

## Do Opposites Attract? Educational Assortative Mating and Dynamics of Wage Homogamy in Switzerland, 1992–2014

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*Abstract:* This paper addresses homogamy and assortative mating in Switzerland. The empirical analysis monitors trends for education and hourly wages using the Swiss Labour Force Survey and the Swiss Household Panel. The analysis disentangles the effects of educational expansion from mating patterns and incorporates not only couples, but also singles. Results show an increasing level of assortative mating both for education and for wages. For wage homogamy, selection is more important than adaptation.

*Keywords:* educational expansion, assortative mating, hourly wages, homogamy; cohabitation

### Ziehen sich Gegensätze an? Bildungs- und Lohnhomogamie in der Schweiz und ihre Veränderung zwischen 1992 und 2014

*Zusammenfassung:* Dieser Beitrag thematisiert die Bildungs- und Lohnhomogamie bei der Partnerwahl in der Schweiz. Die empirische Analyse beschreibt die Veränderungen anhand der Daten der Arbeitskräfteerhebung und des Schweizer Haushalt-Panels. Die Analyse berücksichtigt sowohl Paare als auch Singles und unterscheidet zwischen Auswirkungen der Bildungsexpansion und der Partnerwahl. Die Resultate zeigen eine Zunahme der positionsgleichen Partnerwahl bei der Bildung und bei den Löhnen. Für die Lohnhomogamie sind Selektionseffekte stärker als Anpassungseffekte.

*Schlüsselwörter:* Bildungsexpansion, Homogamie, assortative mating, Lohnniveau, Kohabitation

### Les opposés s'attirent-ils ? L'appariement sélectif selon le niveau l'éducation et les dynamiques d'homogamie de revenu en Suisse, 1992–2014

*Résumé:* Cet article porte sur l'homogamie et l'appariement sélectif en Suisse. L'analyse empirique s'appuie sur l'évolution des niveaux d'éducation et des salaires horaires à partir de l'Enquête suisse sur la population active et le Panel suisse de ménages.

L'analyse distingue les effets de l'expansion scolaire des effets de l'appariement sélectif en incorporant les célibataires. Les résultats montrent un niveau croissant d'appariement sélectif selon le niveau d'éducation et les revenus. En outre, la sélection est plus importante que l'adaptation.

*Mots-clés:* expansion scolaire, appariement sélectif, salaires horaires, homogamie, cohabitation

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## 1 Introduction

Marrying someone similar to ourselves is a phenomenon that social scientists call assortative mating. Assortative mating is based on one or more factors including ethnicity, parental background, religion, and migration status and results in homogamy. While absolute homogamy refers to the share of homogenous couples, assortative mating refers to a preference to choose a similar partner over other possible partners. At the societal level, assortative mating is used as an indicator of stratification and it can be seen as a form of group closure and of social immobility (Kalmijn 1998).

In this paper, we focus on socio-economic aspects of assortative mating in Switzerland by analysing education and hourly wages. Assortative mating can contribute to the transmission of economic status (Kremer 1997; Chadwick and Solon 2002; Black and Devereux 2011) and can be a potential driver of income inequality because societies in which similar earners intermarry are more unequal than those in which high earners marry low earners (Esping-Andersen 2007; Schwartz 2010; 2013). Education is an important factor that affects the social status of individuals and consequently the level of economic inequalities (Sweeney and Cancian 2004). Due to educational expansion, the meaning of education and its role for mating patterns is likely to have changed over time (Blossfeld 2009; Schwartz and Mare 2005). An example is the cliché of doctors who formerly married nurses and who are now more likely to marry other doctors (Esping-Andersen and Myles 2011). The rising wage dispersion among graduates (Lemieux 2006; Budría and Telhado 2011) might also imply that the signalling effect of tertiary education in terms of earnings and social status has declined over time.

The literature on assortative mating points to several issues to solve. First, not only marital preferences, but also the probability of finding a partner in the first place needs to be considered (Breen and Salazar 2010). The exclusion of singles from the analysis might therefore miss important changes in assortative mating. Second, the distinction of educational levels is not sufficient to measure homogamy in socio-economic status.<sup>1</sup> For this reason, researchers should also investigate other relevant characteristics (Schwartz 2013). Third, most papers on economic assortative mating analyse annual earnings, which are determined not only by hourly wage, but also by labour supply (Dribe and Nystedt 2013). Because labour market participation and the number of hours worked is a joint decision within couples, annual earnings are problematic indicators for studying assortative mating (Pestel 2016; Frémeaux and Lefranc 2015). Fourth, many women do not participate in the labour market and thus earn nothing. Because labour force participation is related to the level of earnings, the omission of inactive individuals will induce bias. Rich data are required

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1 For example, the detailed educational levels in the SHP (pooled sample 2000–2014) explain only 15% of the variation of men's hourly wages and 10% of the variation of men's realised yearly earnings. For women, the explained variances amount to 12 and 15 %, respectively.

for a good imputation model of hourly wages. Finally, it is difficult to disentangle to what extent earning differences between partners are due to selection into couples rather than to adaptation to the partner (Nakosteen et al. 2004).

