The Impact of Interprovincial Migration on Aggregate Output and Labour Productivity in Canada, 1987-2006

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ABSTRACT

Interprovincial migration has increased significantly in Canada since 2003. This article develops a methodology to estimate total output gains due to interprovincial migration from two sources: gains due to increased employment, and gains due to re-allocation of workers between provinces with different productivity levels. It estimates that in 2006 the net output gains arising from interprovincial migration were $883.1 million (1997 constant prices), or 0.074 per cent of GDP. Higher employment rates in provinces experiencing a net positive balance of interprovincial migrants were responsible for $398.0 million of the gains and higher output per worker in these provinces was responsible for $485.0 million.

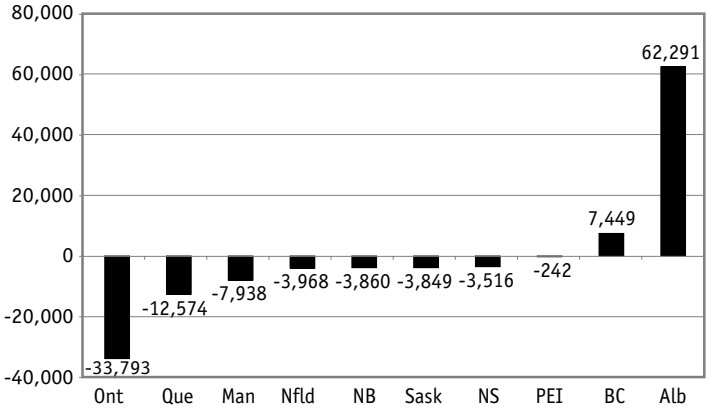
A RECORD NUMBER OF PERSONS, 370,791, equivalent to 1.14 per cent of all Canadians, moved between provinces in 2006. This is up 50 per cent from 2003. To explore the implications for output and labour productivity of this development, the article develops a methodology to estimate the effect of interprovincial migration on aggregate productivity and output. According to economic theory, workers will tend to migrate from low productivity regions to high productivity regions[2] due to economic incentives, thereby creating an overall positive effect on output and on productivity through a re-allocation, or composition, effect. This should be particularly relevant in the case of Canada as there are large regional disparities in economic development between provinces, where for example, Alberta is booming and has above average productivity levels while Atlantic Canada is experiencing weaker growth and has below average productivity levels. As well, moving between provinces is relatively simple in Canada, which should ensure large flows of migration, moving mostly from east to west.

The first part of this article provides an overview of interprovincial migration in Canada and the characteristics of interprovincial migrants. The second part outlines the methodology used to calculate the contribution of interprovincial migration to total Canadian output and labour productivity. The third part presents the results.

1 Andrew Sharpe is the Executive Director, Jean-Francois Arsenault an economist, and Daniel Ershov a coop student, at the Centre for the Study of Living Standards. This is an abridged version of CSLS Research Report 2007-02 (Sharpe, Arsenault and Ershov, 2007). The unabridged report, which contains a large number of tables, is posted at www.csls.ca/reports/csls2007-02. The authors would like to thank Sharon Qiao, Christopher Ross, Simon Lapointe and Celeste Bradley for contributions to the report and Benoit Robidoux and Frank Lee from Finance Canada for comments. Email: andrew.sharpe@csls.ca

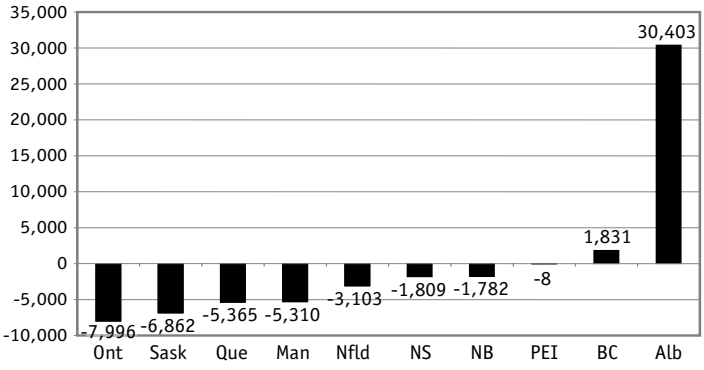
2 In this article the terms low and high productivity are defined in terms of levels, as opposed to growth rates.

Chart 1
Net Migration by Province, 2006
(persons)



Source: Sharpe, Arsenault and Ershov (2007: Table 5).

Chart 2
Average Annual Net Migration by Province, 2001-2006
(persons)



Source: Sharpe, Arsenault and Ershov (2007: Table 5).

The fourth section discusses various qualifications that may cause the results to either overestimate or underestimate the true effect of interprovincial migration on output and productivity. The fifth section concludes.

Interprovincial Migration in Canada: An Overview

Migration Flows

Interprovincial migration can be measured in two ways: net migration of individuals or gross migration. By definition, net migration within Canada for the total population equals zero since the number of in-migrants equals the number of out-migrants of provinces. Net migration flows for a province can have either a positive or negative balance. Net migration of workers within Canada will not however be equal to zero because a person unemployed in the province of origin may become employed in the destination province. The concept of net positive migration (by definition, equal to net negative migration at the national level) is used to calculate output gains of interprovincial migration. Gross interprovincial migration is equal to the sum of all the in-migrants or out-migrants, as those two quantities are equal.

Migration Flows, 2006

Only two provinces gained people through interprovincial migration in 2006 — Alberta and British Columbia (Chart 1). Alberta gained on a net basis 62,291 persons while British Columbia gained 7,449 persons. All of the other provinces lost people. Ontario, lost the most, with net interprovincial outflows of 33,793 persons, followed by Quebec (12,574 persons) and Manitoba (7,938 persons).

Total net positive interprovincial migration, which is equivalent to net negative interprovincial migration, was 69,740 persons in 2006, representing 0.21 per cent of the total population (Table 1). This is a record high in absolute terms, surpassing the previous peak of 57,126, attained in 1987. Net positive migration as recently as 2003 totaled only 14,835 persons.

Migration Flows, 2001-2006

Average annual net positive migration trends in the period 2001-2006 were similar to the migration trends in 2006 (Chart 2). Alberta showed significant positive flows over this period, with an average of 30,403 net migrants moving there annually from across the country. The only other province to gain people was Brit-

ish Columbia, which gained 1,831 migrants annually, on average. The largest losses were experienced by Ontario and Saskatchewan, who lost a net of 7,996 and 6,862 migrants per year, respectively.

