What Happened to the Canada US Brain Drain of the 1990s?
New Evidence from the 2000 US Census

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Abstract

This article uses the 2000 US Census to ascertain both quantitative and qualitative changes in Canadian immigrants to the US through the 1990s, and compares these to earlier migration cohorts from census data in 1980 and 1990. Canadians in the US continue to have higher relative salaries and education levels *vis-à-vis* their American counterparts, and this gap has widened in the 1990s, even when controlling for variety of labour market factors. A similar phenomenon occurred amongst immigrants from Britain and Ireland and suggests that US economic performance and immigration policy are the probable driving force behind this migration.

Résumé

Cet article utilise le 2000 Recensement d'Etats-Unis pour vérifier des changements quantitatifs et qualitatifs dans les immigrants canadiens aux Etats-Unis par les 1990, et compare ceux-ci aux bandes de migration précédentes des données de recensement dans 1980 et 1990. Les Canadiens dans les Etats-Unis continuent à avoir de plus hauts salaires et les niveaux d'éducation relatifs vis-à-vis de leurs homologues américains, et cet écart a élargi dans les 1990, même en contrôlant pour la variété de travail facteurs du marché. Un phénomène similaire est arrivé parmi les immigrants de Grande-Bretagne et Irlande et suggère qu'Etats-Unis exécution économiques et la politique d'immigration sont la force de conduite probable derrière cette migration.

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Introduction and Background

The so-called "brain drain" from Canada to the United States attracted a lot of attention from the Canadian media, policy makers, and the public-at-large in the late 1990s.[1] Some observers (DeVoretz and Laryea, 1998) argued that a large number of Canadians immigrated to the United States during this period, largely due to the increased ease of entry to the US in the post-free trade era.[2] In addition, recent evidence (Frank and Bélair, 1999; Zhao, et al., 2000) has shown that these individuals have been amongst the country's best and brightest, and its highest income earners. Schwanen (2000) also noted this and added that the southward flow is especially worrisome because it includes knowledge workers in the sciences and engineering, individuals that are needed in Canada to spur productivity and incomes in the new information economy. Card (2003) and Mueller (1999, 2000) have argued that qualitative improvements (in terms of education and earnings) in Canadian migrants to the United States began as early as the 1980s, owing to the relative spread of the distribution of earnings in the United States and the related increase in returns to education.[3] Much of this research has focused on domestic Canadian policies and economic performance, particularly relative marginal income tax rates and employment growth in key sectors, which have provided the impetus for migration south.

Others have noted that the loss of talent to the United States may not be problematic. Zhao, et al. (2000) showed that permanent migration to the United States in the 1990s as a percentage of the Canadian population is at a historic low. They also find that temporary migration, although ostensibly increasing during the decade, is hard to measure accurately. Furthermore, Canada still

attracts a large number of highly educated individuals from third countries, more than offsetting

the migration of educated Canadians. In a similar vein, Helliwell (1999) argued that the

historically low migration in the 1990s was surprising given the high income and unemployment

rate differentials between the countries, both of which favoured higher migration to the US,

especially amongst highly skilled individuals.[4] Globerman (1999) observed an increase in

temporary migration, but said that this could be beneficial to the Canadian economy since it

fosters economic integration with the US, and because individuals who return will do so with

knowledge and experience that could benefit the country. Indeed, a recent article in the *Globe

and Mail* (Valpy, 2004) argued that young Canadians living in the United States fully intend to

return to Canada owing in large part to the diverging values between Canadians and Americans.

Up until now, evidence of this immigration phenomenon has been hindered by data limitations.

In the US inter-census periods (i.e., between 1980 and 1990, and 1990 and 2000), only two

sources of data exist with the potential to analyze the foreign born: the March supplement to the

Current Population Survey (CPS) and administrative records from the Immigration and

Naturalization Service (INS). Estimates from either of these sources, while informative, may not

be accurate.[5] Now that the 2000 US census data are available, we are able to more accurately

portray both the quantitative and qualitative aspects of Canadian emigration to the United States

in the 1980s and 1990s. In particular, we address the number of individuals who were resident in

the United States at the time of each census, when they initially entered the United States, as well

as the earnings and educational attainment of these individuals. Although the 2000 census has

been used previously (e.g., McHale, 2003), what follows is the most detailed analysis to date of

Canadians living and working in the United States. We are able to compare Canadians with both

Americans and other immigrant groups to determine if there have in fact been changes in the

numbers and composition of Canadians in the United States. In sum, we are able to ascertain if in fact there was a brain drain in the 1990s.

We find that there has been an increase in the number of Canadians residing in the United States as of the 2000 US census relative to 1990, but that this total number is still less than in 1980. Nevertheless, those who are in the labour market have higher salaries and levels of education compared to the American-born in the sample, and those Canadians in the United States as of 2000 have higher education and salaries compared to those in the two earlier censuses, even when controlling for a variety of other labour market variables. These results are consistent with a brain drain from Canada to the United States. However, a similar pattern of migration emerges when we address individuals entering the US from the Britain and Ireland, suggesting that it is US immigration policy that has encouraged this movement of people.

Data

We use data from the 1980, 1990, and 2000 US censuses.[6] Each of these is a five per cent sample of the population. All Canadian-born as well as those born in both the UK and Ireland were retained, while a 1/100 subsample of the American-born was used.[7] Since the original data are a weighted sample of the population, and since we further subsample all groups but the Canadian born, the use of unweighted statistics would bias our results. Thus, in all calculations we use the inverse of the sampling proportions to weight individual observations and to infer population totals.

We assume that individuals who immigrate to the United States do so from their country of birth and do not enter the United States via a third country. While this may misrepresent the migration patterns of some immigrants, there is no way to distinguish transmigrants in these data. For

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consistency, those who where born outside the US to American parents (and hence were US citizens) were also excluded from the sample.

The education variable was recoded in each case to be years of education, consistent with the highest level of education completed, or in some cases its mean. For example, a completed high school education was recoded to be 12 years of education, completion of grades 1 through 4 was coded to 2.5 years of education, and four or more years of university were coded to be 16 years of education.

While we are interested in getting an accurate count of the changes in the number of Canadian-born living in the United States at each census, we also desire to ascertain the success of these individuals in the US labour market. As such, we also limit the sample to include only those individuals between the ages of 25 and 64 who did not live in group quarters, were not attending school, were not self-employed, worked at least 40 weeks in the previous year, and had at least $1000 (1989 dollars) in salary. It is this subsample that will be used for the bulk of the analysis in this paper.

Results

Table 1 shows the number in various groups captured by the census snapshot at each of the three decennial censuses, as well as the percentage changes between 1980 and 1990, and 1990 and 2000. The table shows that the number of Canadians living in the US was 820,713 in 2000, compared to 844,351 in 1980 and 739,752 in 1990. Thus, the number of Canadian-born living in the United States was actually less in 2000 than it was in 1980, although this does represent an increase of about 11 per cent since 1990. Still, compared to increases amongst the other foreign-born, the increase in the number of Canadians captured by the census has been significantly less.

