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Female Education and Marriage in Canada

A Preliminary Investigation using Census Data.

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Abstract

This paper uses 2001 and 2006 Canadian Census data to examine the link between female education and marriage rates and concludes that higher education improves a females' likelihood to marry. It also finds that if females are more educated than males there is a decrease to the female's likelihood of marriage.

Motivation

Sociologists often speak of social class and how it factors into marriage decisions; someone of a higher social status is a more attractive marital partner (Conger, Conger, & Martin, 2010). There is no true measure of social status but education can act as a proxy because schooling signals an individual's ability and potential success. Evidence of positive financial returns to education is well documented in labour economics literature (Carneiro, Heckman, & Vytlacil, 2011). Researchers have found additional benefits from education such as increased life expectancy (Echevarria & Iza, 2006) and reduced criminal activity (Lochner & Moretti, 2004).

Historically, men are the bread-winners of the household and tend to be more educated than their wives. However, with the increase in women's education levels in Canada over the past decades, the gap in the education difference is decreasing[1,2] – women are now more likely to enter post secondary education than men.

In examining the effect that educational differences have on female marriage rates two not-mutually-exclusive outcomes exist: females tend to marry below their education level more often than

[1] There are conflicting results on if males or females are more educated in Canada as a whole. More young females are attending higher education than young males are, however the older male population is generally more educated than the older female population. Thus, the education gap has not yet completely reversed.
[2] Data from the 2001 and 2006 Canadian Census is examined later in this paper.

before or more of them tend to remain single. This question is of interest for many reasons. First, because children who are raised by married parents benefit from various social and economic advantages and less marriages implies less of this gain (Harknett & Kuperberg, 2011). Second, because individuals tend to marry people with similar backgrounds we may find matching between highly educated parents and less educated parents (Mare, 1991) which may lead to greater income disparity between the two groups. Third, if fewer women are marrying then whether the single ones tend to come from the educated or uneducated groups is of interest regarding the social status implications of female education.

Of particular interest are the marriage gains from each level of female education. If the returns are positive, this may be further reasoning for subsidization of education. This also becomes a question of their concavity or convexity. A convex pattern would suggest there will be a faster move to higher female education rates. A concave pattern would suggest that low levels of education each add more marriage probability than its successor and the shift in female education will occur at a slower rate.

Existing Literature

Mare (1991) wrote a comprehensive report on educational assortative mating; he finds that persons with similar levels of schooling tend to marry one another partially because of the social stratification that education brings. He focuses on the lag between the end of schooling and the time of marriage and finds that it increases with time. Shafer & Qian (2010) do similar research on marriage timing and educational assortative matching and find that educational homogamy occurs at younger ages for the uneducated and at older ages for the highly educated. Interestingly, they find that older educated men tend to marry less educated women more often and older educated females tend to remain unmarried rather than 'settling'. This coincides with Mare's findings on social stratification and

with the notion that marrying someone with high social status is more important for women than for men. Breen and Salazar (2011) investigate how educational assortative mating affects inequality of earnings amongst households. They find a small negative relationship between educational assortative mating and earning inequality and that matching has a weak impact on inequality. Moreover they conclude that marital educational sorting is a poor proxy for marital sorting on earnings.

Cogner, Cogner and Martin (2010) show that social class is correlated with success, stability and satisfaction in marriage unions. They argue that social class is best proxied by education level and income because of their correlation with prestige, power and economic well-being. A paper by Dakin and Wampler (2008) argues that economic well-being of a husband is critical in a female's marriage decision. They find that marital satisfaction is positively correlated with the education level of their spouse.

Harknett and Kuperberg (2011) use labour market conditions to explain the positive relationship between education levels and marriage. They find evidence to suggest that lower earning potential, not social status, of the uneducated is the cause for the difference in marriage outcomes. Moreover, they find that better labour market conditions are positively related to male's marriage rates for all education levels. In contrast, these improved conditions lead to better marriage outcomes for women with lower education than women with higher education.

Lefgren and McIntyre (2006) use United States census data to explain the relationship between female education and marriage outcomes. They find that the relationship is highly non-linear and that it varies widely across husband's earnings. Additionally they use birth quarter as an instrument for educations and uncover evidence that women's education has a possible causal effect on husband's earnings but not on the probability of marriage.

Berhman, Rosenzweig and Taubman (1994) use data from identical and fraternal twins to show the positive correlation between human capital outcomes and the marriage market. Contrary to other studies, they find that men's earnings and their wives education are negatively correlated. Furthermore they consider the marginal effect of female education and find that, on average, for each additional year of schooling a female has they marry a husband with 0.3 more years of education. This study is important because it completely controls for genetic differences and attempts to control for family input factors and demonstrates that education is related to improved marriage conditions.

Data and Methodology

The remainder of this paper uses Canadian census data[3] to focus on marriage probability returns to female education and considers a simple approach to determine the gain or loss to marriage probability based on the difference of female and male education among spouses. This section focuses on the data and how it has been formatted for use in a probit model. The following section presents the probit output and comments on the findings.

