THE MARRIED WIDOW: MARRIAGE PENALTIES MATTER!

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Abstract
Marriage penalties are a controversial feature of many government policies. Empirical evidence of their behavioral effects is quite mixed, which is surprising because economic theory predicts that they should have an impact on the headship decision. We investigate the removal of marriage penalties from the surviving spouse pensions of the Canadian public pension system in the 1980s. These reforms provide a simple and transparent source of identification. Our results indicate that marriage penalties can have large and persistent effects on marriage decisions. We also present evidence suggesting that it is individuals with characteristics correlated with greater wealth who respond to the penalties. (JEL: J1, H2)

1. Introduction

Subsidies or penalties for certain family structures are a feature of many government policies. These provisions attract spirited debate in both media and policy circles. Alm, Dickert-Conlin, and Whittington (1999) argue that marriage penalties are viewed not only as violating principals of equity and efficiency but also as undermining the rule of law and family values. Few features of legislation enjoy such widespread notoriety.

Economists' primary interest is in the behavioral effects of these penalties. The reasons are standard efficiency concerns as well as the ideal opportunity the penalties provide for testing the widely accepted economic model of marriage (Becker 1973, 1974). This model predicts that relative economic opportunities,

inside and outside marriage, are an input to the decision to wed. Marriage penalties/subsidies generate direct variation in income by an individual's marital state. An additional policy interest is the possible collateral effects of the penalties on health and longevity, as well as children's outcomes. For example, if marriage penalties promote out-of-wedlock births, or if they prevent widowed or divorced individuals from remarrying, then children will miss any developmental benefits that result from growing up with two married adults instead of with two cohabiting adults or with a single adult.

Empirical evidence of the impact of marriage penalties challenges both our theoretical intuition and policy interest. The majority of previous studies focuses on the marriage penalties of the U.S. federal tax system or U.S. welfare system and indicates that the effects are modest. One is led to the conclusion that either these incentives do not weigh heavily on individuals' partnership decisions, or the U.S. tax and welfare systems are, for some reason, inappropriate forums for evaluating their effects.

Our paper makes two contributions, one general and one specific. The general contribution is direct evidence that marriage penalties can have large and persistent effects on marriage decisions. The specific contribution is evidence of how marriage penalties on the survivor pensions of a public social security system affect the remarriage behavior of widows and widowers. The first contribution is of interest because there is so little evidence that marriage penalties matter. The second is of interest because the income security systems of most developed countries impose these penalties on survivor pensions.

Our analysis exploits reforms that removed marriage penalties from the surviving spouse pensions of the Canadian public pension system in the 1980s. Prior to the reforms, surviving spouses lost their pensions upon remarriage. A unique feature of the Canadian system is that there are two separate, but mostly identical, pension plans that cover individuals in different parts of the country. The Quebec Pension Plan (QPP) serves individuals working in Quebec, while the Canada Pension Plan (CPP) serves workers in other parts of the country. The marriage penalties were removed from the QPP in 1984 and from the CPP in 1987. The structure of the reforms allows us to avoid many of the perceived deficiencies of previous studies. More specifically, it offers: (1) simple identification—the temporal structure implies that as widows/widowers in one part of the country are affected by a reform, those in another part are not; (2) size—the marriage penalty is relatively large so that widows/widowers in most age groups experience an unambiguous reduction in financial welfare through remarriage before the reforms take place; (3) high treatment—the majority of prime age widows were in receipt of a survivor pension before the reforms took place; and (4) breadth—the group of individuals affected by the reforms spans a fairly large range of the age distribution and also a greater range of the income distribution than samples used in many past studies.
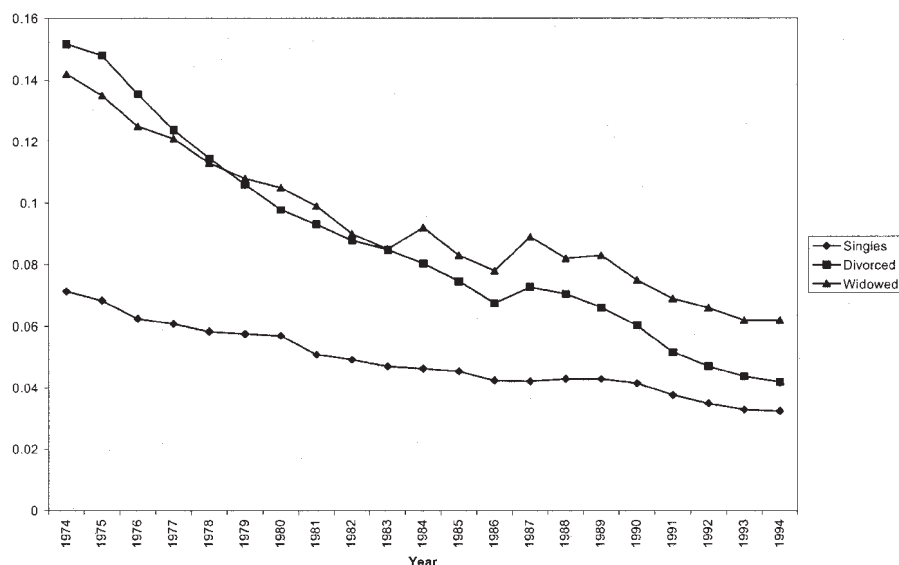
FIGURE 1. Marriage rates by marital status in Canada, 1974–1994. Source: Nault (1996). The rates for the widowed population have been multiplied by 10 to produce a common scale.

Trends in marriage rates by previous marital status, presented in Figure 1, suggest these penalties had some effect. There is a significant negative trend in the marriage rate of each group throughout the period. However, there are distinct spikes in the remarriage rates of widows in 1984 and 1987 when the marriage penalties were removed from the QPP and CPP, respectively.[1] Furthermore, after 1987 there appears to be a trend break in the remarriage rates of widows relative to the rates of the other groups.

Using data from vital statistics, we confirm this inference by documenting large and significant jumps in the remarriage rates of widows aged 15–59 and prime-age widowers as the reforms take place. The identification of this result is transparent in graphs of the remarriage rates of widows and widowers by jurisdiction over the period, and the estimates are robust to a variety of checks for spurious inference. The impact of the penalties varies across age groups and jurisdictions in expected ways. Finally, we control for "stock" or "timing" effects, which appear as spikes in remarriage rates in the years that the reforms took effect. After controlling for these spikes, a persistent and substantive effect of the penalties on marriage decisions remains.

We also investigate the characteristics of widows/widowers who remarried as the penalties were removed by using data from the 1990 and 1995 Canadian

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1.   There is also a spike in the marriage rate of divorcees in 1987, which is due to the 1986 reforms of Canada's divorce law. The effect of these reforms is discussed in Sections 8 and 9.

General Social Surveys. The evidence suggests that individuals responding to the reforms possess characteristics associated with higher economic status relative to the mean in the prereform equilibrium. One interpretation of this result is that the benefits of marriage over de facto relationships in Canada have value for higher-income individuals. This is because the benefits are typically legal rights to assets and income when the relationship ends, or to (a partner's) employment benefits associated with high-paying jobs.

2. Previous Evidence

The vast majority of previous evidence on the effects of the marriage penalties is from studies of U.S. federal laws, many of which are surveyed in Alm, Dickert-Conlin, and Whittington (1999). The primary sources are the U.S. federal tax code and the U.S. welfare system. In either case the evidence is that marriage penalties have modest to no effect on marriage decisions (see e.g. Alm and Whittington 1999, Blau, Kahn, and Waldfogel 2002, Hoynes 1997, Moffitt 1994),[2] although a few studies have found larger effects (Grogger and Bronars 2001, Lichter, McLaughlin, and Ribar 1997, Yelowitz 1998). There is evidence of more substantial impacts of tax provisions on the *timing* of marriage, divorce and births (e.g. Alm and Whittington 1996b, Gelardi 1996, Dickert-Conlin and Chandra 1999).[3]

One conclusion from this evidence is that marriage penalties are not an important determinant of marriage decisions. As noted in the introduction, however, another possibility is that U.S. federal laws are not informative on this issue. A number of potential deficiencies have been identified. For example, the average marriage penalty in the U.S. federal tax system is quite small and so we might expect it to have little impact on marriage decisions (Alm and Whittington 1996a). Also, because many of these laws vary only at the national level, it can be difficult to separate their effect from secular trends in marriage behavior. Finally, in cases where there is subnational variation in the penalties, it is not clear that it is exogenous (see Moffitt 1998 for a discussion of these issues).

We are aware of only one previous paper that has investigated marriage penalties in social security systems. Brien, Dickert-Conlin, and Weaver (2000) examine marriage penalties in the U.S. Social Security system. The authors exploit a change in the law in 1979, which removed a partial penalty for remarriage after age 60. They document a dip in the marriage rate of widows at

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2.   See Dooley et al. (2001) for a similar conclusion from Canadian data. Whittington and Alm (1997) and Dickert-Conlin (1999) report little to no relationship between marriage penalties and the decision to divorce.