As a further comparison we separate those born in the Ireland and Britain from the foreign-born. This is because these English-speaking countries likely provide a better comparator for Canada than the group of all foreign countries.[8] The migration pattern is similar to that of migration from Canada: a decrease in the 1980s, followed by an increase again in the 1990s (albeit less in magnitude compared to Canada).

While these numbers are interesting they do not necessarily capture any loss of Canadian human capital to the United States. In the context of the brain drain, it is individuals who migrate to the United States and contribute to that economy, instead of their home country's economy, that is the real issue. In other words, the total number of immigrants gives us an estimate of how *extensive* the movement of individuals is, but not how *intensive* it is. As such, we now focus only on individuals who are active labour force participants in each of the censuses (as explained in the data section above).

Table 2 provides information comparable to Table 1, but with only active labour force participants included as well as immigration cohort (i.e., period of entry). In all cases, the decennial changes are higher amongst these groups of immigrants compared with the total sample in Table 1. For example, between 1990 and 2000, total Canadian immigration increased by almost 11 per cent, but amongst those in the labour force, the increase exceeded 25 per cent. For immigrants from Ireland and Britain, the pattern is similar, but still not as dramatic as in the case of Canadian immigration: a total increase of 17.29 per cent between 1990 and 2000 for those in the labour force versus an increase of 2.77 per cent, for the total sample (Table 1). Similar patterns hold for other immigrants as well, as these increases are larger than for the native-born US population. Finally, for males in the labour force, these percentage increases are even more dramatic relative to comparable females. Thus, it appears that immigrants, regardless

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of origin or sex, have entered the United States largely to pursue economic opportunities in the

1990s. These increases, especially amongst Canadian males, are very dramatic during the later

half of the 1990s. This is consistent with the findings of McHale (2003).

Thus far we have shown that there has been a decrease in the number of Canadians living in the

United States between the 1980 and 1990, followed by an increase between 1990 and 2000. We

also observe a similar, albeit less pronounced, pattern for individuals from Ireland and Britain.

This is supportive of the brain drain hypothesis, not only from Canada, but from Britain and

Ireland as well.[9] Still, these data do not answer one major question: What is the composition of

these changes in immigration flows? Are the individuals represented in each census in

possession of higher education levels and earning higher salaries than the comparator groups

(i.e., native-born Americans and immigrants from Ireland and Britain)? Once again, we have

estimates of how *extensive* the movement of human capital has been over this time period, but

we are also interested in determining how *intensive* the transfer of human capital has been. To

do this, we first look at the changes in salaries and years of education over time in our sample.

Since there may be a secular change in these numbers that is not related to migration *per se*, we

control for this by comparing Canadian immigrants with individuals born in both the United

States and in Ireland and Britain.

Tables 3 and 4 contain information on comparisons of log real earnings of Canadians (males and

females) in the United States as of the 1980, 1990, and 2000 United States censuses.[10]

Comparable figures for the US-born are included as well as figures for immigrants from Ireland

and Britain. Because the composition of immigrants can change over time, along with the

composition of the American-born, addressing changes in immigrant cohorts without a

comparison group might bias our conclusions. For example, in addressing the brain drain from

Canada, the question is not how much has the education of immigrants changed in the intercensal period, but rather by how much has this changed relative to the change in educational attainment of the two comparator groups. Similarly, addressing the earnings growth of Canadians is meaningless without comparing this growth to the growth of some base group.

Table 3 shows that the mean of the log real earnings for Canadian males averaged 10.411 in the 1980, compared to 10.255 for American-born. Thus, Canadian males had a significant earnings advantage of about 15.6 per cent in 1980. By 1990, this earnings advantage increased to about 25 per cent, and further increased to near 32 per cent in 2000. The net increase in earnings or the earnings *difference-in-difference* (i.e., once the effect of changing American earnings is controlled for) is about nine and seven percentage points, respectively, over the two intercensal periods. To look at this somewhat differently, by 1990 Canadians in the United States had increased their earnings advantage over Americans by nine percentage points relative to 1980 (i.e., 0.248 - 0.156 = 0.092). This earnings advantage increased a further seven percentage points by the 2000 census. Over the entire period (1980-2000) Canadian-immigrant earnings increased by some 16 percentage points. Relative female earnings increased by approximately 8.5 percentage points between 1980 and 1990, and 5.6 percentage points between 1990 and 2000, or a total of 14 percentage points between 1980 and 2000. All results are statistically significant at 99 per cent confidence.

Comparisons with Ireland and Britain are more ambiguous (Table 4). Here Canadian males have a salary disadvantage of between six and eight percentage points in each of the three years. For females, Canadians have salaries which are some five percentage points higher in both 1980 and 1990, and about 2.4 percentage points higher in 2000. In other words, Canadians in the US have been increasing their salary advantage relative to the American-born and have had mixed results

over the two decades relative to the Irish and Britons, which have themselves obviously seen their mean unadjusted earnings improve relative to the American-born.

From a Canadian public policy perspective, a key issue is whether the educational levels of these migrants have changed during this period. The issue is quite different if Canadians in the United States are being rewarded because they possess higher levels of formal education (presumably education obtained in the taxpayer-financed Canadian system of public education), or if they are simply being rewarded for unobservable characteristics (which the Canadian taxpayer has not financed).[11] Tables 5 and 6 address the net change in the educational attainment of Canadians, as well as nationals of Ireland and Britain, who have migrated to the United States.[12] Since returns to education in the United States increased dramatically in the 1980s and the 1990s, we would expect that the average Canadian in the United States would indeed have higher levels of educational attainment in 1990. The data do in fact support this hypothesis. As of the 1980 census, Canadian males in our sample had a mean educational attainment of 12.48 years, about the same as the American-born. By 1990, this relative differential had increased to 0.36 years of education, and by 2000 this difference was about 0.81 years. The net increase between 1980 and 2000 was also about 0.81 years. Relative to immigrants from Ireland and Britain (Table 6), the pattern is similar: a relative increase of 0.56 years over the period 1980 to 2000.

The female experience is similar. In 1980, Canadians in the United States had slightly fewer years of education on average compared to their US-born counterparts. This educational advantage increased to 0.14 years in 1990, and 0.43 years in 2000. Stated differently, relative education increased by about 0.52 years over the period 1980-2000. Relative to

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female immigrants from Ireland and Britain (Table 6), the increase was a positive, albeit less dramatic: an increase of 0.31 years between 1980 and 2000.[13]

In sum, the data in Tables 3 through 6 show two phenomena. First, on average Canadians in the United States have improved their relative earnings position, or at least held steady, both relative to the US-born and to those from Ireland and Britain over the 1980 to 2000 period. Second, there has been an increase in the relative educational attainment of Canadian migrants relative to these two comparators over this same period.