Our contribution addresses these issues and applies them to the Swiss case. We first assess the evolution of absolute homogamy and educational assortative mating using the Swiss Labour Force Survey 1992–2014 and then move to homogamy in hourly wages using the Swiss Household Panel 2000–2014. To the best of our knowledge, information on homogamy in Switzerland remains scarce, outdated and limited to educational levels. In this country, there has been considerable educational expansion, which increased the share of tertiary-educated individuals from 8% in 1992 to 27% in 2014 for working-age women and from 23% to 45% for working-age men. Even though the educational expansion has been relatively slow in Switzerland, women in younger cohorts have meanwhile reached men in terms of education (Becker and Zangger 2013).

Besides providing evidence on Switzerland, we contribute to the previous literature on the topic in two respects. First, the use of panel data helps to distinguish effects from intra-couple decisions (adaptation) from effects from assortative mating (selection). Second, we specifically model the relationship between educational homogamy and wage homogamy.

This paper is organised as follows. After presenting the theoretical framework (Section 2) and providing a literature review on the topic (Section 3), it describes the data and the methodology (Section 4) and the empirical results (Section 5). Section 6 concludes by highlighting the main results and discussing the consequences of assortative mating on inequalities more generally.

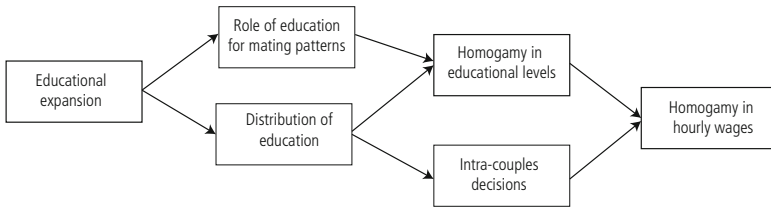
## 2 Theoretical framework and previous literature

Figure 1 summarises the theoretical framework that will guide our analysis and illustrates the multiple connections between educational expansion, educational homogamy, and homogamy in hourly wages. Even if not shown in the Figure, there might be differences between population groups. We will now explain the different links in more detail. We refer to homogamy as a similarity of partners with respect to the absolute level of education or wages. Assortative mating reflects the preference to choose a similar partner over other partners and thus relates to the ranking in education or in the wage distribution.

### 2.1 Assortative mating and education

There are many potential and mostly unconscious reasons why people tend to choose a similar partner and these reasons range from values and social expectations to overlapping social networks (Kalmijn 1998). Regarding education, individuals

Figure 1 Theoretical framework on the link between educational expansion, educational assortative mating and homogamy in hourly wages



may choose a partner with the same educational level because they share the same interests, communicate in a similar way, or because they meet each other more frequently (e. g. at university or at the workplace). In addition to these similarities, highly educated partners might be preferred because education is linked to higher income and ability. The degree of educational assortative mating can be interpreted as the importance given to education in the selection of the partner.

Educational expansion might affect educational homogamy through two different processes: by the alteration of the marginal distribution of educational levels and by the change in preferences for the suitable partner. Even when preferences and mating patterns remain constant, more tertiary educated individuals translate into more couples in which both partners have a tertiary education degree. The change in preferences is what interests us the most.

There are different theories that claim that the role of education in the selection of the partner has changed over time. The technical change hypothesis advanced by economists attributes a rising importance of education for mating patterns because skill-based technological change and deindustrialisation have lowered the demand for low-qualified labour and increased the demand for high-qualified labour. Some commentators have concluded that these economic processes have deepened the earning differences between low and high-educated individuals (Förster 2000). Similarly, the status attainment hypothesis used in sociology postulates that modernisation gives more importance to achieved characteristics such as education than to ascribed characteristics such as ethnicity or social origin (Schwartz 2013; Goode 1963).

The conflict theory of Collins (1971) proposes another theoretical argument for the weakening importance of education in mating patterns. If education is a positional good, educational expansion might reduce the signalling effect of tertiary education for high social status, prestige and cultural capital. Having a tertiary education has indeed another meaning for new generations than for older ones. Prestige or cultural capital might no longer be the products of popular universities, but of few elitist institutions. This means that stratification might have shifted from between

educational level to within tertiary education. Several empirical studies confirm the role of education as a positional good (Trostel et al. 2002; Leuven et al. 2004). If individuals do no longer distinguish themselves because of their educational level, this raises the question on whether education might be replaced or complemented by other signals for social status (Schwartz 2013).

Theories taking into account the gender-bias in the educational expansion propose additional arguments. Women's changing role in society and employment has made them more similar to men in terms of social status and earnings. Gender asymmetries in mating preferences might have weakened in parallel. In gender-traditional societies, women have incentives to choose a partner with a high educational level and good employment prospects (Brines 1994). On the one hand, partner's social status might have become less important for women because they have become more independent (Fernandez et al. 2005). If this is the case, women should show a rising tendency to marry down and a lower tendency to marry up. On the other hand, partner's education and employment prospects might have become more relevant for men because their spouses contribute more strongly to household income. This process would result in more assortative mating over time. Some studies indeed find that women's economic characteristics have become more important for assortative mating (Kalmijn 1994; Mare 1991; Sweeney and Cancian 2004).

