The Changing Role of Education in the Marriage Market: Assortative Marriage in Canada and the United States since the 1970s

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Abstract. This paper reports trends in educational assortative marriage in Canada and compares them to similar trends in the United States. We show that educational homogamy — the tendency of like to marry like — has risen in both countries over the last three decades. At the beginning of the 1970s, educational homogamy rates were substantially higher in the United States than in Canada. However, the tendency to marry across educational boundaries declined more rapidly in Canada than in the United States so that by century's end the two countries were virtually indistinguishable. Trends in both countries were mainly driven by changing patterns of mate selection rather than changes in the marital opportunity structure produced by growing similarity in the educational attainments of young men and women. We discuss these trends in the context of their implications for recent developments and future trends in family income inequality.

Résumé. Dans le présent document, nous examinons les tendances de l'homogamie éducationnelle au Canada et les comparons à des tendances semblables aux États-Unis. Nous montrons que l'homogamie éducationnelle — la propension à épouser une personne de même niveau d'études — a augmenté dans les deux pays au cours des trois dernières décennies. Au début des années 1970, les taux d'homogamie éducationnelle étaient sensiblement plus élevés aux États-Unis qu'au Canada. Toutefois, la propension à choisir un conjoint n'ayant pas le même niveau de scolarité a régressé plus rapidement au Canada qu'aux États-Unis, de sorte qu'à la fin du siècle il était à peu près impossible de repérer des distinctions entre les deux pays. Les tendances dans les deux pays ont été dictées principalement par des changements dans le choix du conjoint plutôt que par des changements dans les possibilités de mariage, en raison de la similitude croissante des niveaux de scolarité chez les jeunes hommes et les jeunes femmes. Nous examinons ces tendances dans le contexte de leurs incidences sur les faits récents et sur les tendances futures dans le domaine de l'inégalité du revenu familial.

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1. Introduction

The distribution of market incomes among families has become markedly more unequal in most affluent nations over the past quarter century and rising rates of marital homogamy — the tendency of men and women with high earnings to be married to one another — is one of the major factors underlying this trend (Esping-Andersen 2007; Kenworthy 2004). In Canada and the United States, the correlation between husbands' and wives' earnings has been rising, reflecting the fact that well-educated men and women tend to marry one another and form families with high earnings and few risks of unemployment (Fortin and Schirle 2006; Hyslop 2001). Less well-educated couples have lower wages and both partners are far more likely to experience periods without work. What exactly is driving this trend?

Changes in the *absolute* or overall rate of educational homogamy can come from two main sources: a) changes in the marital "opportunity structure" that result from changes in the male-female distribution of educational attainment; and b) changes in marital "preferences" and patterns of mate selection reflected in changes in the *relative* rate, net of changes in the educational distribution of men and women. Changes in *absolute* rates of educational endogamy/exogamy are of interest when the question concerns the *effects* of educational homogamy on outcomes such as family earnings inequality (Goldthorpe 1987).[1] However, if changes in marital patterns are entirely exogenous to the mate selection process (i.e., entirely a result of changes in the marginal education dis-

1. The analysis of educational homogamy has been modelled along the lines of traditional studies of intergenerational occupational inheritance captured by the cross-classification of a hierarchically ordered distribution of occupations held by a generation of adults with that of the parental generation (usually fathers). The questions of interest in social mobility studies concern whether or not societies are more "fluid" or "open" than in the past, whether some class boundaries are more permeable than others, whether some societies are more open than others. From the outset, researchers recognized that where the marginal distributions of such tables were not identical some degree of mobility would be displayed; it is simply not arithmetically possible for all cases in the table to fall in the diagonal (Goldthorpe 2000). Similarly, as some occupations decline and others expand the absolute amount of mobility will also change. To address this issue, mobility researchers turned to odds ratios and log-linear analysis to distinguish between *absolute* mobility rates (the total rates shown in a percentage table) and *relative* mobility rates, the odds ratios that define the association between occupational origins and destinations, net of changes or differences in the marginal distribution of occupations. These methods (odds ratios, log linear analysis) and metaphors (absolute vs. relative rates, "openness," "permeability") of social mobility studies are standard fare in analyses of marital homogamy.

tributions of men and women), the nature of the question changes. If the rising share of university-educated men married to university-educated women is mainly due to the rising share of women with university degrees, for example, the only task that remains is to explain the rise in women's educational attainment. Changes in relative rates, in contrast, are indicative of whether the function of education in mate selection is strengthening or weakening.

Given the paucity of studies of educational homogamy in Canada, we begin our presentation of empirical findings with a detailed description of changes in the absolute rate of marital homogamy between 1971 and 2001 and compare them with similar trends in the United States. Starting from a lower base, Canadian homogamy rates rose more rapidly than in the United States and essentially converged on American levels by the turn of the century. We then turn to three questions concerning changes in relative rates. First, what is the overall trend in the relative rate of educational marital homogamy in Canada and the United States over the three decades from the beginning of the 1970s to the turn of the century? Second, are the highly educated more likely now than in the past to marry within their own educational level or to marry down and are the less educated more likely than in the past to marry within their own educational class or to marry up? Third, do women and men experience different trends in educational homogamy given that the rapid increase in women's educational attainment relative to men implies *declining* opportunities for women to marry better educated men but *rising* opportunities for men to marry more educated women?

The paper is organized as follows. Section 2 provides an overview of recent debates on changes in *relative* rates of educational homogamy and the empirical results that have stimulated these discussions. In section 3, we sort out a series of methodological issues related to the measurement of educational homogamy and present the rationale for the methodological strategies adopted here. Section 4 describes our data and section 5 presents our results.

2. LITERATURE REVIEW: HAVE MARITAL PREFERENCES CHANGED?

As Halpin and Chan (2003:473) observe, education has always been a factor in the choice of mate selection in modern societies. Schools and universities provide contexts in which young people meet one another and produce common understandings of desirable lifestyles and cultural tastes. There are several reasons why postindustrial societies are likely to reinforce such patterns. Rising levels of postsecondary education among

women in recent decades have augmented the opportunities for well-educated men to meet well-educated women. Since workplaces are typically characterized by employees with similar levels of education but growing gender diversity, they too provide new sites for meeting potential spouses with similar educational qualifications (Oppenheimer 1994).

Theoretically, however, these developments have produced contradictory expectations about recent trends in, and likely future of, educational homogamy in postindustrial societies. On the one hand, the "gender revolution" (Goldin 2006) in married women's employment and earnings since the 1960s and the replacement of the "male breadwinner" family model with the "dual-earner couple" has dramatically augmented the *economic* incentives for highly educated men to seek out highly educated partners. And for both men and women, these economic incentives have been enhanced by the growing earnings gap between more and less educated workers (Kalmijn 1998) and the corresponding rise in the earnings gap between high and low income families (Heisz 2007). On the other hand, as Oppenheimer (1994) observes, these same trends potentially diminish the importance of *economic incentives* in the mate selection process. As highly educated women become increasingly able to support themselves, for example, the incentive to seek out a "good provider" as a mate may decline. A growing literature suggests that women's marital preferences may have changed as labour market conditions continue to improve among young women while deteriorating among young men (Oppenheimer 1997; Sweeney 2002; Sweeney and Cancian 2004). Equipped with potential or realized economic resources, a highly educated woman may be willing and able "to marry a man who is unlikely to be a great provider but who is highly desirable in other respects" (Oppenheimer 1994:315).

Mare's (1991) "life course" thesis also advances reasons for a decline. He suggests that people who are married while they are at school or shortly after leaving school are more likely to have similar levels of education. But as the time gap between leaving school and age of marriage rises, the pool of potential spouses becomes increasingly heterogeneous and is likely to lead to a decline in homogamy. From the early part of the 20th century until the 1970s, the age gap between leaving school and marriage narrowed but has been rising since then. According to the life course argument, the u-shape trend in the time-gap would lead to a rise in educational homogamy until the 1970s but a decline or stabilization thereafter (Halpin and Chan 2003; Mare 1991).

