Immigration, Poverty and Income Inequality in Canada

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A DOMINANT THEME IN IMMIGRATION DEBATES IN CANADA HAS BEEN THE DECLINE in the economic outcomes of immigrants since the 1980s and the associated rise in their poverty rate. These deteriorating outcomes were the impetus for significant changes in immigrant selection policy during the 2000s. Existing programs were altered and new ones introduced in an attempt to improve immigrants' economic prospects, among other things (see Ferrer, Picot and Riddell 2014). Given the increases in immigration during the 1980s and 1990s, there were also concerns that immigrants' declining earnings and rising poverty levels could result in an increase in the national low-income rate and in family income inequality overall. Research showed this was indeed the case. While the low-income rate among the Canadian-born fell through the 1990s, it rose among immigrants, accounting for virtually all of the increase in the national low-income rate during that period (Picot and Hou 2003). Immigrants' declining economic outcomes had an effect on family income inequality as well: as much as one-half of the small rise in inequality during the early 1990s was associated with the immigrant population (Moore and Pacey 2003). The effect was most pronounced in large cities, where the immigrant population grew most.

These studies were concerned with what we refer to in this chapter as the *direct* effect of immigration on the incidence of low income and inequality among the total population (immigrants plus the Canadian-born) due to rising immigration levels and the worsening economic outcomes of immigrants. But another dimension is the *indirect* effect of rising immigration on overall poverty and inequality in Canada, which can occur as a result of the impact on the wages of Canadian-born workers as they compete with immigrants for jobs. Although only a small number of Canadian papers exist on this topic, the extensive international literature tends to find

that immigration has only a very small effect on the wages of domestic workers (see, for example, Card 2009; Dustmann and Preston 2012; Longhi, Nijkamp and Poot 2009; Manacorda, Manning and Wadsworth 2012; Ottaviano and Peri 2012). In the United States, for instance, Card (2009) found that immigration had little effect on wage inequality among the American-born (i.e., the indirect effect), while the direct effect on inequality was larger, although still not dramatic. Given these results, it seems likely that the indirect effect of immigration on low income or family income inequality among the Canadian-born population would be quite small.

In this chapter, we focus primarily on the direct effect of immigration poverty and inequality during the period from 1995 to 2010, a period that differed significantly from the 1980s and 1990s in two important ways. First, as noted above, there have been significant changes brought to immigrant selection policy, which have improved immigrant economic outcomes (Ferrer, Picot and Riddell 2014). These changes include the introduction of the *Immigration and Refugee Protection Act*, which altered the selection criteria for economic immigrants; the expansion of the Provincial Nominee Program (PNP), which sent more immigrants to nontraditional destinations, mainly in western Canada; and the introduction of new programs such as the Ministerial Instructions, the Canadian Experience Class and the Skilled Trades Program, which attempted to better match immigrants with occupations in demand. The second way in which the more recent period differed from the 1980s and 1990s was the sustained period of economic growth that occurred from 2001 to 2007, during which the poverty rate fell to low levels not seen in decades and family income inequality essentially stopped rising.

In that context, we assess the direct effect of immigration on changes in the low-income rate, the high-income rate, family income inequality and earnings inequality in Canada between 1995 and 2010, and in particular we examine what factors explain the decline in the low-income rate among recent immigrants over the 2000s. In the concluding section, we discuss the potential indirect effect of immigration on these trends.

Immigration and Low-Income Rates in Canada

THE LOW-INCOME RATE MOST COMMONLY REPORTED BY STATISTICS CANADA — based on the low-income cut-off (LICO) for after-tax income — is cyclically

Figure 1
The low-income rate[1] in Canada, 1976-2011

Source: Statistics Canada, Survey of Consumer Finances and Survey of Labour and Income Dynamics, 1976-2011.
[1] Based on after-tax and after-transfer income. The rate is the percentage of people with adult-equivalent-adjusted family income below Statistics Canada's low-income cut-off, 1992 base.

sensitive, rising in recessions and falling in expansions. In the 1980s and 1990s, however, the low-income rate also continued to rise for a number of years after the recessionary shocks of those decades. For example, the low-income rate rose until 1995 following the 1990-92 recession (figure 1). (Interestingly, the low-income rate increased only marginally during the milder 2007-08 recession and returned to its falling trajectory quite quickly.) Moreover, since immigrants tend to experience larger declines in earnings and increases in poverty rates than the Canadian-born during recessionary periods, the cyclical variation shown in figure 1 could be accentuated for the immigrant population.

We are not primarily concerned with cyclical variation, however, but with longer-term trends. To assess these trends we focus on the business cycle peaks. As figure 1 shows, the low-income rate fell during the 1980s from 11.6 percent at the 1981 business cycle peak to 10.2 percent in 1989, the next peak. Over the first half of the 1990s, the low-income rate rose considerably; this was followed by more than 15 years of relatively steady decline, reaching 12.5 percent by 2000 and falling to 9.1 percent by the 2007 business cycle peak. The low-income rate again rose marginally during the 2008 recession and fell to 8.8 percent by 2011. It is conceivable that improvements in

the economic circumstances of immigrants contributed to the falling low-income rate during the 2000s.

Trends in the low-income rate also can differ depending on the data source, the definition of income and the measure of low income that is used (see box 1). *Trends* based on Statistics Canada's Longitudinal Administrative Databank (LAD) and using our fixed low-income measure (LIM) are similar to those from survey data illustrated in figure 1, although the *levels* are quite different, for a number of reasons (see table 1 and appendix A).[1] The administrative data (or taxation data) indicate that the low-income rate fell by about one-third between 1995 and 2010, while the survey data suggest a 39 percent drop. Some of this decline reflects business cycle effects — notably the improvement in the economy between 1995 and 2000. Both the administrative and the survey data show that about one-third of the overall decline in the low-income rate between 1995 and 2010 occurred during the economic expansion of the late 1990s. But the decline in the low-income rate during the 2000s likely was due at least in part to other factors, possibly including the declining low-income rate among immigrants.

Box 1
Measuring low income

There are a number of different ways of assessing whether an individual is in a low-income family. For most of the analysis in this chapter, we use Statistics Canada's low-income measure (LIM), but we also periodically refer to its low-income cut-off (LICO).

The LIM is one-half the median adult-equivalent-adjusted (AEA) family income, which is measured here as the average of that observed in 1995, 2000, 2005 and 2010, "adult-equivalent adjusted" to account for differences in family size. As well, family income in each year is adjusted for inflation over the 1995-2010 period to 2010 constant dollars. This approach produces a "fixed" (not relative) LIM, adjusted for inflation, of $16,300.

The fixed LIM we use differs from the yearly LIM (a relative poverty measure) used by Andrew Heisz in this volume. We hold the LIM constant over the study period in order for the effects of business cycle fluctuations and economic growth through the 2000s to be reflected in the low-income rate. In contrast, the relative LIM is based on the median income in each year and tends to fall in recessions and rise in expansions. The resulting low-income rate is thus less responsive to economic cycles. The low-income rate based on the fixed LIM fell during the economic expansion of the late 1990s and 2000s; but it remained fairly stable when measured using the relative yearly LIM (see Heisz, in this volume).

The LICO is based on the average family spending on food, clothing and shelter in 1992 and updated annually using the Consumer Price Index. Families that spend a much larger share than average (20 percentage points or more above the average — typically 63 percent or more of family income) of their income on these basics are said to be below the low-income cut-off. There is more than one LICO, as it varies by community and family size.

Table 1
Low-income rates in Canada based on selected data sources, 1980-2010 (percent)

	Census[1]	Taxation data[2]	Survey data[3]
1980	17.1	NA	11.6
1985	18.7	NA	13.0
1990	15.5	NA	11.8
1995	19.1	20.1	14.5
2000	15.6	18.1	12.5
2005	15.3	15.5	10.8
2010	NA	13.7	8.8