The Canadian census masterfiles provide sound data for analysis and each include information on over 5 million Canadian residents and households. This large sample size is appealing in regression analysis because of the exceptionally high degrees of freedom that it allows. 2006 is the latest census released at the time of this paper.[4] 2001 is the only comparison year because previous census questionnaires do not contain information on the highest level of

[3] The data sets used are confidential and are not available for public use. The output, graphs and other statistics went through a vetting process before being released.
[4] This paper was written in 2012 but the 2011 census has not yet been released.

education achieved; they track only the years of education. The 2001 and 2006 censuses are compared to examine the change over time.[5]

Following the proposition of Lefgren & McIntyre (2006) only females between the ages of 30 and 45 are included in the analysis. Females in this age group are likely to have completed their education and their husbands are unlikely to be deceased or retired. This places the strong assumption that marriage decisions are independent of any educational obtainments after females reach the age of 30. It may also cause a bias from doctoratal degrees because of the high number of people who complete their PHd after the age of 30[6]. Reducing the range of the analysis from 30 to 45 year old females gives 70.18% of females married in 2001 and 67.43% of females married in 2006.[7]

This paper defines marriage as legally wed whether the couple is separated or not. Although it is possible to drop separated couples from the analysis it has been left in for two reasons. First, it is the concept of legal marriage that is important and not simply relationship status. Second, the number of couples to whom this applied was relatively small and had little impact on the analysis.[8] Same sex couples have been dropped from the analysis because this paper is interested in gender differences and same sex marriages do not allow easily explainable results. Moreover, the number of legally wed female same sex couples is relatively small and has only a minor effect on sample size. Widowed females who have not remarried are not considered

[5] Time series analysis cannot be used due to only two time periods.
[6] This problem is often referred to as timing bias.
[7] These are weighted percentages (by given weighting variable) as per Statistics Canada regulations.
[8] The analysis was also conducted with dropping these individuals from the dataset, however there was no effect on the signs of the coefficients and only slight magnitude changes.

because they add another level of complexity to the interpretation of results.[9] Common law couples are excluded from this definition of marriage[10] because a common law partnership does not necessarily imply long term commitment.

The possibility of divorce creates problems with the construction of the married female dummy variable as well as with interpretation of the results. Because of the way that the census tracks marriage status there is no way to tell if the current marriage is their first marriage. A female who has divorced and remarried is counted as married but a female who has divorced and not remarried is not. Because of the possibility of divorce and the data being unable to track it, the binary variable for marriage may be more correctly referred to as "successful" marriage. For example, it may be that higher education levels impact marriage rates because they raise the likelihood of remaining married rather than the likelihood of signing marriage documents.

Education

Since the variable of interest is the difference in education attainment, and not simply years of education, it is necessary to construct an ordered ranking of educational levels. The census provides an ordered ranking system consisting of 13 different educational levels ranging from none to doctorate degrees. Here the data has been compressed into 7 levels because of low sample sizes in certain categories, such as veterinary and orthodontist degrees. The ordered levels and values assigned to them are as follows:

[9] If a widow has remarried than she is treated as married because there is no way to obtain this information from the census. The number of remarried widows between 30 and 45 should be relatively small and not the impact the analysis.

[10] This is also necessary due to the data from the Census questionnaire.

1 - Less than High School[11]
2 - High School Diploma
3 - Apprenticeship and Trades
4 - College Diploma or Certificate[12,13]
5 - Bachelor's Degree
6 - Master's Degree[14]
7 - PHd[15]

It is assumed that each subsequent level of education is a better mating signal than the previous one. It is a ranking system that does not necessarily require that each lower level be completed. Moreover, this ranking does not imply that the earnings from each subsequent level of education increase; for example, it may be the case that trades-people have a higher income than those with a college certificate. Since the data in the census only has highest level of education achieved it is not possible to extract from the dataset if, for example, an individual with a doctorate also has a college diploma. This is a self reported level of education so there may be an over reporting of higher education than the real value due to the tendency for individuals to over report desirable traits. Finally, there are slight differences in the possible responses of the questionnaire between the two years; discretion has been used to combine the categories.[16]

Table 1

	2001 Female Education Level %	2006 Female Education Level %
None	18.4	10.28
High School	24.33	22.35
Trades	10.05	9.41
College	26.25	30.64
Bachelor	14.5	18.34
Master	5.47	7.61
Doctorate	1	1.36

[11] The census does not have data on lower levels of educational attainment.
[12] Includes non-completed College diplomas or certificates.
[13] CEGEP is included here which likely gives a downward bias to Quebec results.
[14] Includes J.D.
[15] Includes professional certifications such as veterinary degrees.
[16] The exact categories in the questionnaires cannot be released due to Statistics Canada regulations of their confidential codebook.

Table 1 shows the percentage of educational attainment by females aged 30-45 in the respective census. There has been some movement from the lower end of the education to the higher end -- a change from no education or high school to college, Bachelor or Master degrees.

Table 2

Education	2001 Male Education Level %	2006 Male Education Level %
None	20.64	12.17
High School	20.89	21.53
Trades	17.48	15.46
College	19.6	24.41
Bachelor	13.71	16.62
Master	5.95	7.86
Doctorate	1.72	1.96

Table 2 shows the percentage of educational attainment by males ages 30-45 in the respective census. These figures show large movement away from no education and trades to high school, college, Bachelor and Master degrees. Note that more men are graduating high school in 2006 than 2001, where the statistic is reversed for women. Below is a table of the exact percentage changes as well as a differenced column to show relative changes in each education level.

Table 3[17,18]

Education	Female Change	Male Change	Relative Change
None	-8.12	-8.47	0.35
High School	-1.98	0.64	-2.62
Trades	-0.64	-2.02	1.38
College	4.39	4.81	-0.42
Bachelor	3.84	2.91	0.93
Master	2.14	1.91	0.23
Doctorate	0.36	0.24	0.12

[17] The values from female change and male change are the 2001 percentages subtracted from the 2006 percentages.

[18] A positive value in the relative change column indicates that from 2001 to 2006 there is a relative increase in the number of females in the corresponding education level. The reported value is the female change minus the male change.