In cross-national studies, Smits and his associates (Smits 2003; Smits, Ultee, and Lammers 1998; 2000) report an inverted, yet asymmetric u-curve trend in educational homogamy across a number of na-

tions. Like Oppenheimer, they attribute the inverted u-shape pattern to changing preferences associated with *modernization*. They argue that educational homogamy first rises with industrialization as education becomes increasingly important in deciding individuals' socioeconomic status. People with higher levels of education have greater potential to maximize family socioeconomic status through marriage and thus are more attractive in the marriage market (the status attainment thesis). However, in the later stages of industrialization, continued modernization favours greater societal "openness" and individualization as people become increasingly able to afford the luxury of mate selection on the basis of other desirable criteria.

Is there any reason to expect more or less change in societal "openness" or "individualization" with respect to marital choice in Canada than in the United States over the period? Though Canadians like to emphasize their distinctiveness from their southern neighbours, as Card and Freeman (1993:1) note, when measured against a wider cross-national landscape, Canada and the United States "are as close economically and socially as any pair of countries in the world." The similarities are especially pronounced with respect to their educational systems (Davies and Guppy 2006). Relative to most European nations there is minimal streaming at the secondary school level, the curriculum is less oriented to "high culture," and secondary schools provide a standardized credential (the "high school diploma"). American postsecondary institutions are more highly differentiated by prestige, selectivity, and cost than their Canadian counterparts (Davies and Guppy 1997). As a result, marriages *among* university graduates are likely to be more "homogamous" with respect to academic ability and family socioeconomic status in the United States but these differences are unlikely to have significant effects on marriages *between* those with and without university credentials.

There are of course "small differences" in policies and institutions that can and do shape social and economic outcomes (Card and Freeman 1993). We found small differences in the scale and scope of trends in women's labour force participation, in educational attainment, and in the growth of the educational wage gap over the period.[2] Given the broad

2. The labour force participation rate of younger (35 and under) married women was somewhat lower in Canada (46%) than in the United States (49%) at the beginning of the period but substantially higher in Canada (77%) than in the United States (71%) by the turn of the century. The university/high school wage gap was similar at the beginning of the 1970s but rose considerably more in the United States than in Canada over the following decades (Murphy, Riddell, and Romer 1998). However, the relative earnings of young adults (35 and under) declined substantially in both countries. As we show below, educational levels among Canadian husbands and wives were much

similarities in the direction and scale of these historical trends and in mass culture, however, we are skeptical about these "small differences" having large effects on the overall direction of trends in the process of mate selection in Canada and the United States since the 1970s. There would have to be very large differences in the "preference-shaping" institutions with regard to marital choice in the two countries to produce rising homogamy in the one and declining homogamy in the other.

Existing research, however, is not especially helpful for answering questions about Canadian trends or about similarities and differences between Canada and the United States. Studies of relative homogamy rates in Canada are relatively few in number and now rather dated (see Table 1). Based on the Canadian census results for 1971 and 1981, Ultee and Luijkx (1990) find a slight decrease in Canada during the 1970s though the changes are not statistically significant. Based on cross-sectional data from the 1976 Census of Canada, Smits et al. (2000) report a sharp rise in educational homogamy in Canada but in a follow-up analysis of the same data (Smits et al. 2003) they report a slight fall, a point to which we return below.

Although there are many more of them, until recently (Schwartz and Mare 2005) American results have also been ambiguous (see Table 1). The majority of studies, like Kalmijn (1991a; 1991b), find that educational homogamy increased steadily from the 1930s to the 1980s in the United States. Ultee and Luijkx (1990) find a slight increase up to the end of the 1970s. Qian and Preston (1993) and Qian (1998) suggest that educational homogamy increased in the 1980s in the United States. Schoen and Cheng (2006) find a rise in educational homogamy in North Carolina and Wisconsin in the 1970s and 1980s. However, Raymo and Xie (2000) find that educational homogamy was stable in the United States between the early 1970s and late 1980s. Mare (1991) concludes that educational homogamy increased between the 1930s and 1970s but then stabilized or even declined in the 1980s. In a study that is most similar in spirit to our own, however, Schwartz and Mare (2005) conclude that relative homogamy rates in the United States declined between 1940 and 1960 but then rose between the 1960s and the turn of the century.

The inconsistent findings among existing studies are in part attributable to large differences in study populations and methodologies taken up in the following section. However, they also reflect differences in analytical focus. Some studies (Kalmijn 1991b; Raymo and Xie 2000;

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lower than in Canada than in the United States at the beginning of the 1970s. By the turn of the century, Americans were still more likely to have a university education but Canadians were more likely to have a postsecondary education beyond high school.

Table 1. Overview of major studies on changes in educational homogamy related to the United States and Canada

Studies	*Educational groupings*	*Target population*	*Cohorts of change*	*Modelling strategies*	*Data sources*	*Sample size*	*Conclusion*
Ultee & Luijkx, ESR 1990	4 levels, US: < 9, 9–11, 12, college; Canada: < 9, 9–13, some university, university degree	US: all marriages involved males aged 20–64; Canada: all marriages	Overlapping marriage cohorts	Log-linear models: step (distance) parameters	1971 & 1981 Canadian census; 1962 & 1973 US CPS, 1982–85 US GSS	Rescaled to 1,000 marriages per period/country	Slight fall in homogamy in Canada, rise in the US
Kalmijn, AJS 1991	5 levels: < 9, 9–11, 12, college 1–3, college 4+	Couples married within 10 years	Real marriage cohorts	Log-linear models: distance and diagonal parameters	1962 and 1973 OCG	2,400–5,000 couples per period	Rise in homogamy
Kalmijn, AJS 1991	4 levels: < 12, 12, college 1–3, college 4+	Married couples in their first marriage	Overlapping marriage cohorts	Log-linear models: quasi-symmetry parameters	1955 GAF, 1965 NFS, 1972–89 GSS	450–4,100 per decade	Rise in homogamy
Mare, ASR 1991	5 levels: < 10, 10–11, 12, college 1–3, college 4+	Couples aged 16–34, first marriage within a year	Real marriage cohorts	Log-linear models: crossings parameters	1940, 1960–80 US census, 1985–87 CPS	4,000–13,100 couples per period	Rise in homogamy until 1970s
Qian & Preston, ASR 1993	3 levels: < 12, 12, college	Newly married couples with women aged 18–44	Real marriage cohorts	Harmonic mean function	1973, 1980, 1988 CPS	< 1,000 couples per year	Rise in homogamy
Qian, Demography 1998	4 levels: < 12, 12, college 1–3, college 4+	First married within 5 years, age 15–39	Real marriage cohorts	Log-rate models: asymmetry and crossing models	1970, 1980 census, 1988/90/92 CPS	9,600–146,200 couples per period	Rise in homogamy until 1970s
Raymo & Xie, ASR 2000	4 levels: < 12, 12, college 1–3, college 4+	Newly married couples aged 18–34	Real marriage cohorts	Log-linear models: diagonal and distance parameters	1970 US census, 1985–87 CPS	1,300–2,000 couples per period	Slight fall in homogamy
Smits et al. ASR 2000	4 levels: < 12, 12, college 1–4, college 4+	Married couples aged 20–52	Cross-sectional age groups	Log-linear models: step (distance) parameters	1976 Canadian census, 1980 US census	About 3,500 per age cohort/country	Significant rise in both Canada and the US
Smits, SSR 2003	2 levels: < 12, 12+	Married couples aged 18–52	Cross-sectional age groups	Log-linear models: odds ratio for 2 by 2 table	1976 Canadian census, 1980 US census	About 15,000 each age cohort/country	Slight fall in homogamy in both countries
Schwartz & Mare 2005	5 levels: < 10, 10–11, 12, 13–15, ≥ 16	Newly married and prevailing marriages aged 18–40	Real and overlapping marriage cohorts	Log-linear models: homogamy & crossings parameters	1940–2000 US census and 1962–2003 CPS	Large total sample	Fall between 1940–60, rise afterwards
Schoen & Cheng 2006	4 levels: < 12, 12, 13–15, 16+	Recent marriages	Real marriage cohorts	Harmonic mean function	1970–90 marriage records in two US states	Over 50,000 in each state	Rise in homogamy

Smith, Frazee, and Davison 2000; Smits 2003) examine the overall trends without attending to trends among men and women at different education levels. The issue here is that the overall trend may obscure large changes, even in opposite directions, among the underlying components (Wong 2003). Still other studies draw their conclusions from changes in one or other of the underlying components. Mare (1991), for example, focused mainly on changes in the difficulty of intermarriage between adjacent educational levels. When it becomes more difficult for marriage to cross one educational boundary but easier to cross another barrier, it is not clear what the overall trend is. Similarly, a rise in homogamy between highly educated, more affluent, individuals would support the status attainment hypothesis over the "modernization" thesis but the preferences of the highly educated do not necessarily dominate the overall trend (Smits 2003). In this respect, the recent American study by Schwartz and Mare (2005) provides an important corrective to earlier research by considering both overall change and trends by educational level.