Sources: Census data: Picot et al. (2010); taxation data: Statistics Canada, Longitudinal Administrative Databank, 1995-2010; survey data: Statistics Canada, Survey of Consumer Finances and Survey of Labour and Income Dynamics, 1976-2010.
[1] Based on AEA before-tax, after-transfer family income, using Statistics Canada's low-income cut-off (LICO).
[2] Based on AEA after-tax, after-transfer family income, using a fixed low-income measure (LIM).
[3] Based on AEA after-tax, after-transfer family income, using the LICO.
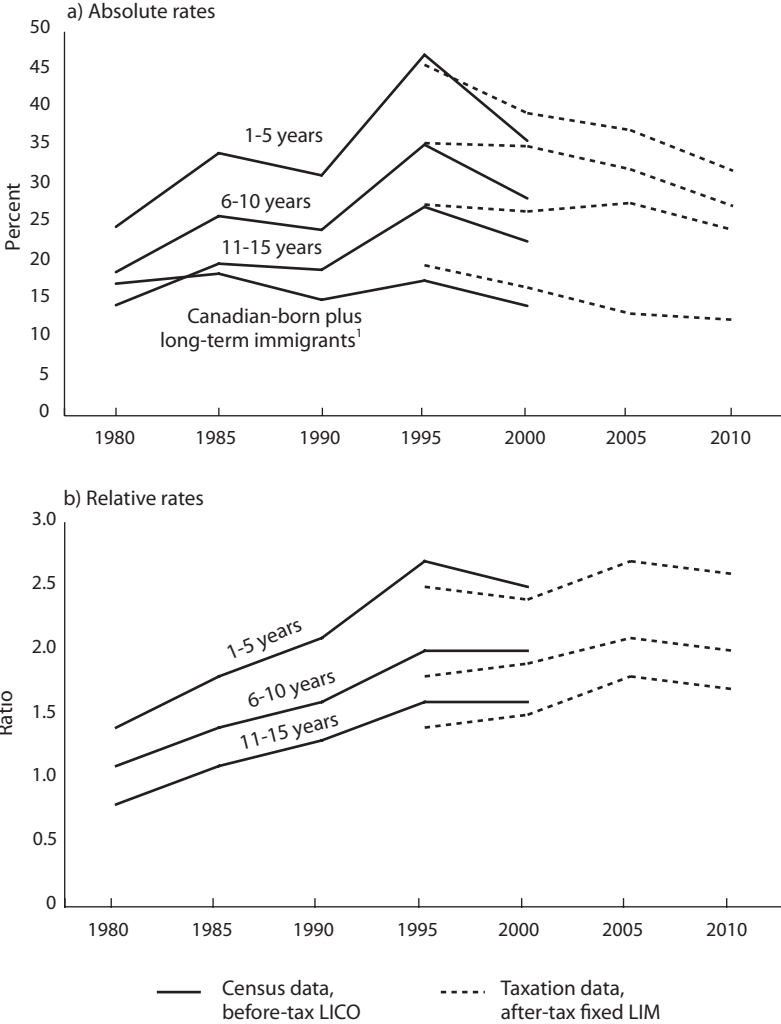NA = not available
AEA = adult-equivalent-adjusted

Trends in immigrant low-income rates

Using census data on before-tax income and the LICOs, we found that, abstracting from business cycle fluctuations, low-income rates — both absolute and relative to that of the Canadian-born — among immigrants rose through the 1980s and the mid-1990s (see figure 2a) (Picot and Hou 2003; Picot, Hou and Lu 2010). We observed this increase not only among recent immigrants (those who had been in Canada for less than 5 years), but also among longer-term immigrants (those in Canada for 6 to 15 years). Indeed, the low-income rate increased by roughly 50 percent in each group. The increase was evident across all education, age and language groups, but was concentrated primarily among immigrants from Asia, Africa and southern and eastern Europe. In relative terms, the low-income rate of recent immigrants increased from 1.4 to 2.5 times that of the Canadian-born population between 1980 and 2000 (figure 2b). The trend among immigrants who had been in Canada for more than 15 years closely resembled that of the Canadian-born population (not shown).

Since 1995, however, low-income rates have been declining among immigrants and for the population as a whole. Among recent immigrants, the after-tax low-income rate based on a fixed LIM fell by about one-third, from 45.7 percent to 31.9 percent,

Figure 2

Low-income rates of immigrants (by number of years in Canada) relative to the rates of the Canadian-born, 1980-2010

a) Absolute rates

Percent

1-5 years

6-10 years

11-15 years

Canadian-born plus
long-term immigrants[1]

b) Relative rates

Ratio

1-5 years

6-10 years

11-15 years

Census data,
before-tax LICO

Taxation data,
after-tax fixed LIM

Sources: Statistics Canada, Census of Canada, 1981-2001 microdata files, and Longitudinal Administrative Databank, 1995-2010.
[1] Long-term is defined as 15 years or longer.
LICO = low-income cut-off
LIM = low-income measure

between 1995 and 2010 (tables 2 and 3). The rate for the largely Canadian-born comparison group[2] — which acts as a control for business cycle and policy changes that can affect the low-income rate of all groups — also fell by roughly one-third, from 18.6 percent to 12.5 percent. Hence, there was little change in the relative low-income rate of recent immigrants, which in 2010 remained about 2.6 times that of the Canadian-born (figure 2b). The absolute low-income rates of immigrants who had been in Canada for 6 to 10 years and 11 to 15 years also declined over the period from 1995 to 2010 (by 23 percent and 12 percent, respectively), although the relative low-income rate of these two groups rose marginally.

Since the immigrant share of the population and the economic outcomes of immigrants differ across regions, low-income rate trends may vary by city and province (for further details, see Picot and Hou 2014), while generally reflecting that reported at the national level. That is, absolute low-income rates fell somewhat over the 2000s in all regions, but relative rates remained more or less stable, particularly for recent immigrants. There are, however, a few exceptions to this observation. In Toronto, the low-income rates for recent immigrants did not decline significantly during the 2000s, and the rate for the Canadian-born did not fall. In Manitoba and Saskatchewan — which saw a significant increase in the number of immigrants admitted through the PNP in the 2000s, doubling the share of the population consisting of recent immigrants (although remaining well below the share in Montreal, Toronto and Vancouver) — the low-income rate among recent immigrants rapidly declined over the decade (see table 2). Indeed, these were the only two regions where the relative low-income rate of recent immigrants fell significantly, declining by 40 percent in Manitoba and by 50 percent in Saskatchewan. In both provinces, the relative low-income rate of recent immigrants fell back to around 1.2 times that of the Canadian-born population, a level not seen in Canada since the early 1980s. The absolute low-income rate of recent immigrants also declined significantly in Alberta and British Columbia during the 2000s, but the relative rate remained in the 1.9 to 2.4 range in 2010, suggesting no real improvement had occurred beyond what was observed for the population as a whole, and well above relative levels observed in earlier decades.

The effect of changing immigration programs and immigrant characteristics
Canada's immigrant selection system changed significantly over the 2000s. The *Immigration and Refugee Protection Act*, introduced in 2002, altered the points system

Table 2

Decomposition of changes in the low-income rates of recent immigrants[1] to Canada associated with immigrant characteristics, 1995-2000 (percentage points)

	Low-income rate 1995 (%)	Low-income rate 2000 (%)	Change 1995-2000	Admission class	Education	Language	Source region	Age, family structure	Total	Regression coefficients	Joint change
Canada	45.7	39.4	−6.3	−0.3	−1.3	−0.1	0.6	−0.9	−1.9	−4.9	0.6
Atlantic region	40.2	38.9	−1.3	−0.5	−1.3	1.3	1.1	−0.8	−0.2	−4.3	3.2
Quebec	51.8	41.5	−10.3	0.5	−1.4	−0.2	−1.0	−0.6	−2.7	−7.8	0.2
Ontario	47.4	39.7	−7.7	−0.5	−1.9	0.0	1.3	−1.1	−2.1	−6.3	0.7
Manitoba	36.2	27.8	−8.4	0.1	−1.9	−0.1	1.1	−1.1	−1.9	−7.6	1.2
Saskatchewan	37.7	31.2	−6.5	−1.3	−0.7	−0.2	−0.4	−.06	−3.3	−2.6	−0.7
Alberta	50.1	36.5	−13.6	−0.5	−1.6	−0.1	0.7	−1.3	−2.9	−11.4	0.7
British Columbia	45.4	46.6	1.2	−1.5	−0.6	−0.1	0.6	−0.4	−2.0	1.6	1.6
Montreal	53.9	42.7	−11.3	0.5	−1.5	−0.2	−1.0	−0.5	−2.7	−8.4	−0.1
Toronto	46.8	39.0	−7.8	−0.3	−1.7	0.0	1.4	−1.1	−1.8	−6.5	0.5
Vancouver	47.2	48.0	0.8	−1.8	−0.5	−0.2	0.5	−0.4	−2.3	1.6	1.5
Next five largest CMAs	53.0	40.0	−13.1	−0.8	−2.3	0.0	0.8	−1.2	−3.5	−9.9	0.4
Other CMAs	44.4	40.1	−4.3	−0.3	−1.4	0.2	1.1	−1.0	−1.4	−4.6	1.7

Source: Authors' calculations based on Statistics Canada, Longitudinal Administrative Databank, 1995 and 2000.
Note: The low-income rates are based on a fixed low-income measure (LIM).
[1] Defined as those who have lived in Canada for 5 years or less.
CMA = census metropolitan area

Table 3

Decomposition of changes in the low-income rates of recent immigrants[1] to Canada associated with immigrant characteristics, 2000-2010 (percentage points)

