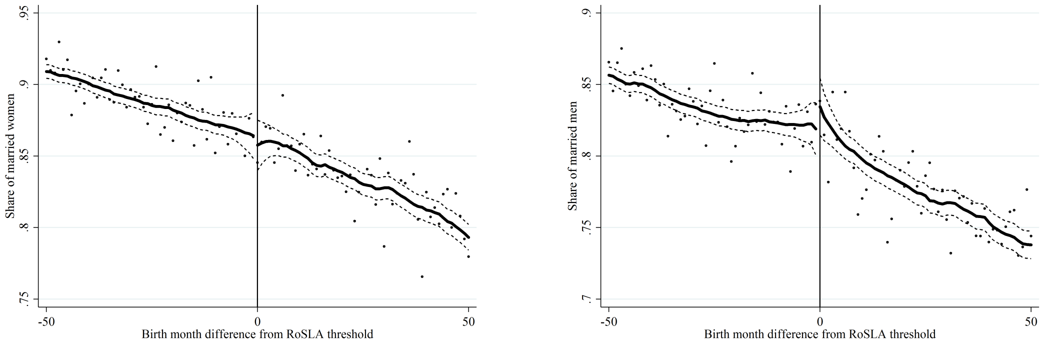
(c) Married Men



(d) Married Men

Notes: The graphs show local polynomial smooths of the control variables age and ethnicity. The dots means by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

Fig. S.4: Probability of marriage



(a) Women (b) Men

Notes: The graphs show local polynomial smooths of the proportion of married individuals 35 years and older from the full LFS sample. The dots reflect mean fractions married by each bin on the abscissa. The solid line is the local polynomial smooth with bandwidth 24 and degree 2 using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial.

Table S.1: RoSLA on own academic qualification by month of birth

	(1)	(2)	(3)	(4)	(5)	(6)
			Married Women			
Optimal Bandwidth (24)	0.121***	0.114***	0.055***	0.120***	0.113***	0.054***
	(0.016)	(0.020)	(0.015)	(0.016)	(0.020)	(0.015)
N	40,264	40,264	40,264	40,264	40,264	40,264
G-statistic (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AIC	51,247	51,248	51,200	51,221	51,222	51,174
1/2 x Optimal B. (12)	0.089***	0.052**	0.096***	0.089***	0.052**	0.095***
	(0.013)	(0.015)	(0.017)	(0.013)	(0.015)	(0.017)
N	20,119	20,119	20,119	20,119	20,119	20,119
G-statistic (p-value)	0.004	0.086	0.277	0.002	0.044	0.165
AIC	25,689	25,679	25,675	25,675	25,665	25,661
2 x Optimal B. (48)	0.133***	0.124***	0.111***	0.133***	0.123***	0.110***
	(0.013)	(0.018)	(0.017)	(0.013)	(0.018)	(0.017)
N	79,397	79,397	79,397	79,397	79,397	79,397
G-statistic (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AIC	100,418	100,414	100,400	100,309	100,305	100,290
			Married Men			
Optimal Bandwidth (24)	0.111***	0.102***	0.092***	0.111***	0.101***	0.092***
	(0.013)	(0.020)	(0.025)	(0.013)	(0.020)	(0.025)
N	38,383	38,383	38,383	38,383	38,383	38,383
G-statistic (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AIC	51,625	51,628	51,622	51,590	51,593	51,587
1/2 x Optimal B. (12)	0.086***	0.112***	0.163***	0.086***	0.111***	0.163***
	(0.019)	(0.020)	(0.016)	(0.019)	(0.020)	(0.016)
N	19,391	19,391	19,391	19,391	19,391	19,391
G-statistic (p-value)	0.002	0.072	0.723	0.001	0.036	0.586
AIC	26,217	26,205	26,194	26,203	26,191	26,180
2 x Optimal B. (48)	0.111***	0.121***	0.106***	0.111***	0.121***	0.105***
	(0.011)	(0.014)	(0.017)	(0.011)	(0.014)	(0.017)
N	74,843	74,843	74,843	74,843	74,843	74,843
G-statistic (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AIC	100,029	100,021	100,020	99,929	99,922	99,921
Polyn. degree	1	2	3	1	2	3
Basic controls	No	No	No	Yes	Yes	Yes

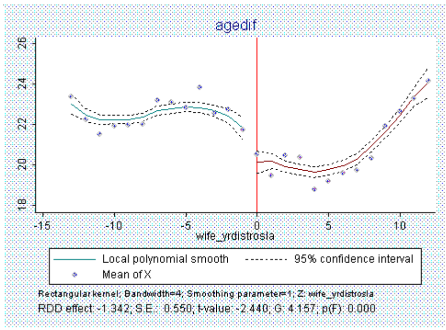
Notes: The table shows estimates from local parametric estimation of equation (1) as described in Section 4.1 using different bandwidths, over rows, and polynomial degrees 1 to 3 over columns. The dependent variable is an indicator for own academic qualifications. Controls include own age and ethnicity. The bandwidth reflects the number of values of the running variable (month of birth) on each side of the discontinuity. Standard errors are robust and allow for random and identical specification errors. Below the estimates the p-value of the Lee and Card (2008) G-statistic and the Akaike Information Criterion indicate goodness of the polynomial fit. Robust standard errors reported in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table S.2: Sensitivity to upper age limit