Migration Flows, 1987-2006

When looking at total net migration gains from 1987 to 2006, Alberta has gained the most people, with an overall net increase of 295,463 persons (Chart 3). It is notable that 112,108, or 38 per cent, of these net migrants came in 2005 and 2006 alone. British Columbia comes in second with 269,969 persons gained. Quebec lost the most persons (186,196), followed by Saskatchewan (151,092), Manitoba (110,279) and Newfoundland (80,000). Ontario experienced gains in its population due to interprovincial migration during certain sub-periods and losses in others, but over the total period it gained only 6,000 persons.

Net Migration and Gross Migration Relative to Total Population

Net migration flows are very small compared to both the total population of each province and the gross migration flows (Chart 4). In 2006, total net interprovincial migration as a share of total Canadian population was 0.21 per cent. This is a considerable increase compared to earlier years, such as the 2003 record low of 0.05 per cent, though it is slightly below the 1987 record high of 0.22 per cent. In contrast, gross migration accounted for 1.14 per cent of the total population in 2006. Compared with earlier years this proportion has declined, decreasing from a peak of 1.23 per cent of the total population of Canada in 1989, though the 2006 proportion is the highest since 1990.

The largest net flow for a province relative to its population in any year over the 1987-2006 period took place in Alberta in 2006, when the net migration inflow was equal to 1.85 per cent of the province's population. The largest negative net migration relative to a province's population occurred in Saskatchewan in 1989, when the net migration outflow represented 1.80 per cent of Saskatchewan's population.

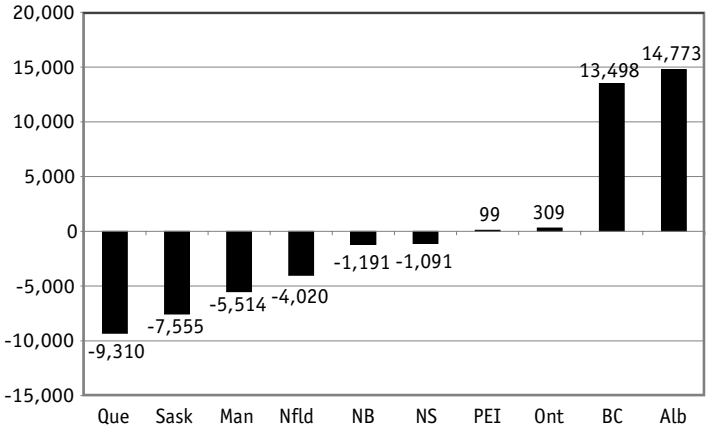
The rise in interprovincial migration in recent years due to the increasing economic opportunities in Western Canada suggests that barriers to labour mobility may not be as important as sometimes thought. In fact,

Table 1
Total Gross Migration and Total Net Positive Migration, 1987-2006
(persons)

	Total Gross Migration	As a % of the Total Population	Total Net Positive Migration	As a % of the Total Population
1987	306,410	1.16	57,126	0.22
1988	311,501	1.17	40,639	0.15
1989	335,707	1.23	40,592	0.15
1990	320,900	1.16	50,066	0.18
1991	304,105	1.09	40,831	0.15
1992	297,868	1.05	40,511	0.14
1993	273,145	0.96	37,336	0.13
1994	276,222	0.96	34,532	0.12
1995	276,100	0.95	27,751	0.10
1996	274,115	0.93	32,428	0.11
1997	280,719	0.94	39,770	0.13
1998	286,380	0.95	49,833	0.17
1999	266,690	0.88	38,132	0.13
2000	280,645	0.92	46,619	0.15
2001	271,371	0.88	34,906	0.11
2002	271,738	0.87	22,622	0.07
2003	247,230	0.78	14,835	0.05
2004	260,532	0.82	26,216	0.08
2005	304,991	0.95	54,404	0.17
2006	370,791	1.14	69,740	0.21
Period Averages				
87-89	308,956	1.16	48,883	0.184
90-95	291,390	1.03	38,505	0.136
96-00	277,710	0.92	41,356	0.137
05-06	337,891	1.04	62,072	0.192
01-06	287,776	0.91	37,121	0.116
87-06	290,858	0.99	39,944	0.136

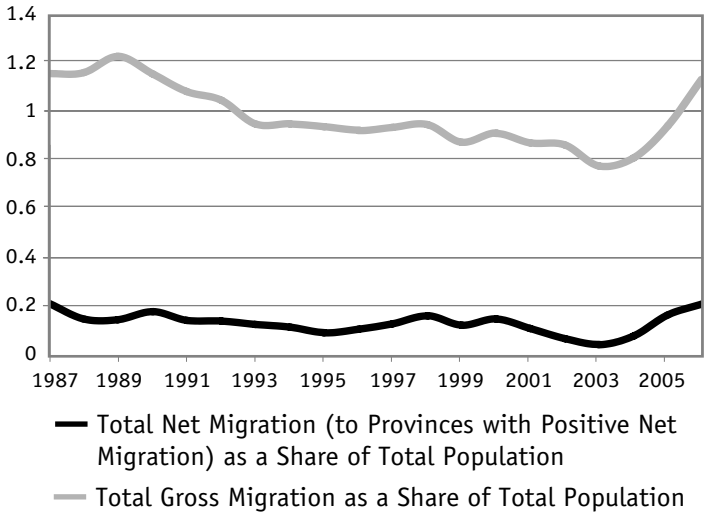
Source: Sharpe, Arsenault and Ershov (2007: Tables 5, 5A, 6 and 6A).

Chart 3
Average Annual Net Migration Changes by Province, 1987-2006
(persons)



Source: Sharpe, Arsenault and Ershov (2007: Table 5).

Chart 4
Total Number of Interprovincial Migrants as a Percentage of Total Canadian Population, 1987-2006
(per cent)



Source: Sharpe, Arsenault and Ershov (2007: Table 5A).

based on a literature review, Grady and Macmillan (2007:27) conclude that:

> "No empirical studies were found that demonstrate that professional and occupational regulations constitute a substantial barrier to mobility. This suggests that either the barriers are not that important in practice or that for some unexplainable reason they have been overlooked by researchers."