	Low-income rate 2000 (%)	Low-income rate 2010 (%)	Change 2000-2010	Admission class	Education	Language	Source region	Age, family structure	Total	Regression coefficients	Joint change
Canada	39.4	31.9	−7.5	−0.2	−1.0	−0.4	−0.7	−0.3	−2.5	−4.2	−0.8
Atlantic region	38.9	28.8	−10.1	−3.0	0.2	−0.7	−1.2	0.0	−4.6	−8.8	3.4
Quebec	41.5	31.3	−10.2	−1.3	−1.5	−0.4	−0.4	−0.5	−4.2	−8.0	2.0
Ontario	39.7	38.8	−0.8	0.2	−0.8	−0.2	0.2	0.1	−0.6	0.3	−0.5
Manitoba	27.8	16.3	−11.6	0.8	−1.1	0.4	−1.2	−1.0	−2.1	−3.8	−5.7
Saskatchewan	31.2	14.7	−16.5	−1.8	0.3	0.5	−3.5	−0.6	−5.0	−12.6	0.9
Alberta	36.5	22.1	−14.4	−2.7	−1.5	0.0	−0.5	−0.4	−5.1	−10.5	1.2
British Columbia	46.6	33.2	−13.5	2.4	−0.9	−0.9	−1.9	−0.2	−1.4	−9.2	−2.8
Montreal	42.7	33.0	−9.6	−1.5	−1.7	−0.5	−0.5	−0.7	−4.8	−7.2	2.4
Toronto	39.0	38.5	−0.4	0.2	−0.8	−0.1	−0.1	0.0	−0.7	0.6	−0.3
Vancouver	48.0	35.6	−12.4	2.2	−0.9	−0.5	−1.8	−0.2	−1.2	−8.7	−2.5
Next five largest CMAs	40.0	28.8	−11.1	−2.2	−1.3	−0.6	0.0	−0.2	−4.3	−7.1	0.2
Other CMAs	40.1	33.8	−6.3	−0.7	−0.9	−0.8	0.8	0.1	−1.4	−2.9	−2.1

Source: Authors' calculations based on Statistics Canada, Longitudinal Administrative Databank, 2000 and 2010.
Note: The low-income rates are based on a fixed low-income measure (LIM).
[1] Defined as those who have lived in Canada for 5 years or less.
CMA = census metropolitan area

used to select skilled workers. As a result, the educational attainment of new immigrants increased, their occupations shifted away somewhat from engineering and information technology toward other types of jobs, their language skills improved and their regions of origin changed substantially. These changes tended to increase the average earnings of principal applicants entering the country after 2004 under the Federal Skilled Worker Program (FSWP) (Citizenship and Immigration Canada 2010).

The other major compositional shift was the expansion of the Provincial Nominee Program (PNP).[3] The share of immigrants entering under this program increased from near zero in 2000 to 7 percent in 2010. In Manitoba and Saskatchewan, in particular, the share of immigrants entering under the PNP increased over the same period from 4 percent to 66 percent and from zero to 49 percent, respectively. Employers play a larger role in selection under this program than under the FSWP, so that more immigrants now enter Canada with a job already in place. As a result, during the first few years after entering Canada, PNP immigrants had, on average, higher earnings than those admitted under the FSWP. After about five years, however, the earnings of FSWP immigrants surpassed those of PNP workers, likely due to the former's higher educational attainment (Citizenship and Immigration Canada 2011).

The extent of these compositional shifts is reflected in the data on recent immigrants. Between 2000 and 2010, the proportion with a university degree increased from 31 percent to 42 percent, and among those whose mother tongue was not English, the proportion of those able to speak English increased from 48 percent to 59 percent (however, the proportion speaking French, but whose mother tongue was not French, rose only marginally). These shifts in immigrants' characteristics and entry programs might have been partly responsible for the decline in immigrants' low-income rates over the 2000s, particularly among recent immigrants. Using a regression decomposition approach,[4] we can assess the extent to which the decline in the low-income rate among recent immigrants was associated with changes in characteristics (such as changes in the proportion of immigrants with a bachelor's degree or coming from a particular source region) or changes to various programs (such as changes in the proportion entering under the PNP and the FSWP).[5] We carried out the decomposition both at the national level and at the level of regions and cities, and for two periods, from 1995 to 2000 and from 2000 to 2010. In this chapter, we focus on the latter period but briefly report the results for 1995 to 2000.[6]

During the economic expansion that took place from 1995 to 2000, the low-income rate among recent immigrants fell by 6.3 percentage points. The changing characteristics of recent immigrants — particularly with respect to their education, age and family composition — contributed 1.9 percentage points, or about 30 percent, of the decline (table 2). During the period from 2000 to 2010, 2.5 percentage points, or about one-third, of the 7.5 percentage point decline in the low-income rate among recent immigrants was associated with their changing characteristics, with rising educational attainment and changing source regions together accounting for 1.7 percentage points of the decline (table 3). Changes in admission class (program categories under which immigrants were admitted) did not have a large effect nationally, however. For Canada as a whole, the best esti-mate suggests that these changes accounted for only roughly 0.2 of a percentage point, or 3 percent, of the decline in the low-income rate of recent immigrants, and at most 13 percent of the decline.[7] Changes in admission class did have more impact in some regions, however.

Changes in the selection of immigrants varied by province during the 2000s, as these jurisdictions began to play a more active policy role than before. Some provinces — particularly Manitoba and Saskatchewan, as we have seen — embraced the PNP; others did not. Furthermore, immigrant landings shifted somewhat away from Toronto and Vancouver toward other regions. For example, the proportion of immigrants going to Toronto fell from 48 percent in 2000 to 30 percent by 2012, while the proportion going to Alberta rose from 6 percent to 14 percent (Bonikowska, Hou and Picot, forthcoming). As a result, changes in the characteristics and admission class of immigrants differed across jurisdictions, as did their effect on reducing the low-income rate, which varied by one-fifth to one-half depending on the location.

Toronto, Montreal and Vancouver remained the destinations for most recent immigrants throughout the 2000s, although the effect of compositional changes on their low-income rate varied significantly from one city to another (see table 3). In Toronto, the low-income rate among recent immigrants did not fall over the period. In Montreal, however, there was a significant decline of 9.6 percentage points, half of which was associated with compositional changes — notably, rising educational attainment levels among recent immigrants and chan-ges in admissions programs, particularly an increase in the share of immigrants admitted via the FSWP from 39 percent to 57 percent. In Vancouver, there was

also a substantial 12.4 percentage point drop in the low-income rate of recent immigrants, but only about 10 percent of that decline (1.2 percentage points) was associated with compositional changes. The city also saw the share of immigrants entering through the FSWP fall from one-half to one-third, while the shares entering through the family class and PNP rose. This shift in admission classes tended to put upward pressure on the low-income rate, but this was offset by changes in immigrants' source regions and rising educational attainment.

The effect of compositional changes on the low-income rate of recent immigrants in the 2000s also varied significantly across provinces. Saskatchewan posted the largest rate decline at 16.5 percentage points, about one-third of which appears to have been associated with changes in the composition of recent immigrants, driven primarily by changes in their source regions. Alberta and Atlantic Canada also experienced declines in the low-income rate among recent immigrants, with compositional changes accounting for almost one-half of the decline in the Atlantic region, driven mainly by changes in admission class, and for about one-third in Alberta, mainly as a result of changes in admission class and rising educational attainment.[8]

In summary, compositional changes — including changes in the characteristics of immigrants and their admission class (for some areas) — played a significant, but not dominant, role in the decline in the low-income rate among recent immigrants in the first decade of the twenty-first century, and the specific factors driving the compositional effect varied by region. But did the decline in the low-income rate among recent immigrants contribute to the fall in the overall Canadian rate during the 2000s, just as it accounted for much of the rise in the 1990s?

Immigration's contribution to the decline in low-income rates in Canada

The direct effect of immigration on the overall low-income rate can be driven by two factors: a change in the share of immigrants in the population, and a change in their low-income rate. The decomposition technique we describe in appendix B can be used to determine any group's contribution to the change in the aggregate low-income rate, either in the country as a whole or in a particular region. We focus on recent immigrants because their low-income rate is typically much higher than that of the Canadian-born, so a change in their population share can alter the overall low-income rate. As table C1 shows (see appendix C), the share

of recent immigrants in the population rose marginally through the 2000s, from 2.9 percent to 3.3 percent, although there was considerable variability across cities and regions, with shares decreasing in Toronto and Vancouver and rising in Manitoba, Saskatchewan and Alberta (for further detail on provinces and cities, see Picot and Hou 2014).

At the national level, recent immigrants accounted for only 2 percent (not percentage points) of the overall decline in the low-income rate between 2000 and 2010 (see tables 4 and C2). Indeed, only in Vancouver did recent immigrants play a significant role, accounting for about one-half of the 3.5 percentage point decline in the city's low-income rate, due both to a declining low-income rate among recent immigrants and to a decline in their share of the city's population. In Manitoba, in contrast, although the low-income rate also declined significantly among recent immigrants, putting downward pressure on the overall low-income rate, the share of recent immigrants in the province's population increased considerably, which pushed up Manitoba's overall low-income rate, but only by about 0.2 of a percentage point.