3.   There is a parallel here to the empirical tax literature. Auerbach and Slemrod (1997) argue that tax reform leads to a hierarchy of responses, ranging from first-order effects on the timing of transactions to higher-order effects on real decisions.

age 59, and a spike at age 60, which becomes more pronounced in the post-1979 period. This strongly suggests that this marriage penalty affects the *timing* of marriage.

3. Survivor Benefits in the Canada and Quebec Pension Plans

The CPP and QPP provide survivor benefits to widows and widowers (henceforth "widows"). To qualify, an individual must be the legal or common law (de facto) spouse of the deceased. Separated legal spouses can also qualify for this benefit.[4] The benefit is payable, regardless of the age of the deceased, as long as he or she made contributions to the plans in one third of the calendar years in the contributory period (three-year minimum) or ten calendar years, whichever is less. The contributory period begins at age 18 (or January 1, 1966, whichever is later) and in the 1980s ends at age 65 (or death whichever is earlier). Prior to the reforms outlined next, benefit payment would terminate should the surviving spouse remarry. Benefits would be reinstated, however, if this subsequent marriage ended in divorce or if the new spouse also died.[5]

The benefits payable are based on the deceased's retirement pension, calculated at the time of death, but they vary with the age and family circumstances of the surviving spouse. The formulas in the 1980s, prior to the reforms removing the marriage penalties, were as follows. A surviving spouse of age 65 or older would receive the greater of (a) 37.5% of the deceased's retirement pension plus 100% of her or his own retirement pension, or (b) 60% of the deceased's retirement pension plus 60% of the survivor's own retirement pension, with an upper cap equal to the maximum retirement pension payable in that year. If the surviving spouse is younger than 65 and is disabled or has dependent children, then the payment is 37.5% of the deceased's retirement pension plus a flat-rate benefit, which varies by year and between the CPP and QPP programs. For surviving spouses younger than age 35, the payments continue only while the children are dependent: up to age 18, or to age 25 if they are in school. Finally, if the surviving spouse is younger than 65 and is not disabled or has no dependent children, the same formula is used except that the benefit is reduced by 1/120 for each month the surviving spouse is younger than age 45, so that no benefit is payable to such individuals aged 35 or younger.[6] There are also separate orphan's benefits for surviving dependent children.

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4.   Application for survivor benefits can be rejected if death occurs within one year of marriage.

5.   In this latter case, the surviving spouse can collect survivor benefits on the basis of any of her deceased spouses' records.

6.   Note, however, that these excluded individuals are eligible for survivor benefits upon reaching age 65.

TABLE 1. The monthly flat-rate component of survivor benefits
in the CPP and QPP by year.

	QPP		CPP
1980	146.78		57.25
1981	161.31		62.91
1982	181.18		70.68
1983	201.44		78.60
	Aged < 55	Aged 55–64	
1984	214.94	275.00	83.87
1985	224.40	287.10	87.56
1986	233.38	298.58	91.06
1987	242.95	310.82	94.79
1988	253.64	324.50	98.96
1989	264.04	337.80	103.02
1990	276.71	354.01	107.96

Notes: All amounts are in current Canadian dollars. Surviving spouses under age 65
receive the flat rate component plus 37.5% of the deceased spouse's retirement
pension. The benefits for surviving spouses over the age of 64 are described in the
text. The years chosen precede the reforms of the two programs that removed the
marriage penalties.

The flat-rate component of these benefits in the 1980s, payable to surviving
spouses under age 65, is presented in Table 1. Note that the rates are generally
much higher in the QPP than the CPP. This difference between the CPP and
QPP emerged in 1973 when the QPP rate roughly tripled. Additional disparity
between the two programs emerged in 1984 when a new higher rate was
established for surviving spouses between the ages of 55 and 64 in the QPP.

More general information about the CPP and QPP is available elsewhere.[7]
Here they may be simply described as contributory public retirement and
disability pension plans that are financed by both employee and employer
contributions. At the beginning of the 1980s, retirement benefits were payable
starting at age 65; by the end of the 1980s, benefit receipt could be initiated
anytime between age 60 and 70 subject to an actuarial adjustment. The maxi-
mum benefit in the 1980s averaged somewhat less than 25% of a moving
average of the industrial aggregate wage.[8] Older individuals also have access to
three other Income Security (IS) programs for seniors: the Old Age Security
(OAS) pension, the Guaranteed Income Supplement (GIS) and the Spouse's
Allowance (SPA). For the period of this study, the OAS is a benefit paid to all
individuals aged 65 or older and is financed out of general tax revenues. The

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7.   See, for example, Burbidge (1987), Baker and Benjamin (1999), and CCH Canadian Limited
(2001).

8.   The maximum now tracks exactly 25% of a moving average of the industrial aggregate wage.

GIS is an income-tested benefit also available at age 65 and financed out of general tax revenues. Finally, the SPA is a program that allows individuals to collect OAS and GIS benefits as early as age 60 if they are married to someone aged at least 65.[9] In 1986, SPA eligibility was extended to 60–64-year–old widows, creating a new (albeit transitory) marriage penalty for this group.[10] To provide some context, in 1985 the maximum CPP/QPP benefit was \$435.42 per month, the OAS pension was \$282.94 per month and the maximum GIS available to a single individuals was \$338.95 per month. In Appendix A we present an overview of Canadian IS programs in the 1980s.

4. A Comparison to Survivors' Benefits in Other Countries

Although our general contribution is new evidence that marriage penalties matter, the application to survivor pensions commands policy interest in its own right. Many survivor pensions incorporate marriage penalties either explicitly—through a prohibition of remarriage—or implicitly through an income test applied at the household level. For example, the survivor benefits of the public pension plans of almost all countries of the European Union incorporate a full or partial penalty[11] as do the benefits of the U.S. Social Security system.[12] Our results provide direct evidence concerning the potential impact of these penalties on the remarriage decisions of beneficiaries.

The structure of Canadian survivor benefits incorporates features that are present (in whole or in part) in the survivor benefits of public pension plans in other countries. For example, many plans condition benefit receipt for some widows on the presence of dependent children (e.g., Belgium, Netherlands, Norway, Portugal, Sweden, United Kingdom, and United States). In the absence of children, benefits in some plans are available only to older widows (e.g., France, Netherlands, the United Kingdom, and United States) whereas others permit some (or all) childless, younger widows to benefit (e.g., Belgium, Denmark, Finland, Germany, Italy, Norway and Spain). Because we perform the analysis separately by age groups who face these different program rules, the results can potentially be informative for program design in other countries.

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9.   In this case the entire benefit (OAS plus GIS) is means tested, and at a higher rate. A more complete description of this program is contained in Baker (2002).

10.   Any effect of this marriage penalty should be absorbed in the estimating equation by common year effects. Additional discussion is provided in Footnote 20 of Baker et al. (2003).

11.   See   http://europa.eu.int/comm/employment_social/missoc2001/missoc_153_en.htm.   The lone exception appears to be Denmark for cases in which death occurred after June 30, 1992.

12.   See e.g., Brien, Dickert-Conlin, and Weaver (2000).

5. The Reforms of the CPP and QPP That Eliminated the Marriage Penalties

In 1984, a package of reforms was introduced to the QPP that included the introduction of flexible retirement provisions permitting the initiation of retirement benefit receipt anytime between ages 60 and 70 subject to an actuarial adjustment. The package also included the reform of interest here: elimination of remarriage as a cause for the termination of survivor benefits.[13] In addition, passage of the law enabled surviving spouses who had previously lost their benefits because of remarriage to have them reinstated. Reforms of the CPP were made in 1987 that in many dimensions mirrored the 1984 QPP reforms. In particular, they included[14] the elimination of the marriage penalty for surviving spouses and the reinstatement of benefits for those who had remarried previously.[15]

The political economy of these reforms is outlined in Baker and Benjamin (1999). The reforms were mentioned periodically in the press, and most of the coverage focused on the general level of benefits and solvency of the plans. Likewise, parliamentary discussion of the reforms focused on elements other than the elimination of marriage penalties (e.g., Standing Committee on National Health and Welfare 1986). There is no evidence on record that the reforms were tailored to some well-known trend in the marriage behavior of widows.

There is, however, direct evidence that widowed individuals were aware of the reforms. In Figure 2 we graph the fiscal year-over-year growth rate of CPP/QPP survivor pension beneficiaries in Quebec and the Rest of Canada (ROC). There are spikes in the growth rates in each jurisdiction in the years corresponding to the relevant reforms. These are due to applications for the reinstatement of benefits by individuals who had previously lost their benefits due to remarriage.

6. The Predicted Effects of the Removal of the Marriage Penalties

Elimination of the marriage penalty from the CPP and QPP raises nonlabor income in the married state. Survivor benefits for the single state are unchanged

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13.   This reform also included increasing in the flat-rate portion of disability benefits, providing disability pensions to individuals aged 60 to 64 who are no longer able to continue their current employment, and raising the flat-rate portion of the survivor benefit for surviving spouses aged 55 to 64.