To disentangle the various components of educational homogamy requires a careful reconsideration of the measurement and modelling strategies used in the literature. We turn to these methodological issues in the next section.

3. Now You See It, Now You Don't: Measuring Changes in Educational Homogamy[3]

In this section, we organize our discussion around three issues: (1) the choice of educational groupings; (2) first marriage vs. marriage stock and real marriage cohorts vs. synthetic cohorts; and (3) measuring overall and heterogeneous changes in homogamy with log-linear models. From the discussion of the potential impact of these differences on detecting changes in educational homogamy, we can either choose the most appropriate approach or compare results from different approaches in our subsequent analyses.

3.1 Education groupings

Wong (2003) shows that arbitrary and inconsistent classification of educational levels is a critical weakness in studies on temporal trends and cross-country differences in educational homogamy. He demonstrates that combining Mare's (1991) five categories of education into four categories results in differential loss of association between wife's and hus-

3. This title emulates that of Wong (2003).

band's education at various time periods. Aggregation to four categories exaggerates the degree of homogamy at earlier periods and deflates the upward trend. Similarly, the conclusions drawn by Smits et al. (2000) and by Smits (2003) noted above are quite different although the only difference between the two studies is that the former uses four educational categories and the latter two.

The *method* of aggregation also affects results. Aggregation across education levels at the lower end of the educational distribution eliminates heterogeneity in educational levels prevalent in earlier historical periods and inflates the homogamy estimates for the beginning of the time series. Conversely, aggregation at the top eliminates heterogeneity prevalent in later periods inflating estimates of homogamy at the end of the period. To illustrate, Table 2 shows the effects of aggregating changes in the absolute rate of educational homogamy among couples where both are younger than 35 in the United States (1940–2000) and Canada (1971–2001). The first column shows the change in homogamy rates when measured with nine educational classes. Educational groupings 9, 7, 6, 5, 4a, and 3a

Table 2. Percentage of Couples with Same Educational Levels among All Couples Aged 34 or Younger

	Groupings of educational categories							
	9	*7*	*6*	*5*	*4a*	*4b*	*3a*	*3b*
United States								
1940	36.4	44.1	47.3	51.0	66.6	53.3	86.5	69.0
1960	38.5	40.3	41.5	44.9	53.6	50.0	76.9	58.6
1970	45.0	46.0	46.4	48.8	53.5	55.9	71.9	60.5
1980	48.9	49.3	49.5	51.0	53.2	60.8	65.7	63.0
1990		51.9	52.0	52.9	53.9	63.7	62.6	64.8
2000		53.9	54.1	54.7	55.8	67.4	62.7	68.6
Canada								
1971		35.4	36.3	41.8	54.0	46.3	73.5	58.4
1981		41.7	41.9	44.4	48.2	52.5	59.4	56.2
1991		49.0	49.1	50.6	52.1	59.8	60.5	61.4
2001		54.7	54.7	55.2	55.9	70.8	59.6	71.4

Data sources: derived from the 1970–2000 American census public use micro-data files and the 1971 Canadian census 30% and 1981–2001 census 20% sample micro data files

Note: the various educational groupings are defined as the following: 9—grade 0–4, 5–6, 7, 8, 9, 10–11, 12, college 1–3, college 4+; 7—grade 0–4, 5–8, 9, 10–11, 12, college 1–3. college 4+; 6—< grade 9, 9, 10–11, 12, college 1–3. college 4+; 5—< grade 9, 9–11, 12, college 1–3. college 4+; 4a—< grade 12, 12, college 1–3, college 4+; 4b—< grade 9, 9–11, 12, college; 3a—≤ grade 12, college 1–3, college 4+; 3b—< grade 12, 12, college. For Canada, grade 12 is replaced by high-school graduation, college 1–3 is replaced by some post-secondary education without a university degree.

show the effect of aggregation into fewer categories by combining the lowest with the next lowest educational categories. When aggregation is done from the bottom up, the time trend towards rising levels of homogamy gradually disappears and is then reversed. For example, educational homogamy in the United States increases between 1940 and 1960 with 9 educational categories but decreases with more aggregate groupings. In 1940, about 50% of married young women and 43% of married young men had less than grade 10 education and much of the variation in the educational distribution was among those with few or no years of schooling, those that had completed grade 8 and those with some high school. By 1960, in contrast, variation in education levels at the bottom of the distribution had all but disappeared. Hence, by grouping together all those with less than grade 10, Schwartz and Mare's (2005) estimates for 1940 conceal the actual diversity in education levels and inflate the estimated level of homogamy relative to later periods.

Similarly, from 1970 on, educational homogamy in both the United States and Canada unambiguously rises with 7, 6, and 5 educational categories, changes little with the 4a groupings, but declines with the 3a groupings. In 1970, the highest level of education for most young people was high-school graduation and crossing barriers of intermarriage for the majority of people occurred at or below high-school graduation. Thus, a fine distinction across educational levels at the lower end is critical.

By 2000, in contrast, most young people had at least some postsecondary education and crossing barriers occurred mainly at levels beyond high-school graduation. Hence, aggregating from the top down eliminates heterogeneity in educational attainment prevalent in later but not earlier periods producing inflated levels of homogamy at the end of the series. The differences between groupings 5 and 4b and between 4a and 3b reflect the effects of aggregation at the upper end by combining "some college" with "college graduation." Thus, for later periods, a fine distinction across education levels at the upper end is important.

A suitable grouping of educational levels for examining temporal changes should adequately reflect the main sources of educational heterogeneity at both the earlier and later periods. Ideally, the more detailed grouping the better. However, too much detail creates many empty cells in the cross-tabulation of wives' and husbands' education and complicates modelling. A practical solution is to choose a grouping that closely resembles more detailed groupings in revealing the trends in homogamy. In our analyses we chose the five-level classification that distinguishes between elementary school only, some high-school, high school graduation, some postsecondary (some college in the United States) education, and university (college in the United States) graduation. The five cat-

egory grouping reveals the same trend as more detailed groupings and captures the main sources of educational heterogeneity at both the beginning and the end of the period.

3.2 First marriage vs. marriage stock and real vs. synthetic cohorts

In previous studies on trends in educational homogamy, some researchers favour newly formed first marriages while others use marriage stock (see Table 1). From newly formed first marriages, husbands' and wives' educational attainment can be measured at the time close to marriage formation. This advantage makes them appropriate subjects for studying the role of education among those entering marriage for the first time. In comparison, the level of educational homogamy among marriage stock (prevailing marriages) reflects the combined effects of assortative entry into the first marriage, assortative dissolution of marriage, assortative entry into subsequent marriages, and the tendency that partners grow alike in educational attainment after marriage (Gelissen 2004; Rogers 2004). Kalmijn (1991b) shows that the percent of homogamous marriages rises as a marriage cohort ages. Given the large prevalence of union dissolution and remarriage in contemporary western societies, focusing on first marriages will not reveal the overall trend in educational homogamy.

A related issue concerns the use of real vs. synthetic marriage cohorts. Newly formed first marriages from repeated cross-sections with sufficient time intervals represent distinct marriage cohorts. This may not be the case for prevailing marriages. In the studies by Smits et al. (2000) and Smits (2003), differences between younger and older couples from one cross-sectional data set are used to infer changes in educational homogamy. The obvious problem with such an approach is that older couples have stayed much longer in marriage than younger ones. If homogamy increases or decreases with the length of marriage, then differences between younger and older couples at least partially capture these attrition effects. When prevailing marriages from multiple cross-sectional data are compared, problems result from overlapping of marriage cohorts. As shown in Table 3, the trend toward rising educational homogamy among younger couples is clear in both countries. The trend is not as clear among older couples or among all marriages.[4]

4. Older and younger couples are also differentially sensitive to the grouping of education levels. In 1971, young Canadian couples (both the husband and wife are between the ages of 15 and 34) had a lower level of educational homogamy than older couples. This is primarily due to the fact that most of the older couples were married before 1960 and the five educational categories did not adequately reflect the important barriers to intermarriage in the earlier

Table 3. Percentage of couples with same education levels by age of wives and husbands, based on five educational groups

	Age of husbands and wives		
	Both between 15–34	*Either over 34*	*All marriages*
United States			
1970	48.8	46.2	46.9
1980	51.0	46.8	48.0
1990	52.9	47.3	48.5
2000	54.7	49.8	50.5
Canada			
1971	41.8	50.0	47.6
1981	44.4	45.2	45.0
1991	50.6	49.7	49.8
2001	55.2	50.8	51.2

Data sources as Table 1.