Overall, empirical studies show that educational homogamy is widespread (Blossfeld and Timm 2003), but trends over time differ and show mixed results (see also Blossfeld 2009 for a literature review on the topic). Some contributions find that homophily<sup>2</sup> (McPherson et al. 2001) and assortative mating have increased over time (Hou and Myles 2008 for Canada and the US). Others register stable levels of assortative mating (Breen and Salazar 2011) or differences between countries (Kalmijn 1998). Ultee and Luijkx (1990), Smits et al. (1998, 2000) and Hu and Qian (2016) explain country differences with the level of societal openness and development of the countries.

Research about the Swiss situation is particularly scarce. Schumacher and Lorenzetti (2005) document occupational homogamy between 1909 and 1928 in Winterthur and revealed particularly high levels among managers and unskilled factory workers. Studies that use more recent survey data and three educational levels report 68% of homogamous couples in 1994 (Diekmann and Schmidheiny 2001) and 63% in 2008 (Bühlmann and Schmid Botkine 2012, 32–33). Also using three educational levels, the Swiss Federal Statistical Office (SFSO 2016, 59) registers 56% of couples with the same educational level in 1990, 55% in 2000 and 58% in 2010–2014.

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2 Homophily is the tendency of individuals to befriend with similar others.

## 2.2 Assortative mating and wages

Homogamy in wages is closely related to educational homogamy. Considering substantial returns to education (Balestra and Backes-Gellner 2017), homogamy in education should translate into homogamy in wages. We therefore expect that couples with the same level of education are more homogenous in terms of wages compared to other couples. There is wide empirical evidence of homogamy in earnings (Zimmer 1996; Nakosteen et al. 2004). In OECD countries, this homogamy has increased over time with 40% of all couples currently having similar earnings compared to only 33% in the 1990s (Keeley 2015).

An important difference between education and hourly wage is that the latter is less stable over time. Winkler, McBride and Andrews (2005) identified that for 30% of educationally homogamous couples in the USA, wage advantages have alternated between the man and the woman over the life course. Similarly, interpretations of wage homogamy need to take into account that not only assortative mating, but also the effects that occur after the formation of the couple influence the level of homogamy. In particular, labour supply decisions and the division of tasks within couples alter wage homogamy over the duration of the relationship.

## 3 Methods and data

We use data from the Swiss Labour Force Survey (SLFS) and the Swiss Household Panel (SHP). The main advantages of the SLFS are the availability of data since 1991 and the presence of new samples of considerable size every year. Because the SLFS lacks information on partner's income, we use data of the SHP for the analysis on hourly wages. The SHP follows households on a yearly basis and includes three samples (SHP I since 1999, SHP II since 2004, SHP III since 2013). Potential drawbacks are the limited sample size, the underrepresentation of immigrants and attrition (see Tillmann et al. 2016 for details). To show the evolution over the longest time span available, we show results for 2000 and 2014 for the SHP and for 1992, 2000 and 2014 for the SLFS.<sup>3</sup> The sample is composed of cohabiting heterosexual couples of the main working age range (25–64).<sup>4</sup> In the first part of the analysis, we also include singles into the sample to take into account the selection into partnership.<sup>5</sup> People who are unable to work have been excluded from the analysis

3 Due to data unreliability, we did not use data from the first year of data collection (1991 in the SLFS, 1999 in the SHP).

4 The sample of homosexual couples (8–33 per year) is too small to be analysed separately. In addition to this, it is not possible to include this group in cross-tabulations that distinguish between men and women.

5 Individuals having a non-cohabiting partner are considered as singles (35% of all individuals living alone say they have a non-cohabiting partner). Because these individuals might live with others, we do not refer to them as single households.

and weights are used for descriptive statistics. For the SLFS, the sample amounts to 13 170 households in 1992 and 57 604 households in 2014. For the SHP, the sample amounts to 3 343 in 2000 and to 5 497 in 2014.

Previous literature on educational assortative mating has relied mostly on cross tabulations (Breen and Salzar 2010) and log-linear models (Ultee and Luijkx 1990). Studies on similarity in earnings use mostly correlations (Nakosteen et al. 2004; Grotti and Scherer 2016). As a way to control for factors that determine earnings (e.g. education, age, experience, region or disability status), researchers often use residuals from spouses' wage regressions. In this paper, we do not follow this approach for two reasons. First, correlation coefficients are global measures, which cannot distinguish homogeneity at different points of the distribution (i.e. at the top or at the bottom of the distribution). Second, potential selection effects are ignored because correlations cannot be computed for singles. Third, it is complex to test how other factors influence wage homogamy, such as adaptation during the relationship or educational homogamy.