Although both genders saw a decrease in the percentage with no education, a relatively larger amount of men moved from no education to higher education levels. Almost 2% of females moved from high school to higher education levels where there was an inflow of 0.64% of males into high school diplomas. Both genders moved away from the trades but a larger portion of men moved than women leaving women with a 1.38% increase in this area. For college, Bachelor, Master, and Doctorate degrees, both genders increased their numbers. There was a relative increase in the number of men with college which jumped 0.42%, and a relative increase in the number of females with Bachelor, Master and Doctorate degrees going up 0.93%, 0.23% and 0.12% respectively. Although not strict, there has been an increase in relative female education over the years in question particularly in the highest levels of education.

Table 4

Education	Married Female % 2001	Married Female % 2006	Difference
None	67.51	60.18	-7.33
High School	72.79	69.56	-3.23
Trades	67.09	58.12	-8.97
College	69.95	68.22	-1.73
Bachelor	71.25	70.29	-0.96
Master	71.2	71.67	0.47
Doctorate	71.95	71.69	-0.26

Table 4 shows the percentage of married females in each education category for each census year. The difference between the two years is calculated in the third column. With the exception of the Master category there was a reduction in the percentage of the married females at each education level. It is also evident that there is a greater reduction in successful marriage rates for the lower levels of education.

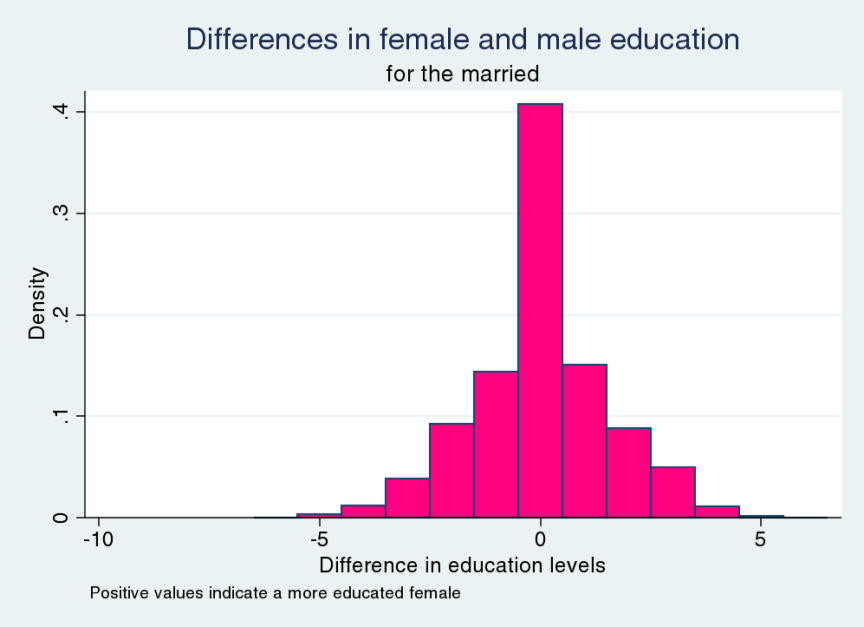
In order to determine how the difference in education levels between the sexes factors into marriage decisions it is necessary to construct a variable to add to the regression. This variable was

created by taking the education level of the wife and subtracting the education level of the husband. Thus a positive value would represent a more educated wife, a negative value would represent a more educated husband, and a value of 0 would represent the same education level for both husband and wife. For unmarried females, the difference in education level is assumed to be zero. This approach is that is treats any difference in education level as having the same magnitude independent of where on the ranking system it falls. For example, an educational difference of 1 would occur if the wife has a doctorate (value of 7) and the husband has a master's (value of 6). This same difference of 1 would occur if the wife has a high school diploma (value of 2) and the husband has no education (value of 1). Therefore, this construction implicitly assumes that this difference is identical across the ranking system, which is likely not true. However, to avoid having a large dummy set[19] and to maintain results that are intuitively interpretable, this method is used.

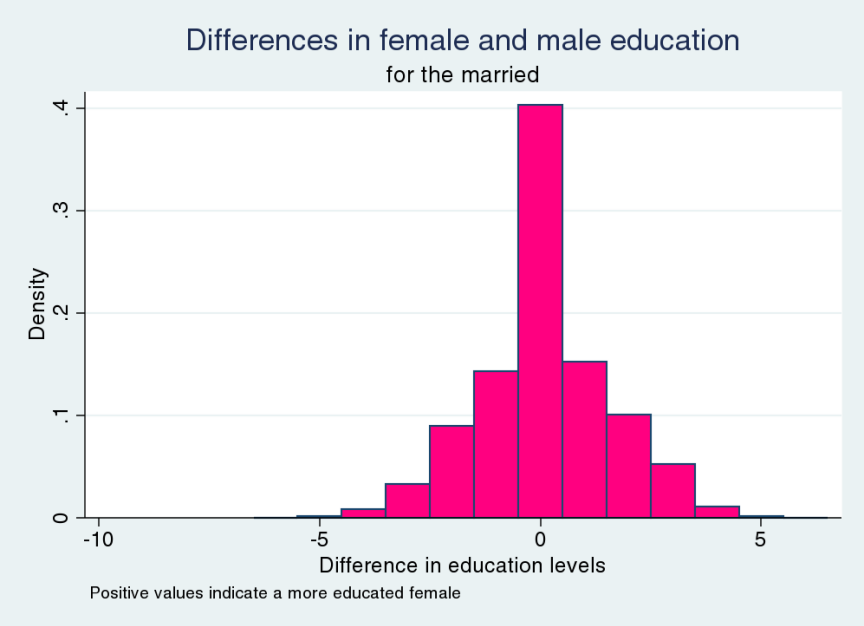
Due to the likelihood that spouses meet in school and that there tends to be similarities between people who have comparable educational backgrounds, there should be clumping at 0 for educational difference. As educational differences increase (values farther from 0) the number of marriages in the respective category should decrease. That is, it would be expected that there are few couples with large educational differences. This is what the data shows; weighted histograms of the difference levels are presented below.