Looking at the national, regional/provincial and municipal levels, we found that recent immigration generally had little to do with the Canada-wide decline in the low-income rate in the 2000s. The same conclusion holds when

Table 4
Low-income rates[1] among immigrants and the Canadian-born and contribution to changes in the national rate, 1995-2010 (percent)

	Low-income rates				Contribution to the change in the national low-income rate	
	1995	2000	2005	2010	1995-2000	2000-2010
All	20.1	18.1	15.5	13.9	100.0	100.0
Immigrants, 1-5 years	45.7	39.4	37.5	31.9	24.8	2.1
Immigrants, 5-10 years	35.5	35.1	32.3	27.3	− 23.7	7.9
Immigrants, 11-15 years	27.5	26.6	27.7	24.2	− 3.4	− 3.0
Canadian-born plus long-term immigrants[2]	18.6	16.7	13.8	12.5	102.1	92.9

Source: Statistics Canada, Longitudinal Administrative Databank, 1995-2010.
[1] Based on after-tax and after-transfer income. The rate is the percentage of people with AEA family income below Statistics Canada's low-income cut-offs (LICOs), 1992 base.
[2] Long-term is defined as 15 years and longer.
AEA = adult-equivalent-adjusted

we consider the effect of low-income rates among immigrants with 1 to 15 years of tenure in Canada. Using this broader categorization, immigration accounted for only 7 percent of the decline in the national low-income rate over the 2000s, and for virtually none of the decline between 1995 and 2000. Likewise, immigration had little direct effect on the low-income rate in most regions. Again, the major exception was Vancouver, where three-quarters of the decline in the low-income rate over the 2000s was associated with both falling low-income rates among immigrants and their declining share of the population. Montreal witnessed a similar but much less dramatic pattern, with immigration accounting for about 15 percent of the 2.9 percentage point decline in that city's low-income rate.

Immigration and High-Income Rates in Canada

In recent years, there has been much debate regarding the concentration of income at the top of the income distribution. Our analysis of income inequality at this end of the distribution mirrors the analysis of low-income trends we presented in the previous section. The high-income threshold measure we use here is twice the median adult-equivalent-adjusted (AEA) family income. Median income is calculated as the average of median income in 1995, 2000, 2005 and 2010, and income is adjusted for inflation over the period using 2010 constant dollars. As is the case with our fixed low-income measure, our high-income cut-off is not relative but held fixed over time.

The proportion of the population with high income rose rapidly between 1995 and 2010, from 6.7 percent to 16.1 percent (table 5). This increase was observed among immigrants as well. This means that not only did the low-income rate decline among immigrants, but a rising share of immigrants had high income. At the same time, the income distribution shifted significantly to the right for all groups (except perhaps immigrants who had been in Canada for 11 to 15 years) between 2000 and 2010. Figure 3 illustrates this general shift toward the higher end of the income distribution. The figure also shows, however, that in both in 2000 and 2010 recent immigrants were more likely than other groups to be in the bottom of the income distribution and less likely to be in the top. Not surprisingly, the high-income rate among recent immigrants, while increasing, remained much lower than among the Canadian-born. In

Table 5

High-income rates[1] among immigrants and the Canadian-born and contribution to changes in the national rate, 1995-2010 (percent)

	High-income rates				Contribution to the change in the national high-income rate	
	1995	**2000**	**2005**	**2010**	**1995-2000**	**2000-2010**
All	6.7	9.7	12.9	16.1	100.0	100.0
Immigrants, 1-5 years	1.4	3.0	3.2	4.6	1.1	1.0
Immigrants, 5-10 years	2.7	3.8	5.6	7.3	2.4	1.5
Immigrants, 11-15 years	4.7	6.5	6.4	9.6	1.6	2.0
Canadian-born plus long-term immigrants[2]	7.0	10.2	13.7	17.0	94.9	95.4

Source: Authors' calculations based on Statistics Canada, Longitudinal Administrative Databank, 1995-2010.
[1] The high-income cut-off used here is twice the median adult-equivalent-adjusted income.
[2] Long-term is defined as 15 years and longer.

2010, 4.6 percent of recent immigrants made it into the high-income category, compared with 9.6 percent of immigrants who had been in Canada for 11 to 15 years, and 17 percent of the Canadian-born and immigrants who have been in Canada for more than 15 years (table 5).
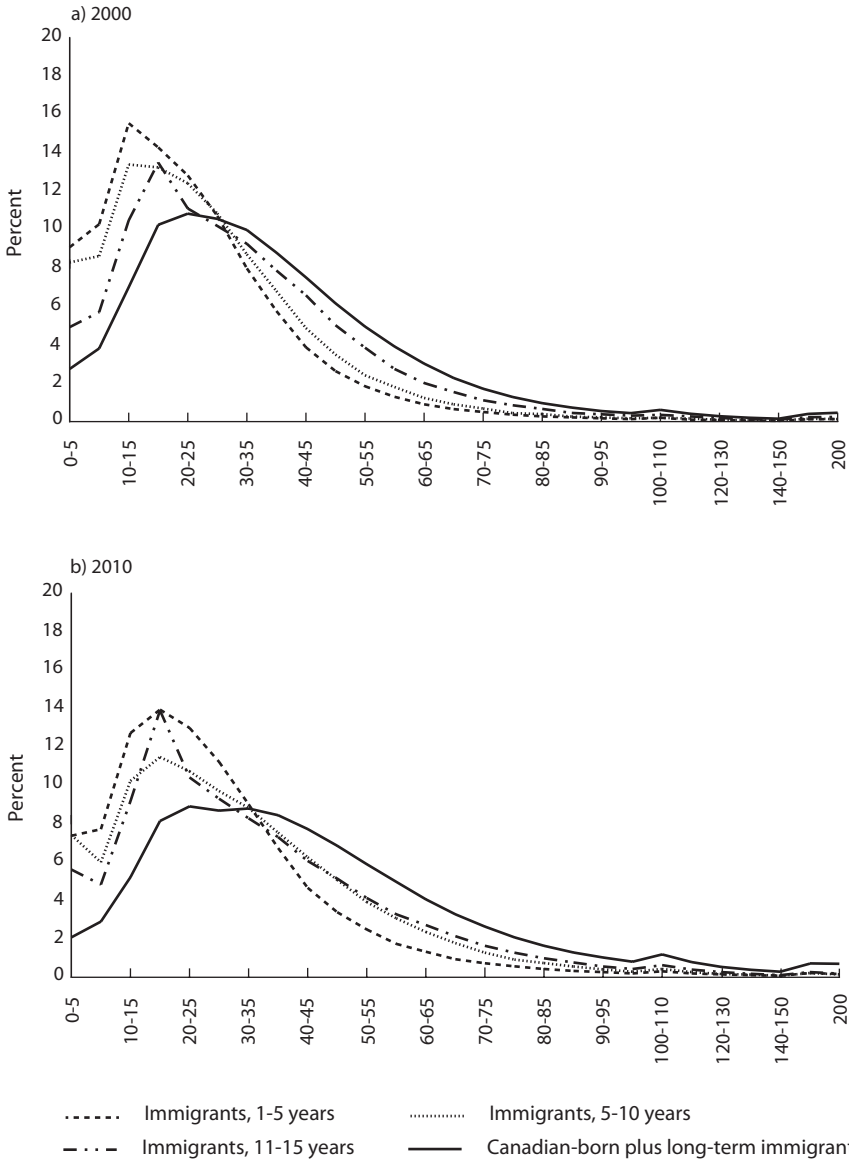
Did immigration contribute to the increase in the national high-income rate between 1995 and 2010? Immigrants could affect this rate either because their share of the population was declining or because their high-income rate was increasing at a faster rate than that of the Canadian-born. Table 5 suggests that neither of these changes occurred. In fact, only from 1 to 2 percent of the increase in the high-income rate can be ascribed to changes in the immigrant population. Although the trend in the high-income rate was very similar for both immigrants and the Canadian-born population between 1995 and 2010, a higher proportion of the Canadian-born ended up in that category.

Immigration and Family Income Inequality

FAMILY INCOME INEQUALITY, AS MEASURED BY THE GINI COEFFICIENT,[9] FELL MARGINALLY during the 1980s, increased significantly during the 1990s — mostly during the latter half of the decade — and changed little during the 2000s (figure 4).[10] Frenette, Green and Milligan (2007) and Heisz and Murphy (in this volume) stress the role of the tax-and-transfer system in preventing a rise in income

Figure 3

The distribution of AEA after-tax income among immigrants (by number of years in Canada) and the Canadian-born, 2000 and 2010 ($ thousands)

a) 2000

b) 2010

..... Immigrants, 1-5 years   .... Immigrants, 5-10 years

— · — Immigrants, 11-15 years   —— Canadian-born plus long-term immigrants[1]

Source: Authors' calculations based on data from Statistics Canada, Longitudinal Administrative Databank, 2000 and 2010.
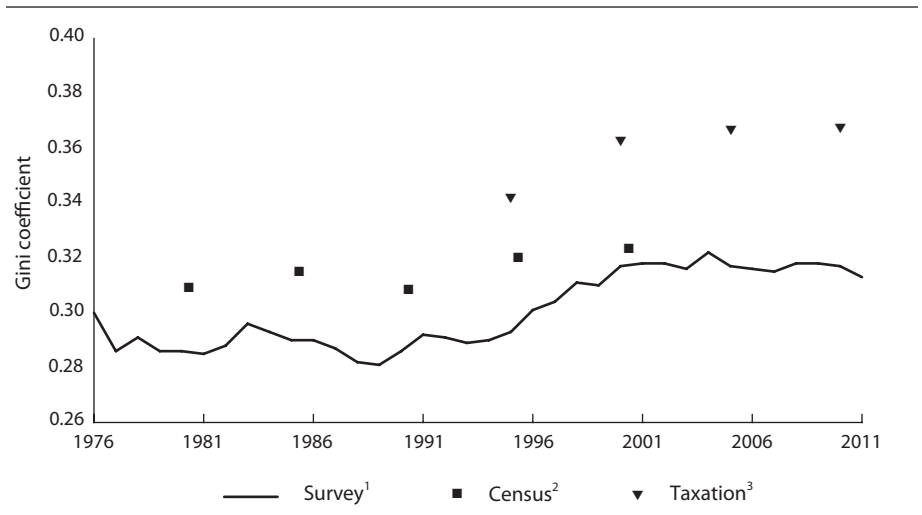[1] Long-term is defined as 15 years or longer.
AEA = adult-equivalent-adjusted

inequality during the 1980s in the face of rising market earnings inequality. But the tax-and-transfer system could not repeat this feat in the 1990s, and family income inequality rose under the pressure of rising market earnings inequality. What effect has immigration had on family income inequality? Moore and Pacey (2003) estimate that approximately one-half of the quite small increase in inequality over the 1980-95 period can be attributed to immigration, and most of this effect occurred between 1990 and 1995.