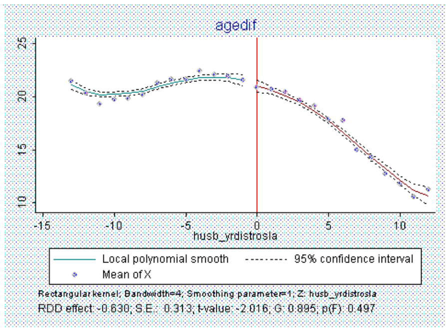
	No upper limit			Upper age=50			Upper age=45			Upper age=40		
Polynomial order	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Married Women											
Optimal Bandwidth (24)	-3.059***	-2.534**	-5.835***	-3.054***	-2.537**	-5.836***	-3.223***	-2.791**	-6.280***	-3.821***	-3.530**	-7.446***
	(0.696)	(0.825)	(1.326)	(0.695)	(0.825)	(1.326)	(0.763)	(0.876)	(1.404)	(0.833)	(1.141)	(1.359)
N	48668	48668	48668	48657	48657	48657	44525	44525	44525	37420	37420	37420
G-statistic (p-value)	0.022	0.016	0.088	0.022	0.016	0.089	0.006	0.004	0.029	0.016	0.010	0.084
1/2 x Optimal B. (12)	-4.595***	-3.898**	-0.674	-4.595***	-3.898**	-0.674	-4.889***	-4.417**	-0.347	-5.448***	-5.934***	-2.667
	(0.790)	(1.057)	(1.264)	(0.790)	(1.057)	(1.264)	(0.865)	(1.226)	(1.626)	(1.033)	(1.256)	(1.997)
N	24273	24273	24273	24273	24273	24273	22237	22237	22237	18686	18686	18686
G-statistic (p-value)	0.493	0.451	0.619	0.493	0.451	0.619	0.250	0.231	0.449	0.341	0.266	0.329
2 x Optimal B. (48)	-2.434***	-2.972***	-3.289***	-2.410***	-2.989***	-3.238***	-2.504***	-2.964***	-3.663***	-2.876***	-3.590***	-4.404***
	(0.542)	(0.702)	(0.760)	(0.548)	(0.711)	(0.775)	(0.599)	(0.793)	(0.867)	(0.623)	(0.876)	(1.045)
N	97424	97424	97424	96657	96657	96657	89047	89047	89047	74957	74957	74957
G-statistic (p-value)	0.025	0.023	0.020	0.013	0.012	0.011	0.002	0.002	0.001	0.004	0.004	0.004
	Married Men											
Optimal Bandwidth (24)	1.171	1.159	2.040*	1.170	1.160	2.040*	1.310*	1.206	2.186*	1.178	1.163	1.593
	(0.594)	(0.698)	(0.856)	(0.594)	(0.697)	(0.855)	(0.649)	(0.719)	(0.949)	(0.779)	(0.924)	(1.205)
N	44475	44475	44475	44466	44466	44466	40497	40497	40497	33452	33452	33452
G-statistic (p-value)	0.823	0.871	0.850	0.823	0.871	0.850	0.507	0.663	0.626	0.138	0.293	0.267
1/2 x Optimal B. (12)	2.087**	1.066	-1.302	2.087**	1.066	-1.302	2.068**	1.164	-0.773	1.829*	0.572	-1.566
	(0.691)	(0.817)	(1.158)	(0.691)	(0.817)	(1.158)	(0.646)	(0.775)	(0.885)	(0.863)	(1.018)	(1.082)
N	22373	22373	22373	22373	22373	22373	20393	20393	20393	16886	16886	16886
G-statistic (p-value)	0.814	0.826	0.872	0.814	0.826	0.872	0.861	0.919	0.947	0.581	0.736	0.804
2 x Optimal B. (48)	1.703***	1.116	1.430*	1.668***	1.083	1.485*	1.926***	1.109	1.518*	2.014**	0.951	1.542
	(0.444)	(0.647)	(0.706)	(0.443)	(0.646)	(0.712)	(0.469)	(0.670)	(0.715)	(0.597)	(0.843)	(0.978)
N	87928	87928	87928	87187	87187	87187	79870	79870	79870	65894	65894	65894
G-statistic (p-value)	0.475	0.448	0.475	0.456	0.430	0.449	0.225	0.223	0.275	0.010	0.012	0.023