[19] There would be 49 dummies; 7 education levels for females multiplied by 7 education levels for males. Moreover, the large number of covariates would cause the model to require days or weeks to run, which is not feasible given the restricted hours and availability of the Queen's Research Data Centre.

(2001) Figure 1[20]



(2006) Figure 2



Figures 5 and 6 show what theory and common sense predict; large clumping at 0 educational difference and a tapering off similar to a normal distribution. Each bar represents one difference in

[20] Figures 5 and 6 include only married females.

education level. Note that, as expected, there are very few marriages in which one spouse has a doctorate and the other has no education. Because the bins are not obvious from the histograms they are listed below.[21]

Table 5

Educational Difference	2001 %	2006 %	Change[22]
6	0.03	0.02	-0.01
5	0.30	0.20	-0.10
4	1.20	0.88	-0.32
3	3.89	3.29	-0.60
2	9.26	8.98	-0.28
1	14.40	14.36	-0.04
0	40.73	40.34	-0.39
-1	15.11	15.28	0.17
-2	8.80	10.08	1.28
-3	5.00	5.26	0.26
-4	1.09	1.12	0.03
-5	0.19	0.17	-0.02
-6	0.02	0.02	0.00

The values in the Change column show that in 2006, marriages tend to have more educated females than husbands compared to 2001. This is likely due to the previous finding that females in 2006 tend towards the higher education levels than males do. Combining this with the results from Table 4 suggest that women are reacting to the relative lower amount of educated males by marrying males with less education. Males have reacted to these changes by "abandoning" marriage with less educated females as indicated by the high drop off of marriage rates for lower female education categories.

Income

Since income is a desirable trait it is possible that male income has an impact on female marriage rates. It may be that women have higher successful marriage rates if their husbands make a

[21] Due to confidentiality reasons and Statistics Canada protocol, frequency counts cannot be included in this paper. The percentage values are listed.
[22] Calculated as the 2006 value minus the 2001 value.

larger salary. As such, income is included in the model for both genders. Income levels have been added for females because there may be an impact on successful marriage rates. One line of reasoning is that higher female income may reduce household financial worries and the coefficient on the variable would be positive. Another possibility is that a higher female income may reduce the likelihood of marriage because a female who is better able to support herself may not be as pressured to find a husband as one closer to the poverty line. If this is the case then the coefficient on the variable will be negative. Income is logged for ease of interpretation. People with negative after tax earning values are dropped so that logs can be taken.[23] A single dollar was added to individuals in the dataset who have exactly 0 income so that logs can be applied. For married females, their husbands' log of income is included. For unmarried females this value is set to zero.[24]

Since there is likely correlation between personal success and success of their spouse it is possible that there is a correlation between female education levels and husband's income. Running a correlation index between female education level and the log of husband's income reports a positive correlation of 11.6% in 2001 and 8.4% in 2006. Figure 7, below, shows a supporting graph of average husband's income against female education level for both census years.

[23] Exceptionally few people negative income so this has a negligible impact on the sample size.
[24] A more accurate way to do this would be to forecast their husband's potential earnings but would require considerably more Data Centre resources.

Figure 3

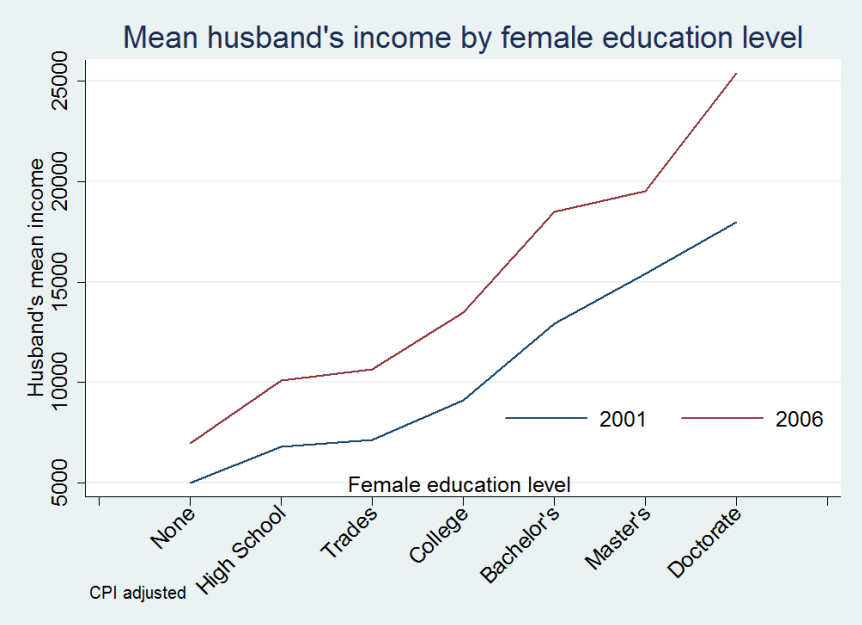


Figure 7 shows CPI adjusted husband's mean income and the female's education level. There is a strictly positive relationship between the two variables for both time periods. Additionally, the slopes for the two are similar for all levels except for the Master's level where the 2006 slope is much flatter than the 2001 slope. The fact that the 2006 line lies strictly above the 2001 line can possibly be explained by productivity increases.