To overcome this shortcoming, we propose an alternative empirical approach divided in three parts. In the first part, we monitor educational assortative mating using cross-tabulations that consider three educational levels (lower secondary, upper secondary and tertiary)<sup>6</sup> and distinguish singles and couples. We apply the same method for hourly wages in the second part of the analysis and consider three different wage levels (lowest third, intermediate third, and highest third). The approach is here slightly different because group sizes change over time for education, but are constant by definition for wage levels. In the third part, we look at homogamy in hourly wages in more detail using regression models. This analysis has a double aim. First, it shows the relation between educational homogamy and wage homogamy. Second, it tests the effect of intra-couple decisions (adaptation) during the partnership.

Hourly wages have been computed at the basis of monthly wages and weekly working hours. Missing values have been imputed not only for all working individuals (13% of men and 15.8% of women participating in the individual interview), but also for non-active individuals (5.9% of men and 21% of women participating in individual interview) to estimate their earning capacity. This is important to measure assortative mating independently from the individual decision to work or not. The SHP provides a very good basis for such imputations because it includes information on earnings from other years and detailed information on the last job held by inactive individuals. We used a sequential procedure for imputation. If information on hourly wage of an individual was available in a previous wave, we used this former value taking account of inflation. Among active individuals, such

6 These classes correspond to ISCED 2A for lower secondary, ISCED 3A-C and 4A-C for upper secondary and ISCED 5A-B and ISCED 6 for tertiary education. Unfortunately, finer distinctions in educational levels are not possible for long-term comparisons with the SLFS data, which distinguishes between Bachelor and Master Degrees only starting from 2010.

information was available in 51% of cases. Among inactive individuals, we could use hourly wage from a previous interview in 29% of cases. If no such information was available, we used information from the next wave (11% of individuals with missing hourly wage and 4% of inactive individuals). The remaining missing information has been imputed using the iterative algorithm from “mi impute chained” in Stata for men and women separately. The regression included many variables on the employment situation from the current or previous job (self-employment, ISCO code, hierarchical position, economic sector), as well as region, education, age, civil status, children, residence permit and fluency in national languages. The mean observed hourly wage over all panel years is 40.4 CHF (standard deviation 21.1), the mean imputed hourly wage for inactive individuals is 33.7 CHF (standard deviation 18.8) and the mean imputed hourly wage for active individuals with missing information amounts to 38.9 CHF (standard deviation 20.5). This confirms that individuals with a low wage potential are more likely to be inactive. The R-squared for the imputation of hourly wage is 0.35 for men and 0.28 for women. In addition to this, we have top-coded wages to 12 000 CHF per week to exclude implausible values.

## 4 Results

### 4.1 Educational expansion 1992–2014

Table 1 shows the proportions of women and men according to three educational levels in 1992, 2000 and 2014. The proportion of tertiary educated women started from a low level (8% in 1992) and touched 27% in 2014, whereas the proportion of tertiary educated men departed from a much higher level (23% in 1992) and reached 47% in 2014. Given this difference in starting levels, the proportion of tertiary educated women more than tripled over the years, whereas the proportion of tertiary educated men just doubled. If we analyse relative growth, we can conclude that the educational expansion of the last twenty years was gender-biased with more women acquiring tertiary education. However, if we look at absolute change in percentage points, we notice that the proportion of men with tertiary education increased by 23 percentage points, whereas the proportion of women only by 19. Absolute changes indicate an almost gender-neutral expansion. It is important to remark that absolute changes are more independent from the cumulative effect of education over generations than relative changes. We can therefore say that this large expansion changed the distribution of education for the entire population. By 2014, almost half of all men, independently from their age, had a tertiary education degree, contrarily to less than one third of all women. Table 1 illustrates how this important educational expansion happened mainly after 2000s. From 1992 to

Table 1 Proportion of household types according to their educational levels, 1992 and 2014

	Women lower secondary	Women upper secondary	Women tertiary	Single men	Proportions of men
<b>1992</b>					
Men lower secondary	7.86	4.54	0.28	1.03	15.19
Men upper secondary	12.96	36.15	2.27	4.51	61.93
Men tertiary	1.69	13.21	3.13	2.61	22.88
Single women	1.92	6.30	1.53	0.00	
Proportions of women	26.60	65.54	7.85		100.00
<b>2000</b>					
Men lower secondary	8.49	4.11	0.29	0.95	15.51
Men upper secondary	9.36	36.11	2.54	5.08	59.47
Men tertiary	1.22	13.63	4.37	3.12	25.02
Single women	1.91	6.92	1.89	0.00	
Proportions of women	23.10	66.88	10.01		100.00
<b>2014</b>					
Men lower secondary	8.11	4.54	0.88	1.06	9.97
Men upper secondary	6.40	27.10	6.55	4.84	45.42
Men tertiary	1.46	12.47	12.66	4.76	44.60
Single women	1.07	4.38	3.72	0.00	
Proportions of women	19.07	54.28	26.65		100.00

Sources: Authors' computations with the SLFS 1992 (N = 13 170), 2000 (N = 17 711) and 2014 (N = 57 604).

Notes: Missing women correspond to single men and vice versa for missing men.