As illuminating as these results are, they are simply averages and really tell us little about the underlying dynamics of the immigration flow from Canada to the United States. In other words, we are interested in looking at how different immigrant groups have changed over time. The concern about the brain drain is that young, educated Canadians with high earnings potential are leaving Canada for the United States. The simple intercensal comparisons that have been presented could be evidence of a brain drain, but they may also represent something else such a bias in return or onward migration flows. For example, perhaps individuals with lower levels of education and earnings returned to Canada during the 1990s. This would bias the 2000 census results and could lead one to believe that a brain drain had occurred in the 1990s when in fact we simply had witnessed selective return migration to Canada. Similarly, the remigration of Canadians from the United States to a third country, or selective job loss or retirement patterns, would also result in bias since individuals who were represented in the 1990 census would not be included in the 2000 sample. The same holds for those captured in the 1980 census who were not captured again in 1990.

To overcome this potential problem, we disaggregate Canadian immigrants by entry cohort.

In these data, we can uniquely identify immigrants by five-year entry cohorts since 1960, a

ten-year entry cohort for those who entered in the 1950s, and a single cohort for all who

entered prior to 1950. The expatriate Canadians are disaggregated into entry cohorts and

these values are then compared to the mean value of the variable for Americans in the

sample. Within each panel are estimates with and without controls for income-generating

personal characteristics. We again use a "difference-in-difference" approach whereby the

relative characteristics of immigrant cohorts in the 1990 (2000) census are compared to those

cohorts at the same stage of their assimilation experience in the 1980 (1990) census. For

example, we look at the relative difference in male earnings for those in the 1990 census with

one to five years of American labour market experience (the 1985-90 cohort) and compare

the average earnings of this group with those from the 1980 census with the same number of

years in the United States (the 1975-80 cohort). We do this for the four most recent cohorts

in each of the two census years 1990 and 2000.[14] These results are contained in Tables 7 and

8, and full results of these estimates can be found in Appendix Tables A-1 and A-2.[15]

In terms of earnings, Table 7 reflects the results in Table 3 in that Canadian males have

significantly higher earnings than their American counterparts. This holds in the estimates

with and without controls. Two important points emerge from this breakdown of the data.

First, these higher earnings are not limited to the most recent entry cohorts. The estimates in

all cases are positive and significant at the one per cent level. Second, there is a definite

trend in these data where newer entry cohorts have relatively higher earnings than earlier

entrants. This result holds in the male data across all censuses. For example, in the estimates

without (with) controls, the newest entry cohort in 2000 had log earnings some 43 (28) per

cent higher than the average American, while the newest cohort had about 32 (26) per cent higher earnings in the 1990 census, and 29 (22) per cent in 1980.

Table 8 presents the difference-in-difference results by comparing the relative position of each cohort in each census, adjusting for equivalent assimilation profiles. In other words, we wish to ask how the earnings of Canadians relative to Americans compare with the other groups of Canadians with the same number of years in the United States. For example, we look at the relative earnings differential of Canadians in 2000 who entered between six and ten years before the census (i.e., 1990-95) and compare this group with those in the 1990 census who entered between 1980 and 1985, and those in the 1980 census who arrived during the five-year period beginning in 1970. Canadian males on average show a six to nine percentage point improvement in their earnings (relative to the American-born) in 1990 relative to 1980, and a further earnings advantage of two to 7 percentage points in 2000 (see the final column of Table 8). In other words, the average earnings of Canadian males have increased over and above that experienced by the American-born. Furthermore, Table 8 shows that this relative earnings advantage for those with between zero and ten years in the United States continued to increase. Those who entered in the five-year period prior to the 2000 census, for example, had earnings advantages of between three and 11 percentage points compared to the immigrant group with the same assimilation profile in the preceding census. Thus, these results are supportive of a brain drain from Canada to the United States as the relative earnings differential continues to widen.

For females, the pattern outlined above for males is also apparent in these data: relative female earnings amongst those in the US between zero and five years had continued to increase between the two intercensus periods.

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In sum, what we have discovered in these estimates is that the average Canadian of either gender in the United States had higher earnings compared to the average American of the same gender in 1980, 1990 and 2000. Furthermore, this relative earnings advantage has been increasing over time, regardless of gender of the inclusion of control variables. And it is the most recent cohort of immigrants in each case (i.e., those with between zero and ten years in the US) that are unambiguously improving their positions.

In the above estimates, the fact that the relative Canadian wage differentials without controls are generally larger than the estimates with controls suggests that there have also been changes in the observable characteristics of Canadians in the United States over the intercensal periods. Perhaps the greatest public policy issue in Canada is that highly educated Canadians are migrating south, and are taking their Canadian-taxpayer subsidized educations with them. This, in essence, provides the federal and provincial levels of government a poor rate of return on investment, since migrants will not be paying taxes in the jurisdiction in which they received their education. Recently, the Government of Canada has responded to this problem by introducing programs such as Canadian Research Chairs to stem (indeed to reverse) this flow of university faculty moving to the United States. As outlined in Table 5, the average level of education of Canadians in the United States increased between 1980 and 1990, further increasing by 2000. Again we are interested in knowing the source of these mean differences. Is it the result of high levels of education of recent cohorts of Canadian immigrants? Or is it the result of earlier cohorts who have attained more education in response to the higher rates of return to education in the United States? The former issue is of concern to Canadian policymakers, while the latter is not.

To address this issue, we perform an analysis similar to the one above for years of education. These results are contained in Tables 9 and 10. Estimates both with and without age controls are included.[16] With few exceptions, educational attainment is significantly higher amongst Canadian immigrants compared with those born in the United States, regardless of census year or gender. In addition, in each census, the difference generally increases as time since immigration decreases: newer immigrants possess more education than past immigrants. Adjusting for age tends to reduce the relative difference, as we might expect given the relative young age of recent immigrants. For example, in the estimates with age controls, males who arrived in the five-year period before the 1990 census had 1.07 more years of education, but 1.27 more years in 2000 (Table 9), for a difference-in-difference of about 0.20 years (Table 10). This pattern is generally repeated between census years and within genders. Thus, there has been an increase in relative years of education amongst Canadians in the both the 1990 and 2000 data. Some of this increase has come from newer cohorts being better educated, but it has also been the result of an increase in the levels of education of older cohorts.

Summary, Conclusions, and Discussion

The migration of highly skilled Canadians to the United States was the topic of extensive debate in Canada in the 1990s with passionate views about its existence, magnitude, and causes being put forward by many commentators, but rather fewer researchers. Despite some reasonably firm theoretical reasons supporting the brain drain hypothesis, there were no adequate data available to test the hypothesis. At least until now. The release of the 2000 US census microdata files presents researchers with the first opportunity to investigate if the brain drain was real, the magnitude of the migration flows, as well as the qualitative aspects of this migration.

By using US census data from 1980, 1990, and 2000, we were able to consider the changing nature of Canadian migration to the United States. We were interested in addressing the actual numbers of the Canadian-born who resided in the United States at the time of each census. We find that the number of Canadians in the US decreased between 1980 and 1990, but increased again by 2000. Still, by 2000, there were only an estimated 820,713 Canadians in the US compared to 844,351 some 20 years earlier. The same pattern in these data is observed for nationals of Ireland and Britain, although the changes for this group have exhibited less variance over the same time period. Amongst those actively engaged in the labour force, these increases have been even more dramatic.