Notes: The table shows estimates from local parametric estimation of equation (1) as described in Section 4.1 using different bandwidths, over rows, polynomial degrees 1 to 3 over columns. The dependent variable is the spousal age gap measured in months (male-female). Controls include own age and ethnicity. The tables compare samples constructed using differing upper age limits as indicated. The bandwidth reflects the number of values of the running variable (month of birth) on each side of the discontinuity. Standard errors are robust and allow for random and identical specification errors. Below the estimates the p-value of the Lee and Card (2008) G-statistic indicate goodness of the polynomial fit. Robust standard errors reported in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Fig. S.5: RD on marital age gap husband-wife by academic cohort



(a) Wives–Census



(b) Husbands–Census

Notes: The graphs show local polynomial smooths of marital age gaps in months (husband-wife). The dots reflect mean age gaps by each bin on the abscissa. The solid line is the local polynomial smooth with the bandwidth and degree as shown using a rectangular kernel and the grid on the abscissa. The dashed lines are 95% confidence intervals of the local polynomial. The Census Longitudinal Study (CLS) is comprised of linked census records from the 1971-2001 censuses of individuals born on four specific days of the year, capturing approximately 1% of the population. To preserve confidentiality the data released for analysis is restricted to academic year of birth for each spouse only. The permission of the Office for National Statistics to use the Longitudinal Study is gratefully acknowledged, as is the help provided by staff of the Centre for Longitudinal Study Information, in particular Chris Marshall, Rachel Stuchbury and Wei Xun, as well as User Support (CeLSIUS). CeLSIUS is supported by the ESRC Census of Population Programme (Award Ref: RES-348-25-0004). The authors alone are responsible for the interpretation of the data. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland. Source: Census.

Table S.3: Change in marital qualifications gap at RoSLA threshold

	(1)	(2)	(3)	(4)	(5)	(6)
			Married Women			
Optimal Bandwidth (24)	-0.117***	-0.123***	-0.065*	-0.117***	-0.123***	-0.065*
	(0.016)	(0.019)	(0.027)	(0.016)	(0.019)	(0.027)
N	39,764	39,764	39,764	39,764	39,764	39,764
p_G	0.000	0.000	0.001	0.000	0.000	0.000
AIC	63,544	63,547	63,522	63,530	63,534	63,509
1/2 x Optimal B. (12)	-0.100***	-0.056	-0.141***	-0.100***	-0.057	-0.142***
	(0.017)	(0.031)	(0.019)	(0.017)	(0.031)	(0.018)
N	19,885	19,885	19,885	19,885	19,885	19,885
p_G	0.000	0.006	0.183	0.000	0.002	0.115
AIC	31,787	31,779	31,767	31,783	31,776	31,764
2 x Optimal B. (48)	-0.122***	-0.123***	-0.110***	-0.122***	-0.123***	-0.110***
	(0.012)	(0.017)	(0.017)	(0.012)	(0.017)	(0.017)
N	78,318	78,318	78,318	78,318	78,318	78,318
p_G	0.000	0.000	0.000	0.000	0.000	0.000
AIC	124,159	124,162	124,161	124,159	124,161	124,160
			Married Men			
Optimal Bandwidth (24)	0.108***	0.117***	0.090*	0.108***	0.117***	0.090*
	(0.016)	(0.025)	(0.036)	(0.016)	(0.025)	(0.036)
N	38,041	38,041	38,041	38,041	38,041	38,041
p_G	0.000	0.000	0.000	0.000	0.000	0.000
AIC	59,364	59,368	59,357	59,364	59,367	59,356
1/2 x Optimal B. (12)	0.094***	0.118***	0.162***	0.094***	0.118***	0.162***
	(0.023)	(0.030)	(0.034)	(0.023)	(0.030)	(0.034)
N	19,217	19,217	19,217	19,217	19,217	19,217
p_G	0.007	0.043	0.155	0.003	0.021	0.085
AIC	30,158	30,153	30,149	30,157	30,151	30,148
2 x Optimal B. (48)	0.095***	0.118***	0.114***	0.095***	0.118***	0.114***
	(0.012)	(0.017)	(0.022)	(0.012)	(0.017)	(0.022)
N	74,150	74,150	74,150	74,150	74,150	74,150
p_G	0.000	0.000	0.000	0.000	0.000	0.000
AIC	115,507	115,500	115,500	115,510	115,504	115,504
Polyn. degree	1	2	3	1	2	3
Basic controls	No	No	No	Yes	Yes	Yes

Notes: The table shows estimates from local parametric estimation of equation (1) as described in Section 4.1 using different bandwidths, over rows, and polynomial degrees 1 to 3 over columns. The dependent variable is the spousal age gap measured in months (male-female). Controls include own age and ethnicity. The bandwidth reflects the number of values of the running variable (month of birth) on each side of the discontinuity. Standard errors are robust and allow for random and identical specification errors. Below the estimates the p-value of the Lee and Card (2008) G-statistic and the Akaike Information Criterion indicate goodness of the polynomial fit. Robust standard errors reported in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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