Note: the five education groups are: United States—< grade 9, 9–11, 12, college 1–3. college 4+; Canada—< grade 9. some high school, high school graduation, some postsecondary, undergraduate degree +

Our main conclusions in this study are based on analyses of prevailing marriages among young couples, both partners under 35, for three reasons. First, our effort to analyze first marriages (results available on request) suffers from problems of data sparsity (small Ns). Second, prevailing marriages among younger couples provides a more complete picture of trends since they also take account of assortative trends in marital dissolution and remarriage. And, third, by focusing on younger couples, we minimize the impact of cohort overlap on our results.

3.3 Measuring heterogeneous and overall changes in homogamy with log-linear models

Most studies of educational homogamy rely on log-linear modeling of the contingency table of wives' and husbands' education levels. For a 2 way table, the log-linear model takes the general form:

$$\text{Log}\ (F_{ij}^{WH}) = \lambda_0 + \lambda_i^W + \lambda_j^H + \lambda_{ij}^{WH}$$

where F_{ij}^{WH} refers to the expected frequency of the (ij) cell consisting of wives with education level i and husbands with education level j. Both i and j range from 1 to k. The marginal effect of wives' educational distribution is captured by λ_i^W, the marginal effect of husbands' education,

decades. When we split those with elementary education into three categories (no education, 1–4 years, 5–8 years), older couples had a lower level of educational homogamy than the younger group in 1971 (results not shown here).

is captured by λ_j^H and λ_{ij}^{WH} captures the association between wives' and husbands' education.

The saturated model includes all the linearly independent effects: k-1 factors for wives' marginal effect, k-1 for husbands, and (k-1)(k-1) for their interactions. The saturated model fits the data perfectly but does not have any extra degree of freedom for testing specific hypotheses. Accordingly, researchers use more parsimonious forms of the interaction terms. Previous studies on educational homogamy often use some variations or combinations of the following forms: quasi-independence (diagonal) parameters, crossings parameters, distance parameters, and quasi-symmetry parameters (see Table 1). Specifications of these parameters are well-documented in the literature (e.g., Haberman 1979; Hout 1983).

Using five educational categories as an example, we show in Table 4 how the above four types of parameters correspond to the log odds ratio of intermarriage (or homogamy when assigned the opposite sign) between a given pair of educational categories. From this table, it is clear that the four commonly used log-linear models differ only in their assumptions about the relationships in log odds ratios of intermarriage among different pairs of educational levels.[5] The choice of models is typically determined empirically by goodness of fit statistics. When applied to all married couples younger than 35 in our data, the quasi-independence model fits the data poorly. Among the remaining three models, the quasi-symmetry model always has the smallest log-likelihood ratio chi-square statistic (L^2), and often the smallest BIC (the Bayesian Information Criterion) value which penalizes less parsimonious models (results available upon request). Accordingly, we report results based on the quasi-sym-

5. The quasi-independence model assumes a general tendency of intermarriage for each education level (λ_{qi} for level i), e.g. university graduates have a higher tendency to marry other university graduates than high-school graduates to marriage other high-school graduates. In this model, the log odds ratios of intermarriage between educational level i and j is the sum of the λ_{qi} and λ_{qj}. The crossings model assumes a unique barrier to intermarriage for crossing two adjacent educational levels and the log odds ratio of intermarriage between two educational levels depends on the selection and number of barriers crossed. The distance model assumes that the difficulty of intermarriage is the same among pairs of educational levels that have the same relative distance. For instance, the relative distance between less than high school (level 1) and high-school graduation (level 3) is considered the same as the distance between high school and university graduation (level 5). In contrast, the quasi-symmetry model does not assume any relationship among pairs of educational levels. Since the quasi-symmetry model imposes few restrictions on the parameter estimates, it is less parsimonious than other models but often the data fit better.

metry model since it is typically the best fitting model when, as in our study, the sample size is sufficient large. Furthermore, a given parameter from the quasi-symmetry model directly corresponds to a log odds ratio of intermarriage between two educational levels as shown in Table 4.

We further add a hypergamy parameter to examine the possibility that with a given education level women are more likely than men to

Table 4. Parameters and their Interpretations in some Log-linear Models of Educational Assortative Marriage

	Parameters					*Log odds ratios of internarriage between two educational levels*			
					1. Quasi-independence model				
	Husband's educational level					*Husband's educational level*			
Wife's	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(1)*	*(2)*	*(3)*	*(4)*
(1)	λ_{q1}	0	0	0	0				
(2)	0	λ_{q2}	0	0	0	$-(\lambda_{q1}+\lambda_{q2})$			
(3)	0	0	λ_{q3}	0	0	$-(\lambda_{q1}+\lambda_{q3})$	$-(\lambda_{q2}+\lambda_{q3})$		
(4)	0	0	0	λ_{q4}	0	$-(\lambda_{q1}+\lambda_{q4})$	$-(\lambda_{q2}+\lambda_{q4})$	$-(\lambda_{q3}+\lambda_{q4})$	
(5)	0	0	0	0	λ_{q5}	$-(\lambda_{q1}+\lambda_{q5})$	$-(\lambda_{q2}+\lambda_{q5})$	$-(\lambda_{q3}+\lambda_{q5})$	$-(\lambda_{q4}+\lambda_{q5})$
					2. Crossings model				
	Husband's educational level					*Husband's educational level*			
Wife's	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(1)*	*(2)*	*(3)*	*(4)*
(1)	0	λ_{c1}	$\lambda_{c1}+\lambda_{c2}$	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}$	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$				
(2)	λ_{c1}	0	λ_{c2}	$\lambda_{c2}+\lambda_{c3}$	$\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$	$2\lambda_{c1}$			
(3)	$\lambda_{c1}+\lambda_{c2}$	λ_{c2}	0	$_{-c3}$	$\lambda_{c3}+\lambda_{c4}$	$2(\lambda_{c1}+\lambda_{c2})$	$2\lambda_{c2}$		
(4)	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}$	$\lambda_{c2}+\lambda_{c3}$	λ_{c3}	0	λ_{c4}	$2(\lambda_{c1}+\lambda_{c2}+\lambda_{c3})$	$2(\lambda_{c2}+\lambda_{c3})$	$2\lambda_{c3}$	
(5)	$\lambda_{c1}+\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$	$\lambda_{c2}+\lambda_{c3}+\lambda_{c4}$	$\lambda_{c3}+\lambda_{c4}$	λ_{c4}	0	$2(\lambda_{c1}+\lambda_{c2}+\lambda_{c3}+\lambda_{c4})$	$2(\lambda_{c2}+\lambda_{c3}+\lambda_{c4})$	$2(\lambda_{c3}+\lambda_{c4})$	$2\lambda_{c4}$
					3. Distance model				
	Husband's educational level					*Husband's educational level*			
Wife's	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(1)*	*(2)*	*(3)*	*(4)*
(1)	0	λ_{d1}	λ_{d2}	λ_{d3}	λ_{d4}				
(2)	λ_{d1}	0	λ_{d1}	λ_{d2}	λ_{d3}	$2\lambda_{d1}$			
(3)	λ_{d2}	λ_{d1}	0	λ_{d1}	λ_{d2}	$2\lambda_{d2}$	$2\lambda_{d1}$		
(4)	λ_{d3}	λ_{d2}	λ_{d1}	0	λ_{d1}	$2\lambda_{d3}$	$2\lambda_{d2}$	$2\lambda_{d1}$	
(5)	λ_{d4}	λ_{d3}	λ_{d2}	λ_{d1}	0	$2\lambda_{d4}$	$2\lambda_{d3}$	$2\lambda_{d2}$	$2\lambda_{d1}$
					4. Quasi-symmetry model				
	Husband's educational level					*Husband's educational level*			
Wife's	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(1)*	*(2)*	*(3)*	*(4)*
(1)	0	λ_{s21}	λ_{s31}	$\lambda_{s4\,1}$	λ_{s51}				
(2)	λ_{s21}	0	λ_{s32}	λ_{s42}	λ_{s52}	$2\lambda_{s21}$			
(3)	λ_{s31}	λ_{s32}	0	λ_{s43}	λ_{s53}	$2\lambda_{s31}$	$2\lambda_{s32}$		
(4)	λ_{s41}	λ_{s42}	λ_{s43}	0	λ_{s54}	$2\lambda_{s41}$	$2\lambda_{s42}$	$2\lambda_{s43}$	
(5)	λ_{s51}	λ_{s52}	λ_{s53}	λ_{s54}	0	$2\lambda_{s51}$	$2\lambda_{s52}$	$2\lambda_{s53}$	$2\lambda_{s54}$