14.   They also included the introduction of flexible retirement provisions, an increase in the flat-rate portion of the disability benefit, changes to the minimum contributory period for disability benefits, an increase in the ceiling for combined survivor and disability benefits, new rules for orphans' benefits and new rules for splitting pension credits upon divorce or annulment.

15.   This sequence of reforms has been used by Baker and Benjamin (1999) to examine the impact of early retirement provisions on retirement behavior and by Gruber (2000) to examine the effect of disability payments on labor supply.
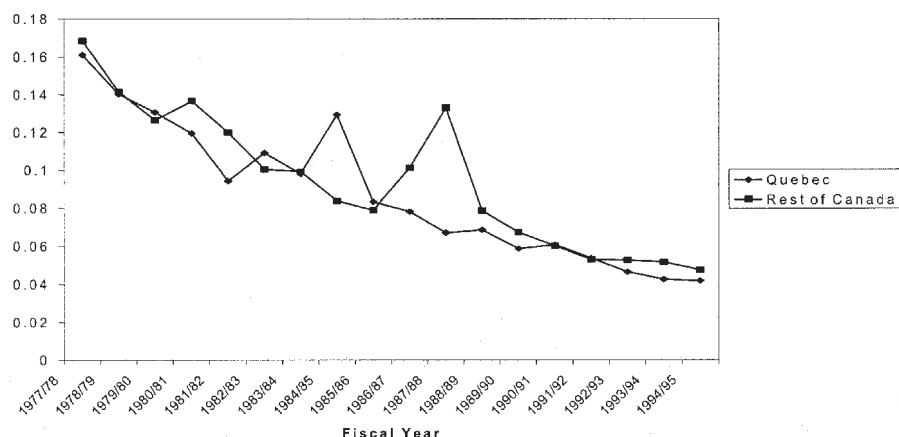
FIGURE 2. Growth rates of CPP/QPP survivor pension beneficiaries. Source: Human Resources Development Canada (1994).

by the reform. Therefore, "full income" in marriage increases both absolutely and relatively, which, all else equal, should raise the incentive to marry.

That being said, whether the reforms have a nontrivial effect on the decision to marry depends on some additional factors. First, the size of the penalty is potentially important. As noted previously, some attribute the failure to find a strong impact of the marriage penalty in U.S. federal tax law to its modest average size. Some information on the size of the penalty—and thereby the potential financial benefit from the reforms—is presented in Tables 2 and 3. In Table 2 we report the average monthly survivor pension in payment, by age and sex, in the month preceding the repeal of the marriage penalty from the QPP (December 1983) and CPP (December 1986), in year 2001 Canadian dollars. The differences by gender and age make sense given the benefit formulas. For example, there are substantial differences in benefits across jurisdictions for

TABLE 2. The average monthly survivor pension benefit payment in the December preceding removal of the marriage penalty.

Age	QPP (December 1983)		CPP (December 1986)	
	Males	Females	Males	Females
<35	445.18	484.12	254.83	301.47
35–44	411.24	466.88	219.43	285.63
45–59	436.45	498.91	248.40	314.94
60–64	447.64	497.78	237.61	309.77
65–69	74.02	219.64	63.62	214.25

Notes: All amounts are in 2001 Canadian dollars. Sources: Regie des rentes du Quebec (1985); Canada Pension Plan (1987).

TABLE 3. The simple present value of average monthly survivor pension benefit payment in the December preceding removal of the marriage penalty.

Age	QPP		CPP	
	Males	Females	Males	Females
30	54,527	61,821	31,231	36,947
40	115,629	131,235	61,713	80,359
50	105,710	120,839	60,197	76,322
60	87,949	97,802	46,710	60,896
65	12,689	37,649	10,912	36,748

Notes: All amounts are in 2001 Canadian dollars. Average monthly benefits are taken from Table 2. Individuals under age 45 are assumed to have children so there is no reduction in benefits. Individuals aged 30 are assumed to have one child aged 5 who finishes school at age 18, so benefits are received for 13 years.

individuals under age 65. One source of this disparity is the higher flat rate benefits for these individuals in the QPP (see Table 1).

An estimate of the average size of the marriage penalties is presented in Table 3. We calculate the present value (2001 Canadian dollars) of the average survivor pension taken from Table 2 at selected ages. This is the amount of benefits that widows give up on remarriage. We discount future benefit receipt by sex-specific survival probabilities (Statistics Canada 1984) and assume a real interest rate of 3%. We also assume that benefits remain constant in real terms in the future, which is consistent with the indexing provisions of the CPP and QPP. Finally, for the estimates at age 30 we assume the widow has one child, aged 5, who will not remain in school past age 18.[16] The estimated costs are not trivial for prime-aged females, ranging from $75,000 to $130,000. The gender differences evident in Table 2 are preserved here because the base differences in monthly benefits are accentuated by gender differences in longevity. Therefore, females in receipt of a pension face a larger penalty and thus a disincentive to marry. The penalty is also clearly larger for individuals under age 65 in Quebec. Finally, the penalty is similar across jurisdictions and quite small for individuals aged 65 or older.[17]

A second factor is any other costs and benefits of marriage relative to the alternatives. A reduction in the costs of marriage might have little effect if the relative benefits of marriage were small. The relative benefits of marriage over the single state have been discussed extensively in the literature. A second alternative, which has received less attention, is cohabitation, called "common-

16.   Therefore, the survivor benefits are received for the next 13 years. The estimates for this age can vary substantially depending on the assumptions made about any dependent children. For example, the present value of the penalty is as high as $97,000 for females if we assume the child is currently 1-year-old and remains in school until age 25.

17.   We have also calculated a more complex accounting of the full IS cost of remarriage prior to the reforms. The "marriage penalty" is defined as the difference between the present discounted value of IS benefits flowing to the survivor who remains single and the value if the survivor remarries. The results of this exercise (available on request) are consistent with the story told by Table 3. A more detailed description appears in Baker et al. (2003).

law" relationships in Canada.[18] The status of these relationships varies by country. In Canada, many of the differences from marriage are legal (see Holland 1990). For example, in most provinces cohabitants do not have occupational rights in the family home, and all provinces exclude them from intestacy provisions. During the 1980s, cohabitants were not equivalent to spouses for the purposes of the Income Tax Act.[19] This meant that cohabitants were not eligible for the spouse deduction and could not contribute to their partner's (tax-subsidized) Registered Retirement Savings Plan as married partners could.[20] Property rights upon dissolution of the relationship have different bases in law. For married individuals, the basis is matrimonial property legislation under which both spouses are assumed to have contributed equally to the marriage; the default is an equal division of family property. Assets are broadly interpreted to include family property, business property, pension rights and even increases in the value of assets acquired prior to marriage. In contrast, property rights for cohabitants are founded on the principle of "unjust enrichment," so the onus is on the litigant to prove that the defendant has been unjustly enriched. Furthermore, cases are typically restricted exclusively to family property. Finally, in the 1980s cohabitation typically did not provide access to a partner's employment or government benefits.

In contrast, in some countries cohabitation is effectively equivalent to marriage. In the Netherlands, for example, heterosexual cohabitation can be legally registered—and once registered it is functionally equivalent to marriage (except for the right to adopt). Other European countries have moved in this direction, though often more informally, including France, Sweden, Finland, and Denmark (see Kiernan 2000). In other countries, such as the United States and some nations of Southern Europe, cohabitants have little or no legal status. The popularity of cohabitation shows similar variation: It is quite common in Scandinavia and France but much less so in Southern Europe (see Kiernan 2003).

Even if we are convinced the marriage decision will be substantively affected by the CPP/QPP reforms, our ability to measure any impact depends on additional considerations. First is the level of treatment—the proportion affected by the reforms—within the population studied. An estimate of the incidence of the penalties, measured as the proportion of widows or widowers in receipt of surviving spouse's pensions in the years preceding the two reforms, is presented in Table 4. These are calculated from administrative data on the number of CPP

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18.   Recent research on cohabitation includes Moffitt, Reville, and Winkler (1998) and Bumpass and Lu (2000); see also the references therein.

19.   Under revisions made in the 1990s, cohabitants and spouses are now treated the same for this purpose.

20.   The incentive to contribute to the partner's RRSP is income splitting upon retirement in order to minimize tax payments. Canada has an individual-based tax system.

TABLE 4. The proportion of widows receiving QPP or CPP survivor benefits.