Characteristics of Interprovincial Migrants

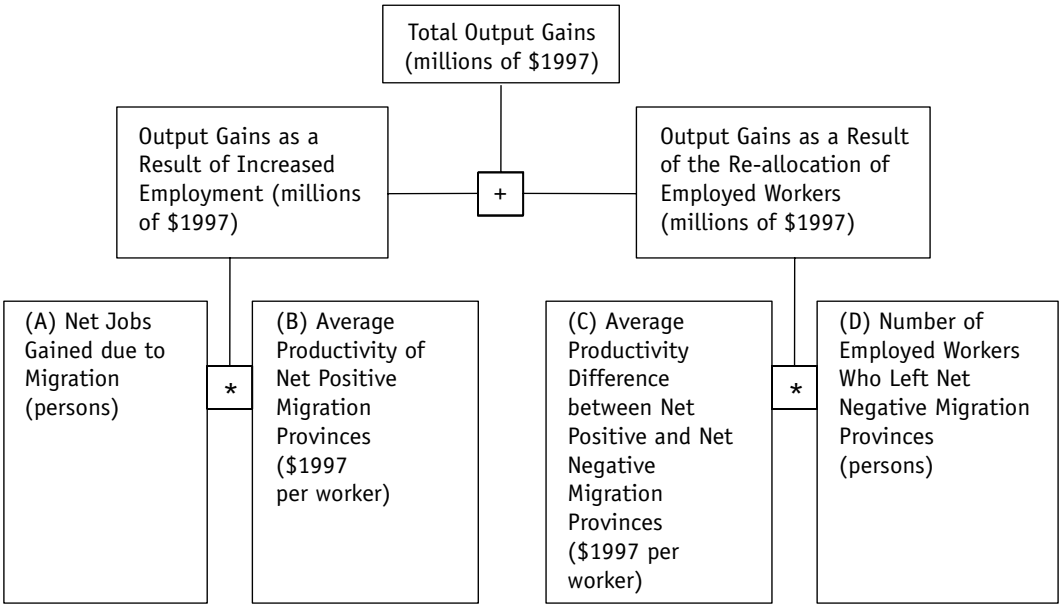
The best source of information on the characteristics of interprovincial migrants is the census. The 2001 census, the most recent currently available, showed that two thirds of interprovincial migrants were aged 15-44 while only 44 per cent of the total Canadian population fell in that age group. It also found that two thirds of migrants had some form of postsecondary education, compared to only 51.0 per cent of the total working age population. Interprovincial migrants also had a much higher unemployment rate during their first year in their destination province: 14.1 per cent, almost double the unemployment rate of the total population.

The employment rate for interprovincial migrants in 2001 was higher than for the total working age population: 65.6 per cent versus 61.4 per cent. Migrants also had higher labour force participation rate: 76.4 per cent versus 66.2 per cent. These labour market statistics show that migrants tended to be more active in the labour force, which is consistent with migrants being younger and better-educated.

People migrate largely for economic reasons. This has been corroborated by studies which find that interprovincial migrants experience larger gains in earnings relative to non-migrants. Using the tax data from the Longitudinal Administrative Database (LAD), Ross Finnie (2001: Table 1a) found that interprovincial migrants in Canada experienced a 9.4 per cent increase in earnings over a two-year period, compared to 4.8 per cent for stayers and 0.8 per cent for others. In other words, interprovincial migrants enjoyed a 4.6 per cent wage gain relative to stayers.[3]

Exhibit 1

A Framework for Estimating Total Output Gains Arising from Interprovincial Migration



Note: Productivity measures can also be measured in current dollars.

Methodology

An Overview of the Methodology

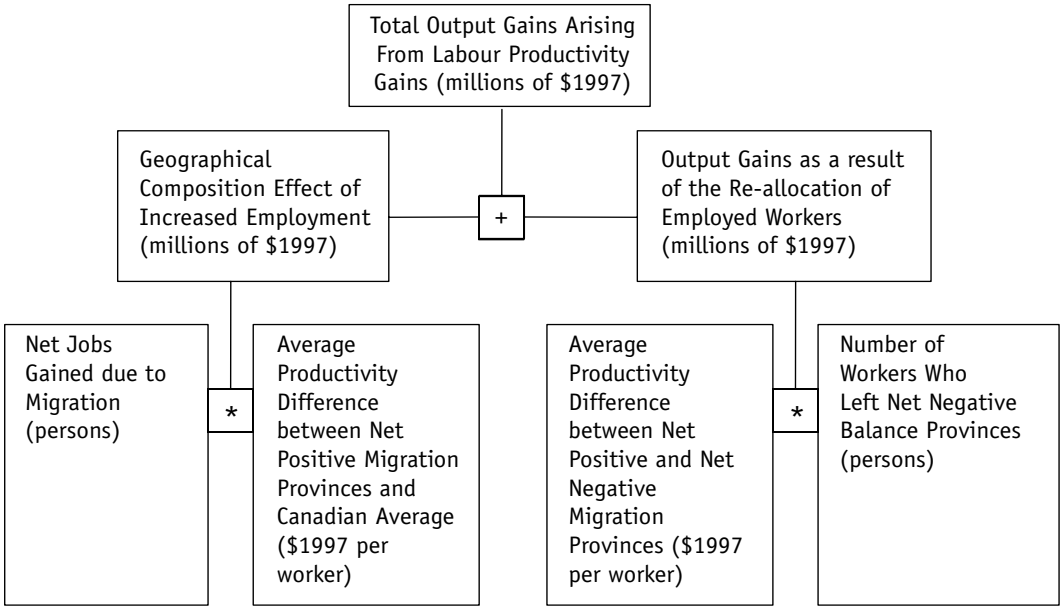
This article attempts to quantify the changes in aggregate output and labour productivity brought about by interprovincial migration of workers. Total output gains are the result of two separate effects. The employment gains as a result of interprovincial migration and the re-allocation of workers between provinces with different productivity levels. The former is due to persons who are unemployed or out of the labour force in the origin province and who find employment in the destination province. The employment gains are approximated using differences in provincial employment rates. The latter is caused by already employed workers moving from provinces with low productivity levels to provinces with high productivity levels. Assuming that a worker has the average productivity level of his province of residence, their productivity will increase as a result of migrating to a higher productivity province. Total national output will increase by the difference in productivity between above and below average productivity provinces for every worker that moves (Exhibit 1).

In more concrete terms, gains in output due to employment changes are equal to the product of the number of new jobs gained as a result of migration between provinces with different employment rates (provinces with net gains tend to have higher employment rates) and the average productivity level of provinces with net migration gains (again, provinces with net gains tend to have above average productivity levels). The gains in output due to re-allocation are

3 An earlier study by Lin (1995) on the economic returns to interprovincial labour mobility in Canada also found that moving to another province pays off greatly. Between 1989 and 1990, male migrants' average nominal earnings from paid employment increased by $7,682, while those of non-migrants increased by only $2,162. Interprovincial mobility resulted in a net economic return of $5,520 or nearly 26 percent of male migrants' pre-move earnings. Economic returns to female mobility was a bit smaller than that of males in magnitude ($5,220), but even higher (nearly 45 per cent) when expressed as a percentage of female migrants' pre-move earnings.