Numbers alone, however, do not support the brain-drain hypothesis. While the increase in the number of individuals during the 1990s supports the notion of an *extensive* migration, it does not necessarily support the existence of an *intensive* migration. In other words, have these individuals migrating to the United States been amongst Canada's best and brightest?

To answer this question, first we look at the relative earnings and educational attainment of Canadians who work in the United States *vis-à-vis* the American-born, as well as nationals of Ireland and Britain living and working in the US. This is to control for secular changes in the labour market in the United States which are assumed to affect both immigrants and Americans equally. The rationale here is that if highly skilled Canadians are in fact leaving the country, their contribution to the US economy is (arguably) equal to the loss to the Canadian economy. For example, if individuals choose to retire to the United States the loss to the Canadian economy (while positive) is less than if they are working in and thus contributing to the US economy. Our results do tend to support the brain-drain hypothesis, both in terms of earnings and education, and using estimates with and without control

variables. In all three censuses, Canadian males and females had higher earnings and levels of education relative to Americans. Furthermore, these advantages continued to increase census-over-census. Compared to nationals of Ireland and Britain, both measures also tended to increase, albeit not as dramatically (which also indicates a relative improvement of this group *vis-à-vis* Americans).

The fact that relative immigrant earnings differentials continue to exist even when controlling for other earnings generating characteristics suggests that the quality of the immigrants continue to improve, and it is the most recent immigrant cohorts that tend have the highest earnings premium relative to the American-born, as well as the largest education difference. Perhaps the greatest public policy issue in Canada is that young, highly educated Canadians are migrating south, taking with them their taxpayer-subsidized educations. This, in essence, provides the federal and provincial governments a poor rate of return on investment, since migrants will not be paying taxes in the jurisdiction in which they received their education. Our results suggest that this problem may be more problematic since Canadians in the United States have earnings above what can be explained by observable characteristics alone. In other words, the loss of tax revenue is likely even greater since these are the individuals that would likely be earning higher-than-average salaries in Canada and hence paying more in taxes.

Of course, our results also show that Canada is not alone in losing these productive people to the United States; migrants from Britain and Ireland also display a similar pattern of earnings premia *vis-à-vis* the Americans in our sample. This result points to the likelihood that it is the pull of the American labour market, coupled with favourable US immigration policies, that is responsible for this migration, rather than the domestic policies of Canada (or Britain

and Ireland). The fact that previous research has shown similar patterns for other countries bolsters this probability.

In sum, we do see qualitative improvements for Canadians in the United States labour market between 1980 and 2000, in terms of both relative educational attainment and relative earnings. For policy purposes, this analysis suggests that this migration began before the 1990s, beginning as early as the 1980s. The 1990s, of course, is when much attention was paid to this issue. If indeed this is a problem there are two major reasons for optimism: The Canadian economy has outperformed the US economy recently; and, following the cutbacks of the 1990s, federal and provincial government spending has increased, including increased funding for education and health care, two of the sectors which experienced large losses of human capital to the United States in the 1990s. Unfortunately, the slowdown of the US economy began shortly before the 2000 US census, meaning that much of the likely return migration to Canada was not captured by the census. However, here we agree with DeVoretz and Iturralde (2001:63), in their analysis of Canadians migrating to the US:

> . . . the brain drain that is causing the departure of many of Canada's high income
> earners remains a by-product, not mainly of Canadian conditions, but of the state
> of the US economy and the immigration policies of the US government. Changes
> in either have the potential of slowing the southward movement faster than any
> Canadian policies could.

In fact, this surge in both the quantity and quality of Canadians entering the United States in the 1990s may be waning; the Canadian economy has performed well relative to its American counterpart since 2000. In addition, changes in US immigration policy post-9/11

have tightened the US border, making the country much less hospitable to immigration. To

wit, McHale (2003) estimates that the number of Canadians in the US declined in 2002 after

climbing steadily between 1998 and 2001.[15] Whether or not this short-term decline turns into

a trend awaits a similar analysis on the 2010 US census.

Acknowledgements

Notes

[1] Finnie (2001) provides a good review of the literature and evaluates some alternative policy

options to stem the flow of talented individuals from Canada to the US

[2] Following the Canada-US Free Trade Agreement in 1989, TC visas became available to skilled

Canadians (generally those with at least a bachelor's degree) wishing to enter the United States.

These were replaced with TN visas under the North American Free Trade Agreement in 1994.

In either case, the one-year visas are unlimited in number, can be issued immediately with the

appropriate paperwork, and can be renewed indefinitely. The most popular alternative method

for similarly skilled workers is the H-1B visa which has numerical limitations, is renewable only

for two three-year terms, and requires a much more cumbersome and time-consuming process prior to issue. See McHale (2003) for an accounting of the increased use of these visas amongst Canadians entering the United States in the 1990s.

[3] Card also notes that mean real wages in the US increased for almost all age-education groups in the United States while remaining constant in Canada. This means that many Canadians, not just the highly skilled, may have increased their real wages by migrating to the United States over this period.

[4] Da Vanzo (1978), for one, has shown the positive relationship between unemployment and migration in the US

[5] The CPS data contains only a small number of Canadians and hence statistical inferences are subject to a wide margin of error. The INS administrative data count the number of admittances into the United States, not the number of individuals. Still, as Riddell (2003:622-23) points out: "It is important, however, to remember that researchers are a bit like the drunk who is looking for his lost keys under the lamp post because that is where the light is, not where the keys were dropped. Researchers look where the data are, and there are often important issues that are not being addressed because we do have suitable data available to examine them." The 2000 US census provides suitable data for this work.

[6] All data were obtained from the Integrated Public Use Microdata Series (IPUMS), Minnesota Population Center, University of Minnesota. The 2000 census data are from the beta version.

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[7] For the estimates of "Total Foreign-Born" in Tables 1 and 2, a 1/25 subsample was utilized. All subsampling was done owing to the large size of the US census micro data files coupled with statistical software limitations.

[8] Including other immigrant groups would confound the effects of language, cultural differences, and foreign education in our analysis. Immigrants from Ireland and Britain seem to be the most natural comparator group.

[9] This finding is reflected by Mueller (2001) who shows that migration flows to the United States from other G-7 countries (which includes the United Kingdom but not Ireland) mirrored those of Canada throughout much of the 1980s and 1990s.

[10] Since these data are for earnings in 1979, 1989, and 1999 (i.e., the year prior to the actual census year), 1979 and 1999 earnings data are converted to 1989 dollars. Results were obtained by regressing the dependent variable (i.e., log real earnings) on two separate dummy variables: one representing Canadians in the United States in the appropriate census year, and one representing the American-born in the same census year. The same methodology is followed in Table 4. For readers not familiar with this methodology, natural logarithms of log real earnings are used in this paper simply because they facilitate comparisons of earnings figures in two ways. First, they provide us with a simple way to compute percentage differences in wages between two groups. For example, in Table 3, the log real earnings figures for Canadian males in the United States in the 1980 and 1990 censuses are 10.411 and 10.475 and the difference (0.064) is roughly equal to a 6.4 percentage point real earnings increase during the intercensal period. The second way in which these are useful is that these approximations always represent the same percentage change regardless of the size of the underlying real earnings. For example, a log

change of 0.05 is always approximately equal to a five per cent change in the underlying

earnings variable, regardless of whether this is an increase from $10,000 to $10,500, or a change

from $100,000 to $105,000; in either case, the increase is five per cent, but the absolute increase

is $500 in the former case and $5000 in the latter.