Our analysis focuses on the period between 1995 and 2010 using AEA after-tax family income from taxation data to assess income inequality. The unit of analysis is the individual, since AEA family income, which accounts for differences in family size among groups, is really a measure of the economic resources available to each individual in the family (a per capita measure). This measure of family income is ascribed to each member of the family. In calculating income inequality, the AEA family income is top coded at $1 million.[11]

Figure 4
Gini coefficient of AEA family income inequality in Canada based on selected data sources, 1976-2011

Sources: Survey data: Statistics Canada, Survey of Consumer Finances and Survey of Labour and Income Dynamics, 1976-2011; census data: Frenette et al., 2006; taxation data: Statistics Canada, Longitudinal Administrative Databank, 1995-2010.
[1] Based on after-tax, after-transfer family income.
[2] Based on before-tax, after-transfer family income.
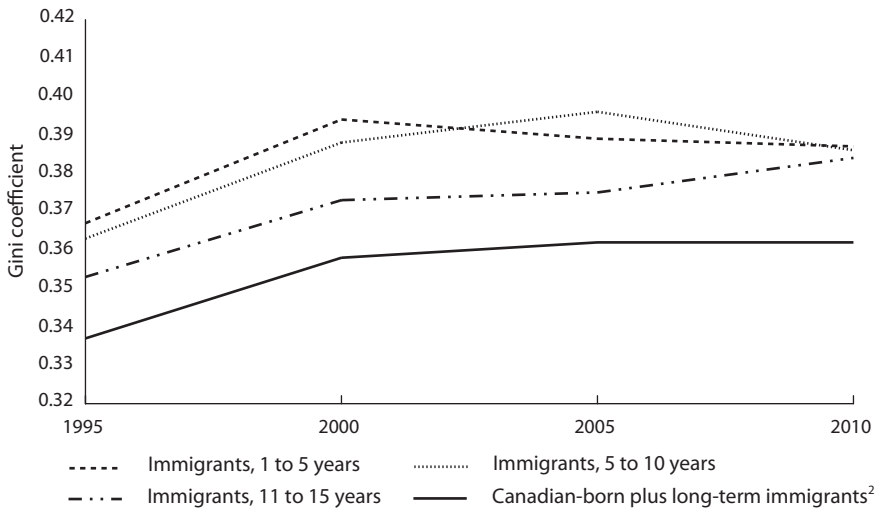[3] Based on after-tax, after-transfer family income.
AEA = adult-equivalent-adjusted

Are taxation data representative of overall income trends? Just as with low-income data, different data sources produce different levels of inequality, but the trends are quite similar. Inequality levels based on census and taxation data tend to be higher than those based on survey data — that is, data from Statistics Canada's Survey of Consumer Finances and Survey of Labour and Income Dynamics — mainly because surveys tend to miss some low and high incomes reported in both taxation and census data (Frenette, Green and Picot 2006; Frenette, Green and Milligan 2007). But the trends we examined over the 1995-2010 period are very similar in both the taxation and survey data (figure 4). According to survey data on after-tax income, of the 0.031 increase in the Gini coefficient (the most commonly used measure of income inequality) observed between 1980 and 2010, about three-quarters (0.024) occurred between 1995 and 2000. The taxation data show a similar 0.025 increase during this period, while the census data (with estimated after-tax income) show very little increase.[12] Income inequality typically rises in recessions, as it did in the early 1980s and 1990s, and therefore might be expected to fall in economic expansions. But this did not occur in the late 1990s expansion; instead, the largest rise in income inequality over the past three decades occurred during that period. Between 2000 and 2010, the survey data show no increase in the Gini coefficient, while the taxation data display only a small rise, 0.004. Comparable data from the census are not available for this period. Overall, the trends over the 2000s observed in the taxation data and the survey data are very similar.

Two basic findings regarding income inequality among immigrants are germane to this analysis. First, levels of income inequality tend to be marginally higher among the immigrant population than among the Canadian-born.[13] For example, in 2010 the Gini coefficient was 0.362 among the mostly Canadian-born comparison group and between 0.384 and 0.387 among immigrants who had been in Canada for 1 to 15 years (figure 5 and table C3). This means that any increase in the immigrants' share of the population will exert upward pressure on family income inequality overall. Second, inequality among immigrants increased over the 1995-2010 period, and most of this increase took place between 1995 and 2000, just as it did for the Canadian-born (see table C3). This suggests that whatever pressures increased inequality among the Canadian-born also likely applied to the immigrant population.

Figure 5
Gini coefficient[1] of AEA family income inequality for immigrants (by number of years in Canada) and for the Canadian-born, 1995-2010

Source: Authors' calculations based on Statistics Canada, Longitudinal Administrative Databank, 1995-2010.
[1] Gini coefficients are based on AEA after-tax, after-transfer income.
[2] Long-term is defined as 15 years or longer.
AEA = adult-equivalent-adjusted

Immigrants' contribution to changing aggregate income inequality

Any group might have a direct effect on aggregate inequality for three possible reasons: (1) the level of inequality within the group might rise; (2) the level of income inequality among groups might rise;[14] or (3) a group's share of the population might increase, and if that group's level of inequality is above average, as it often is for recent immigrants, this would contribute to rising inequality. In our analysis, we divided the total population into four groups: the Canadian-born plus long-term immigrants;[15] immigrants in Canada for 5 years or less (recent immigrants); immigrants in Canada for 6 to 10 years; and immigrants in Canada for 11 to 15 years. We then decomposed selected income inequality indices to answer two questions. First, to what extent did each group contribute to the rise in family income inequality over the reference period? Second, to what extent was this contribution due to (a) increasing inequality within the group; (b) the group's rising share of the total population; and (c) increased inequality among groups (that is, an increased difference in mean family income among groups)?

Although the Gini coefficient is the most commonly used inequality index, there are many others. We used three decomposable indices of changes in inequality over the 1995-2000 and 2000-10 periods — the coefficient of variation squared (CV^2), the Theil index and the mean log deviation (see Allison 1978; Jenkins 1999) — because the values of some indices are more susceptible to movements in certain parts of the income distribution than others. For instance, the CV^2 index is affected more by income movements at the top of the distribution, where much of the action has been located over the past couple of decades, while both the Theil index and, particularly, the mean log deviation are sensitive to changes at the lower end of the income distribution. Thus, the use of more than one index ensures that findings are robust across the entire income distribution.

The results of the analysis are straightforward; indeed, as table C4 shows, all three indices provide similar answers. Over the 1995-2000 period, during which most of the rise in inequality in Canada was concentrated, very little of the increase was associated with immigrants; virtually all of the increase was due to increasing inequality within the Canadian-born comparison group. (See appendix B for the algebraic description of our decomposition technique.)

Inequality as measured by the Theil index rose between 1995 and 2000 from 0.214 to 0.256 for the total population, and remained more or less at that level until 2010 (table C3). We decompose the 0.042 *change* in the index value and find that, although the population share of immigrants who had been in Canada for less than 15 years increased from 7.2 percent to 8.2 percent, the difference in income inequality between immigrants and the Canadian-born did not make a major contribution to the increase in aggregate inequality — the increase in the share of immigrants in the population accounted for only 0.001 of the 0.042 increase. The rise in inequality *within* immigrant groups accounted for 0.002 of the total increase, while the change in between-group inequality contributed virtually nothing to the change (table C4). Overall, immigrant groups accounted for about 0.002, or about 5 percent, of the 0.042 rise in inequality — about what might have been expected since these groups accounted for roughly 7 percent of the population. In other words, immigrants did not contribute disproportionately to the rise in inequality according to the Theil index.

When measured by the CV^2, immigrants accounted for about 4 percent of the increase in inequality (table C4); but the share is about 26 percent according to the mean log deviation (table C4), likely because that measure is the most

sensitive of the three to changes at the bottom of the income distribution, where immigrants are more likely to be concentrated. No matter which measure is used, however, between 88 percent and 97 percent of the increase in income inequality from 1995 to 2000 was associated with rising inequality among the comparison group (the Canadian-born and longer-tenured immigrants). This is also what would be expected, since that group accounts for the majority of the population.