Exhibit 2

A Framework for Estimating Productivity Gains Arising from Interprovincial Migration



equal to the difference in average productivity between provinces with net migration gains and provinces with net migration losses, multiplied by the number of workers who leave provinces with net migration losses.[4] Total gains in output due to interprovincial migration are equal to the sum of these two factors.

The effect of interprovincial migration on aggregate labour productivity is calculated by isolating output gains that directly arise from labour productivity gains. Clearly, output gains resulting from the re-allocation of workers across provinces can be attributed entirely to productivity gains since the re-allocated workers contribute to an increase in output without changing the level of national employment. The effect of new employment on productivity is not as intuitive. If the productivity level of new employment is that of the national average, there is no effect on aggregate productivity. In this case, in terms of productivity, the positive effect on output is offset by the increase in employment. If, however, new employment arising from migration is largely created in provinces with above average productivity, then this new employment will raise the national labour productivity level. Intuitively, an increase in employment in high productivity industries or provinces will tend to increase productivity, even if employment in other provinces remains unchanged. We call this effect on productivity the "geographical composition effect" of new employment creation.

Exhibit 2 outlines how output gains that arise from labour productivity gains are computed. The geographical composition effect of new employment is obtained by multiplying the number of new jobs due to migration by the pro-

4 Again, one needs to remember that the number of employed workers who left net negative migration provinces ((D) in Exhibit 1) is the number of workers who are re-allocated. The number of migrants who join net positive migration provinces is equivalent to the number of employed workers leaving net negative migration provinces (D) to which we add the number of unemployed workers which find employment in the destination province (A). Thus, it is also possible to compute total output gains for Canada by multiplying, for each province, the number of workers gained or lost by the average productivity of the province and then summing up across provinces.

ductivity difference between net positive provinces and the national average. The other component is simply output gains due to the reallocation of employed workers computed in the same way as in Exhibit 1.

Applying the Methodology[5]

There are a number of assumptions embedded in the methodology. To obtain estimates of output gains due to migration, it is assumed that:

- Migrating workers have, on average, the average productivity of their province of origin.
- Migrating workers obtain jobs with the average productivity of the destination province.
- Migrants have, on average, the demographic structure of their province of origin.
- Productivity is defined as output per worker (denoted in either constant dollars or current dollars) and therefore does not account for provincial differences in average hours worked, which in any case are small during the period covered.

These four assumptions do imply a number of other more specific assumptions. For example, it presumes that differences in productivity levels across provinces are not worker-specific, that is they are not due to differences in educational attainment across provinces.[6]

To quantify the contribution of internal migration to overall output and productivity, gross in- and out-migration estimates were obtained for each province and out-migration was subtracted from in-migration to calculate net provincial migration. These net migration estimates, however, were for the entire population, and it was necessary to estimate the number of workers who move and actually contribute to output and productivity (Statistics Canada only provided estimates of interprovincial migration for the total population). The following outlines the method used to calculate the net migration of workers for every province:

- Provincial gross out-migration outflows were multiplied by the ratio of the working age population (persons 15 years old and over) to population of each origin province.[7] This was done to reflect the slightly different provincial demographic structures, assuming that the demographic structure of the migrating population mirrors that of the total population of their origin province.
- To estimate the number of workers gained by the destination province the working age population migrant inflow estimate was multiplied by the employment rate of each destination province.
- To calculate the number of workers lost by the origin province, the working age population migrant outflow estimate for every province was multiplied by the employment rate of the origin province.
- As each origin province is also a destination province, by subtracting the total number of workers lost from the total number of workers gained it was possible to calculate the estimate of net migration of workers for every province.

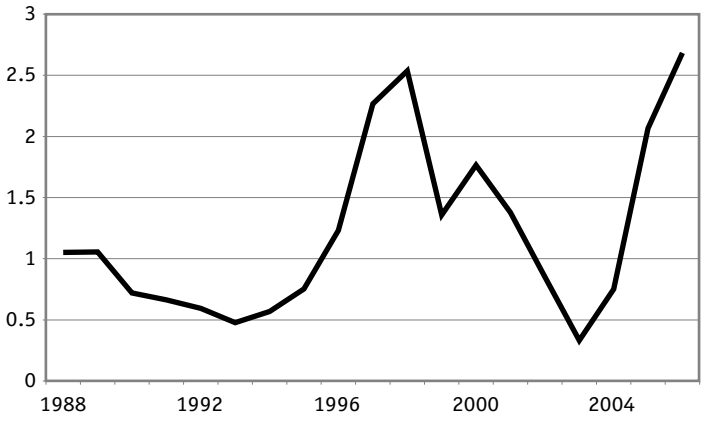
To calculate the output effect of interprovincial migration, net migration of workers to a province was multiplied by the provincial average output per worker of the province. This calculation can be made in either constant or current dollars. It is important to note that, due

5 For a detailed description of the methodology in algebraic form, see Appendix II in the unabridged version of the report (Sharpe, Arsenault and Ershov, 2007).

6 In turn, this would mean that productivity differences between provinces are mostly the result of differences in capital intensity or industrial structure. Productivity differences could also be the result of differences in economies of scale achieved by respective provincial economies, with some provinces having larger cities and a larger proportion of persons in urban areas.

7 Ratios of working age population to total population were quite similar across provinces. For example, in 2006, the ratios ranged from a low of 79.2 per cent in Saskatchewan to a high of 83.3 per cent in Newfoundland).

Chart 5
Contribution of Interprovincial Migration to Real Output Growth in Canada, 1988-2006
(per cent of trend GDP growth)



Source: Sharpe, Arsenault and Ershov (2007: Table 14).

Note: The trend average real GDP growth rate from 1987 to 2006 is 2.83 per cent per year.

to different provincial employment rates and demographic structures, the number of workers lost by the origin provinces does not necessarily equal the number of workers gained by the destination provinces. Indeed, if people migrate in search of employment opportunities, net migration should be from provinces with lower employment rates to provinces with higher employment rates, causing an increase in national employment as a result of unemployed or out of the labour force migrants who find employment in their destination province. This increase in employment will increase aggregate output, as more workers will produce more and add to GDP.

The changes in employment mean that in addition to output gains due to the re-allocation of workers, there are output gains due to increased employment as a result of migration. As discussed earlier, it is possible to decompose total output gains as a result of migration into the employment effect and the re-allocation effect. To calculate the output effect of increased employment we multiply the total number of jobs gained as a result of migration by a weighted average of output per worker of the provinces with positive net migration weighted by the provincial share of net migration. This estimate is then subtracted from the total output gains as a result of migration in order to obtain the output gained as a result of re-allocation, which contributes to overall productivity changes.