[11] Unobservable characteristics are factors such as natural talent, motivation, etc., which are not

measured in standard data sets.

[12] The methodology is identical to that followed in Tables 3 and 4 with years of education

substituted for log earnings as the variable of interest.

[13] It should be noted that the figures presented here are almost certainly underestimates of the

true years of education differentials between the Canadian-born and the American-born. This is

owing to the fact that 16 years of education (representing a bachelor's degree) is the top code in

our data set. Card (2003) has shown that Canadians in the US are much more likely to hold

advanced degrees (i.e., post-graduate and professional degrees) compared to both Americans in

the US and Canadians in Canada. Indeed, in performing using this broader definition of

education in the US census on a selection of the estimates in Table 5, we also found that the

education advantage of Canadians tended to increase, but the patterns presented here did not.

[14] For example, we do this by calculating the statistic $(\bar{x}_{i,2000} - \bar{x}_{n,2000}) - (\bar{x}_{i-10,1990} - \bar{x}_{n,1990})$ where $\bar{x}$ is

the mean of the group-specific statistic in which we are interested, i is one of the four most

recent cohorts in 2000 (i.e., 1980-84, 1985-89, 1990-94 and 1995-2000), i-10 is for the four

matching cohorts in the 1990 census (i.e., 1970-74, etc.), and n is for natives (i.e., the US-born)

in the sample. The first term in the above equation is the first difference obtained from the 2000

cross-section estimates in Table A-1, while the second is the first difference from the

corresponding 1990 estimates. For example, using the estimates without controls in Table 7, the 1990-94 male entry cohort (which had 6-10 years of experience in the US) had log real earnings that were 0.383 log points higher than natives in 2000. In 1990, those in the 1980-84 entry cohort (also with 6-10 years of US experience) had relative earnings some 0.276 log points higher. Thus, the difference-in-difference is 0.107, the statistic reported in Table 8.

[15] To investigate the robustness of the results presented, the 2000 data (without controls) were also estimated using log weekly wages (i.e., the log of annual earnings divided by the number of weeks worked), and also using the log of annual earnings with the 40 or more number of weeks worked restriction removed. The results did not change markedly.

[16] Estimates with age controls are included to compensate for the changing age structure of the sample over the 20-year period we are studying. Estimates using the 2000 Census and slightly different definition of years of education were attempted (where master's and post-graduate professional degrees where coded to 18 years of education, and PhDs where coded to 20 years of education). Doing this resulted in higher years of education differentials in 2000 for the Canadians in Table 9, but the pattern of the differentials by cohort remained the same (i.e., more recent cohorts having more education than their American-born counterparts). We also used the 2001 Canadian census data as well as the results presented here and in Mueller (1999) to compare the education attainment of Canadians in the US with the Canadian-born in Canada. Both males and females in the United States had more years of education in each of the three census year pairs (1980, 1990, and 2000 in the US compared to1981, 1991, and 2001 in Canada, respectively) and this gap tended to widen over time.

[17] These estimates, however, are less-than-reliable since they use the CPS. See above for comments on use of the CPS in inferring population totals.

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Table 1: Weighted Sample Sizes in the United States Census, 1980, 1990, and 2000

	Census Year								
	1980			1990			2000		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Total Canadian-born	351,463	492,888	844,351	303,100	436,472	739,572	358,641	462,072	820,713
Total Foreign-Born	5,746,925	6,595,675	12,342,600	9,286,100	9,500,600	18,786,700	15,171,675	15,239,350	30,411,025
Ireland and Britain only	*329,240*	*536,565*	*865,805*	*324,782*	*484,200*	*808,982*	*364,104*	*467,263*	*831,367*
Total American-Born	103,602,600	108,527,400	212,130,000	110,673,800	116,188,600	226,862,400	121,387,800	127,428,500	248,816,300
Grand total	109,700,988	115,615,963	225,316,951	120,263,000	126,125,672	246,388,672	136,918,116	143,129,922	280,048,038
						Percentage change from previous census			
Total Canadian-born				-13.76	-11.45	-12.41	18.32	5.87	10.97
Total Foreign-Born				61.58	44.04	52.21	63.38	60.40	61.88
Ireland and Britain only				*-1.35*	*-9.76*	*-6.56*	*12.11*	*-3.50*	*2.77*
Total American-Born				6.83	7.06	6.94	9.68	9.67	9.68
Grand total				9.63	9.09	9.35	13.85	13.48	13.66

Note: The number of foreign-born excludes the Canadian-born.

Table 2: Weighted Sample Sizes of Active Labour Force Participants, 1980, 1990, and 2000

	Census Year								
	1980			1990			2000		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Immigration Cohort									
Pre-1950	39,068	31,961	71,029	10,242	9,919	20,161	3,431	3,374	6,805
1950-59	35,182	31,502	66,684	24,365	27,778	52,143	17,224	17,812	35,036
1960-64	18,972	14,230	33,202	21,599	20,370	41,969	15,800	15,901	31,701
1965-69	12,169	9,765	21,934	13,963	14,708	28,671	13,832	15,810	29,642
1970-74	6,205	4,225	10,430	7,485	7,291	14,776	8,766	9,657	18,423
1975-79	10,126	5,005	15,131	8,467	7,915	16,382	10,718	10,510	21,228
1980-84				8,972	7,234	16,206	11,038	8,973	20,011
1985-89				12,219	6,919	19,138	11,405	8,939	20,344
1990-94							18,737	13,949	32,686
1995-2000							30,062	16,339	46,401
Total Canadian-born	121,722	96,688	218,410	107,312	102,134	209,446	141,013	121,264	262,277
Total Foreign-born	1,948,200	1,335,575	3,283,775	3,395,575	2,307,150	5,702,725	5,493,000	3,782,600	9,275,600
Ireland and Britain Only	*125,075*	*106,550*	*231,625*	*139,800*	*116,600*	*256,400*	*171,350*	*129,375*	*300,725*
Total American-born	31,240,000	19,577,900	50,817,900	34,999,300	27,676,500	62,675,800	37,779,000	32,602,900	70,381,900
Grand total	33,309,922	21,010,163	54,320,085	38,502,187	30,085,784	68,587,971	43,413,013	36,506,764	79,919,777
				Percentage change from previous census					
Total Canadian-born				-11.84	5.63	-4.10	31.40	18.73	25.22
Total Foreign-born				74.29	72.75	73.66	138.09	63.95	62.65
Ireland and Britain Only				*11.77*	*9.43*	*10.70*	*22.57*	*10.96*	*17.29*
Total American-born				12.03	41.37	23.33	7.94	17.80	12.30
Grand total				15.59	43.20	26.27	12.75	21.34	16.52

Note: The number of foreign-born excludes the Canadian-born.