	Females					Males				
Age	<35	35–44	45–59	60–64	65+	<35	35–44	45–59	60–64	65+
Quebec in years preceding the 1984 reform										
1981	0.71	0.79	0.68	0.58	0.27	0.24	0.37	0.19	0.13	0.05
1982	0.71	0.87	0.71	0.61	0.31	0.23	0.45	0.22	0.14	0.06
1983	0.71	0.89	0.74	0.64	0.35	0.23	0.52	0.24	0.16	0.07
The ROC in years preceding the 1987 reform										
1984	0.67	0.89	0.83	0.65	0.33	0.17	0.40	0.36	0.26	0.12
1985	0.67	0.90	0.85	0.66	0.37	0.16	0.40	0.36	0.27	0.14
1986	0.66	0.92	0.87	0.68	0.39	0.16	0.37	0.38	0.30	0.16

Notes: Sources: Statistics Canada's CANSIM database, Source Regie des rentes du Quebec (1985) and Canada Pension Plan (1987).

or QPP survivor pensions in payment by age and estimates of the population of widows of that age taken from Statistics Canada's CANSIM database. Receipt is quite high for prime-age females, at 70+%. It is lower for older females, a result that may be due to cohort effects. The CPP/QPP system was initiated in 1966, so the deceased spouses of some of the oldest individuals in these years may have had very little participation in the program. Males also have lower receipt rates. This likely reflects the fact that females have lower labor market participation rates and hence are less likely to have a CPP/QPP earnings history that would generate a benefit for their surviving spouses. Finally, the rates are marginally higher in the ROC than in Quebec, but this is to be expected because incidence is growing over time and the ROC data are from a later period.

Second, the empirical strategy must isolate the outcome of interest. Many previous studies relate the incidence of the married (or unmarried) state to variation in the marriage penalty. An implicit assumption here is that any effect of the penalty on flows into or out of the married state is large enough to manifest fairly quickly in the stock of individuals in the state. Marriage rates of widows are generally much lower than marriage rates for singles or the divorced. It is therefore possible (and documented in Section 11) that a significant change in marriage rates as a result of the reforms would not be perceptible in the stock of widows. As a consequence, our empirical strategy directly analyzes changes in the flow of widows into the married state in response to the removal of the marriage penalties.

7. Data

The variable of interest is the remarriage rate of widowed females and males, by province, over the period. The numerator of this rate is constructed from special

tabulations from the vital statistics marriage file maintained by Statistics Canada. This file contains the information on marriage certificates for all marriages occurring within a given year. Each marriage certificate provides information on the age of the bride and the age of the groom, the previous marital status of the bride and of the groom, and the year and province of marriage. The ages of the bride and groom are reported in 5-year intervals, with 15 age intervals in total. Previous marital statuses are single, divorced, and widowed. Grouping these data within Quebec and by province within the ROC, and within the age groups specified below, we divide the number of widows or widowers remarrying in a given year by the corresponding stock of widows or widowers in these same geographic/age cells, which are available through the Statistics Canada CAN-SIM database. We construct these rates for the period 1975 through 1995 inclusive.

A key advantage of these data is that we can analyze flows into marriage by previous marital state. This is exactly the information we need in order to examine the impact of the reforms. A weakness is that there is little additional information on the widows. Therefore we neither know the magnitude of the survivor benefits to which they were entitled nor much about their demographic and economic characteristics.

8. An Overview of the Empirical Strategy and Identification

We estimate changes in the remarriage rates of widowed females and males in Quebec (the ROC) as the marriage penalty is removed, using the rates in the ROC (Quebec) as a control. The estimating equation is

$$\text{RMR}_{it} = \beta_0 + \beta_1 \text{QU}_i + \beta_2 \text{REF84}_t + \beta_3 \text{QU}_i * \text{REF84}_t + \beta_4 \text{REF87}_t$$
$$+ \beta_5 \text{QU}_i * \text{REF87}_t + \eta X_{it} + \varepsilon_{it} \quad (1)$$

where i indexes provinces, t indexes time, QU_t is a dummy variable for Quebec, REF84_t is a dummy variable for the years 1984 and after, REF87_t is a dummy variable for the years 1987 and after and X_{it} is a vector of other control variables. The parameters β_3 and β_5 capture the relative difference in the change in remarriage rates, RMR_{it}, in Quebec and the ROC as the reforms take place. A priori, we expect β_3 to be positive and β_5 to be negative if the removal of the marriage penalty encouraged remarriage among widows.

The equation is estimated separately for males and females, and for the age groups <35, $35-44$, $45-59$, $60-64$, and $65+$. One reason for conducting the analysis by age group is that preferences and/or opportunities for marriage may vary systematically with age as a result of (for example) fertility or cohort effects. A second reason is that the plan's formulas for calculating survivor benefits make distinctions by many of these age groupings; for example,

survivor benefits are reduced for childless surviving spouses between the ages of 35 and 44. Finally, changes in other marriage penalties over the period directly affect specific age groups. For example, the 1986 extension of the SPA to widows aged 60–64 created an additional marriage penalty for this age group.

The control variables, X_{it}, are province and year effects and measures of marriage market conditions. The latter are estimates of the ratio of unmarried females to unmarried males (in the age groupings just listed) constructed from the Statistics Canada CANSIM database.[21]

Equation (1) is estimated by weighted least squares using the number of widows in the corresponding province/age group cell as weights. Standard errors are corrected for heteroskedasticity.[22] Estimates of the first-, second-, and third-order autocorrelation parameters of the residuals were calculated and indicate autocorrelation is not a significant problem in this instance.[23] Finally, although the linear specification in (1) facilitates comparisons of the estimates to graphical evidence of changes in RMR_{it} over the period, it does not obey the restriction $0 \leq RMR_{it} \leq 1$. We have estimated a logistic specification of RMR_{it} by nonlinear least-squares and both the magnitude and statistical significance of the estimated parameters are in agreement with the results presented in Section 10.[24]

The assumptions for identification in this framework are now well known (e.g., Angrist and Krueger 1999). In addition to the linear functional form, any time trends must be common to both groups and there can be no jurisdiction specific shock coincident with the reform. Furthermore, in the absence of an assumption of a homogeneous treatment effect, we estimate the average effect of the marriage penalty on remarriage for individuals whose marriage decision is affected by the remarriage provisions of the CPP and QPP.

One change in the marriage market over the sample period is the 1986 reform of the federal act governing divorce. This reform removed the requirement of fault as grounds for divorce. Corak (2001) presents evidence of a transitory dip and spike in the aggregate divorce rate around 1986, as some individuals delayed seeking a divorce until the new law came into place. A corresponding dip and spike in the remarriage rate of divorcees can be seen

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21. Although the age groupings do not necessarily provide appropriate delineations for marriage market opportunities, the estimates of β_3 and β_5 are not overly sensitive on this margin. For example, the results are quite similar if we include the gender ratio only for the age group that the dependent variable (marriage rate) is defined for.

22. The correction is calculated using the robust command in STATA.

23. The parameters are estimated by regressions of the current residual on the relevant lagged residual, pooling the data across provinces. The estimates are almost always small (0.2 or less) and statistically insignificant for both males and females (the largest estimate is -0.32). Even accounting for the probable bias of estimating these parameters from a short panel (Solon 1984), they provide little evidence of substantive autocorrelation.

24. Where there are disagreements, the estimates from the nonlinear model indicate larger effects of the reforms.

TABLE 5. Some characteristics of widows and widowers from the 1981 Canadian census.

	Widows		Widowers	
	Quebec	ROC	Quebec	ROC
All Ages (16+)				
Age	67.6	68.8	69.3	70.9
Employed	0.13	0.17	0.26	0.26
High School graduate	0.10	0.06	0.07	0.04
University graduate	0.01	0.02	0.02	0.04
Wages if employed	8,975	8,432	12,673	13,439
Total income (all individuals)	6,573	7,557	8,933	10,574
Cross-jurisdictional mover in past 5 years	0.004	0.006	0.004	0.005
Sample size	4,794	14,464	1,006	3,023
Ages 16–59				
Age	50.9	50.7	51.0	50.4
Employed	0.38	0.55	0.73	0.77
High School graduate	0.13	0.10	0.12	0.05
University graduate	0.02	0.03	0.03	0.07
Wages if employed	9,623	9,396	14,336	16,816
Total income (all individuals)	8,538	10,477	14,093	17,926
Cross-jurisdictional mover in past 5 years	0.008	0.006	0.005	0.006
Sample size	1,122	2,630	214	535

Source: 1981 Canadian Census.

around this time in Figure 1. To the extent that these divorced individuals remarried widows the widowed population becomes indirectly treated by the change in the act.

We perform checks for these sorts of effects and for other jurisdiction specific trends that may bias our inference. We estimate variants of Equation (1) that include province specific linear or quadratic trends. We also use, the marriage rates of singles or divorcees in the corresponding age groups to form a triple difference estimator.[25]

9. An Overview of the Data

In Table 5 we present an overview of widows and widowers in Quebec and the ROC, prior to the reforms, using 1981 Canadian census data. There are many similarities between these groups in the two jurisdictions. However, widows in the ROC are more likely to work and their educational attainment is higher, although the latter difference may be partly semantic as there are fundamental differences in the structure of education in the two jurisdictions.

Table 5 also reports the proportions who migrated from Quebec to the ROC

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25. We have also examined trends in the remarriage rates of widows and widowers in the decades preceding our sample period. This analysis is presented in Baker et al. (2003).