Since age is likely another factor in marriage decisions or time it takes to find the proper spouse, age as well as age squared has been included in the model to allow differing rates of change. It is reasonable to predict that age should have an increasing affect on the probability of marriage; the coefficient of age squared may be positive or negative depending on the convexity/concavity of the returns to age. Province and territory dummies have also been included with Ontario as the baseline group. The provincial dummies may absorb some time variant characteristics caused by omitted variable

bias. Finally, a citizenship dummy is included that tracks if the female was born in Canada or not as well as one for their spouse.[25]

The simple probit model is:

$$Marriage_i = \alpha + \boldsymbol{\gamma} Education_i + \beta_1 Citizen_i + \beta_2 EducationDifference_i + \beta_3 Log(SpouseIncome)_i + \beta_4 Age_i + \beta_5 Age^2{}_i + \beta_6 Log(Income)_i + \beta_7 SpouseCitizen_i + \boldsymbol{\delta} Province_i + \varepsilon_i$$

Where *Education* and *Province* are vectors of dummy variables and *Education* consists of 6 terms (1 for each previously defined education level plus a baseline group of No Education). *Citizen* and *SpouseCitizen* are dummy variables for being a Canadian citizen by birth or not.[26]

This probit is ran for both census years and the results compared.[27]

Limitations

Unobserved heterogeneity between marriage decisions and education decisions may lead to bias of the probit coefficients. The magnitude of the bias is determined by the extent of which outside factors affect the decisions. For example, a woman's IQ may lower her opportunity cost of education and may also allow her to pick a more suitable husband, resulting in improved marriage outcomes. In this case there would be a positive bias from unobserved heterogeneity. A negative bias may occur in a particularly attractive women who expects to have an easy time finding a wealthy husband without

[25] This was included due to a report completed prior to this paper that suggested a large difference in marriage rates between females born in Canada and those who immigrated.
[26] There is likely unobserved herterogeneity between the variables in these regressions.
[27] A combined probit model was attempted which would have allowed for one large (more accurate) regression. However, even with varying the probit maximization technique and dropping the province dummies, the time to run the regression was extreme (over 4 days without converging) and could not be completed.

needing to pay the costs of increasing her education.[28] This case shows how beauty may be positively correlated with marriage but negatively correlated with education. If one does not account for all these outside factors, such as attractiveness, IQ, and other variables, there will be unobserved heterogeneity bias in the probit output. This bias is likely present in the results of this paper.

Marriage and education decisions are not made simultaneously so there is a timing bias present in the analysis. A female may go to school before or after she is married. It may be the case that after marriage a husband discourages his wife from obtaining her desired education level which she may have obtained if she was not married. Her final education level is now determined by the fact she chose to get married before her educational goals were complete. A bias of this type is called a timing bias and is likely present in the following results.

Since many spouses meet in school there is a problem with causality in this analysis. When a husband and wife meet due to attending the same educational institution there is a clumping around the zero education difference category. This may overstate the positive effect of increasing education levels because more education generally implies having spent longer periods in school which gives more opportunity to meet a spouse with similar tastes and social circles.

Results

After the necessary data manipulation, the 2001 probit uses 559770 observations and has a pseudo R^2 of 0.1285. The 2006 probit uses 532595 observations and has a slightly higher pseudo R^2 of 0.1578. Both models converge in under 10 iterations.

[28] These are the same cases point out in Lefgren and McIntyre (2006).

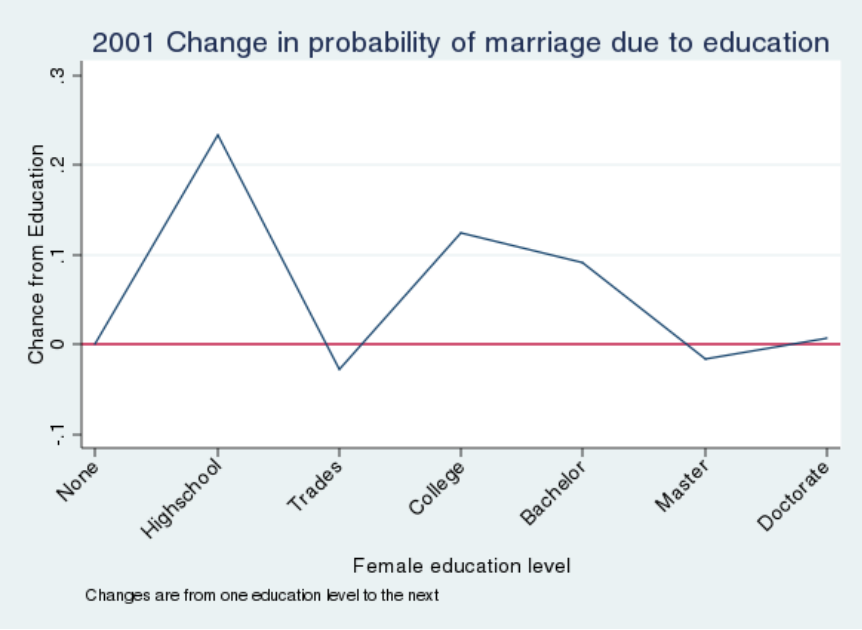
The probit gives the following output for the education explanatory variables. The robust coefficients reported are the marginal effects of the model; they can be interpreted in the same was as OLS results would be. Recall that No Education is the baseline case.

(2001) Table 6[29]

Variable	Robust Coef.	Robust S.E.	P>|t|
High School	.0480	.0014	0.000***
Apprenticeship	.0412	.0017	0.000***
College	.0664	.0014	0.000***
Bachelor's	.0780	.0014	0.000***
Master's	.0720	.0018	0.000***
Doctorate	.0714	.0036	0.000***

Due to the large degrees of freedom caused by the huge sample size, all the education variables are significant.