To obtain the total contribution of migration to productivity changes we add the geographical composition effect of new employment to the estimate of output gains from the re-allocation of workers. To obtain the geographical composition effect of new employment, we compute the difference between average productivity in Canada and average weighted productivity in provinces with positive net migration, and then multiply it by the number of jobs gained as a result of migration.

Results

This section reviews the main results obtained using the methodology outlined in the previous section and focuses on results using constant 1997 prices.

Constant Prices Estimates[8]

Output gains, 1987-2006

The study found that the total change in output as a result of interprovincial migration was an addition of $883.1 million to GDP in 2006 (Table 2). This represented the largest contribution of interprovincial migration to output growth over the 1987-2006 period, equal to 0.076 percentage point growth in 2006, or 2.68 per cent of trend real GDP growth in that year (Chart 5). Over the 1987-2006 period, interprovincial migration resulted in output gains equal to $6,227 million, or an average of 1.27 per cent of total real output growth over the period.

8 All dollar values in this section are expressed in 1997 constant dollars.

Table 2

Decomposition of Output Gains due to Interprovincial Migration, 1987-2006

(millions of 1997 dollars)

	Output Gains due to Re-Allocation of Workers	As a % of GDP	Output Gains due to Employment Increases	As a % of GDP	Total Output Gains due to Migration	As a % of GDP
	A	B	C	D	E=A+C	F=B+D
1987	118.1	0.017	52.1	0.007	170.2	0.024
1988	188.6	0.026	18.9	0.003	207.5	0.028
1989	200.3	0.026	20.0	0.003	220.2	0.029
1990	137.8	0.018	16.3	0.002	154.1	0.020
1991	109.1	0.015	33.4	0.004	142.4	0.019
1992	76.1	0.010	49.0	0.007	125.2	0.017
1993	46.1	0.006	55.5	0.007	101.6	0.013
1994	30.4	0.004	93.4	0.012	123.8	0.015
1995	64.0	0.008	107.9	0.013	171.9	0.021
1996	110.6	0.013	178.3	0.021	288.9	0.034
1997	250.7	0.029	289.2	0.033	540.0	0.061
1998	300.8	0.033	330.1	0.036	630.9	0.069
1999	188.2	0.019	163.5	0.017	351.7	0.036
2000	270.2	0.027	212.0	0.021	482.2	0.047
2001	204.8	0.020	191.4	0.019	396.2	0.038
2002	130.1	0.012	118.5	0.011	248.6	0.023
2003	53.1	0.005	46.8	0.004	100.0	0.009
2004	122.8	0.011	107.8	0.010	230.6	0.020
2005	380.8	0.033	277.3	0.024	658.1	0.057
2006	485.0	0.041	398.0	0.033	883.1	0.074
Period Averages						
87-89	153.4	0.021	35.5	0.005	188.9	0.026
90-95	77.2	0.010	59.3	0.007	136.5	0.018
96-00	224.1	0.024	234.6	0.026	458.7	0.050
05-06	432.9	0.037	337.7	0.029	770.6	0.065
01-06	229.4	0.020	190.0	0.017	419.4	0.037
87-06	173.4	0.019	138.0	0.014	311.4	0.033

Source: Sharpe, Arsenault and Ershov (2007: Table 11 and 11A).

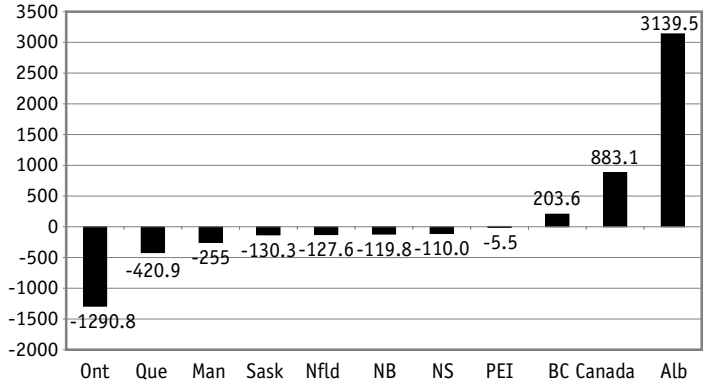
In 2006, the contribution of interprovincial migration to real output was largest in Alberta at $3,139.5 million, with British Columbia coming a distant second place, with $203.6 million (Chart 6). Ontario had the largest negative contribution of interprovincial migration to real output at -$1,290.8 million.

Decomposition of Output Gains

Weighted Labour Productivity

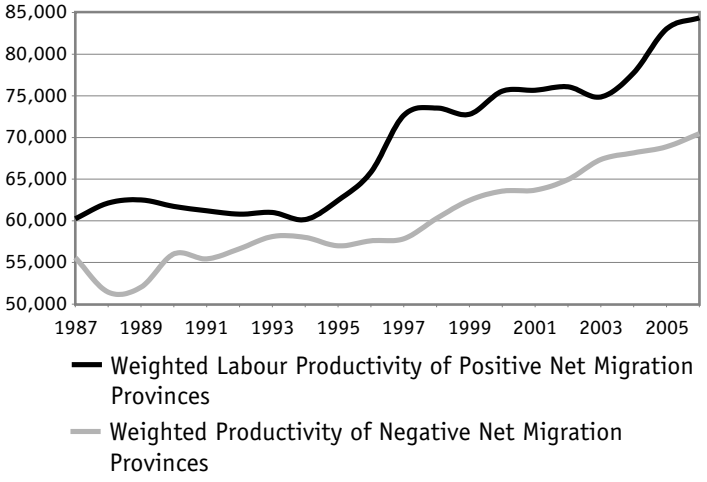
In order to decompose the overall output gains as a result of interprovincial migration into output gains arising from employment increases and output gains resulting from employed worker reallocation across provinces, weighted average labour productivity estimates (weighted by the number of net migrating workers) were calculated for provinces with net losses of workers and provinces with net gains of workers for the 1987-2006 period. In 2006, the average labour productivity for provinces with net gains of workers was $84,360; the average productivity for provinces with net losses of workers was $70,467, making for a difference of $13,893 (Chart 7). The pro-

Chart 6
Contribution of Interprovincial Migration to Real GDP by Province, 2006
(millions of 1997 dollars)



Source: Sharpe, Arsenault and Ershov (2007: Table 11).

Chart 7
Weighted Labour Productivity for Provinces with Negative Net Worker Migration and Provinces with Positive Net Worker Migration, 1987-2006
(1997 dollars per worker)



Source: Sharpe, Arsenault and Ershov (2007: Table 4C).