(or vice versa) over the preceding five years. An implicit assumption of the analysis is that widows in a given jurisdiction are not indirectly treated by the reform in the other jurisdiction. This assumption would clearly be false if all widows in Canada are in the same marriage market. To directly test this hypothesis would require the migration rates of the married population by (previous) marital status in the origin province, or marriage rates by the previous residence of the spouses. This information is not available. Therefore, that Table 5 reveals very little interjurisdictional migration by widowed males and females over the past 5 years is supportive of our assumption but not definitive. More generally, Quebecers are much less likely to make cross-provincial moves than are English Canadians. Among widowed females (males) in the ROC, 2.4 (2.4)% reported moving to another province in the previous five years versus 0.4 (0.4)% of those in Quebec.[26] For the entire female (male) population aged 16+, the rates are 6.3 (6.9)% for those in the ROC and just 1.0 (1.0)% for those in Quebec.[27] These ROC/Quebec differences likely reflect the underlying differences in language and culture between the two parts of the country.

In Figures 3 and 4 we graph remarriage rates, by age, of widowed females and males in the two jurisdictions over the sample period. These are the dependent variables for our regressions. In Figure 3 there is a downward trend in the marriage rates of all females over the period. There is also clear sequential evidence of an effect of the QPP and CPP reforms for females aged 15 through 59. For example, the remarriage rate of females aged 45–59 jumps up in Quebec in 1984 as the marriage penalty is removed from the QPP. A corresponding jump is visible in the remarriage rate in the ROC in 1987 as the penalty is removed from the CPP. In succeeding years the marriage rates in both jurisdictions continue to decline but now from a new, higher base. In each case there is also evidence of spikes in the exact years of the reforms. These spikes are consistent with either timing effects—some individuals postponing their marriages once the reforms were made public—or with stock effects—there was a stock of widows who did not marry due to the penalty but who then married as soon as the reform became law. Timing effects may be the less likely explanation because benefits were reinstated for all widows who had remarried once the rules changed. The elevated levels of the rates that persist after the spikes, however, suggest that the marriage penalties had a longer-term effect on marriage activity.

The evidence for females aged 60+ is not as conclusive. For females aged 60 to 64 there are spikes in the years of the reforms but less evidence of elevated

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26. Note that interjurisdictional and interprovincial migration are the same for individuals in Quebec.

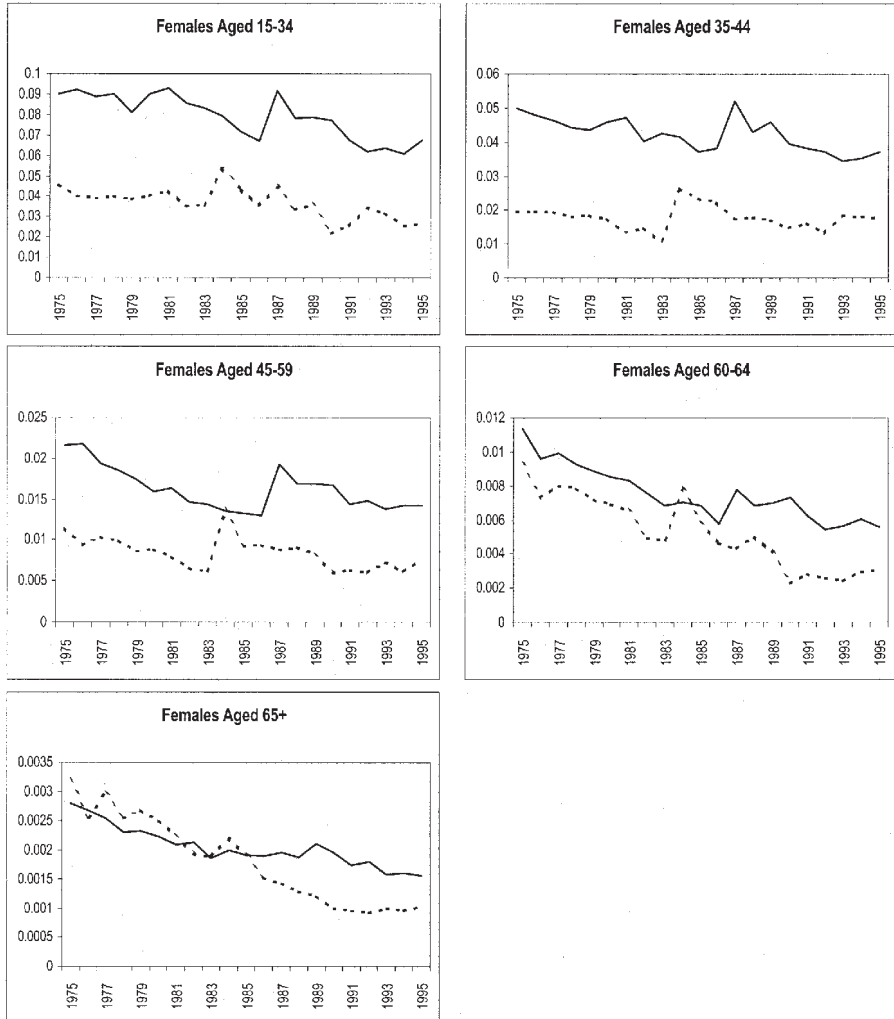27. Quebecers made up 27% of the male and female samples.

FIGURE 3. Remarriage rates of widows in Quebec and the rest of Canada, 1975–1995. Quebec
- - - - - - , Rest of Canada —— . The vertical scale in each graph is different.

remarriage rates thereafter. The remarriage rates of those 65 and older display
little correspondence with the reforms.

One might be tempted to relate the Quebec/ROC differences in the remar-
riage rates by age group to the information in Table 3: Remarriage rates are
lower in Quebec because the marriage penalties are larger, and the differential
declines with age in tandem with the differential in the penalty. Yet while the
interjurisdictional difference in the marriage penalties may contribute to the
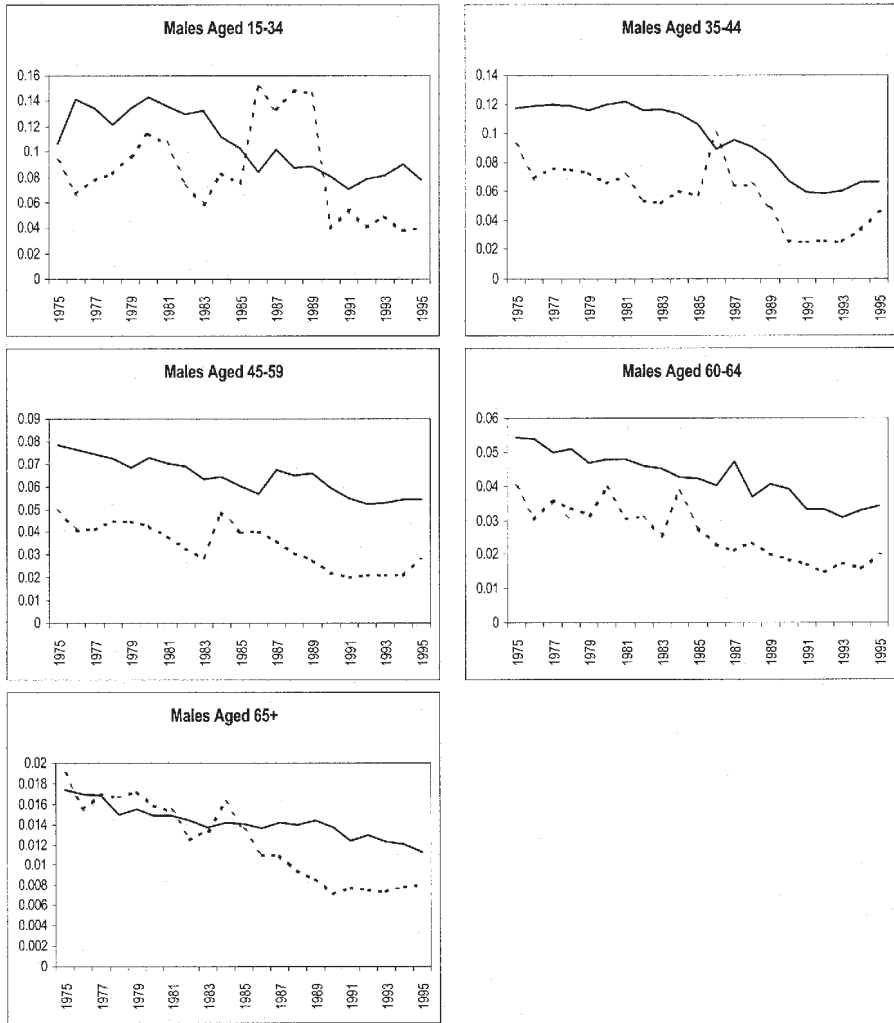
FIGURE 4. Remarriage rates of widowers in Quebec and the rest of Canada, 1975–1995. Quebec
- - - - - -, Rest of Canada ——— . The vertical scale in each graph is different.

corresponding difference in marriage rates, it cannot be the only cause. Single
and divorced Quebecers also have lower marriage rates than their counterparts
in the ROC.[28] Therefore, some portion of the ROC/Quebec differential in the

28.   For example, the remarriage rate of widowed females aged 45–59 averaged 0.93 percentage
points (or 105%) higher in the ROC than in Quebec over the period 1975–1983. Over the same
period, the marriage rate of 45–59-year-old singles averaged 0.36 percentage points (or 54%)
higher in the ROC. Finally, for divorced females in this age group the marriage rate averaged 2.2
percentage points (or 72%) higher!

remarriage rates for widows in this period should be attributable to a common, lower propensity for marriage in Quebec, and not to a marriage penalty differential per se. This is a graphic example of the potential biases in cross section evidence of the relationship between marriage penalties and marriage rates.