2000, the proportion of tertiary educated women and men increased by slightly more than 2 percentage points. All the rest of the expansion happened after this period.<sup>7</sup>

#### 4.2 Absolute educational homogamy

Homogamous couples are illustrated on the diagonal that corresponds to the intersection of equal educational levels. We notice that due to educational expansion, homogamous couples in which both spouses have a tertiary education have increased strongly from around 3% of all household types in 1992 to almost 13% in 2014. As illustrated before, this increase has been much more pronounced in the 2000s than in the 1990s. Although clearly decreasing, the predominant household type remains composed by upper-secondary educated couples (36% in 1992 and 27% in 2014). Low educated couples, where both spouses have completed at best lower secondary education, compose only around 8% of all household types. An additional analysis on socio-demographic characteristics (not shown in Table 1), reveals that

<sup>7</sup> Even if we report only three years, the expansion has been linear, but faster in the 1990s compared to the 2000s.

migrants can be found mainly in tertiary educated couples (approximately 63% of these couples have at least one person with a foreign nationality) and among single low educated men (46% of all single low educated men). Low educated women living alone have a rather different profile, as they are older than the average.

Summing the percentages on the diagonal, we reckon that homogamous couples constitute 48% of all households in 2014, which is 1 percentage point higher than in 1992. Among couples only, we find 68% of homogamy, which is close to previous findings in Switzerland with survey data and three educational levels (Diekmann and Schmidheiny 2001; Bühlmann and Schmid Botkine 2012). Women who marry up in terms of education, have become less frequent over time (from 28 to 20% of all household types), whereas women who marry down are almost symmetrically increasing (from 7% to 12% of all household types). Turning to singles, we observe that the share of highly educated singles is slightly increasing, but the number of all singles has only augmented by 1 percentage point (from 18 to 19%).

The percentages presented in Table 1 refer to absolute homogamy and cannot be interpreted in terms of mating preferences (Liu and Lu 2006). In particular, the increase in homogamy at the tertiary educational level could simply be a consequence of educational expansion rather than of changing mating patterns. Similarly, there could be more tertiary educated singles because the chances of tertiary educated individuals to remain single have increased, or because there are more tertiary educated individuals in the population. In the next section, we move to assortative mating to disentangle these two effects.

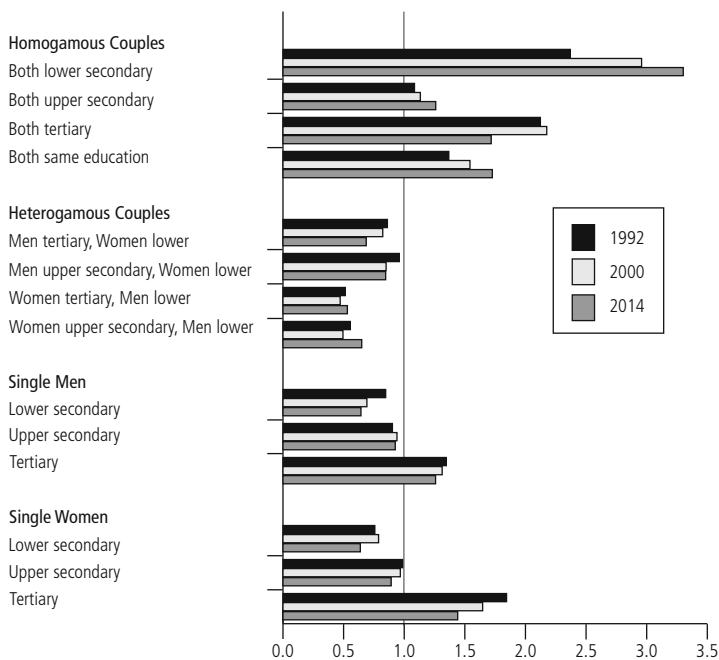
### 4.3 Educational assortative mating

In order to properly isolate the effect of marital preferences from educational expansion, we display assortative mating, measured by relative frequencies (observed frequencies divided by expected frequencies) in Figure 2. The expected frequency is a simulated distribution assuming a mating pattern that is random by education. The expected frequencies are proportionally adjusted to keep the (impossible) case where both women and men are single empty (structural zero). If the relative probability is one, it means that the educational level of the partner is not related to couples formation. If the relative probability is larger than one, a household type (e.g. a homogamous household) is overrepresented in comparison to independence of educational levels.

Results show a strong overrepresentation of couples with the same educational level, in particular for low educated individuals. Considering all homogenous couples according to a weighted average, we see that sorting on education has become more important over time. The probability of having a partner with the same educational level relative to having a partner with a different educational level has risen from 1.37 in 1992 to 1.54 in 2000 and to 1.74 in 2014. For 1992, this means that the observed probability of having a partner with the same education is 37% higher

than it would be under a mating pattern that is independent from education. There are however compensatory effects among educational levels. The probability for assortative mating has declined for tertiary educated individuals (by 0.4 points), whereas it has increased for upper secondary educated (by 0.2 points) and for low educated (by almost 1 point) individuals.<sup>8</sup> The overall increase of homogamy over time found in Table 1 can thus mostly be attributed to stronger assortative mating among low educated individuals rather than among university graduates. The

Figure 2 Relative probability of single and couple household by education



Sources: Authors' computations with the SLFS 1992 (N = 13 170), 2000 (N = 17 711), 2014 (N = 57 604).