Note: For every year, the set of provinces that gain workers and provinces that lose workers is different.

ductivity gap fluctuated greatly over the 1987-2006 period, reaching a low of $2,135 in 1994, one of the few years when high productivity Alberta lost workers, thereby contributing to the average productivity of provinces with net losses of workers. In a similar fashion, a peak gap of $14,819 was reached in 1997, a year when Alberta had a very large net gain of workers.

Weighted Employment Rates

Provinces with net positive interprovincial migration had, on average, more employment opportunities, as exhibited by the employment rate, than provinces which had net negative migration. In 2006, the weighted average employment rate of provinces with net migration gains was 70.1 per cent (Chart 8).[9] It was 8.3 percentage points higher than the employment rate for provinces with net migration losses, 61.8 per cent. Between 1987 and 2006 the gap in employment rates ranged from a low of 0.6 percentage points in 1990 to a high of 12.6 percentage points in 1997.

Unlike the sum of net provincial population changes due to migration, which is zero, net employment changes due to migration total to a value greater than zero. This reflects the number of migrants who were unemployed or out of the labour force in their province of origin, but find work in their province of destination. It is estimated that a net of 4,718 new jobs were gained in 2006, as a result of the difference in employment rates between the provinces with net gains of migrants and the provinces with net losses of migrants. From 1987 to 2006 it is estimated that a total of 37,681 jobs were added in Canada as a result of interprovincial migration.

Output Gains Arising from Employment Increases and Re-Allocation of Workers

The product of the average weighted labour productivity of provinces with positive net migration and the number of new jobs gained

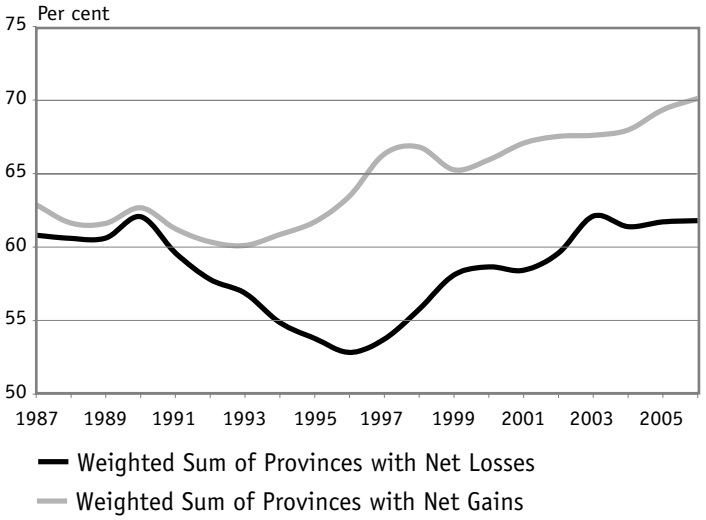
9 The employment rates were weighted by the shares of net outflow of working age population migrants (15+) for provinces with net negative migration estimates and net inflow of working age population migrants (15+) for provinces with net positive migration estimates.

due to net migration gives an estimate of the absolute contribution of increased employment to total output gains as a result of migration. The difference between total output gains and the gains due to increased employment, is the absolute contribution to output gains from the re-allocation of workers among provinces. In 2006, $398.0 million was gained as a result of an increase in employment and $485.0 million was gained as a result of re-allocation, constituting a total of $883.1 million of total output gains resulting from migration (Table 2, Chart 9).

The largest absolute contributions over the 1987-2006 period of both employment and re-allocation due to interprovincial migration were in 2006, when the total gain in output due to migration was the largest. The $398.0 million gains from employment in 2006 exceeds the previous record of $330.1 million attained in 1998. Similarly, the impact of re-allocation, at $485.0 million, was much larger in 2006 year than the previous high of $380.8 million attained in 2005. Interestingly, while the trough for total output gains from migration occurred in 2003, a year where both gains from employment and gains from reallocation were low, that year was not the lowest value for either component. While gains due to increases in employment reached their lowest value in 1990 ($16.3 million), gains due to the re-allocation reach a low of $30.4 million in 1994 (Table 2).

In terms of shares, gains from employment accounted for 45.1 per cent of total output gains in 2006 while gains from re-allocation constituted the remaining 54.9 per cent (Chart 10). The relative importance of the two factors varied greatly during the 1987-2006 period, with re-allocation being the dominant factor until 1993. From 1993 until 1999 the dominant factor was the change in employment, consisting of up to 75.5 per cent of total increases in output. Yet, in more recent years (1999-2006), the effect of the re-allocation of workers dominated slightly the effect of increased employment.

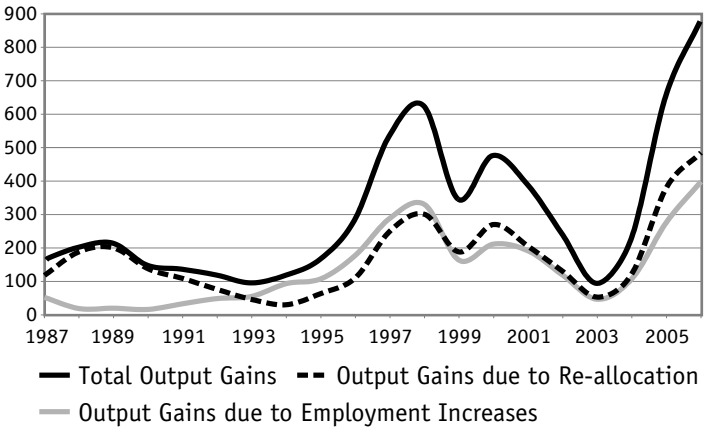
Chart 8
Weighted Employment Rates of Provinces with Positive Net Migration and Provinces with Negative Net Migration, 1987-2006



Source: Sharpe, Arsenault and Ershov (2007: Table 8A).

Note: For every year, the set of provinces that gain workers and provinces that lose workers is different.

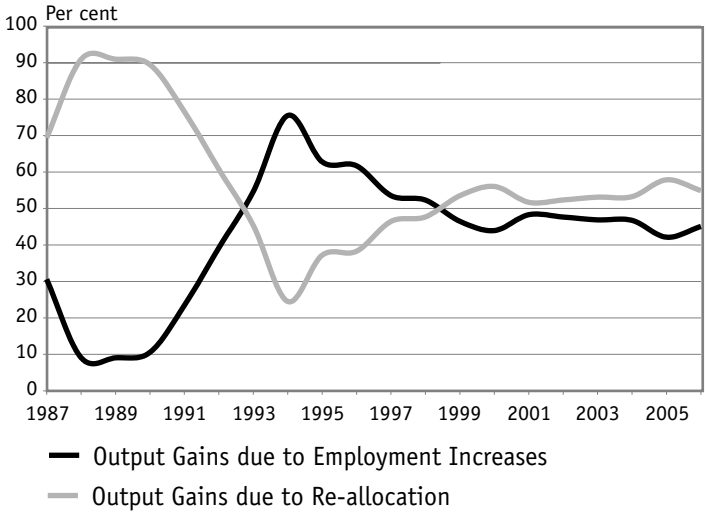
Chart 9
Decomposition of Total Output Gains due to Interprovincial Migration between Employment and Re-Allocation Effects, 1987-2006
(millions of 1997 dollars



Source: Sharpe, Arsenault and Ershov (2007: Table 11A).