The graphs for widowed males aged 45–59, 60–64, and 65+ (Figure 4) are similar to the graphs for their female counterparts. There is clear evidence of a persistent effect of the reform for those 45–59, some evidence of a transitory effect (i.e., spikes) for those 60–64, and little evidence of any effect for those 65+.

In contrast, the graphs for the youngest males paint a confusing picture. Although there are spikes in the expected years, there are also spikes in the Quebec rates in the years between 1986 and 1989. Graphs of the numerator of these remarriage rates reveal dramatic increases (200 to 300%) in the number of widowers remarrying at these ages in these years, followed by offsetting dramatic decreases. One possible source of this activity are the previously mentioned reforms of Canada's divorce laws that led to a transitory surge in the remarriages of divorcees starting in 1987 (Figure 1). If female divorcees primarily married widowed males, this could account for the pattern in remarriage we see in Figure 4. However, if this were true we would expect to see corresponding jumps in remarriage in the ROC because the divorce reforms affected all parts of the country. Also, examination of the disaggregate data reveals the surge in marriages is through unions with single females. The other possibility is some sort of coding error. We have contacted Statistics Canada about this hypothesis but they report no obvious problem with the data. Since we cannot confirm an explanation of these patterns in the data, we simply report results for these age groups and focus our attention on the estimates for the older males.[29]

10. Estimates of the Effect of the QPP and CPP Marriage Penalties

Estimates of Equation (1) are reported in the first panel of Table 6. The results for widowed females are strongly consistent with the story told in Figure 3, highlighting the transparency of the identification. For example, the positive and statistically significant estimate of QU∗REF84 (0.007) for widows aged 45–59 captures the positive shift in remarriage rates in Quebec starting in 1984. The negative estimate of QU∗REF87 (−0.005) for this same age group captures the fact that remarriage rates in the ROC shift up in 1987 but not in Quebec. In

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29. Another explanation is that these remarriage rates are based on the smallest cell sizes observed, often fewer than 40 or 50 individuals. That said, if this were measurement error then we would expect a less systematic pattern, which is exactly what we observe in the remarriage rates of younger males in other provinces.

TABLE 6. Estimates of the impact of marriage penalties on remarriage probabilities.

	Widows		Widowers	
	QU*REF84	QU*REF87	QU*REF84	QU*REF87
Base specification				
15–34	0.016	−0.017	0.056	−0.001
	(0.003)	(0.004)	(0.022)	(0.026)
	[0.42]	[−0.24]	[0.70]	[−0.01]
35–44	0.013	−0.009	0.025	0.010
	(0.002)	(0.002)	(0.015)	(0.016)
	[1.00]	[−0.24]	[0.43]	[0.10]
45–59	0.007	−0.005	0.018	−0.013
	(0.001)	(0.001)	(0.002)	(0.002)
	[1.00]	[−0.38]	[0.55]	[−0.22]
60–64	0.0015	−0.0028	0.003	−0.005
	(0.0004)	(0.0005)	(0.003)	(0.003)
	[0.28]	[−0.44]	[0.10]	[−0.12]
65+	−0.0002	−0.0006	−0.0005	−0.0036
	(0.0001)	(0.0001)	(0.0010)	(0.0010)
	[−0.10]	[−0.32]	[−0.04]	[−0.26]
Specification including timing effects for 1984 and 1987				
15–34	0.014	−0.015	0.074	−0.023
	(0.004)	(0.004)	(0.029)	(0.032)
	[0.37]	[−0.21]	[0.94]	[−0.23]
35–44	0.014	−0.008	0.039	−0.001
	(0.002)	(0.002)	(0.019)	(0.019)
	[1.08]	[−0.22]	[0.67]	[−0.06]
45–59	0.005	−0.004	0.017	−0.012
	(0.001)	(0.001)	(0.003)	(0.003)
	[0.71]	[−0.31]	[0.52]	[−0.20]
60–64	0.0009	−0.0020	−0.0006	0.0008
	(0.0003)	(0.0004)	(0.0018)	(0.0016)
	[0.17]	[−0.31]	[−0.02]	[−0.02]
65+	−0.0003	−0.0003	−0.0018	−0.0026
	(0.0001)	(0.0001)	(0.0008)	(0.0007)
	[−0.15]	[−0.16]	[−0.13]	[−0.19]

Notes: Source: Vital Statistics and CANSIM data. Sample period is 1975–1995. Base specification includes a full set of province and year effects, as well as the gender ratios of unmarried individuals for the age groups 15–34, 15–44, 45–59, 60–64 and 65+ (see Equation 1). The "timing effects" are interactions between the dummy variable for Quebec and the year effects for 1984 and 1987, the years the reforms took effect. All estimation is by weighted least-squares using the number of widows or widowers in the relevant age group as weights. Standard errors (in parentheses) are corrected for heteroskedasticity. The change in the remarriage probability implied by the estimate, normalized by the average probability in the three years preceding the relevant reform, is reported in square brackets.

contrast, the estimates for widows aged 65+ do not indicate a systematic effect of the reforms, which is consistent with the lack of a pattern in the picture for this age group in Figure 3.

To provide an indication of the economic significance of the results, we normalize the estimated increase in the remarriage rates by the average rate in the three years preceding the reforms (1981–1983 for Quebec and 1984–1986 for the ROC). These results are reported in the square brackets in Table 6. These

calculations highlight the lower base remarriage rates in Quebec. For example, the estimated increase of 0.013 for females aged 35–44 in Quebec is from a base of 0.013 in 1981–1983. Thus, the remarriage rate effectively doubles for this group. The jump of 0.009 for females of this age in the ROC is from a higher base of 0.038 in 1984–1986, implying a much smaller (24%) increase. More generally, for females under the age of 65, the removal of the marriage penalty increased the remarriage rates between 24 and 100%.

In the second panel of Table 6 we present a set of estimates that attempt to net out any timing or stock effects of the reforms—the spikes in 1984 and 1987. We add an interaction between the Quebec dummy variable and year effects for 1984 and 1987 in (1). These should absorb any extra jump in the rates in these years. The result for females aged 15–59 is modest decreases in the estimated effect of the penalty that preserve the relative magnitudes across jurisdictions. The estimates continue to imply sizable increases in remarriage rates ranging from 21 to 108%.

The results for widowed males are presented in the second half of each panel. Given the vagaries of the data for younger widowers from Quebec, we focus on the results for those aged 45 years and older. The patterns of statistical significance of the parameter estimates are very similar to the results for females. Significant effects are found for males aged 45–59. Widowed males have higher remarriage rates than widowed females, so the larger point estimates for this group do not imply larger proportional effects. The proportionate responses to the reforms in the first panel are 55% in Quebec and 22% in the ROC. Netting out timing or stock effects (Panel 2) results in only marginal changes. The estimates for males 60–64 and 65+ are small, sometimes wrong signed, often statistically insignificant, and sensitive to specification.

The checks for jurisdiction specific trends involve augmenting Equation (1) with province specific trends, or adding singles or divorcees to the estimation sample as an additional control. The latter exercise results in a triple difference estimator and controls for any secular trends that are common to widows and singles or to widows and divorcees. The results of these modifications are reported in Baker et al. (2003). For most age groups, the estimates are robust to these innovations.