Notes: For each type of couple, probabilities higher (lower) than one indicated an overrepresentation (underrepresentation) with respect to independence of educational levels for couple formation.

8 Literature on mobility often refers to odds ratios rather than to probabilities. The odds ratio for low educated individuals to have a partner with the same education have increased from 5.7 in 1992 to 10.7 in 2014 (relative to the probability to have a partner with another educational level or having no partners). The odds ratio for individuals with upper secondary education to have a partner with the same educational level has increased from 1.5 to 2.4 and the odds ratios for tertiary educated individuals have increased only marginally from 3.3 to 3.5. This method does not take into account the change in the marginal distribution of educational levels, which is the reason why the odds ratios for tertiary educated individuals do not decline.

lower assortative mating among tertiary educated individuals does not necessarily reflect declining homophily, but might also be the result of tertiary education having become a large and heterogeneous group. This process is unlikely to reflect positive mating preferences among low educated individuals (Smits 2003), but rather a segregation of a small disadvantaged group that has lower probabilities for social mobility through marriage.<sup>9</sup>

It is also interesting to look at the evolution in hypergamy and hypogamy. The fact that the probability for women to marry up has become less frequent and the probability for men to marry up (or women to marry down) more frequent suggests indeed that men's and women's preferences for partner's education have become more similar over time. Low educated individuals, however, are not more likely to remain single than what they were before. On the contrary, they are less likely to form single households.

Besides homogenous couples, tertiary educated singles are the only other household type that is overrepresented. In particular, women with tertiary education are likely to form single households (relative probability of 1.44 in 2014 compared to 1.26 for men). Interestingly, this tendency has declined over time, which could suggest a better reconciliation between work and family for highly educated women. The decline of single households could also be due to an increase in cohabitation patterns. Some decades ago, couples cohabitated only when they married. Nowadays, cohabitation is more socially accepted before or as a substitute for marriage.

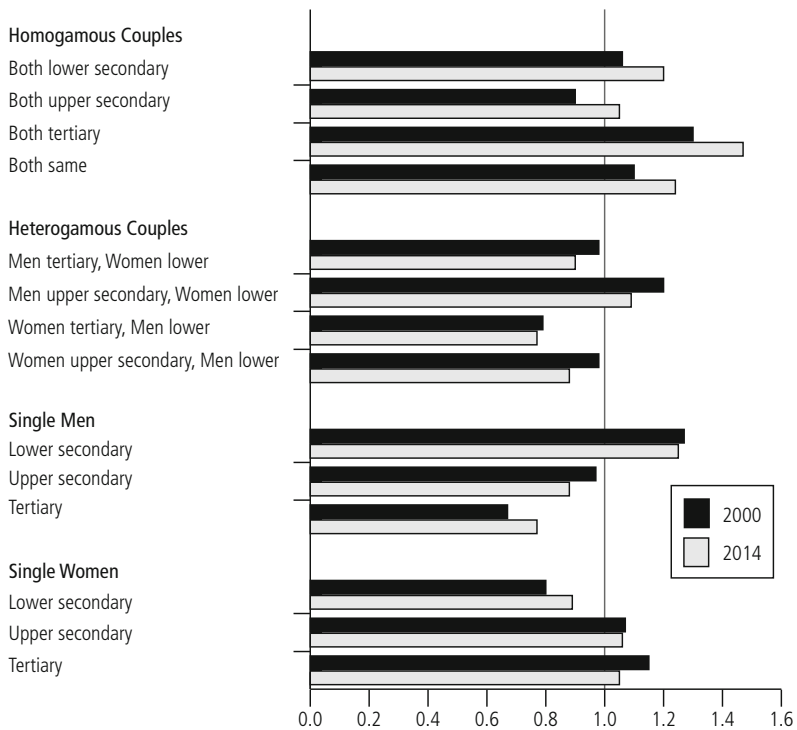
#### 4.4 Assortative mating in hourly wages 2000–2014

To measure assortative mating in hourly wages, we use the samples from the SHP in 2000 and 2014. We distinguish three wage categories (low, intermediate and high wage) of equal size (tertiles) for women and men.<sup>10</sup> Because the marginal distribution in the cross-tabulations remains stable over time (always 33.3%), we directly address relative probabilities for each category. The cross tabulation presented in Figure 3 illustrates that there is assortative mating in the lower third and in the upper third of the (hourly) wage distribution. Moreover, assortative mating in each earning category has increased between 2000 and 2014. Averaging over the three wage categories, the relative probability has risen from 1.11% to 1.24%. Although lower than for educational groups, assortative mating is considerable, particularly because we are likely to underestimate its extent for two reasons. One is that measurement errors in hourly wages are frequent and the other is that adaptation to the partner masks part of the effect. Another interesting point in comparison to education is

9 In 2014, this group was composed by 36% of migrants and the average age of the group was not significantly higher than for other groups. This highlights that the segregation of this group is not likely to be linked to a generational or a migratory phenomenon.