Output gains due to re-allocation are a function of the difference in average productivity between provinces with net migration gains and provinces with net migration losses,

Chart 10
Percentage Composition of Total Gains in Output due to Interprovincial Migration in Canada, 1987-2006



Source: Sharpe, Arsenault and Ershov (2007: Table 11A).

and the number of workers leaving net losing provinces. From 2000 to 2006 the increase in the average labour productivity gap between provinces contributed only 2.49 percentage points annually to the 10.24 per cent per year increase in output gains. In other words, during this six year period, the increasing productivity gap accounted for 24.3 per cent of the increase in total output gains due to the re-allocation of workers, with the increasing migration flows of workers accounting for the rest. It thus appears that the recent increase in the productivity gap between positive net migration and negative net migration provinces was not as important as the increase in migration flows. It was the latter that played the larger role in the sharp recent increase in output gains attributable to migration. Yet, over the 1987-2006, increases in the productivity gap contributed more than 50 per cent to the growth of output gains due to re-allocation. This suggests that the recent rise in the importance of migration flows in comparison to productivity differences could be a temporary development.

The Impact of Interprovincial Migration on Labour Productivity Growth

The contribution of migration to aggregate labour productivity growth stems from two sources: the re-allocation of workers between provinces of different average productivity levels and what we call the geographical composition effect of new employment. The latter is a fairly small effect, and can even be negative as it was in 1994. If new employment arising from interprovincial migration is disproportionately created in above average productivity provinces, it will tend to increase aggregate productivity at the national level while if it is created mostly in below average productivity regions it will have the opposite effect.

The total per cent contribution of interprovincial migration to trend aggregate labour productivity growth is calculated by dividing the share of net output change due to re-allocation and geographical composition of new employment in total national output by the trend average annual growth rate of output per worker in the economy. In this study, the trend growth rate of output per worker in Canada for the period 1987-2006 was estimated to be 1.27 per cent per year. The contribution of interprovincial migration to trend productivity growth in 2006 was 0.045 percentage points or 3.57 per cent (Chart 11).[10] Over the entire period, 1987-2006, output gains arising from productivity gains due to migration averaged 0.02 per cent of total GDP. Therefore, on average, migration contributed 0.02 percentage

10 The contribution of migration to actual labour productivity growth in 2006 (which at 0.73 per cent was significantly smaller than trend labour productivity growth of 1.27 per cent) was 6.23 per cent. Calculating the contribution of interprovincial migration to actual labour productivity growth can be misleading as the annual labour productivity growth rates vary and, as in 2006, can be small.

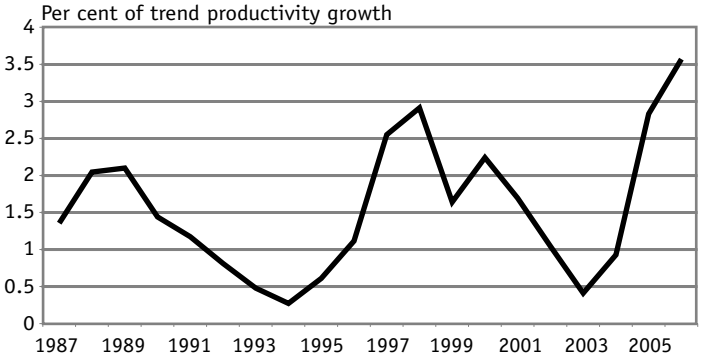
points to labour productivity growth each year, or 1.56 per cent of total labour productivity growth each year.

Comparison of CSLS Estimates of the Impact of Interprovincial Migration with Finnie-based Estimates

In the literature, there are few estimates of the impact of interprovincial migration in Canada on productivity. In one study on the subject of interprovincial migration, Finnie (2001) found that interprovincial migrants enjoyed a 4.6 per cent wage gain relative to stayers over a two-year period. In order to compare the order of magnitude of this report's estimates with those of Finnie, we assume that Finnie's finding about wage gains translates into equivalent relative productivity gains. We first estimate the gross number of employed migrants by multiplying the gross flows of migrants by the working age population to total population ratio and the employment rate for Canada. We then assume that each of these migrants achieves a 4.6 per cent gain in productivity due to migration to obtain an estimate of total output and productivity gains due to gross migration flows.

We would expect estimates based on Finnie's findings to be larger than ours as the latter account only for net migration flows. Effectively, estimates based on Finnie are considerably larger than CSLS estimates of output gains due to the re-allocation of labour. In 2006, estimates constructed from Finnie's average wage gains for migrants estimated output gains at $633 million constant 1997 dollars compared to only $485 million constant 1997 dollars for the CSLS estimated gains due to the re-allocation of labour. In addition, over the 1987-2006 period, estimates based on Finnie are much more stable than CSLS estimates, the former averaging $411 million with most years' estimates within a 10 per cent range of this average. In contrast, CSLS estimates vary from $30 million to $485 million, with an average of $174 million, depending on the year as net provincial migration flows vary greatly as a share of gross migration.

Chart 11
Contribution of Interprovincial Migration to Trend Labour Productivity Growth in Canada, 1987-2006



Source: Sharpe, Arsenault and Ershov (2007: Table 14A).

Note: The trend labour productivity growth, measured as ouput per worker growth, from 1987-2006 was 1.27 per cent per year.

Estimates based on Finnie, however, do not include the effect of new employment captured by CSLS estimates. Yet, CSLS estimates of total output gains due to migration, which include the new employment effect, are still generally lower than Finnie-based estimates, which exclude these gains. On average, the CSLS total estimates are $100 million lower, but in some years they are considerably larger, notably in 2006 where CSLS total estimates are $250 million larger than Finnie-based estimates.

Most of the difference between CSLS and Finnie-based estimates is a direct consequence of the decision to focus on net migration flows instead of gross migration flows. Net migration flows are not only much smaller than gross migration flows, they are also more variable year upon year. On the other hand, using national gross flows of migrants misses the potentially large impact of recent migration flows to high productivity Alberta. Yet, surprisingly, despite significant methodological differences, both estimates appear to be roughly in line. Moreover, both estimates show that while interprovincial migration

can be of importance for migrants themselves, it does not appear to have a major impact on the Canadian economy in a given year, albeit the cumulative impact may be large.