Education levels in the US:
(1) < grade 9
(2) 9–11
(3) 12
(4) college 1–3
(5) college 4+

Education levels in Canada:
(1) < grade 9
(2) some high school
(3) high school graduation
(4) some post secondary
(5) undergraduate degree +

marry up (or down) on education.[6] Rather than assume women and men have the same tendency to marry up (or down), the hypergamy parameter essentially allows us to test for asymmetry in male-female rates of intermarriage.

In sum, we use quasi-symmetry parameters and a hypergamy parameter to capture the association between wives' and husbands' education. Building on this base model, we examine how such an association has changed over time in terms of overall trends, and trends specific to the highly educated and less well educated, and trends specific to women and men.

To answer our first research question regarding trends in the overall rate of marital homogamy, we can choose from various modelling strategies including the uniform layer effect model (Yamaguchi 1987), the log-multiplicative layer effect model (Xie 1992), and the regression-type approach (Goodman and Hout 1998). We use the log-multiplicative layer effect model since it allows greater parsimony than the regression approach and defines layer (time period) effects by directly comparing the predefined pattern of the two-way association between husbands' and wives' education (in our case, the quasi-symmetry pattern plus hypergamy), which is not the case in the uniform layer effect model.[7]

To answer our second question regarding changes across educational levels, we rely on the interaction terms between quasi-symmetry parameters and time periods. The change in a given quasi-symmetry parameter can be expressed as the difference of two log odds ratios or the log of the ratio of odds ratios. For instance, the change in λ_{s53} which is one half the log odds ratio of intermarriage between high-school graduation and university graduation, can be expressed as:

$$\lambda_{s53.t2} - \lambda_{s53.t1} = \frac{1}{2}\left[\log\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t2} - \log\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t1}\right] = \frac{1}{2}\log\left[\left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t2} \div \left(\frac{F_{35}}{F_{33}} \times \frac{F_{53}}{F_{55}}\right)_{t1}\right]$$

Thus, a positive change in λ_{sij} indicates an increase in the tendency of women and men with education levels i and j to marry across their own education levels (or a decrease in homogamy). Alternatively, a negative change in λ_{sij} indicates a decrease in the tendency of women and men with education levels i and j marry across education levels.

To answer our third question regarding gender specific trends, we further add the interaction terms between the hypergamy parameter (λ_h) and

6. In the log linear model, the hypergamy variable is coded simply as 1 when a woman marries a better-educated man and 0 when a woman marries a man with same or less education.

7. We estimated both the log-multiplicative layer model and the uniform layer effect model. The results showed similar trends.

time period. In this model where the change in hypergamy is controlled, the change in a given quasi-symmetry parameter over time $\lambda_{sij.t2} - \lambda_{sij.t1}$, assuming i is a higher educational level than j, is the change in the log odds ratio of marrying down on education among women. Meanwhile, the change in the log odds ratio of marrying down on education among men is $(\lambda_{sij.t2} - \lambda_{sij.t1}) + (\lambda_{h.t2} - \lambda_{h.t1})$.

4. Data Sources

The data for prevailing marriages among young adults under age 35 were derived from 1970, 1980, 1990, and 2000 American census public use sample (IPUMS) (Ruggles and Sobek 2003). For Canada, the data are derived from the 1971 census 1/3 sample micro data file, and 20% sample micro data files for the census years from 1981 through 2001.

Since race effects on intermarriage are so pervasive, the ideal solution is to estimate separate models by racial origin categories (Lewis and Oppenheimer 2000). Given the very different history and composition of racial minority populations in the two countries (Lee and Boyd 2008), we have not attempted that task here. Hence, for both countries, we only consider marriages among the white population.

As shown in Table 5, the sample size ranges from 109,630 to 611,080 marriages in the United States (standardized weights are used to make it representative to the population) and from 173,180 to 386,720 in Canada. Following common practice in the literature (e.g. Raymo and Xie 2000), we scaled down the sample size to about 100,000 for each year in the subsequent modeling.[8] The rescaled sample is small enough that our chosen parsimonious quasi-symmetry model can fit the data reasonably well (with negative BIC statistic) for any given year.

5. Results

5.1. Changes in Absolute Rates: Educational Homogamy Among the Married

Table 5 shows the percentage distribution of wives' and husbands' level of education and changes in *absolute* rates of homogamy and intermarriage among prevailing marriages for young adults aged under 35 in the United States and Canada between 1970–71 and 2000–2001.

8. We also use both larger and smaller rescaled sample sizes to test the sensitivity of our results. The parameter estimates based on different rescaled sample sizes are very similar in value, but are more likely to be significant with larger sample sizes.

Average educational attainment rose for both sexes over the three decades, particularly for women (the column totals). By 2000–2001, wives had higher average educational levels than their husbands in both countries. Starting from a lower base, the gains were larger among Can-

Table 5. Assortative Mating on Educational Attainment for Couples Younger than 35, the United States and Canada

	The United States						*Canada*					
	Husband's years of schooling						*Husband's years of schooling*					
Wife's years of schooling	*< 9*	*9–11*	*12*	*13–15*	*≥ 16*	*Total*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*Total*
1970–71												
<9	2.7	1.7	1.3	0.2	0.1	6.0	8.8	4.9	1.6	1.3	0.1	16.6
9–11	2.9	6.5	7.3	1.2	0.3	18.2	7.3	15.1	7.2	4.5	1.0	35.0
12	2.5	7.4	26.9	8.8	4.6	50.2	2.7	8.2	9.9	6.5	2.5	29.7
13–15	0.2	0.7	3.7	5.1	5.3	15.0	0.9	2.2	2.6	5.1	3.8	14.5
≥ 16	0.1	0.2	1.0	1.7	7.7	10.6	0.1	0.2	0.3	0.7	3.0	4.2
Total	8.5	16.4	40.1	17.0	18.0	100	19.7	30.5	21.5	18.0	10.3	100
Sum of diagonals						48.8						41.8
Sample size						(109,635)						(386,726)
1980–81												
<9	1.4	0.9	0.8	0.2	0.1	3.4	1.8	1.4	0.8	0.9	0.1	5.0
9–11	1.3	3.9	5.3	1.2	0.2	12.0	2.5	10.9	4.5	7.6	0.6	26.0
12	1.3	5.0	26.0	10.2	4.6	47.1	1.2	5.1	8.4	9.7	1.4	25.8
13–15	0.2	0.7	5.5	8.0	6.9	21.2	0.9	5.1	5.4	17.5	5.4	34.2
≥ 16	0.1	0.1	1.5	2.9	11.7	16.3	0.0	0.3	0.5	2.5	5.7	9.0
Total	4.3	10.7	39.1	22.5	23.5	100	6.4	22.7	19.6	38.2	13.1	100
Sum of diagonals						51.0						44.3
Sample size						(611,076)						(318,036)
1990–91												
<9	1.0	0.5	0.5	0.2	0.0	2.1	0.7	0.7	0.3	0.3	0.0	2.0
9–11	0.6	2.6	3.6	1.0	0.1	7.9	1.1	9.4	3.4	4.8	0.3	19.0
12	0.7	3.9	22.1	9.1	2.3	38.0	0.6	4.8	9.3	7.9	0.9	23.5
13–15	0.2	1.3	10.1	14.7	6.4	32.7	0.6	6.2	8.0	23.6	4.7	43.1
≥ 16	0.0	0.2	2.1	4.5	12.5	19.2	0.0	0.4	1.0	4.1	6.9	12.4
Total	2.5	8.5	38.3	29.4	21.3	100	3.1	21.5	21.9	40.7	12.9	100
Sum of diagonals						52.8						50.0
Sample size						(496,373)						(264,339)
2000–01												
<9	1.4	0.5	0.6	0.2	0.0	2.8	0.6	0.3	0.2	0.2	0.0	1.3
9–11	0.6	2.1	2.6	0.8	0.1	6.2	0.6	5.5	1.9	3.3	0.2	11.5
12	0.8	2.9	16.7	6.9	1.6	28.8	0.4	2.5	5.4	5.2	0.6	13.9
13–15	0.3	1.4	10.4	16.6	5.8	34.4	0.6	5.8	8.1	29.9	5.3	49.6
≥ 16	0.1	0.2	2.8	7.0	17.9	27.9	0.1	0.6	1.4	8.9	12.7	23.7
Total	3.2	7.1	33.0	31.4	25.4	100	2.2	14.6	16.9	47.5	18.8	100
Sum of diagonals						54.7						54.0
Sample size						(354,061)						(173,179)