A consistent result for both females and males is that the estimated effect of the penalties is larger in the province of Quebec. An explanation of this result is that marriage penalties are much larger for prime-aged males and females in this province (Tables 1, 2, and 3). In the top panel of Figure 5 we plot the responses of widows aged 15–64 and widowers aged 45–64 from the top panel of Table 6 against the estimated marriage penalty for each group from Table 3. We also plot the predicted values of a simple linear regression of the responses on the penalties. The relationship between the responses and penalties is positive: the slope of the regression line is 0.00000216 with a t-value of 3.60.
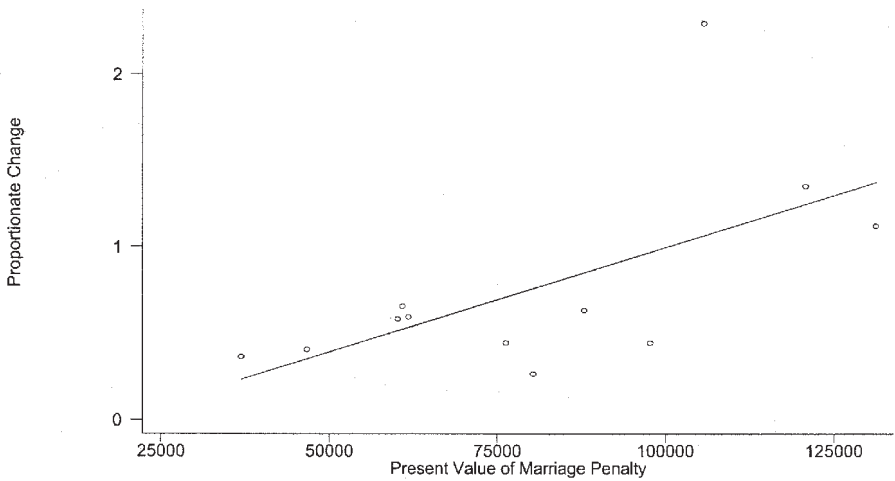
Panel A
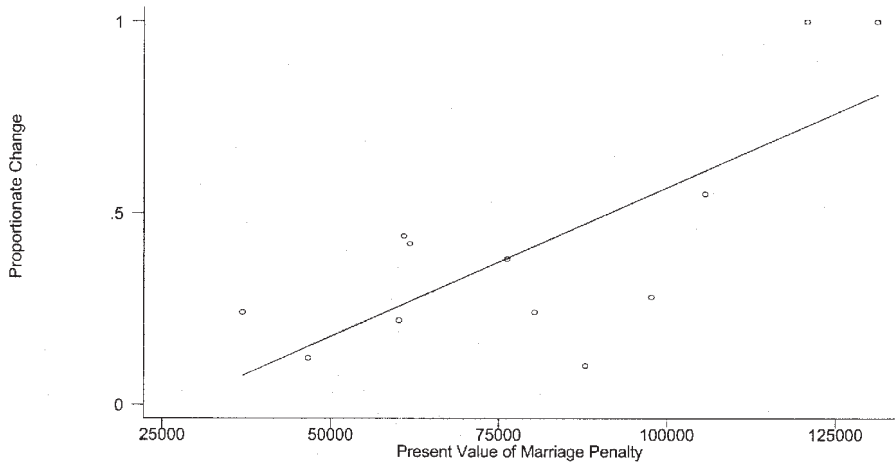
Panel B

FIGURE 5. The relationship between the estimated behavioral response and size of the marriage penalty. In Panel A, the present values of marriage penalties and estimated behavioral responses are from Tables 3 and 6, respectively. In Panel B, the estimated behavioral responses have been divided by the proportion of widow(er)s in an age group receiving a survivor pension from Table 4, in order to account for differences in treatment across age groups. The solid lines graph the predicted values of the simple regression of the behavioral responses on the marriage penalties.

In the second panel of Figure 5 we attempt to account for the differences in treatment across widows and widowers of different ages documented in Table 4. If we assume the reforms have no effect on widows and widowers who are

not receiving a survivor pension, then we can divide the estimated behavioral response for each group by the proportion of the group that is receiving a pension.[30] The figure in the second panel uses the proportions from 1983 and 1986. The slope of the regression line is now 0.00000491 with a t-value of 2.47, again confirming the inference.

One limitation of the vital statistics data is that they provide little information on the individuals who remarried in response to the reforms. We next use data from the 1990 and 1995 *General Social Surveys* (GSS) to try to shed light on this issue. The GSS is an annual, nationally representative survey of the Canadian population that focuses on different social issues. The 1990 and 1995 surveys contain information that enable us to construct the marriage histories of respondents extending back three marriages. This allows us to view the marriage behavior of widowed individuals over the period that the reforms took place. The number of widowed individuals captured in these data is small, however, so our analysis must necessarily be exploratory and speculative.

We select individuals whose marriage ended upon the death of their spouse. We require that the deceased spouse could potentially have contributed to the CPP/QPP for at least 5 years in order to ensure that there is a survivor pension at stake. This produces a sample of 2,179 individuals, 1,723 of whom are females. Some summary statistics are reported in the top panel of Table 7. Two notable characteristics are the rather low level of completed education of the sample and the cumulative remarriage rate of 12%.

Most of the characteristics of the individuals captured in the GSS are for the survey date: January–March 1990 or January–December 1995. Since we are interested in the characteristics of these individuals at the time of any remarriage, we focus on attributes that are unlikely to change considerably over time. We investigate 0/1 indicators of educational attainment and use home ownership as a proxy for wealth. We also examine an indicator of whether any remarriage was preceded by cohabitation. These characteristics are used as dependent variables in the equation

$$Y_{it} = \alpha_0 + \alpha_1 QU_{it} + \alpha_3 QU_{it}*REM84_{it}$$
$$+ \alpha_5 QU_{it}*REM87_{it} + \lambda t + \phi X_{it} + \nu_{it} \tag{2}$$

where Y_{it} is the binary variable for individuals' education, home ownership, or cohabitation: REM84 and REM87 are dummy variables that equal one if the

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30. This assumption will be incorrect if treated widows and widowers remarry untreated widowers and widows. Across all sample years, just under 10% of widows/widowers aged 20–29 remarried other widowers/widows. This proportion rises to roughly 37% for those aged 50–59.

TABLE 7. Evidence of widows and widowers who responded to the removal of marriage penalties.

Sample characteristics	
Sample size	2,179
Age at death of spouse	59
Elementary education	0.37
University graduate	0.13
Resident in Quebec	0.25
Remarried in sample period	0.12
1995 survey	0.55

Regression results for full sample	QU*REF84	QU*REF87
Elementary education	−0.441	0.156
	(0.111)	(0.232)
High school graduate	0.423	−0.302
	(0.319)	(0.385)
Post-secondary education	0.149	−0.076
	(0.349)	(0.402)
University graduate	0.275	−0.118
	(0.329)	(0.374)
Household member owns dwelling	0.180	−0.169
	(0.310)	(0.368)
Cohabitated prior to remarriage	0.310	−0.474
	(0.299)	(0.301)

Regression results for females		
Elementary education	−0.460	−0.022
	(0.096)	(0.089)
High school graduate	0.758	−0.844
	(0.111)	(0.132)
Post-secondary education	0.378	−0.446
	(0.335)	(0.344)
University graduate	0.475	−0.377
	(0.379)	(0.379)
Household member owns dwelling	0.628	−0.842
	(0.112)	(0.118)
Cohabitated prior to remarriage	0.389	−0.692
	(0.361)	(0.372)

Notes: In addition to the reported parameters, the regression equation includes quartics in age, age at spouse's death, the year the spouse died, the year of any remarriage, and dummy variables for Quebec, remarriage, and females (where appropriate). All estimation is by weighted least-squares using GSS sample weights. Standard errors (in parentheses) are corrected for heteroskedasticity. Source: 1990 and 1995 General Social Survey.

individual remarries respectively, in 1984 or 1987 (or later); t is a dummy variable equal to 1 for observations from the 1995 survey; and X_{it} is a vector of other control variables, which are quartics in the individual's age and their age when their spouse died, a quartic in the year their spouse died, a quartic in the year of any remarriage, and dummy variables for females and individuals who

remarry.[31] This equation has a similar structure to (1), with α_3 and α_5 playing analogous roles to β_3 and β_5. The main difference is that time (and age) effects are modeled as quartics rather than unrestricted dummy variables as a concession to the small sample size.[32] All estimation is by weighted least-squares using GSS sample weights, and standard errors are corrected for heteroskedasticity.

The regression results are reported in the lower panels of Table 7. We report estimates for both the full sample and the smaller sample of widows. In the first four rows we examine measures of educational attainment. In both samples the signs of the estimates indicate a relative increase in the educational attainment of individuals marrying after the removal of the marriage penalty in the QPP, which is subsequently offset as the penalty is removed from the CPP. Note that the only statistically significant estimates are from the sample of widows. The signs of the estimates for home ownership as a proxy for wealth, indicate greater resources among those marrying after the reforms. Finally, the signs of the estimates in the sixth row of each panel indicate that the postreform remarriages were more likely to be preceded by cohabitation.

These results provide some tentative evidence that it was the more educated and wealthier individuals who responded to the removal of the marriage penalties. One explanation for this result is that there are only small incremental benefits of marriage over cohabitation for the low-income population. Recall that primary differences between cohabitation and marriage in Canada are property rights and access to the partner's employment and government benefits. These regression results are based on small samples, however, and many of the estimates are not statistically significant.

11. Context and Interpretation

Two features of our results are important to their interpretation and comparison to the findings of previous studies. First, we find little or no behavioral response for the age group 65+. Because most widows are quite old this means that the majority of widows did not respond to the removal of the marriage penalties. The reason may be that the marriage market for older individuals is quite poor. Also note, as reported in Figures 3 and 4 the remarriage rates of older widows are very low. Even if the rates were to double the resulting change in the stock of widowed seniors would be quite small. Second, we do find significant

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31. We have also estimated specifications that include interactions between the remarriage dummy and the quartics in age at spouse's death and the year the spouse died. These interaction terms are typically jointly insignificant, and the effect of this change in specification on the parameters of interest is negligible.