Figure 4[30]

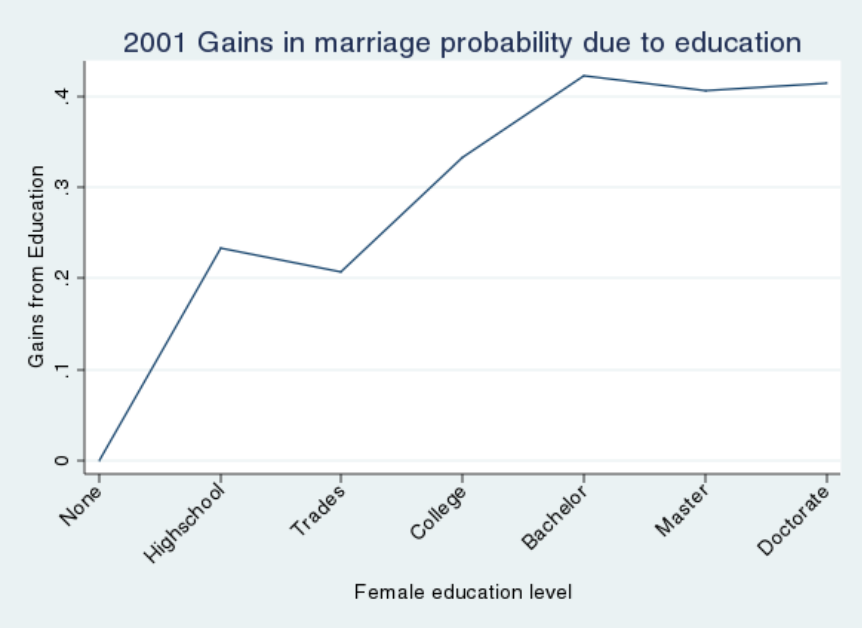


[29] For this paper * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.
[30] The values presented for figures 8 and 10 use a midpoint formula of the difference of two coefficient values divided by their midpoint.

Figure 8 shows the change in likelihood of marriage from one education level to the next. The largest positive changes are from no education to high school and from the trades to college. There are two negative changes: high school to trades and Bachelor's to Master's.

Figure 9, below, presents the same data as a total gain from each level of education. It is obvious that in 2001, female's marriage likelihood is maximized with a Bachelor degree. It is also notable that the coefficients on Bachelor, Master, and Doctorate are not vastly different.[31]

Figure 5



The marginal effects of the education dummies in 2006 are shown in table 7, below.

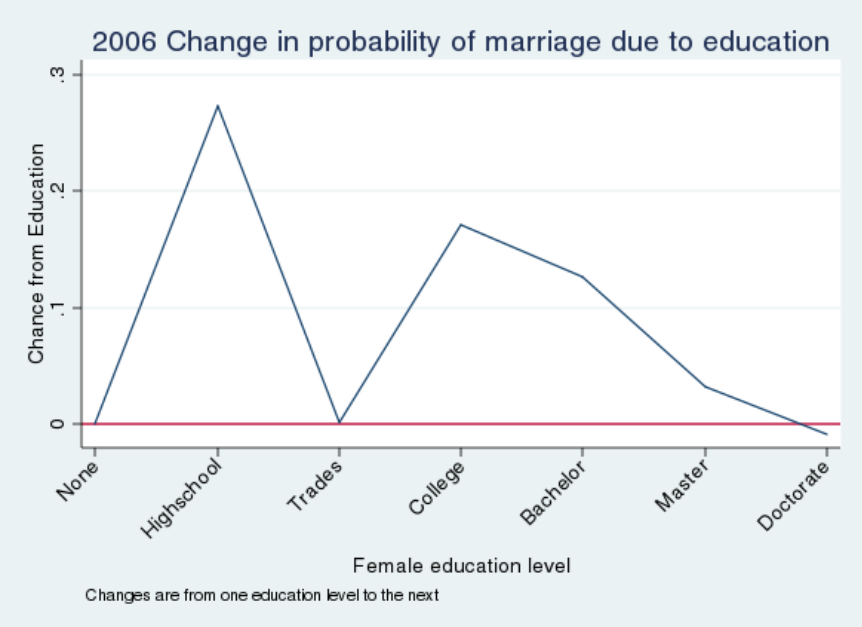
(2006) Table 7

Variable	Robust Coef.	Robust S.E.	P>|t|
High School	.0605	.0018	0.000***
Apprenticeship	.0582	.0020	0.000***
College	.0974	.0019	0.000***
Bachelor's	.1131	.0018	0.000***
Master's	.1090	.0017	0.000***
Doctorate	.1028	.0028	0.000***

[31] Running F-Tests on this shows that they are statistically different from each other.

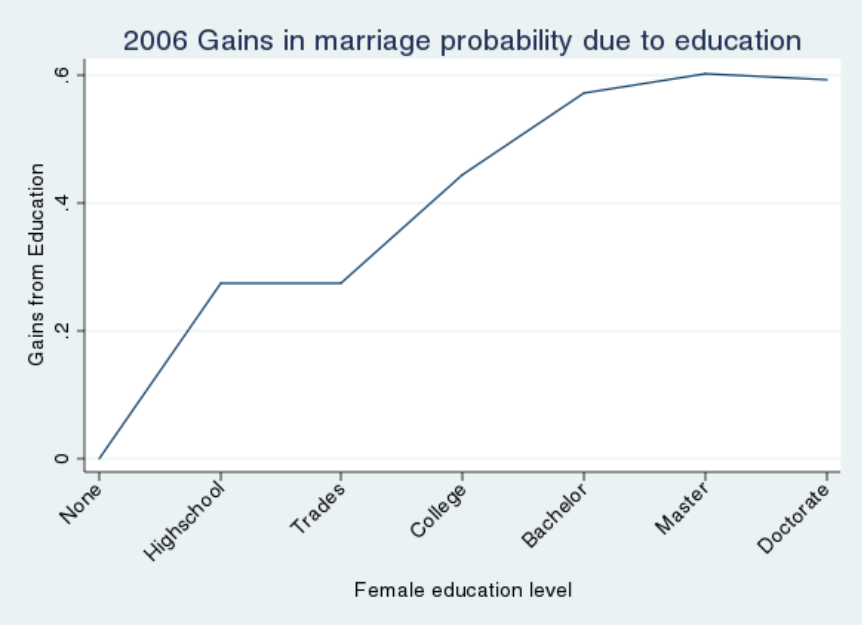
Once again, there is statistical significance to all the variables in question. Figures 10 and 11 are constructed in the same fashion as the 2001 graphs:

Figure 6



Unlike the 2001 probit, this model has only one negative change in probability of marriage: moving from a Master's to a Doctorate. Again there is a high gain from highs school and college. In this probit, marriage probability is maximized at the Master's level. Both the 2001 and 2006 gains graphs (figures 9 and 11) seem to follow a concave path with the exception of the trades level. That is, there seems to be strong initial gains to marriage that taper off as the educational levels increase.