Data sources: 1970–2000 US census public use micro-data files; 1971-2001 Canadian census micro-data files.

adians and particularly among Canadian wives.[9] By 2000, the gender gap in the share of husbands and wives with university degrees was 5 percentage points in Canada (23.7% for women and 18.8% for men) compared to a 2.5 percentage point gap in the United States (27.9% for women and 25.4% for men). Canadians were less likely to have completed a university degree than Americans but much more likely than Americans to have some postsecondary schooling.

Among prevailing marriages, the percentage of educationally homogamous couples (the sum of diagonal cells in Table 5) increased steadily in both countries and by 2000–2001, young couples had a similar level of educational homogamy in the two countries. In the United States, some 55% of marriages consisted of couples with the same level of education in 2000, up from 49% in 1970. In Canada, 54% of couples had the same level of education in 2001, up from 42% in 1971. The American rate increased by about 2 percentage points per decade. In Canada, the rate rose by 2.6 percentage points in the 1970s and then accelerated to 6 percentage points in the 1980s and by about 5 percentage points in the 1990s.

Tables 6 and 7 show the detailed trends in homogamy and intermarriage for men and women separately by education level for the United States and Canada respectively. The total homogamy rate rose among women in both countries but the trend was driven mainly by the sharp increase among women with some postsecondary education. The average trend, however, was offset by a decline in homogamous marriages among university-educated women — a decline of 8 percentage points in the United States and almost 18 percentage points in Canada. By 2001, only 53% of young Canadian university-educated married women had partners with university degrees. Less educated women, in contrast, were somewhat more likely to marry up in 2000 than in 1970.

Not surprisingly, the trends for men tend to be the mirror image of those for women. Rates of homogamy and marrying "up" rose sharply for men with at least some college education and by 2000 well-educated men were more likely to have a highly educated partner than were highly educated women, reversing the situation of 1970. The share of male high-school graduates marrying better-educated women rose from 12 to 40% in the United States and from 13 to 55% in Canada over the three decades. In 1970, women with high school completion were much more likely than men to marry "up." By 2000, the advantage had turned decisively to men. Overall, rising education levels have improved the marriage market for men much more than for women.

9. Change in the marginal distributions of education for husbands and wives as indexed by the index of dissimilarity are as follows: American wives, .37; Canadian wives, .55; American husbands, .22; Canadian husbands, .38.

Table 6. Changes in Upward, Downward and Homogamous Marriage by Sex and Educational Level, 1970–2000, the United States

	Wives' years of schooling						*Husbands' years of schooling*					
	<9	*9–11*	*12*	*13–15*	*≥ 16*	*Total*	*< 9*	*9–11*	*12*	*13–15*	*≥ 16*	*Total*
	% of marriage within an educational level in a given year						*% of marriage within an educational level in a given year*					
Up												
1970	54.6	48.2	26.8	35.6	na	29.3	67.7	49.8	11.8	9.9	na	20.5
1980	59.9	56.4	31.4	32.4	na	28.1	67.5	54.5	17.8	13.0	na	20.0
1990	55.1	59.5	29.8	19.6	na	22.0	61.9	63.5	31.8	15.1	na	23.4
2000	47.6	55.4	29.4	16.8	na	20.4	54.6	63.2	39.9	22.2	na	24.5
Homogamous												
1970	45.4	35.8	53.5	33.7	72.3	49.9	32.3	39.7	66.9	29.7	42.6	51.7
1980	40.1	32.9	55.2	37.6	72.0	52.2	32.5	36.9	66.5	35.5	49.8	52.5
1990	44.9	33.3	58.0	45.0	65.0	53.2	38.1	30.9	57.6	50.1	58.6	52.8
2000	52.4	34.4	57.9	48.2	64.1	54.2	45.4	29.7	50.5	53.0	70.4	55.5
Down												
1970	na	16.0	19.7	30.7	27.7	20.7	na	10.5	21.3	60.4	57.4	27.7
1980	na	10.7	13.4	30.0	28.0	19.7	na	8.6	15.7	51.5	50.2	27.5
1990	na	7.2	12.2	35.4	35.0	24.8	na	5.6	10.6	34.8	41.4	23.8
2000	na	10.2	12.7	35.0	35.9	25.4	na	7.1	9.6	24.8	29.6	20.0

Sources: derived from 1970–2000 US census public use micro-data files.

Table 7. Changes in Upward, Downward and Homogamous Marriage by Sex and Educational Level, 1971–2001, Canada

	Wives' years of schooling						*Husbands' years of schooling*					
	<9	*9–11*	*12*	*13–15*	*≥ 16*	*Total*	*< 9*	*9–11*	*12*	*13–15*	*≥ 16*	*Total*
	% of marriage within an educational level in a given year						*% of marriage within an educational level in a given year*					
Up												
1971	47.1	36.1	30.1	26.0	na	31.4	55.3	34.6	13.3	3.9	na	25.8
1981	63.3	48.8	43.3	15.7	na	29.6	71.0	45.9	30.1	6.5	na	25.5
1991	63.6	44.4	37.5	10.9	na	24.2	77.0	52.9	40.9	10.0	na	25.5
2001	53.7	47.4	41.4	10.8	na	20.2	71.4	60.4	55.9	18.7	na	24.9
Homogamous												
1971	52.9	43.0	33.4	34.9	71.2	44.3	44.7	49.5	46.1	28.0	28.7	43.7
1981	36.7	41.8	32.6	51.1	63.3	46.1	29.0	47.9	42.9	45.8	43.2	44.5
1991	36.4	49.6	39.5	54.8	55.9	49.9	23.0	44.0	42.5	58.0	53.9	50.5
2001	46.3	47.6	38.5	60.2	53.7	53.2	28.6	37.3	31.6	62.9	67.6	56.3
Down												
1971	na	20.9	36.5	39.1	28.8	24.2	na	15.9	40.6	68.1	71.3	30.5
1981	na	9.4	24.1	33.2	36.7	24.4	na	6.2	27.0	47.7	56.8	30.0
1991	na	6.0	23.0	34.3	44.1	25.9	na	3.1	16.6	32.0	46.1	24.0
2001	na	5.0	20.1	29.0	46.3	26.6	na	2.3	12.5	18.4	32.4	18.8

Sources: derived from 1971–2001 Canadian census micro-data files.

5.2 Changes in Relative Rates

Given the larger gains in wives' educational attainment, changes observed in the absolute rates may not appear especially surprising. In 1970–1971, husbands were on average much better educated than wives were while in 2000–2001 wives were better educated than husbands were. The convergence of wives' education on that of husbands increased the possibility of forming homogamous unions. As wives surpassed the educational attainments of husbands, the likelihood that more women would marry "down" increased as did the likelihood that husbands would marry better educated women. To test the modernization thesis, for example, requires estimation of changes in relative rates, net of changes in the educational distributions of men and women.