Table 3: Relative Log Real Earnings of Canadians in the U.S., 1980, 1990, and 2000 Censuses
(standard errors are in parantheses)

		Males		Females	
		Canadians in the U.S.	Americans in the U.S.	Canadians in the U.S.	Americans in the U.S.
1980	Mean	10.411	10.255	9.664	9.625
	Difference with native-born		0.156 ***		0.039 ***
			(.0018)		(.0020)
1990	Mean	10.475	10.227	9.843	9.719
	Difference with native-born		0.248 ***		0.124 ***
			(.0020)		(.0021)
2000	Mean	10.532	10.214	9.961	9.781
	Difference with native-born		0.318 ***		0.179 ***
			(.0020)		(.0021)
Difference-in-difference					
	1980-1990		0.092 ***		0.085 ***
			(.0027)		(.0029)
	1990-2000		0.070 ***		0.056 ***
			(.0028)		(.0030)
	1980-2000		0.162 ***		0.140 ***
			(.0027)		(.0029)

Note: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively.

Table 4: Relative Log Real Earnings of Canadians in the U.S., 1980, 1990, and 2000 Censuses
(standard errors are in parantheses)

		Males		Females	
		Canadians in the U.S.	Irish & Britons in the U.S.	Canadians in the U.S.	Irish & Britons in the U.S.
1980	Mean	10.411	10.472	9.664	9.612
	Difference with Ireland/Britain		-0.061 ***		0.051 ***
			(.0024)		(.0028)
1990	Mean	10.475	10.559	9.843	9.788
	Difference with Ireland/Britain		-0.084 ***		0.055 ***
			(.0027)		(.0029)
2000	Mean	10.532	10.605	9.961	9.937
	Difference with Ireland/Britain		-0.073 ***		0.024 ***
			(.0027)		(.0029)
Difference-in-difference					
	1980-1990		-0.023 ***		0.003
			(.0036)		(.0040)
	1990-2000		0.011 ***		-0.030 ***
			(.0038)		(.0041)
	1980-2000		-0.012 ***		-0.027 ***
			(.0037)		(.0040)

Note: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively.

Table 5: Relative Educational Attainment of Canadians in the U.S., 1980, 1990, and 2000 Censuses
(standard errors are in parantheses)

		Males		Females	
		Canadians in the U.S.	Americans in the U.S.	Canadians in the U.S.	Americans in the U.S.
1980	Mean	12.479	12.475	12.280	12.366
	Difference with native-born		0.004		-0.086 ***
			(.0089)		(.0080)
1990	Mean	13.630	13.266	13.469	13.333
	Difference with native-born		0.364 ***		0.136 ***
			(.0076)		(.0067)
2000	Mean	14.445	13.637	14.170	13.736
	Difference with native-born		0.808 ***		0.434 ***
			(.0053)		(.0055)
Difference-in-difference					
	1980-1990		0.360 ***		0.222 ***
			(.0110)		(.0104)
	1990-2000		0.444 ***		0.298 ***
			(.0093)		(.0086)
	1980-2000		0.805 ***		0.520 ***
			(.0012)		(.0093)

Note: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively.

Table 6: Relative Educational Attainment of Canadians in the U.S., 1980, 1990, and 2000 Censuses
(standard errors are in parantheses)

		Males		Females	
		Canadians in the U.S.	Irish & Britons in the U.S.	Canadians in the U.S.	Irish & Britons in the U.S.
1980	Mean	12.479	13.173	12.280	12.419
	Difference with Ireland/Britain		-0.695 ***		-0.139 ***
			(.0117)		(.0104)
1990	Mean	13.630	14.040	13.469	13.274
	Difference with Ireland/Britain		-0.411 ***		0.195 ***
			(.0095)		(.0088)
2000	Mean	14.445	14.576	14.170	13.996
	Difference with Ireland/Britain		-0.131 ***		0.174 ***
			(.0069)		(.0073)
Difference-in-difference					
	1980-1990		0.284 ***		0.334 ***
			(.0152)		(.0136)
	1990-2000		0.279 ***		-0.021 *
			(.0120)		(.0114)
	1980-2000		0.564 ***		0.313 ***
			(.0136)		(.0127)

Note: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively.

Table 7: Differential Log Real Earnings of Canadians in the United States, by Immigration Cohort, 1980, 1990 and 2000 U.S. Censuses

(p-values are in parantheses)

Males

		1995-00	1990-94	1985-89	1980-84	1975-79	1970-74	1965-69	1960-64	1950-59	Before 1950	All cohorts
Without controls	1980					0.285 ***	0.098 ***	0.180 ***	0.153 ***	0.155 ***	0.128 ***	0.156 ***
						(.007)	(.009)	(.005)	(.004)	(.003)	(.003)	(.002)
	1990			0.323 ***	0.276 ***	0.344 ***	0.273 ***	0.212 ***	0.179 ***	0.240 ***	0.247 ***	0.248 ***
				(.006)	(.008)	(.008)	(.008)	(.005)	(.004)	(.004)	(.006)	(.002)
	2000	0.434 ***	0.383 ***	0.362 ***	0.380 ***	0.281 ***	0.251 ***	0.227 ***	0.187 ***	0.227 ***	0.317 ***	0.318 ***
		(.004)	(.006)	(.007)	(.008)	(.007)	(.009)	(.006)	(.006)	(.005)	(.013)	(.002)
With controls	1980					0.222 ***	0.054 **	0.160 ***	0.121 ***	0.122 ***	0.039 ***	0.104 ***
						(.006)	(.008)	(.005)	(.004)	(.003)	(.003)	(.002)
	1990			0.257 ***	0.197 ***	0.220 ***	0.201 ***	0.196 ***	0.155 ***	0.101 ***	0.094 ***	0.166 ***
				(.006)	(.007)	(.007)	(.007)	(.005)	(.004)	(.003)	(.005)	(.002)
	2000	0.283 ***	0.220 ***	0.192 ***	0.228 ***	0.176 ***	0.163 ***	0.144 ***	0.124 ***	0.072 ***	0.118 ***	0.186 ***
		(.004)	(.005)	(.006)	(.007)	(.006)	(.007)	(.005)	(.005)	(.005)	(.011)	(.002)