Do these results hold, however, across the country? In cities where immigrants constitute a large share of the population, did they account for a disproportionately large share of the rise in income inequality in the late 1990s? To answer these questions, we used the Theil index and found that, in Toronto, the rise in inequality between 1995 and 2000 was 0.072 points, or about 28 percent, somewhat larger than the 20 percent increase for Canada as a whole. Fully 97 percent of this increase in Toronto was accounted for, however, by rising inequality within the Canadian-born population (see Picot and Hou 2014 for the detailed results). A similar story holds for Vancouver, where none of the 0.055 point (22 percent) increase in inequality was accounted for by immigrants, and for Montreal, which experienced an increase of only 0.020 points (9 percent) in inequality.

Immigration and family earnings inequality

The tax-and-transfer system can reduce income inequality at any given point and potentially can affect inequality trends over time. In the 1980s, for example, earnings inequality was rising, but income inequality changed very little after taking into account the redistribution of income through the tax-and-transfer system. While immigration has not affected after-tax, after-transfer income inequality, as we have seen, it may have affected *earnings* inequality trends — that is, income *before* taxes and transfers.

Aggregate family earnings inequality rose between 1995 and 2010, with most of the increase occurring in the late 1990s (see Picot and Hou 2014). The AEA family earnings Gini coefficient for all Canadian earners with positive earnings rose from 0.420 in 1995 to 0.439 in 2000, and then to 0.447 in 2005. Our three other measures of inequality — the mean log deviation, the Theil index and the CV^2 — tell a similar story. Family earnings inequality also rose among immigrants in Canada for less than 15 years, but the rise occurred more equally between the late 1990s and early 2000s. Little increase was observed in the late 2000s.

Did immigration contribute to the rise in family earnings inequality? The answer is essentially no. The Theil index increased for the population as a whole from 0.324 in 1995 to 0.371 in 2000, an increase of 0.047. Of this, only 0.002, or about 4 percent, can be ascribed to changes in the immigrant population. Similarly, over the 2000-10 period, immigration accounted for none of the very small increase of 0.007 in the Theil index overall.

The Indirect Effect of Immigration on Wage Inequality

As noted in our introduction, an increasing share of immigrants in the population could affect the wages of the Canadian-born as a result of labour supply changes, and the effect could vary across the wage distribution, thereby affecting wage inequality. The international literature suggests that whatever the effect of immigration on wages, in general it is very small (see, for example, Dustmann and Preston 2012; Kerr and Kerr 2011; Longhi, Nijkamp and Poot 2006, 2009; Manacorda, Manning and Wadsworth 2012; Okkerse 2008; Ottaviano and Peri 2012).The effect varies, however, depending on the country's industrial structure and on the occupational skills and education of immigrants.

Although Canadian studies of this issue are sparse, Aydemir and Borjas (2007) find that immigration has a negative effect on the wages of the Canadian-born. Overall, they estimate that a 10 percent immigration-induced increase in the labour supply, which is a very large increase, reduces the wages of the Canadian-born by 3 to 4 percent. Thus, since immigration increases the labour supply by perhaps 0.7 to 0.8 percent per year, it might reduce the wages of the Canadian-born by around 0.3 percent. The negative effect is greater among the more highly educated, moreover, since the immigration-induced labour supply increase is concentrated among this education group. Aydemir and Borjas therefore conclude that, by negatively affecting the wages of highly educated Canadians more than those of the less-educated (for whom the effect may be to increase wages), immigration tends to reduce wage inequality.[16]

But by how much? Between 1980 and 2000, the real wages of university graduates fell by 2.2 percent and those of high school graduates fell by 16.2 percent (Aydemir and Borjas 2007, table 5). Hence, between-group wage inequality rose. Using the results from a series of simulations that Aydemir and Borjas produce, one can roughly estimate that, over the 20-year period, in the absence of immi-

gration, the wages of the highly educated would have increased by 4 to 8 percent (instead of declining by 2 percent), and those of high school graduates would have fallen by 17 to 20 percent (instead of by 16 percent). Hence, without immigration, both the income gap and income inequality between education groups would have increased more than they did. In short, immigration might have reduced *between-group* inequality somewhat. But it is important to remember that changes in overall inequality are also determined by *within-group* inequality. Within-group inequality among the highly educated Canadian-born could increase if immigration effects were concentrated among those located near the bottom of the within-group income distribution. This outcome seems quite possible, since, on average, better-educated immigrants earn less than their Canadian-born counterparts, and hence might compete more with the Canadian-born at the bottom of the within-group wage distribution. This possible increase in within-group inequality could offset to some unknown extent the immigration effect that reduces between-group inequality, and might lead to a small total indirect effect of immigration on income inequality among the Canadian-born. Thus, it seems likely that the kinds of effects Aydemir and Borjas find would have had some impact, but would not result in a large indirect effect on total wage inequality.

Tu (2010), using a methodology similar to that of Aydemir and Borjas, but applied at both the national and subnational levels and over a different time period (the 1990s), finds no evidence that immigration had a negative effect on the wages of the Canadian-born, and in some specifications, it had a small positive effect. Overall, this would translate into only a small effect on wage inequality.

Card (2009) examines the effect of immigration on the wage distribution of the native-born in the United States, and notes that the answer depends on a number of factors, including the extent to which immigrants and the native-born with similar education levels are perfect substitutes and hence compete directly with one another. Card and a number of other researchers (Manacorda, Manning and Wadsworth 2012; Ottaviano and Peri 2012) determine, however, that immigrants and the native-born are *not* perfect substitutes, and that new immigrants, in particular, likely compete more with other immigrants, especially the recently arrived, than with the native-born. Hence, immigration-induced wage effects, at least in the United States, might be more evident among other immigrants than among native-born workers. Card concludes that, overall, the effect of immigration on native-born wage inequality is very small.

Card also argues that, if the educational distributions of immigrants and the native-born were similar, immigration would have little effect on the wages of the native-born. But since immigrants in Canada tend to be more highly educated than those in the United States,[17] the downward pressure of immigration would be more likely to be felt on the wages of the highly educated in Canada, since immigrants are overrepresented in this group. On balance, although Card's general conclusion likely applies to Canada as well, additional research is needed to reach a more definitive conclusion.

Conclusion

IN PREVIOUS RESEARCH WE SHOWED THAT THE INCREASED INCIDENCE OF LOW INCOME among immigrants during the 1990s accounted for nearly all of the increase in the national low-income rate. Following up on this research, in this chapter we examined whether immigration contributed to the significant decline in the low-income rate from 12.5 percent to 8.8 percent in the 2000s. We find that the low-income rate among immigrants also declined over the period, falling among recent immigrants (those in Canada for five years or less) from about 39 percent to 32 percent, the first long-term decline (excluding cyclical variations) seen since the 1970s. Over the past 30 years, however, the low-income gap between immigrants and the Canadian-born has not closed. Instead, the relative low-income rate of recent immigrants increased from 1.4 times that of the Canadian-born in 1980 to 2.4 times that of the Canadian-born by 2000, and did not improve during the 2000s, even though the low-income rate among immigrants declined.

There were, however, regional exceptions to this general pattern. First, in Toronto the low-income rate among immigrants did not fall as it did in other regions during the 2000s (nor did the rate among the Canadian-born). Second, the relative low-income rate among immigrants declined most quickly in Manitoba and Saskatchewan, where the rate among recent immigrants fell to around 1.2 times that of the Canadian-born, a level not seen since the early 1980s.

Significant changes in immigrant selection policies and practices in the 2000s — notably, the introduction of the *Immigration and Refugee Protection Act* in 2002 and the expansion of the Provincial Nominee Program in Manitoba and Saskatchewan — altered both the social-economic characteristics and admission class (program of entry) of new immigrants. These changes tended to increase the

earnings of new entrants, and may have contributed to the fall in the low-income rate among recent immigrants. At the national level, the rising educational attainment and changing source regions of new immigrants accounted for about one-third of the decline in the low-income rate among recent immigrants during the 2000s, but changes in admission class did not have a significant effect overall. At the regional level, changes in selection policies and practices over the 2000s varied tremendously, as some provinces embraced the PNP more than others. Furthermore, the change in the share of recent immigrants in the population also varied by region as fewer new immigrants settled in Toronto and more opted to locate in the western provinces in particular. As a result, depending on the region, changes in immigrant characteristics and class of entry accounted for between one-fifth and one-half of the decrease in the low-income rate among recent immigrants.

The declining low-income rate among immigrants contributed little, however, to the fall in the low-income rates among the overall population during the 2000s. Unlike in the 1990s, when the rising share of immigrants in the total population and increases in their low-income rate accounted for most of the increase in the national low-income rate, in the 2000s the decline in the overall low-income rate was driven primarily by a falling rate among the Canadian-born. The only exception was in Vancouver, where three-quarters of the decline in the city's low-income rate was associated with both a rapid drop in the low-income rate among immigrants and their declining share of the population.

Finally, although family income inequality increased from 1990 to 2010 among both immigrants and the Canadian-born (with most of the rise occurring during the late 1990s), we find that immigration contributed little to the increase, either in the country as a whole or in the three largest cities. As well, based on our review of the international literature and available Canadian evidence, the indirect effect of a rising share of immigrants in the population on the wages and wage distribution of the Canadian-born appears to be very small.