Table 8 summarizes the model goodness-of-fit estimates for various steps of the log-linear estimation. The starting model (M0) includes only the marginal values for husbands' and wives' education and period but assumes no association between the education of husbands and wives and no association between time period and the association between husbands' and wives' education. Model one (M1) adds parameters for the quasi-symmetry model of association between husbands' and wives' education and a hypergamy (the tendency for wives to marry "up") parameter but assumes that the associations do not change over time. Introduction of the hypergamy parameter essentially allows the model to estimate different parameters for husbands and wives, whether men and women at the same education level have the same tendency to marry within or to marry out. For both countries, the model (M1) with quasi-symmetry and hypergamy parameters significantly improves the model

Table 8. Goodness-of-fit Results for Models of all Marriages among Young Adults

	The United States			*Canada*		
	d.f	L^2	*BIC*	*d.f*	L^2	*BIC*
M0: Baseline model	64	1999833	1999007	64	150566	149829
M1: M0 + quasi-symmetry + hypergamy	53	1252	568	53	2104	1420
M2: M1 + log-multiplicative layer effect	50	966	321	50	1502	857
M3: M1 + quasi-symmetry*period	23	254	-43	23	220	-77
M4: M3 + hypergamy*period	20	134	-124	20	204	-54

The baseline model contains the main effects of wive's education, husbands' education, and period; and two-way interactions between period and education for each sex.

L^2 is the log-likelihood ratio chi-square statistic. BIC = L^2 - (d.f.)In(N), where N is the rescaled sample size (401,282 for the United States and 402,499 for Canada).

fit relative to the baseline model that assumes no association between husbands' and wives' education.

Change in relative rates of homogamy

Model two (M2) adds the log-multiplicative layer effect to Model one and provides the parameter values (the normalized Φ parameter) that answer the question of whether or not the relative rate of homogamy has changed over time. The log-multiplicative layer effect model (M2) has the best fit based on the BIC statistic in Canada and improves the model fit by the standard of the log-likelihood ratio Chi-square statistic in both countries.

The log-multiplicative layer effect model (M2) tests for the "average" or "overall" change in the relative homogamy rate over time. The results confirm a steady increase in the relative rates of educational homogamy. The normalized Φ parameter for the United States rose from .48 in 1970, to .49 in 1980, to .51 in 1990, and to .53 in 2000. In Canada, Φ for all unions increased from 0.45 in 1971, to 0.47 in 1981, to 0.53 in 1991, and to 0.54 in 2001.[10] In effect, in both countries, the relative rate of marital homogamy increased unambiguously over all three decades.

Importantly, the predicted values for marital homogamy net of changes in the marginals indicate that most of the increase was due to *change in the association* between husbands' and wives' education rather than to *changes in the distribution* of husbands' and wives' education. In the United States, the change in association, net of changes in the marginals, accounts for 4 of the 6 percentage point increase in educational homogamy between 1970 and 2000. In Canada, the change in association accounts for almost 10 of the 12 percentage point increase. In other words, most of the increase in educational homogamy over the three decades is not a result of changes in the relative supply of husbands and wives with different educational levels.

Changes in the odds of crossing educational boundaries

The heterogeneous change model (M3) generates parameters required to answer questions concerning where in the educational hierarchy the rise in homogamy is being produced (i.e., are the changes at different education levels the same or different). M3 improves the model fit further by the standard of the log-likelihood ratio Chi-square statistic and BIC (Table 8). Finally, Model 4 asks whether the change in the subcomponents differs among husbands and wives by testing for change in the hypergamy parameter. The inclusion of changes in the hypergamy parameter also improves the model fit further, although it is not as parsi-

10. Among legal marriages the corresponding change was from 0.44 in 1971, to 0.47 in 1981, 0.54 in 1991 and to 0.55 in 2001.

monious as M3 for the Canadian data. The parameter estimates for both Models 3 and 4 are available upon request.

To facilitate interpretation, we transform the parameter estimates in Model 3 and Model 4 into the odds of intermarriage relative to the odds of a homogamous marriage by period and present them in Table 9 for the United States and in Table 10 for Canada. Each table contains three panels titled separately as "1. Overall," "2. Wives marrying down," and "3. Husbands marrying down." The odds ratios in panel 1 are derived from Model 3 which assumes change in intermarriage is symmetrical with respect to sex. The odds ratios in panels 2 and 3 are derived from Model 4 which specifies that men and women experience different changes in intermarriage.

In both countries, intermarriage across education levels occurs primarily between adjacent education levels and the odds ratios for intermarriage are very small when wives and husbands are separated by more than one education level. Since the odds of intermarriage across more than one educational level are very small, their changes over time have minimum impact on the overall trends in educational homogamy. Hence,

Table 9. Odds of Intermarriage Relative to Odds of Homogamy among Prevailing Marriages, the United States, 1970–2000

	Overall				*Wives marrying down*				*Husbands marrying down*			
	Spouses' education				*Husbands' education*				*Wives' education*			
	< 9	*9–11*	*12*	*13–15*	*< 9*	*9–11*	*12*	*13–15*	*< 9*	*9–11*	*12*	*13–15*
1970												
9–11	0.282				0.199				0.287			
12	0.043	0.304			0.029	0.212			0.042	0.304		
13–15	0.003	0.025	0.248		0.002	0.018	0.169		0.003	0.026	0.243	
≥ 16	0.000	0.001	0.021	0.249	0.000	0.001	0.015	0.168	0.000	0.001	0.022	0.242
1980												
9–11	0.218				0.170				0.220			
12	0.031	0.259			0.024	0.201			0.031	0.259		
13–15	0.004	0.027	0.270		0.003	0.021	0.208		0.004	0.028	0.268	
≥ 16	0.000	0.001	0.021	0.219	0.000	0.000	0.017	0.168	0.000	0.001	0.022	0.217
1990												
9–11	0.106				0.093				0.106			
12	0.017	0.243			0.015	0.213			0.017	0.243		
13–15	0.003	0.032	0.283		0.002	0.029	0.249		0.003	0.032	0.283	
≥ 16	0.000	0.001	0.017	0.155	0.000	0.001	0.015	0.137	0.000	0.001	0.017	0.156
2000												
9–11	0.106				0.110				0.105			
12	0.019	0.212			0.020	0.220			0.019	0.211		
13–15	0.002	0.029	0.259		0.002	0.032	0.268		0.002	0.030	0.257	
≥ 16	0.000	0.000	0.014	0.136	0.000	0.001	0.016	0.142	0.000	0.001	0.015	0.136

Source: authors derived from 1970–2000 American census public use micro-data files.

our summary of findings will focus primarily on changes in intermarriage across adjacent education levels.

Declining intermarriage at the top of the educational hierarchy

In both Canada and the United States, declining intermarriage among university graduates was a major source of the overall rise in educational homogamy. In Canada, the relative rate of intermarriage between the university educated and those with some university fell by 38% (from .201 to .125) and in the United States by 45% (from .249 to .136). The largest declines occurred in Canada during the 1970s and in the United States during the 1980s. In Canada, the downward trend was arrested in the 1990s and rates of intermarriage by the university educated actually rose slightly by 2000.

Whereas Canadian trends were quite similar for men and women, the American decline was almost entirely driven by declining intermarriage among university-educated men (from .242 to .136 or 44%). The decline in intermarriage among American university-educated women (from .168 to .142 or 15%) was modest by comparison and, as in Canada, stabilized and even rose slightly during the 1990s.