Females

		1995-00	1990-94	1985-89	1980-84	1975-79	1970-74	1965-69	1960-64	1950-59	Before 1950	All cohorts
Without controls	1980					0.106 ***	-0.030 ***	0.089 ***	0.030 ***	0.051 ***	0.015 ***	0.039 ***
						(.009)	(.010)	(.006)	(.006)	(.003)	(.004)	(.002)
	1990			0.199 ***	0.167 ***	0.164 ***	0.103 ***	0.141 ***	0.129 ***	0.103 ***	0.044 ***	0.124 ***
				(.008)	(.008)	(.008)	(.008)	(.005)	(.005)	(.004)	(.007)	(.002)
	2000	0.355 ***	0.263 ***	0.162 ***	0.205 ***	0.187 ***	0.143 ***	0.124 ***	0.117 ***	0.098 ***	0.033 ***	0.179 ***
		(.006)	(.006)	(.007)	(.008)	(.007)	(.007)	(.005)	(.006)	(.005)	(.013)	(.002)
With controls	1980					0.032 ***	-0.020 ***	0.101 ***	0.067 ***	0.065 ***	0.048 ***	0.060 ***
						(.007)	(.007)	(.005)	(.004)	(.003)	(.003)	(.002)
	1990			0.087 ***	0.131 ***	0.114 ***	0.074 ***	0.092 ***	0.122 ***	0.126 ***	0.066 ***	0.107 ***
				(.006)	(.006)	(.006)	(.006)	(.004)	(.004)	(.003)	(.005)	(.002)
	2000	0.187 ***	0.146 ***	0.134 ***	0.116 ***	0.132 ***	0.077 ***	0.092 ***	0.122 ***	0.067 ***	0.062 ***	0.117 ***
		(.000)	(.005)	(.005)	(.006)	(.006)	(.006)	(.004)	(.004)	(.004)	(.009)	(.002)

Note: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively. See Tables A-1 and A-2 for full results.

Table 8: Difference-in-Difference of Relative Log Real Earnings of Canadians,

by Time in the United States

(standard errors are in paratheses)

	1980-1990				
	Males				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without controls	0.038 ***	0.178 ***	0.165 ***	0.121 ***	0.092 ***
	(.010)	(.012)	(.010)	(.009)	(.003)
With controls	0.035 ***	0.143 ***	0.061 ***	0.080 ***	0.062 ***
	(.008)	(.010)	(.009)	(.008)	(.002)
	Females				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without controls	0.093 ***	0.198 ***	0.075 ***	0.073 ***	0.085 ***
	(.012)	(.012)	(.010)	(.009)	(.003)
With controls	0.056 ***	0.151 ***	0.013	0.007	0.047 ***
	(.009)	(.010)	(.008)	(.007)	(.002)
	1990-2000				
	Males				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without controls	0.111 ***	0.107 ***	0.017	0.107 ***	0.070 ***
	(.008)	(.010)	(.011)	(.011)	(.003)
With controls	0.027 ***	0.023 ***	-0.028 ***	0.027 ***	0.021 ***
	(.007)	(.009)	(.009)	(.010)	(.002)
	Females				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without controls	0.156 ***	0.095 ***	-0.002	0.102 ***	0.056 ***
	(.010)	(.010)	(.011)	(.011)	(.003)
With controls	0.100 ***	0.015 *	0.020 **	0.042 ***	0.010 ***
	(.008)	(.008)	(.008)	(.008)	(.002)

Note: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively.

Table 9: Relative Educational Attainment of Canadians in the United States, by Immigration Cohort, 1980, 1990 and 2000 U.S. Censuses

(p-values are in parantheses)

Males

		1995-00	1990-94	1985-89	1980-84	1975-79	1970-74	1965-69	1960-64	1950-59	Before 1950	All cohorts
Without age controls	1980					1.351 ***	0.514 ***	-0.337 ***	-0.176 ***	0.113 ***	-0.333 ***	0.004
						(.026)	(.039)	(.031)	(.023)	(.016)	(.016)	(.009)
	1990			1.179 ***	0.802 ***	0.873 ***	0.481 ***	0.189 ***	-0.026	0.239 ***	-0.144 ***	0.364 ***
				(.019)	(.024)	(.023)	(.029)	(.021)	(.018)	(.016)	(.027)	(.008)
	2000	1.415 ***	1.258 ***	1.009 ***	1.033 ***	0.905 ***	0.600 ***	0.170 ***	-0.074 ***	0.407 ***	0.523 ***	0.808 ***
		(.009)	(.011)	(.017)	(.017)	(.020)	(.022)	(.020)	(.019)	(.015)	(.037)	(.005)
With age controls	1980					1.250 ***	0.474 **	-0.327 ***	-0.142 ***	0.161 ***	0.034 **	0.131 ***
						(.026)	(.038)	(.031)	(.022)	(.016)	(.016)	(.009)
	1990			1.070 ***	0.742 ***	0.880 ***	0.466 ***	0.189 ***	0.007	0.399 ***	0.231 ***	0.425 ***
				(.018)	(.024)	(.023)	(.029)	(.021)	(.017)	(.016)	(.027)	(.008)
	2000	1.267 ***	1.178 ***	0.999 ***	1.039 ***	0.879 ***	0.620 ***	0.250 ***	0.087 ***	0.659 ***	0.969 ***	0.832 ***
		(.009)	(.011)	(.017)	(.017)	(.020)	(.022)	(.020)	(.019)	(.015)	(.037)	(.005)

Females

		1995-00	1990-94	1985-89	1980-84	1975-79	1970-74	1965-69	1960-64	1950-59	Before 1950	All cohorts
Without age controls	1980					0.941 ***	0.588 ***	0.068 ***	-0.213 ***	0.097 ***	-0.506 ***	-0.086 ***
						(.029)	(.038)	(.025)	(.020)	(.014)	(.014)	(.008)
	1990			1.013 ***	0.684 ***	0.466 ***	0.352 ***	0.134 ***	0.029 *	-0.118 ***	-0.367 ***	0.136 ***
				(.021)	(.022)	(.020)	(.024)	(.018)	(.015)	(.013)	(.023)	(.007)
	2000	1.211 ***	0.858 ***	0.513 ***	0.648 ***	0.457 ***	0.469 ***	0.158 ***	-0.134 ***	0.036 **	0.036	0.434 ***
		(.011)	(.013)	(.021)	(.019)	(.018)	(.019)	(.016)	(.016)	(.015)	(.035)	(.005)
With age controls	1980					0.663 ***	0.392 ***	0.010	-0.201 ***	0.219 ***	-0.017	0.089 ***
						(.029)	(.037)	(.025)	(.020)	(.013)	(.014)	(.008)
	1990			0.785 ***	0.554 ***	0.410 ***	0.348 ***	0.168 ***	0.145 ***	0.181 ***	0.130 ***	0.264 ***
				(.021)	(.021)	(.020)	(.023)	(.018)	(.015)	(.013)	(.022)	(.006)
	2000	0.946 ***	0.694 ***	0.429 ***	0.643 ***	0.511 ***	0.504 ***	0.335 ***	0.149 ***	0.389 ***	0.598 ***	0.508 ***
		(.011)	(.013)	(.021)	(.019)	(.017)	(.019)	(.016)	(.016)	(.014)	(.034)	(.005)

Notes: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively. The control variable used is the individual's age in years.