Appendix A: Data Sources and Issues

The primary data source we used in this chapter is Statistics Canada's Longitudinal Administrative Databank (LAD). The LAD is a random, 20 percent sample of the T1 Family File, which is a yearly cross-sectional file of all taxfilers and their families. Individuals selected for the LAD are linked across years to create a longitudinal profile of each individual. Since the early 1990s, approximately 95 percent of working-age Canadians have filed tax returns. Immigrants who have entered Canada since 1980 can be identified in this file. Furthermore, information based on immigrant landing records — such as education at entry, age at entry, intended occupation, gender, family status, whether the immigrant speaks English or French at entry and immigrant class — are included in the LAD file for immigrants. All immigrants who filed a return at any time during their tenure in Canada are included in the sample.

Other data sources are used for comparison purposes. Low-income rates are compared across three data sources: survey data (the Survey of Consumer Finances and the Survey of Labour and Income Dynamics), census data and administrative data. The administrative data consist of T1 taxation data linked to the landing records of immigrants who entered Canada after 1980. The low-income rate levels differ across these data sources for a few reasons. First, in the 1980s and 1990s, the census collected before-tax income data, and low-income rates were calculated on that basis. Instead, we used welfare measures based on after-tax data, which are available in the taxation and survey data, and reported in table 1. Second, the census and the survey data use Statistics Canada's low-income cut-offs, while the administrative data use a fixed low-income measure cut-off. The latter is simply the average of one-half of the median adult-equivalent-adjusted after-tax family income, held constant over the entire 1995-2010 period. We calculated the adult-equivalent-adjusted family income on a constant dollar basis (CPI adjusted to 2010) in each year we examined (1995, 2000, 2005 and 2010), and we used the average of these values as the low-income threshold in all years. Finally, the surveys tend to miss some low and high incomes reported in the taxation and census data (see Frenette, Green and Picot 2006) with an overall response rate of around 80 percent, but the response rate is much higher in the census and taxation data. As a result of these differences in response rates, the type of income used and the low-income cut-off applied, low-income rates are higher in the administrative and census data than in the survey data, although the trends are similar.

Appendix B: Decomposition Methodologies

Determining the effect of immigration on the aggregate low-income rate

The direct effect of immigration on the aggregate low-income rate can be driven by two factors: a change in the share of immigrants in the population, and a change in their low-income rate. To determine a group's contribution to the change in the aggregate low-income rate in Canada or in a region, the following formula is used:

$$\% \text{ contribution} = \left[r_{i, y2} * S_{i, y2} - r_{i, y1} * S_{i, y1} \right] * 100 / \left[R_{y2} - R_{y1} \right],$$

where $r_{i, y1}$ and $r_{i, y2}$ are the low-income rates for immigrant group i in year 1 and year 2, respectively; $S_{i, y1}$ and $S_{i, y2}$ are immigrant group i's shares of the population in year 1 and year 2, respectively; and R_{y1} and R_{y2} are the low-income rates for the population as a whole in year 1 and year 2, respectively.

The contribution of each group can be further decomposed into three components, namely:

(1) the change in the group's low-income rate,

$$S_{i, y1} * \left[r_{i, y2} - r_{i, y1} \right] * 100 / \left[R_{y2} - R_{y1} \right];$$

(2) the change in the group's population share,

$$r_{i, y1} * \left[S_{i, y2} - S_{i, y1} \right] * 100 / \left[R_{y2} - R_{y1} \right]; \text{ and}$$

(3) the joint change in the group's low-income rate and population share,

$$\left[S_{i, y2} - S_{i, y1} \right] * \left[r_{i, y2} - r_{i, y1} \right] * 100 / \left[R_{y2} - R_{y1} \right].$$

In this chapter, we have focused on recent immigrants since their low-income rate is typically much higher than that of the Canadian-born, and hence a change in their population share can alter the overall rate.

Decomposing the CV^2, Theil and mean log deviation indices

To assess the contribution of each of four groups — immigrants who have been in Canada 1 to 5 years, 6 to 10 years, and 11 to 15 years and the remainder of the Canadian population — to a *change over time* in three inequality indices, we decompose each index using an algebraic development.

For the CV^2, the decomposition is as follows. At a given time point, the CV^2 can be written as the sum of two terms: one is attributable to within-group income

inequality, $\Sigma P_i CV_i^2 R_i^2$, while the second is attributable to between-group inequality, $\Sigma P_i(R_i^2 - 1)$, where P_i is the population share of group i (in this chapter, $i = 1$ to 4), CV_i^2 is the CV^2 for group i, and R_i is the ratio of the mean income of group i to the mean income of the total population. By straightforward algebraic manipulation, the *change* in CV^2 over two time points can be decomposed into four terms:

$$\Delta CV^2 = \Sigma \Delta P_i(CV_i^2 R_i^2 + R_i^2 - 1) + \Sigma \Delta CV_i^2 P_i R_i^2 + \Sigma \Delta R_i^2 P_i (CV_i^2 - 1) + \text{joint changes.}$$

The first term is the contribution of changes in the population share of each group; the second term is the contribution of changes in within-group inequality; the third term is the contribution of changes in between-group income inequality; and the fourth term is the joint changes of population share, within-group inequality and between-group inequality. The joint change term includes:

$$\Sigma \Delta P_i \Delta CV_i^2 R_i^2 + \Sigma \Delta P_i CV_i^2 \Delta R_i^2 + \Sigma P_i \Delta CV_i^2 \Delta R_i^2 + \Sigma \Delta P_i \Delta CV_i^2 \Delta R_i^2 + \Sigma \Delta P_i \Delta R_i^2.$$

The same approach can be used with the Theil index. At a given time point, the Theil index T can be expressed as the sum of two terms: $\Sigma P_i T_i R_i$, the component representing within-group income inequality, and $\Sigma P_i ln(R_i)$, the component representing between-group income inequality, where P_i and R_i are defined the same as the above, and T_i is the Theil index for group i.

The change in T over two periods can be decomposed into four terms:

$$\Delta T = \Sigma \Delta P_i R_i (T_i + LnR_i) + \Sigma \Delta T_i P_i R_i + [\Sigma \Delta R_i P_i (T_i + LnR_i)$$
$$+ \Sigma \Delta LnP_i R_i (R_i + \Delta R_i)] + \text{joint changes.}$$

The first term is the contribution of changes in the population share of each group; the second term is the contribution of changes in within-group inequality; the third term is the contribution of changes in between-group income inequality; and the fourth term is the joint changes of population share, within-group inequality and between-group inequality. The joint change term includes:

$$\Sigma T_i \Delta P_i \Delta R_i + \Sigma \Delta T_i \Delta P_i R_i + \Sigma \Delta T_i P_i \Delta R_i + \Sigma \Delta T_i \Delta P_i \Delta R_i + \Sigma \Delta P_i \Delta R_i ln(R_i)$$
$$+ \Sigma \Delta P_i R_i \Delta ln(R_i) + \Sigma \Delta P_i R_i \Delta ln(R_i) + \Sigma \Delta P_i \Delta R_i \Delta ln(R_i).$$

At a given point in time, the mean log deviation, L, can be written as the sum of two terms: $\Sigma P_i L_i$, the component representing within-group income inequality, and $\Sigma P_i ln(R_i)$, the component representing between-group income inequality, where L_i is the income inequality index for group i. The change in L over two periods can be decomposed into four terms:

$$\Delta L = \Sigma \Delta P_i [L_i + ln (R_i)] + \Sigma \Delta L_i P_i + \Sigma \Delta ln (R_i) P_i + \text{joint changes.}$$

The joint change term includes $\Sigma \Delta L_i \Delta P_i + \Sigma \Delta P_i \Delta ln (R_i)$.

Appendix C

Table C1

Population shares of immigrants (by number of years in Canada) and the Canadian-born, 1995-2010 (percent)

	1995	**2000**	**2005**	**2010**
All	100.0	100.0	100.0	100.0
Immigrants, 1-5 years	3.5	2.9	3.2	3.3
Immigrants, 5-10 years	2.0	3.4	2.8	3.1
Immigrants, 11-15 years	1.7	2.0	3.3	2.7
Canadian-born plus long-term immigrants[1]	92.8	91.8	90.8	90.9

Source: Authors' calculations based on Statistics Canada, Longitudinal Administrative Databank, 1995-2010.
[1] Long-term is defined as 15 years or longer.

Table C2
Contribution of immigrants and the Canadian-born to changes in aggregate low-income rates in Canada, 1995-2010 (percent)

	1995-2000				2000-2010			
	Total	Change in low-income rate	Change in population share	Joint effect of changes	Total	Change in low-income rate	Change in population share	Joint effect of changes
Immigrants, 1-5 years	25	11	16	-2	2	5	-4	1
Immigrants, 5-10 years	-24	0	-24	0	8	6	2	-1
Immigrants, 11-15 years	-3	1	-4	0	-3	1	-5	0
Canadian-born plus long-term immigrants[1]	102	94	9	-1	93	90	3	-1

Source: Authors' calculations based on Statistics Canada, Longitudinal Administrative Databank, 1995, 2000 and 2010.
[1] Long-term is defined as 15 years or longer.