10 For men, the cut-offs are at 34.4 CHF per hour and 47.2 CHF per hour in 2000 (34.2 CHF and 46.8 CHF in 2014). For women, the cut-offs are at 25.8 CHF per hour and 36 CHF per hour in 2000 (26.6 CHF and 37.2 CHF in 2014).

Figure 3 Relative probability of single and couple households by hourly wage



Sources: Authors' computations with the SHP 2000 (N = 3 362), 2014 (N = 4 769).

that assortative mating in earnings has not only increased in the lower part of the distribution, but to a similar extent also in the upper part. The analysis using correlation coefficients comes to a consistent conclusion (Kuhn and Ravazzini 2017). The rank-order correlation (Spearman correlation) is positive for hourly wages and increases slightly over time.

In addition to assortative mating, wage levels are also associated with being single. In particular, men with the lowest hourly wages have a considerably higher probability of being single (relative probability of 1.25 in 2014) than men with intermediate and high wages (relative probability of 0.88 and 0.77 in 2000). Another interesting comparison is the gender differences over the two time points. In 2000, the relationship between remaining single and the wage level was negative for men and positive for women. Even if differences remain, by 2014, men and women have become more similar in this respect. In particular, high earning women have become less likely to be single and high earning men more likely to be single.

Even if these changes over time are interesting, we cannot interpret them in terms of assortative mating because of potential adaptation effects that occur during the relationship (most importantly through the division of labour). For example, wage similarity might have increased over time because women and men pay more attention to wages (or wage potential) when choosing their partner, or because double earner couples with a similar wage progression for both spouses have become more frequent. Additional analyses are thus needed to better disentangle these effects.

#### 4.5 The link between educational homogamy and wage homogamy

Having addressed homogamy and assortative mating in education and in hourly wages in the previous sections, we now look at whether there is a link between educational assortative mating and wage homogamy. In contrast to the previous empirical analyses, we take couples as units of analysis and use the ratio of their hourly wage as dependent variable to measure homogamy. We always divide the lower hourly wage by the higher average wage of the two partners, irrespectively of whether the woman or the man earns more per hour (in 74% of couples, the man has a higher hourly wage than his partner). The value of this ratio ranges between 0 and 1 (mean = 0.65, standard deviation = 0.21). Therefore, positive coefficients in the regression model mean higher wage homogeneity and negative coefficients higher wage heterogeneity. Note that this measure captures similarity in earnings (absolute position) rather than similarity in the wage distribution (relative position).<sup>11</sup>

We estimate two different models. The first model is a pooled linear regression (OLS) with clustered standard errors to account for repeated observations per couple.<sup>12</sup> The second model analyses only couples during their first year of cohabitation. The wage homogamy in this sub-population can then be interpreted as a result of assortative mating. This is in line with Ultee, Dessens and Jansen (1988, 113), who state that “what really counts as a test for assortative mating are data for occupation at time of marriage.” We include the following variables in the regression models: education of the couple, age (three categories of men’s age), a binary variable indicating age homogamy (within 5 years), as well as duration of the partnership in the first model.<sup>13</sup> Even though the models explain only a small part (3.8% and 4.2%) of the variation in wage homogamy, they illustrate some interesting patterns.<sup>14</sup>

11 We are aware that the dependent variable has considerable measurement errors because of the ratio. Although estimators are unbiased when measurement error is in the dependent variable, standard errors will be overestimated. Some coefficients might therefore be insignificant even if there is a true underlying relationship.

12 We do not use individual fixed effect panel models because they cannot capture the effect of assortative mating and education, which are time-invariant for individuals.

13 Considering the measurement error and the limited number of observations in the second model, we did not include other control variables into the model.

14 These OLS models do not directly show the extent of wage homogamy. To test whether age and education explain the relationship between partner’s hourly wages, we looked at correlations of predicted wages of men and women including their age, age squared and education. For couples who just moved together, this correlation amounts to 0.09 with control variables compared to

Table 2 Panel regression models on ratio of hourly wage within couples, 1999–2014

	Model 1		Model 2	
Education				
Both lower secondary (ref.)	0	—	0	—
Both upper secondary	−0.009	(−0.94)	0.042	(1.25)
Both tertiary	0.008	(0.77)	0.037	(1.08)
Men tertiary, Women lower	−0.063**	(−6.34)	0.008	(0.24)
Men upper secondary, Women lower	−0.033**	(−3.05)	−0.020	(−0.50)
Women tertiary, Men lower	0.029**	(2.62)	0.071*	(2.03)
Women upper secondary, Men lower	0.020	(1.55)	0.014	(0.34)
Age				
Man 25–38 years (ref.)	0	—	0	—
Man 39–52 years	−0.034**	(−7.19)	−0.047**	(−3.67)
Man 53–64 years	−0.036**	(−5.24)	−0.048**	(−2.64)
Women of similar age (within 5 years)	0.014**	(2.62)	0.032**	(2.74)
Partnership duration	−0.002**	(−7.06)		
Constant	0.722**	(69.29)	0.662**	(19.35)
Observations	36 726		1 315	
R <sup>2</sup>	0.038		0.042	

Sources: Authors' computations with the SHP 1999–2014. Notes: The dependent variable is defined as the lower hourly wage divided by the higher hourly wage of the two partners; T-statistics in parentheses \*\*, \* indicate significant coefficients at the 5% and at the 1% level respectively.