Figure 7



The output of the other variables in the regression, except the province dummies, is presented in tables 8 and 9.

(2001) Table 8[32]

Variable	Robust Coef.	Robust S.E.	P>|t|
Citizen Dummy	-.0750	.0017	0.000***
Husband Cit. Dummy	-.0615	.0018	0.000***
Log(Husbands Income)	-3.56e-07	6.89e-08	0.001***
Log(Income)	-.0060	.0003	0.000***
Age	.0329	.0021	0.000***
$(Age)^2$	-.0003	.0000	0.000***
Difference in Educ.	-.0150	.0004	0.000***

[32] Citizen and Husband Citizen Dummies are coded 1 for Canadian at birth and 0 otherwise.

(2006) Table 9

Variable	Robust Coef.	Robust S.E.	P>|t|
Citizen Dummy	-.0886	.0018	0.000***
Husband Cit. Dummy	-.0766	.0019	0.000***
Log(Husbands Income)	-2.77e-07	7.99e-08	0.001***
Log(Income)	-.0015	.0004	0.000***
Age	.0323	.0023	0.000***
$(Age)^2$	-.0003	0.000	0.000***
Difference in Educ.	-.0196	.0005	0.000***

The interpretation of the coefficients for variables involving the husband[33] is more difficult than with the female only variables. Because the dataset has values of 0 coded when there is no observation for husband values it can be better off to think of these coefficients representing 'for a potential spouse'. For example: The female selects a potential spouse.[34] This potential spouse is either a citizen or an immigrant. If the potential spouse is a citizen, she is 6.15% less likely to marry and have a successful marriage with him. For another example, consider a female with a college degree. She selects a potential spouse who could be any of the education levels. Assume she selects one who has high school. This difference of two education levels leads to a 3% decrease in the likelihood that she will marry him and have a successful marriage. The cases are explained in further detail in the following paragraphs.

In both census years, the citizen dummy variable has a significant negative coefficient and is correlated with a 7.5% decrease in 2001 and a 8.86% decrease in 2006. Therefore, females who are born in Canada are less likely to be married than females who are board abroad and immigrate to Canada. The cause of this may be that there is some inherent difference in marriage decisions between the two types. However, it is complicated by causality; marriage decisions may be the cause immigration, or, immigration may be the cause of previous marriage decisions.

[33] These are: Husband Citizen dummy, log(Husband's income), difference in education.
[34] The term 'potential spouse' is not intended to imply that the female has selected the male to be her partner; simply that she is considering it.

Similarly, controlling for husband's citizenship at birth implies that women are less likely to marry if their potential spouse is a Canadian citizen at birth; it does not necessarily imply that females are less likely to marry Canadian born men. The values are slightly lower than the female citizen dummies, at -6.15% in 2001 and -7.66% in 2006. Because the values for both the citizen dummy and the husband citizen dummy are both negative in both years, this gives support that immigrant's marriage decisions are typically made before they immigrate.[35]

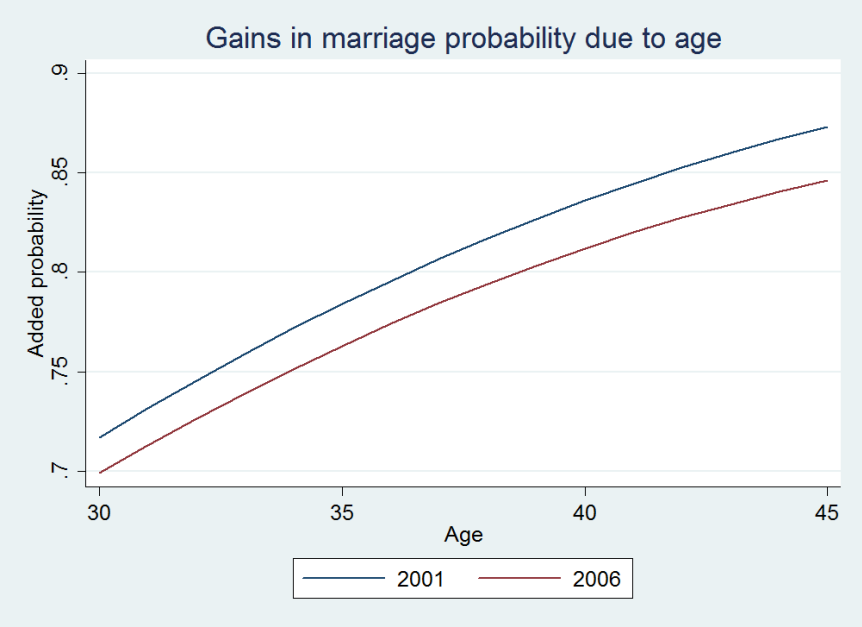
Husband's income has no impact on the female's likelihood of a marriage in either census year. High spousal income is a desirable trait, but does not appear to have an impact on marriage rates or on stability of marriage.[36]

Female income has a negative coefficient in both years, indicating that a 1% increase in income decreases the likelihood of successful marriage by 0.6% in 2001 and 0.15% in 2006. Although the magnitudes may appear small, they are significant particularly because of the wide spread of income levels. This finding may be caused by females deciding to remain unmarried because they are better able to support themselves without a second income stream or it may be because there is a hidden factor with higher income that causes high divorce rates.[37]

As anticipated, age has a positive relationship with marriage in both years. There are also diminishing returns to age at the same rate in both census years. These gains are presented in figure 12 below. The maximum increase in marriage probability occurs at age 45. The graph only ranges from age 30-45 because that is the age used in the probit. These gains cannot be projected past age 45.