Table C3
Income inequality among immigrants (by number of years in Canada) and the Canadian-born, according to selected indices, 1995-2010

	Gini			Theil			CV²			Mean log deviation		
	1995	2000	2010	1995	2000	2010	1995	2000	2010	1995	2000	2010
All	0.342	0.363	0.368	0.214	0.256	0.256	0.635	0.909	0.848	0.240	0.274	0.275
Immigrants, 1-5 years	0.367	0.394	0.387	0.245	0.291	0.277	0.682	1.006	0.848	0.312	0.357	0.339
Immigrants, 5-10 years	0.363	0.388	0.386	0.235	0.275	0.263	0.625	0.831	0.671	0.302	0.357	0.360
Immigrants, 11-15 years	0.353	0.373	0.384	0.224	0.256	0.262	0.648	0.811	0.730	0.260	0.304	0.336
Canadian-born plus long-term immigrants[1]	0.337	0.358	0.362	0.208	0.250	0.250	0.622	0.896	0.835	0.230	0.262	0.262

Source: Authors' calculations based on Statistics Canada, Longitudinal Administrative Databank, 1995, 2000 and 2010.
[1] Long-term is defined as 15 years or longer.

Table C4

Decomposition of changes in income inequality among immigrants (by number of years in Canada) and the Canadian-born, according to selected indices,1995-2010

	2000 relative to 1995					2010 relative to 2000				
	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total
a) Theil index										
Immigrants, 1-5 years	0.001	0.001	0.001	0.000	0.003	0.000	0.000	0.000	0.000	–0.001
Immigrants, 5-10 years	–0.001	0.001	0.000	0.000	–0.001	0.000	0.000	0.000	0.000	0.000
Immigrants, 11-15 years	0.000	0.000	0.000	0.000	0.000	–0.002	0.000	0.001	–0.001	–0.001
Canadian-born plus long-term immigrants[1]	0.003	0.040	–0.002	0.000	0.040	0.005	0.000	–0.002	0.000	0.003
Total	0.002	0.042	–0.002	–0.001	0.042	0.004	0.000	–0.002	–0.001	0.001
b) CV^2										
Immigrants, 1-5 years	0.003	0.004	0.002	–0.005	0.005	–0.001	–0.002	–0.001	0.002	–0.002
Immigrants, 5-10 years	–0.002	0.002	–0.001	0.005	0.004	0.001	–0.003	0.000	–0.001	–0.002
Immigrants, 11-15 years	–0.001	0.002	0.001	0.001	0.003	–0.005	–0.001	0.002	0.001	–0.002
Canadian-born plus long-term immigrants[1]	0.007	0.266	–0.007	–0.004	0.263	0.017	–0.059	–0.009	–0.004	–0.055
Total	0.007	0.275	–0.004	–0.003	0.274	0.012	–0.065	–0.007	–0.002	–0.062

Table C4 (cont.)

Decomposition of changes in income inequality among immigrants (by number of years in Canada) and the Canadian-born, according to selected indices, 1995-2010

	2000 relative to 1995					2010 relative to 2000				
	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total
c) Mean log deviation										
Immigrants, 1-5 years	−0.002	0.002	−0.005	0.000	−0.006	0.001	−0.001	0.003	0.000	0.003
Immigrants, 5-10 years	0.001	0.001	0.008	0.002	0.012	−0.001	0.000	−0.002	0.000	−0.002
Immigrants, 11-15 years	0.000	0.001	0.001	0.000	0.003	0.002	0.001	0.003	0.001	0.007
Canadian-born plus long-term immigrants[1]	−0.002	0.030	−0.002	0.000	0.025	−0.004	−0.001	−0.002	0.000	−0.007
Total	−0.003	0.033	0.002	0.002	0.034	−0.002	−0.001	0.003	0.001	0.001

Source: Authors' calculations based on Statistics Canada, Longitudinal Administration Databank, 1995, 2005 and 2010.
[1] Long-term is defined as 15 years or longer.

Notes

1. The LAD is an administrative source based primarily on income tax data; see appendix A for a description of the LAD and for a discussion of why the levels vary among these data sources.

2. The comparison group includes the Canadian-born and immigrants who have been in Canada for more than 15 years. In the 2006 Census, the Canadian-born constituted about 89 percent of this comparison group. Based on that census, the low-income rate of immigrants in Canada for more than 15 years (14.7 percent) was slightly higher than that among the Canadian-born (13.3 percent), but much lower than that of immigrants in Canada for up to 15 years (30.4 percent). Immigrants in Canada for more than 15 years cannot be identified in the taxation data before 1995 because those data identify only immigrants who have entered Canada since 1980. We used the same definition of the comparison group in 2000, 2005 and 2010 to maintain comparability among years.

3. The PNP differs in its detail among provinces. Each province has a number of "streams" through which an immigrant can enter, so that, for Canada as a whole, there are roughly 60 different entry streams, each with somewhat different entry criteria. Generally speaking, however, the PNP concentrates more on filling short-term skill shortages than does the Federal Skilled Worker Program (FSWP), which focuses more on immigrant characteristics that will allow them to succeed in the longer run. This means that a higher proportion of immigrants tend to enter with a prearranged job under the PNP than under the FSWP.

4. We ran ordinary least squares regressions for Canada and each region for 2000 and 2010, where the dependent variable was 1 if the recent immigrant was in low income, and 0 otherwise (that is, a linear probability model). The independent variables include program of entry, age, educational attainment, knowledge of French and English, source region and family status. Using the formula below, the overall change between the beginning and ending years (for example, 2000 and 2010) in the low-income rate in the region can be decomposed into three terms: the overall change associated with changes in the composition of recent immigrants (for example, changes in the proportion with a bachelor's degree or entering under the PNP); the overall change associated with changes in the likelihood of being in low income conditional on having a particular characteristic (for example, the change in the likelihood of a recent immigrant with a bachelor's degree or coming from a particular source region being in low income); and a term indicating the "joint change" (a change that cannot be separated from the first two terms). The third term is typically small. The three terms are described algebraically as follows: $b1 * (X2 - X1)$, $X1 * (b2 - b1)$, $(X2 - X1) * (b2 - b1)$, where $b1$ and $b2$ are regression coefficients in time 1 and time 2, and $X1$ and $X2$ are means of explanatory variables in time 1 and time 2.

5. Changes in entry programs can be thought of as the effect that exists after any differences in the characteristics of immigrants among programs (such as educational attainment, age and source region) are taken into account. Such a program effect might be related to differences in factors such as the share of immigrants who enter with a job in place, the link between the occupational skills of entering immigrants and those in demand in the local

economy, and the labour market network to which an immigrant has access after entering the country.

6. Much of the decline over the 1995-2000 period was likely related to the economic expansion that took place during that phase of the business cycle. This was not the case, however, over the 2000-10 period, when other factors could have contributed significantly to the decline.

7. This estimate assumes that all of the "joint change" is associated with changing admission class, which is unlikely.

8. The effects of changes in admission class are difficult to assess in such cases because, in Manitoba, there was a very large "joint effect," and controls for educational attainment and other characteristics are in place, which means that the effect of any change in these characteristics associated with, for example, the introduction of the PNP, is excluded from the admissions class effect and captured by other characteristics.

9. This measure is based on the Gini coefficient using the after-tax and after-transfer income of individuals, where each individual is represented by his or her adult-equivalent-adjusted household income.

10. Among recent studies that have addressed the issue of family income inequality, see Frenette, Green and Milligan (2007) and Fortin et al. (2012). Heisz (in this volume) presents an overview of trends and notes that most of the recent increase in family income inequality occurred in the late 1990s. Veall (2012) concentrates on changes at the top of the income distribution.

11. Top coding reduces the influence of a few extreme values on the inequality index for small population groups. As table C3 shows, CV^2 is the most sensitive to top coding, while the mean log deviation is the least sensitive. Moving from no top coding to top coding at $1 million (adjusted income) significantly reduces the increase in inequality between 1995 and 2010 as measured by the CV^2, but has relatively little effect on the trend as measured by the three other indices. Setting the top coding to lower values does not affect the trend in income inequality.

12. The census at that time collected only before-tax income data. We used regression estimates to estimate after-tax income (see Frenette, Green and Milligan 2007).

13. This does not apply to all regions. In Toronto, Manitoba and Saskatchewan, inequality was lower among immigrants.

14. We measured inequality among groups using the average adult-equivalent-adjusted family income for each group.

15. This refers to immigrants who stayed in Canada for 16 years or more. Characteristics of longer-term immigrants resemble those of the Canadian-born in many ways, including their income patterns.

16. One assumption of their analytical approach is that well-educated immigrants compete in the same labour markets as well-educated native-born workers. This assumption is problematic, particularly for recent immigrants (see Dustmann, Frattini and Preston 2013; Dustmann and Preston 2012). During their first few years in Canada, for various reasons, many highly educated immigrants find themselves competing with less-educated Canadians for jobs not requiring a degree. This can be seen in the earnings data; university-educated recent immigrants earn much less than their Canadian-born counterparts, and not much more than those with a high school education, on average. This assumption is relaxed in Dustmann and Preston (2012).

17. Card (2009) states that, in the United States, 36 percent of immigrants have a college-equivalent education, compared with 41 percent of the US-born. Using somewhat different educational classifications, the 2006 Canadian census indicates that, among 20-to-65-year-olds, 20.4 percent of the Canadian-born and 31.4 percent of immigrants have a university degree.

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