Current Price Estimates

The total change in output due to interprovincial migration was $1,966.4 million current dollars in 2006, equivalent to 0.144 per cent of actual GDP growth in 2006.[11] In current dollars, both the level of output gains and output gains as a percentage of GDP in 2006 are almost double the estimates obtained using constant dollars. Since constant dollar estimates are deflated for price changes, differences in relative prices across provinces explains these large differences. Indeed, much of the difference between constant dollar output gains and current dollar output gains is attributed to the larger price increases in Alberta. Between 2002 and 2006, the GDP deflator in Alberta increased by 5.8 per cent per year, due to energy price increases, while the GDP deflator for Canada rose by 2.6 per cent per year. Current prices give a more accurate a picture of the incentives to move than constant prices as they reflect the actual relative price structure at a point in time. However, they cannot be used to estimate the impact of interprovincial migration on productivity growth, as the latter is measured in real terms.

Limitations of the Methodology

The analysis in this article is constructed to focus on the effect of net interprovincial migration on output and productivity rather than the effect of gross interprovincial migration. Clearly, it is not meant as a comprehensive account of the effects of migration on the economy. It is restrictive in nature and should be interpreted as such. In fact, there are a number of reasons why the methodology may exhibit bias.

Ambiguous biases

Two important simplifying assumptions may impact either an upward or downward bias to the results. First, the productivity measure used is output per worker, as opposed to the more accurate output per hour. Differences in output per worker among provinces may, therefore, overestimate or underestimate differences in output per hour. However, differences in average hours worked are generally small across provinces.

Second, the productivity measures are provincial averages. As such, they may fail to capture the actual productivity of workers who migrate, if workers have, on average, above or below average productivity at the margin. This may result in either over- or underestimation of the output and productivity impacts of migration, as the type of workers who migrate and the type of jobs the workers find may vary from the average. If a below average productivity worker leaves Newfoundland, then the negative contribution on output of the worker leaving will be overestimated. Similarly, if a worker finds an above average productivity job in Alberta, the contribution of the worker to overall output is underestimated.

Upward biases

By adopting average productivity for both origin and destination provinces, we implicitly assume that productivity differences between provinces are not worker-specific. In other words, these differences are not due to differences in human capital across provinces because when a worker moves from a low productivity province to a high productivity province, he is assumed to achieve the destination province's

11 The unabridged version of the report provides detailed estimates on the impact of interprovincial migration on output and productivity expressed in current dollars.

average productivity. The fact that he may be from a province with below average human capital is not taken into account. Yet, this assumption may not be completely unrealistic since productivity differences between provinces can largely be explained by factors such as differences in capital intensity, industrial structure, job characteristics, and economies of scale due to differences in population density.

Downward Bias

There exist a variety of omissions or methodological choices that may result in the underestimation of the effect of interprovincial migration on output and productivity.

First, and most important, the estimates are based only on net interprovincial migration. They do not take into account the gains associated with gross migration. Such positives gains can arise because of better matching between workers and employers. Since workers generally move in search of better employment opportunities, it is most likely that migrants are better off after migrating even when a worker moves from a high productivity province to a low productivity province. In this context, if a pair of provinces have zero net migration but large gross flows of migrants, the real gains to interprovincial migration are likely not zero, as implied by our methodology, as migrants are potentially improving their situation and that of the destination province.

Another reason for underestimation is that migrants self-select and likely have non-observable characteristics such as drive that distinguish them from non-migrants and hence have above average productivity. This effect, however, would likely be small since migrants would possess these non-observable characteristics both while in their origin and destination province. As such, while these characteristics may lead them to have above average productivity in their destination province, it might also mean that they had above average productivity in their origin province. Still, on average, we would expect a small underestimation due to migrants' non-observable characteristics.

Third, the incidence of migration is likely to be higher among unemployed workers than among already employed workers. This follows naturally from the fact that unemployed workers face stronger incentives to migrate than do other workers because their potential wage gain is much larger. If a larger share of migrants were previously unemployed than assumed in the methodology, the output gains might have been considerably larger.

Migration flows and, hence, benefits of interprovincial migration may also have been underestimated due to the existence of temporary migrants, who are not captured through the methods used to estimate migration flows. There are, for example, many Newfoundland residents who work in Alberta for large parts of the year though they still return to Newfoundland several times each year. In official statistics, they may be considered to be both working and living in Newfoundland, although their output contribution is actually attributed to Alberta. Employment in Newfoundland is therefore overestimated and employment in Alberta is underestimated, with the overall impact of migration on output per worker being underestimated as well.

The choice of restricting the analysis to interprovincial migration rather than including on intraprovincial migration also diminishes the estimated impact of migration on output. The inclusion of intraprovincial migration, nearly three times that of interprovincial migration, would have greatly increased the gains to aggregate output and productivity due to migration.

Finally, one potentially large source of underestimation of the importance of interprovincial migration to the Canadian economy is the decision to measure the annual effect rather than the cumulative effect of migration. Because migra-

tion is largely an adjustment mechanism to market conditions, it provides the necessary labour market flexibility to facilitate and encourage beneficial structural shifts in the economy. When a worker moves from a less productive to a more productive province, this development not only increases productivity for that year, but also for every following year in which he is employed. The level effect is permanent rather than transitory. In this context, if there would have been no interprovincial migration during the entire period covered in this report, output and productivity levels would have been significantly lower in 2006 than the current levels. Future research is needed to address all these limitations and provide more accurate estimates of the role of interprovincial migration in output and productivity growth in Canada.

Conclusion

The re-allocation of labour, in itself, does not produce productivity growth. It is factors such as increased human capital, technological advancement, and capital investment that create potential productivity gains. The re-allocation of labour ensures that these productivity gains are further exploited. This re-allocation can take place both within and across firms, industries, and provinces. The estimates of the effect of interprovincial re-allocation of labour on productivity growth in this article represent only a portion of the impact that the overall re-allocation of labour ultimately has on productivity growth.

Nevertheless, the 50 per cent increase in the number of interprovincial migrants in Canada between 2003 and 2006, largely driven by increased migration to high productivity Alberta, has boosted both aggregate labour productivity and output in the Canadian economy. It is estimated that in 2006, the net output gains arising from interprovincial migration were $883.1 million (1997 constant prices), or 0.074 per cent of GDP. Higher employment rates in provinces experiencing a net positive balance of interprovincial migrants were responsible for $398.0 million of the gains and higher output per worker in these provinces was responsible for $485.0 million.

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