The first model reveals that homogamy in education and homogamy in hourly wages are related. Interestingly, the group with the most similar wages does not consist of couples with the same education, but of couples where only the woman has a tertiary education degree. As this effect is significant also in the second model, we can interpret this in terms of assortative mating. Tertiary educated women who choose a partner with a lower educational level tend to choose a partner with a relatively high wage level. The same does not apply to tertiary educated men who choose a partner with a lower educational level. The large wage-gap of these couples can be explained by a traditional division of labour rather than by a low wage level when the partners moved together. This interpretation is based on the fact that this effect is significant in the first, but not in the second model. The hypothesis that says that educational homogamy is related to homogamy in hourly wage is therefore supported only in comparison to couples where women marry up, but

0.15 without controls. For all couples, the correlation amounts to 0.07 with control variables and to 0.11 without control variables. This shows that sorting on wage levels is not just a by-product of education and age.

not in comparison to couples where women marry down. Furthermore, there is no significant difference by educational level among educationally homogamous couples.

Apart from education, also age plays a role for wage homogamy in general and homogamy during the first year of cohabitation (as age effects are significant in both models). Younger couples have more similar hourly wages than older couples.<sup>15</sup> Whether this is a life-cycle or a cohort effect has to remain open. What is clear is that wage homogamy is increased by age homogamy.

Finally, the first model includes the duration of the relationship and reveals a divergence of wage homogamy of 0.2 points per year of partnership. Wages of partners are thus most similar when they meet and then diverge over time. Possible reasons for this are divergent career-path due to the division of labour. The negative effect of adaptation on wage homogamy is an important point to note because it suggests that observed wage homogeneity is the result of assortative mating (or selection), rather than of adaptation. The effect of assortative mating on wage homogamy is therefore stronger than what is suggested in Figure 3.

## 5 Conclusions

This study broaches the subject of socio-economic assortative mating in the context of educational expansion. The Swiss Labour Force Survey is used to assess the evolution of educational homogamy and assortative mating and the Swiss Household Panel is used to analyse assortative mating in earnings capacities within couples. Results show increasing assortative mating both for educational levels from 1991 to 2014 and for wages homogamy from 2000 to 2014. Looking more in detail, we see compensatory effects between people with different educational levels. The share of tertiary educated couples among all households has sharply increased from 3% in 1992 to 13% in 2014, whereas the probability of an individual with tertiary education to be with a tertiary educated partner has declined. Educational expansion rather than changing mating patterns is responsible for the increasing number of highly educated couples. At the same time, homogenous couples with low education present a relatively constant population share (around 8% of the total population), but this type of assortative mating has become more pronounced over time. Low educated individuals have become a more segregated group in terms of marital patterns and this might expose them to a higher social and economic vulnerability. This evidence deserves further investigation in future studies. We have also found that the probability to remain single has declined in particular for tertiary educated individuals and most strongly for tertiary educated women.

Even though assortative mating among tertiary educated individuals has declined over time, this does not imply that assortative mating in hourly wages has

15 Results are similar when the age group of the women rather than the man is used.

also weakened in the upper part of the distribution. Our second analysis has indeed shown that assortative mating in hourly wages has not only increased among low earners, but also among high earners. For education, this suggests that individuals with a tertiary education degree have become more heterogeneous and that tertiary education alone has become a less selective characteristic for mating patterns. The signalling effect of education in terms of socio-economic importance seems to have weakened, but other criteria of selectivity play an important role. It remains an open question to establish to what extent selectivity has moved within tertiary education according to the type of university, the type of degree or the field of study.

A difficulty for wage homogamy is that it reflects not only assortative mating, but also (labour-supply) decisions and adaptations taken during the relationship. Using information from the Swiss Household Panel and regression models, we have found that similarity in wages is the result of selection into couples rather than of influences between partners. This conclusion is drawn from the fact wage homogamy declines over the duration of the relationship. In addition to this, we have found that educational homogamy is associated with wage homogamy. Couples where the woman married up show the highest wage gap within couples, and couples where the man married up show the lowest wage gap within couples. Homogamous couples with tertiary education do not show a higher homogamy in earnings than other homogamous couples.

Overall, economic homogeneity has important consequences for inequalities in society. Shrinking inequalities within households might lead to rising inequalities between households. With increased homogamy at the top and at the bottom of the distribution, we found support for wage polarisation. Even if these results appear worrisome from the perspective of inequality at the societal level, further research shows that consequences of assortative mating in Switzerland are small and have not lead to rising income inequality (Kuhn and Ravazzini 2017).

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