Table 10. Odds of Intermarriage Relative to Odds of Homogamy among Prevailing Marriages, Canada, 1971–2001

	Overall				*Wives marrying down*				*Husbands marrying down*			
	Spouses' education				*Husbands' education*				*Wives' education*			
	< 9	*9–11*	*12*	*13–15*	*< 9*	*9–11*	*12*	*13–15*	*< 9*	*9–11*	*12*	*13–15*
1970												
9–11	0.268				0.251				0.269			
12	0.047	0.392			0.044	0.366			0.047	0.393		
13–15	0.025	0.130	0.339		0.023	0.122	0.313		0.025	0.130	0.336	
≥ 16	0.000	0.003	0.021	0.201	0.000	0.003	0.019	0.186	0.000	0.003	0.021	0.199
1980												
9–11	0.179				0.168				0.179			
12	0.057	0.249			0.053	0.234			0.056	0.249		
13–15	0.025	0.201	0.363		0.023	0.189	0.339		0.025	0.202	0.362	
≥ 16	0.000	0.003	0.013	0.137	0.000	0.002	0.012	0.128	0.000	0.003	0.013	0.137
1990												
9–11	0.114				0.116				0.113			
12	0.028	0.184			0.029	0.187			0.028	0.183		
13–15	0.010	0.133	0.288		0.010	0.136	0.295		0.010	0.133	0.288	
≥ 16	0.000	0.002	0.014	0.118	0.000	0.002	0.014	0.120	0.000	0.002	0.013	0.118
2000												
9–11	0.057				0.059				0.057			
12	0.019	0.163			0.020	0.170			0.019	0.162		
13–15	0.006	0.116	0.264		0.007	0.122	0.276		0.006	0.116	0.263	
≥ 16	0.000	0.002	0.012	0.125	0.000	0.002	0.012	0.131	0.000	0.002	0.012	0.125

Source: authors derived from 1971–2001 Canadian census micro-data files.

Trends in the middle

In the United States, the odds ratios of intermarriage between those with *some postsecondary* education and *high-school graduates* rose between 1970 and 1990 (from .248 to .283) falling back to .259 by 2000. The American trends were very different for men and women however. The odds ratios of intermarriage among women rose by 59% (from .169 to .268). Among men, the odds ratios of intermarriage rose moderately (from .243 to .283) between 1970 and 1990 before falling back to .257 in 2000. In Canada, intermarriage rose during the 1970s but then declined substantially over the following two decades for a net decline of 12% and changes were quite similar among women and men.

The odds ratios of intermarriage between *high-school graduates* and those with some *high school* fell from .304 to .212 (30%) in the United States but the overall trend was entirely driven by high-school men. Among high-school women, the odds ratios of intermarriage with men with some high school actually rose slightly from .212 to .220 between 1970 and 2000. In Canada, the decline in intermarriage between high school graduates and those with some high school was even more precipitous, falling by 58% (from .392 to .163), and trends were very similar for men and women.

Intermarriage at the bottom

Declines in the odds ratio of intermarriage between those with some high school and those with less than high school were uniformly large in both Canada and the United States for both men and women. In the United States, the odds ratio of intermarriage between those with less than 9 years of education and those with 9–11 years of education decreased 62% from 0.282 in 1970 to 0.106 in 2000. The decline in the odds ratio of intermarriage among the least educated was much larger among husbands than among wives. The odds ratio of marrying down among those with 9–11 years of education declined 63% among husbands (from 0.287 to 0.105) compared with a decline of 45% among wives. Thus, the chance of the least educated wives marrying up declined faster than that of least educated husbands.

In Canada, the odds of intermarriage between those with 9–11 years of education and those with less than 9 years of education decreased 79%, and the decline was similar in magnitude among men and women.

6. Conclusion

Our analysis of prevailing marriages among young adults reveals several clear trends in educational homogamy and intermarriage in the United

States and Canada. First, the overall level of both absolute and relative rates of educational homogamy have unambiguously increased in both countries over the three decades and we find no evidence for the asymmetric inverted-u shape reported in some previous studies. Second, beginning from a lower base, absolute rates of educational homogamy rose more in Canada over the period and had converged on American levels by the turn of the century. Third, the overall trend at the national level appears to have been driven mainly by changes in the association of husbands' and wives' education rather than by changes in the relative supply of more and less educated partners.

Declining odds of intermarriage at both the top and the bottom of the educational hierarchy were major drivers of the rising rate of marital homogamy in both countries but two important differences stand out. Declining rates of intermarriage between high-school graduates and those with both higher and lower levels of education were much larger in Canada. Indeed the odds ratios of intermarriage between those with some university education and high-school graduates actually increased in the United States.

Second, while changing patterns of intermarriage were quite similar among Canadian men and women, changes among American men and women differed in important ways. The declining odds of marrying "down" among university graduates were predominantly a male phenomenon in the United States while rising intermarriage with high school graduates by those with some postsecondary education occurred mainly among women. Finally, the odds of marrying "down" among female high-school graduates rose slightly over the period but fell among male high-school graduates. Put somewhat differently, in the United States, the prospect of marrying "up" the educational hierarchy improved substantially for males with high-school diplomas or less, and, compared to women, declined only modestly for men with some postsecondary education.

There were two important exceptions to the general trend towards rising homogamy. The first was the aforementioned increase in intermarriage between those with some postsecondary education and high-school graduates in the United States. The second was the stabilization and/or small gains in intermarriage in the 1990s among male and female university graduates in Canada and among female university graduates in the United States.

The increased tendency of American women with some postsecondary education to "marry down" and small increases in intermarriage by female university graduates in the 1990s in both countries are seemingly consistent with Oppenheimer's (1994:315) observations concern-

ing changing preferences, the expectation that more educated women are more willing and able to marry a man who is unlikely to be a great provider but who is highly desirable in other respects (Oppenheimer 1994:315). However, it is important to point out that the rising intermarriage in the United States occurred predominantly between women with some college education and men with high-school graduation. Women with some college education were not the ones with the greatest economic resources or potential. Indeed, even by 2000 they still had a much lower labour force participation rate than men with high-school graduation. Among those who participated in the labour force, the earnings of women with some college education were less than 60% of the earnings of male high-school graduates.[11] Similarly, university-educated women had a much lower labour force participation rate and lower average earnings than men with some college education. Therefore, the large increase in intermarriage among women with some college education over the three decades and the small increase in intermarriage among women who finished college education may primarily reflect the possibility that those well-educated women who are not successful in the labour market marry men who are less educated but manage to be in a superior financial position. More empirical studies are needed to confirm this possibility.

The overall downward trend in intermarriage, especially between 1970–1971 to 1990–1991 in both countries, does not support Mare's (1991) life course hypothesis which postulates changes in the opportunity structure as the causal mechanism — that the rising time gap between school completion and marriage increases the probability that men and women with different educational backgrounds will meet one another. In particular, the life course hypothesis suggests that marriage across barriers at the university level is particularly sensitive to the time gap between school leaving and marriage. However, the time gap for the university educated rose continuously over three decades in Canada while

11. Based on the 2000 American census public use sample, we find that among married young women (under age 35) the labour force participation rate (defined here as the percentage with positive employment earnings in the previous year) was about 82% among the university educated, 72% among those with some college education, and 66% among high-school graduates. Among those with positive employment earnings, the average earnings were $34,000 among the university educated, $21,100 among those with some college education, and $17,300 among high-school graduates. Among married young men, the labour force participation rate was 96% among the university educated, 94% among those with some college education, and 91% among high-school graduates. Among young husbands with positive employment earnings, the average earnings were $55,800 among the university educated, $36,700 among those with some college education, and $31,700 among high-school graduates.

intermarriage by university-educated people decreased significantly between 1970 and 1990 and only increased slightly in the 1990s.[12]

It is clear, however, that the u-turn in marital homogamy postulated by modernization theorists (Smits 2003; Smits, Ultee, and Lammers 1998; 2000) has yet to have had large impacts on marital patterns in Canada and the United States. Were it so, this would be good news for policymakers and those concerned with rising inequality in family incomes. The rise in educational homogamy, along with increased selection into marriage based on education, is now regarded as a potent force underlying rising inequality in family earnings (Esping-Andersen 2007; Fortin and Schirle 2006; Hyslop 2001; Kenworthy 2004). Were it the case that these trends in absolute levels of marital homogamy were driven mainly by the revolution in women's educational attainment (changes in the "marginals") there would be reason for optimism since that trend is undoubtedly now reaching maturity. But that is not the case: most of the gains in marital homogamy are the result of changes in the association between husbands' and wives' education rather than by changes in their levels. The exceptions to the trend provide some evidence that this upward trend may be abating but scant hope for any large scale reversal in the proximate future.

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12. In the United States, the time-gap between age at marriage and age at school leaving increased from 1970 through the late 1980s, but may have stabilized in the 1990s (Schwartz and Mare 2005). In Canada, the gap between the two life-events has been rising continuously since the earlier 1970s. Median age at first marriage has increased by about six years while median years of schooling among young adults aged between 20 and 30 has only increased from 12 to 14 years.

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