Table 10: Difference-in-Difference of Relative Educational Attainment of Canadians,

by Time in the United States

(p-values are in paratheses)

1980-1990

	Males				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without age controls	-0.173 ***	0.288 ***	1.210 ***	0.657 ***	0.360 ***
	(.032)	(.046)	(.039)	(.037)	(.012)
With age controls	-0.180 ***	0.267 ***	1.207 ***	0.608 ***	0.294 ***
	(.032)	(.045)	(.039)	(.037)	(.012)

	Females				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without age controls	0.072 **	0.096 **	0.398 ***	0.565 ***	0.222 ***
	(.036)	(.043)	(.032)	(.031)	(.010)
With age controls	0.122 ***	0.161 ***	0.400 ***	0.549 ***	0.175 ***
	(.035)	(.042)	(.032)	(.031)	(.010)

1990-2000

	Males				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without age controls	0.236 ***	0.456 ***	0.136 ***	0.552 ***	0.444 ***
	(.021)	(.027)	(.029)	(.034)	(.009)
With age controls	0.197 ***	0.436 ***	0.118 ***	0.573 ***	0.408 ***
	(.021)	(.027)	(.029)	(.034)	(.009)

	Females				
	1-5 years	6-10 years	11-15 years	16-20 years	All years
Without age controls	0.198 ***	0.174 ***	0.048	0.296 ***	0.298 ***
	(.024)	(.025)	(.029)	(.031)	(.009)
With age controls	0.161 ***	0.141 ***	0.019	0.295 ***	0.244 ***
	(.023)	(.025)	(.029)	(.030)	(.008)

Note: The 1, 5, and 10 per cent levels of significance are denoted by ***, **, and *, respectively.

Table A-1: OLS Estimates of Log Real Earnings Equations, 1980, 1990 and 2000 U.S. Census, Males

(absolute values of t-statistics are in parentheses)

	1980 Census				1990 Census				2000 Census			
	Without controls		With controls		Without controls		With controls		Without controls		With controls	
Years of education			0.071	(1688.13)			0.098	(2232.17)			0.118	(2253.87)
Experience			0.037	(921.43)			0.038	(1008.23)			0.029	(718.75)
Experience squared			-0.001	(652.04)			0.000	(643.47)			0.000	(477.50)
Married			0.138	(493.70)			0.128	(546.67)			0.205	(1012.22)
Number of childen			0.027	(324.20)			0.019	(215.89)			-0.004	(21.74)
Hours worked per week			0.022	(378.15)			0.064	(984.48)			0.070	(965.59)
Hours per week squared			0.000	(267.28)			0.000	(832.50)			-0.001	(754.55)
Speaks English			0.063	(159.76)			0.060	(163.46)			0.059	(155.60)
White			0.194	(562.55)			0.176	(611.54)			0.132	(505.96)
Entry Cohort:												
Before 1950	10.383	(3233.11)	7.873	(2336.66)	10.474	(1707.53)	6.327	(1100.28)	10.531	(800.19)	5.978	(529.65)
1950-59	10.410	(3615.78)	7.955	(2621.98)	10.468	(2825.34)	6.333	(1652.78)	10.441	(2035.16)	5.933	(1202.44)
1960-64	10.407	(2341.12)	7.954	(1847.98)	10.406	(2459.78)	6.387	(1516.56)	10.401	(1818.47)	5.985	(1059.29)
1965-69	10.434	(1899.85)	7.993	(1568.71)	10.440	(1913.57)	6.428	(1306.38)	10.441	(1775.94)	6.005	(1065.72)
1970-74	10.353	(1209.42)	7.887	(979.53)	10.500	(1290.17)	6.433	(910.09)	10.465	(1215.31)	6.024	(834.60)
1975-79	10.540	(1475.47)	8.055	(1245.94)	10.572	(1277.01)	6.453	(890.36)	10.495	(1409.83)	6.037	(940.57)
1980-84					10.503	(1660.83)	6.430	(918.79)	10.594	(1354.70)	6.089	(855.95)
1985-89					10.550	(1660.83)	6.489	(1117.86)	10.576	(1466.10)	6.053	(906.60)
1990-94									10.597	(1790.55)	6.081	(1096.52)
1995-2000									10.647	(2563.46)	6.144	(1511.43)
Natives	10.255	(97202.84)	7.833	(4737.72)	10.227	(98434.65)	6.232	(3442.59)	10.214	(93021.77)	5.861	(2984.79)
N	31,361,722		31,361,722		35,106,612		35,106,612		37,920,013		37,661,213	

Notes: Two equations were jointly estimated, one each with and without controls. R-squared values are not noted since regressions did not include constant terms.

Controls for industry and occupation were also included but are not reported above.

Table A-2: OLS Estimates of Log Real Earnings Equations, 1980, 1990 and 2000 U.S. Census, Females

(absolute values of t-statistics are in parentheses)

	1980 Census				1990 Census				2000 Census			
	Without controls		With controls		Without controls		With controls		Without controls		With controls	
Years of education			0.065	(1092.63)			0.109	(1811.41)			0.123	(1876.75)
Experience			0.016	(329.37)			0.018	(451.43)			0.025	(585.49)
Experience squared			0.000	-(280.82)			0.000	-(329.03)			0.000	-(458.85)
Married			-0.042	-(168.30)			-0.009	-(46.08)			0.007	(33.38)
Number of childen			-0.047	-(422.97)			-0.035	-(352.68)			-0.030	-(313.25)
Hours worked per week			0.060	(969.74)			0.077	(2027.37)			0.077	(1629.50)
Hours per week squared			0.000	-(537.26)			-0.001	-(1393.11)			-0.001	-(1080.02)
Speaks English			-0.023	-(46.68)			-0.029	-(66.09)			0.009	(21.94)
White			-0.006	-(15.39)			0.010	(34.69)			0.024	(91.84)
Entry Cohort:												
Before 1950	9.639	(2712.96)	7.172	(2125.68)	9.763	(1430.89)	6.089	(1149.15)	9.814	(768.74)	5.782	(601.75)
1950-59	9.676	(2851.70)	7.189	(2123.96)	9.822	(2359.65)	6.148	(1800.97)	9.879	(1897.03)	5.787	(1338.43)
1960-64	9.654	(1755.66)	7.191	(1512.12)	9.849	(2122.77)	6.145	(1627.28)	9.898	(1767.69)	5.841	(1254.13)
1965-69	9.714	(1629.59)	7.225	(1332.75)	9.861	(1886.11)	6.115	(1342.85)	9.905	(1852.85)	5.811	(1259.53)
1970-74	9.594	(984.43)	7.104	(943.67)	9.822	(1280.41)	6.096	(1022.81)	9.924	(1434.49)	5.796	(978.24)
1975-79	9.730	(1088.38)	7.155	(980.11)	9.884	(1202.87)	6.137	(968.59)	9.968	(1345.99)	5.852	(1022.01)
1980-84					9.886	(1272.87)	6.154	(963.60)	9.986	(1298.80)	5.835	(939.41)
1985-89					9.918	(1193.66)	6.110	(976.17)	9.943	(1400.70)	5.853	(1056.05)
1990-94									10.044	(1653.28)	5.866	(1154.52)
1995-2000									10.136	(1752.75)	5.907	(1211.13)
Natives	9.625	(69092.33)	7.124	(4100.40)	9.719	(79535.30)	6.023	(4250.80)	9.781	(83032.08)	5.719	(3618.50)
N	19,674,588		19,674,588		27,778,634		27,778,634		32,724,164		32,724,164	

Notes: See notes to Table A-1.