[35] It may also be that immigrant couples are more likely to remain married because of limited divorce options due to immigration laws.
[36] These effects may both be present and may offset each other.
[37] Standard divorce models suggest higher female income leads to higher divorce probabilities because it makes single income survival easier.

Figure 8



The difference in education variable is negative in both years: -1.5% in 2001 and -1.96% in 2006. This implies that when females are more educated than males each "educational difference" decreases the likelihood of marriage. For example, the 2001 probit implies that a female with a doctorate has a 4.5% decrease in marriage probability if her potential spouse has stopped at a college education. This supports the concept of social status being important in the marriage market. This difference variable can be thought of as a diminishing return to the education dummy variables presented earlier; recall the concave nature of figures 9 and 11. The 0.46% change in the variable is interesting. It suggests that the status difference is more important in 2006 than in 2001. This may be due to the relatively smaller pool of relatively educated males. That is, the change in the proportions of academic achievement between the genders may have an impact on the importance of social status; females in 2006 are less likely to marry below their educational level than in 2001.

(2001) Table 10

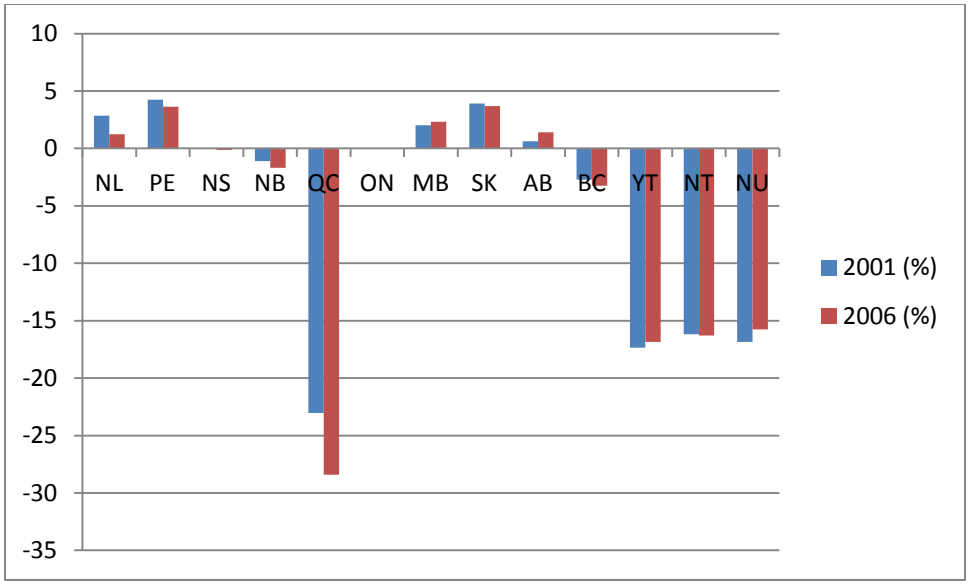
Province / Territory	Robust Coef.	P > |t|
Newfoundland	.0284	0.000
Prince Edward Island	.0425	0.000
Nova Scotia	-.0003	0.915
New Brunswick	-.0110	0.002
Quebec	-.2302	0.000
Ontario	Baseline	Dummy
Manitoba	.0203	0.000
Saskatchewan	.0390	0.000
Alberta	.0063	0.001
British Columbia	-.0272	0.000
Yukon	-.1734	0.000
North West Territory	-.1617	0.000
Nunavut	-.1685	0.000

(2006) Table 11

Province / Territory	Robust Coef.	P > |t|
Newfoundland	.0123	0.007
Prince Edward Island	.0362	0.000
Nova Scotia	-.0014	0.700
New Brunswick	-.0170	0.048
Quebec	-.2840	0.000
Ontario	Baseline	Dummy
Manitoba	.0233	0.000
Saskatchewan	.0370	0.000
Alberta	.0140	0.000
British Columbia	-.0326	0.000
Yukon	-.1686	0.000
North West Territory	-.1630	0.000
Nunavut	-.1575	0.000

Tables 10 and 11 show the probit output for the provincial dummies. In both cases all the dummies show the same sign in both years and the Nova Scotia coefficient is insignificant in both years. The Yukon, North West Territories and Nunavut all have roughly the same negative correlation. This is likely due to the remote nature of the areas. Quebec shows a very high negative relationship of 23 % and 28%. This may be in line with the views on marriage within the province as unnecessary. Figure 13 shows the coefficients in a bar graph with their related percent effect on marriage likelihood.

Figure 9



Conclusions

In Canada from 2001 to 2006 there has been a relative increase in female education. The percentage of married women fell over this period but there was a much smaller decline in the marriage rates of higher educated women; lower educated women had rates fall significantly. The women who do not keep up with the increasing education levels are suffering in the marriage market. Since women with greater levels of education are not marrying at much lower rates they must be marrying below their own education level more frequently than before. There are positive marriage probability gains given by higher female education that are reduced slightly by the relative education level of their potential spouse. The net effect of increasing female education tends to be positive for each subsequent level of education. Females will find their probability of marriage maximized at the university level and above.

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