32. We have replicated the analysis using this alternative specification and retrieved point estimates that are qualitatively similar to those reported in Table 7.

TABLE 8. Estimates of the impact of the marriage penalties on the stock of widows.

	Widows		Widowers	
	QU∗REF84	QU∗REF87	QU∗REF84	QU∗REF87
Base specification				
15–34	−0.0008	−0.0001	−0.0000	−0.0006
	(0.0005)	(0.0005)	(0.0004)	(0.0004)
35–44	0.0002	−0.0049	−0.0014	0.0008
	(0.0021)	(0.0020)	(0.0011)	(0.0010)
45–59	0.0033	−0.0029	−0.0053	0.0017
	(0.0042)	(0.0042)	(0.0022)	(0.0021)
60–64	−0.0006	0.0109	−0.0042	0.0041
	(0.0115)	(0.0117)	(0.0065)	(0.0065)
65+	0.0033	0.0232	0.0236	−0.0144
	(0.0092)	(0.0094)	(0.0074)	(0.0075)

Notes: The sample period is 1975–1995. In addition to the reported parameters, the estimating equation includes a full set of province and year effects as well as the gender ratios of unmarried individuals for the age groups 15–34, 15–44, 45–59, 60–64, and 65+ (see Equation 1). All estimation is by weighted least-squares using LFS sample weights. Standard errors (in parentheses) are corrected for heteroskedasticity. Source: Labor Force Survey and CANSIM data.

responses among younger widows who have higher remarriage rates and better marriage markets. Therefore, the largest response is in the age groups with the lowest proportions of widows.

We have noted that most previous studies of marriage penalties concern the U.S. federal tax code and U.S. welfare system. Relatively few studies use the time-series cross-section empirical framework utilized here. Among those that do a common finding is that marriage penalties have little or no effect on the headship decision (e.g., Blau et al. 2002, Dooley et al. 2001, Hoynes 1997, Moffitt 1994; but also see Lichter et al. 1997).

What leads to this difference in results? First, it's not clear that the populations of widows and, say, welfare recipients are directly comparable. Welfare recipients are economically disadvantaged relative to many widows, and the evidence in Table 7 suggests this may be important. Welfare recipients are also younger on average, although our evidence does indicate that it is younger widows who respond to the penalties.

A second consideration is the analytical framework. We study relatively large penalties in populations with high levels of treatment. We also focus directly on flows into the married state. As noted previously, if baseline flow rates are small then the effects of penalties may be difficult to measure in the stock, a preferred measure of headship in previous studies. This is an issue that has received little discussion in the literature but may be important (Hoynes 1997, Bitler et al. 2002). It is clearly important here. The age groups with the highest remarriage rates have the lowest incidence of widowhood, and vice versa. In Table 8 we report estimates of Equation (1) when the dependent variable is a 0/1 indicator that an individual is widowed.

We use data from the 1976–1995 Labor Force Surveys (LFS), sampling all males or females of all marital statuses in the indicated age categories.[33] Given the results in Table 6, we expect β_3 to be negative and β_5 to be positive in these results. The estimates indicate no systematic effects of the marriage penalties on the stock of widows. Most of the estimated parameters are statistically insignificant. The sample sizes for these regressions are between 125,000 and 1,000,000 observations.

Our primary contribution is evidence that marriage penalties can have substantive effects on the marriage decision, but our estimates also have implications for the penalties in income security programs. The largest and most robust estimated effects are for widowed females under the age of 60. Data (1981 Canadian census, Human Resources Canada 1994) from a year just prior to the reforms reveal that 56% of widows in this age group had children at home. Therefore, the marriage penalties potentially denied these children any benefits of growing up in a household with married adults.

More generally, the results can inform debate over the wisdom of maintaining marriage penalties on survivor pensions. As noted before, these penalties are common in public social security programs around the world. Their rationale is not obvious. One view is that a survivor pension is a form of payout of the actuarial value of the deceased's entitlement or accumulated contributions to the plan. This perspective makes some sense for the Canadian system because other death benefits are limited to a maximum of $2,500, regardless of how long the deceased contributed to the CPP/QPP. In this case a remarriage penalty on the survivor pension does not have an obvious motivation. Rather, the survivor pension should be tailored to the actuarial value of the contributions and the age of the widow. Another view is that survivor pensions play a social insurance role targeting a group in society whose members are in particular need. Widows and orphans have long been an object of assistance. One implication of the results of this paper is that, at younger ages, widowhood is not an immutable state but rather one that is determined in part by this targeting. Of course, removal of the marriage penalty undermines the social policy goal. It extends benefits to individuals who may—through marriage—have gained better economic status. There are also the program costs of the extension, although presumably it is individuals who were entitled to relatively small survivor pensions (or saw relatively large benefits from marriage) or who self-selected into marriage in the presence of a penalty. On the benefit side are any welfare

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33. We use the April and October samples in each year to ensure no repeated observations on individuals. There is no public use data for the 1975 LFS. The LFS is a monthly cross-sectional survey of the Canadian population that collects information on the labor force status and demographic characteristics of respondents.

advantages of the increase in remarriage rates. The benefits of marriage over the alternatives are widely debated. Some argue that married individuals achieve better outcomes due to self-selection rather than some causal effect of the married state. What is clear is that, in most developed countries, partners in marriages are in a different legal position than partners who cohabitate. The relative advantages of these different positions are an important topic for research.

12. Conclusions

Marriage penalties are a controversial feature of many government programs. Although they have been found deficient in a variety of dimensions, the evidence that they cause behavioural distortions is quite mixed. This is surprising because economic theory predicts that these penalties provide a clear incentive to remain single (or cohabitate). In this paper we provide new evidence that marriage penalties matter. Previous studies may have been limited by problematic identification strategies and/or by applications in which the penalties are too small to make a difference. We examine the marriage penalties in the surviving spouse pensions of the Canadian Income Security system. These penalties are monetarily substantial. Also, we focus on reforms—which removed the penalties—that provide a simple and transparent basis for identification.

   Our primary contribution is evidence that these marriage penalties had large and persistent effects on the remarriage rates of widows aged 15–59 and prime-age widowers. The inference is robust to a variety of checks for spurious inference, and it varies across age groups and jurisdictions in expected ways.

   A secondary contribution, albeit one based on small samples, is evidence suggesting that the behavior of individuals with characteristics correlated with higher wealth was affected by the penalties. This is perhaps surprising because it is low-income individuals who bear the greater proportionate cost from marriage penalties. We argue, however, that the incremental benefits of marriage over cohabitation may be small for these individuals. This is because many of the benefits are found in laws covering the treatment of assets and income.

   The most important implication of these results is that marriage penalties matter. Headship status is in part a function of financial incentives in government programs. A secondary implication is for the remarriage penalties that are common to survivor pensions in public social security programs. One motivation for these penalties is targeting social security to a particularly needy group. The results imply that, at younger ages, membership in this group is a function of this targeting.

TABLE A1. Parameters of Canada's Income Security Programs in the 1980s

	Eligibility and funding	Benefits	Means/Earnings tests
Old Age Security (OAS)	• Age 65+ • Universal subject to residency requirement • Financed from general tax revenues	• Set by Parliament	• None
Guaranteed Income Supplement (GIS)	• Age 65+ • OAS pensioner • Satisfy means test • Financed from general tax revenues	• Set by Parliament • Different "Married" and "Single" benefits • Not subject to regular income taxes	• Yes, based on family income • Tax rate of 50% (25% if spouse is not a IS recipient) • Certain income is exempt
Spouse's Allowance (SPA)	• Ages 60–64 • Spouse is OAS pensioner or (starting 1986) individual is widowed • Financed from general tax revenues	• Set by Parliament • Equivalent to sum of OAS and relevant GIS benefits • Not subject to regular income taxes	• Yes, based on family income • Tax rate of 75% until OAS component gone and then like GIS • Certain income is exempt
Canada/Quebec Pension Plan (CPP/QPP)	• QPP: Age 65+ (1980–83), Age 60+ (1984+) • CPP: Age 65+ (1980–86), Age 60+ (1987+) • Contribute in at least one calendar year of "Contributory Period" (starts Jan. 1 1966 or at age 18, whichever is later, and ends at age 70 or commencement of pension, whichever is earlier) • Financed by employers' and employees' contributions	• 25% of "Average Pensionable Earnings" over Contributory Period up to cap • Years rearing young children (as of 1977 in QPP or 1978 in CPP), receiving a disability pension, and 15% of remaining years can be excluded from calculation (Contributory Period cannot be less than 10 years) • Benefits subject to actuarial adjustments starting 1984 in QPP and 1987 in CPP	• None

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