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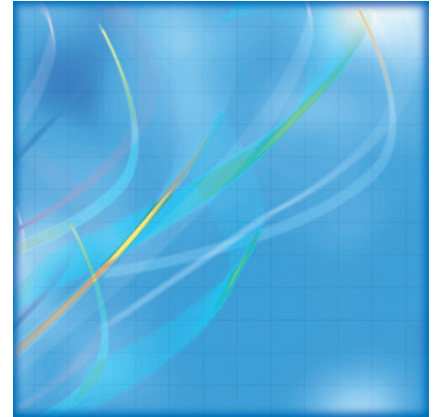
Insights on the Canadian Economy

Provincial Income Disparities Through an Urban-Rural Lens: Evidence from the 2001 Census

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Abstract

This paper describes per capita employment income disparities across provinces and across the urban-rural continuum, from larger to small cities and between cities and rural areas. Its first objective is to compare the degree of income disparities across provinces to income disparities across the urban-rural continuum. Its second objective is to determine the extent to which provincial disparities can be tied to the urban-rural composition of provinces. The paper also seeks to determine whether urban-rural disparities in per capita employment income stem from poorer labour market conditions in smaller cities and rural areas compared to large cities.

1. Introduction

Most analyses of regional income disparities in Canada have focused on provincial disparities. Given that Canada is a federation of provinces, this emphasis is understandable. But our province of residence is not the only geographic characteristic that might influence incomes. As others have argued,¹ income levels can be influenced just as much by whether we live in a large or small city or in a rural region.

The purpose of this paper is to analyse geographic income disparities in Canada from the perspective of provinces and especially urban and rural areas. In particular, we are interested in how per capita incomes vary across the urban-rural continuum—that is, how per capita incomes in large cities like Toronto and Montreal compare with medium sized cities like Halifax and Victoria, small cities like Brandon and Drummondville and with rural areas, be they those that are found close to cities or those that are more remote.

We are interested not only in how incomes vary across the urban-rural continuum, but also whether income disparities across city sizes and between cities and rural areas can provide us with a better understanding of provincial disparities. If incomes systematically fall with city size and between cities and rural areas, then part of the reason why provincial incomes may vary is because the populations of some provinces are concentrated in smaller cities and rural areas, while the populations of others are concentrated in larger cities. It is through this ‘urban-rural lens’ that we might better understand provincial income disparities.

There are several reasons why we expect per capita income levels to vary across urban and rural regions.

1. Savoie (1992) noted that disparities within provinces are often greater than between them and the Economic Council of Canada (1977) has argued provincial disparities, in part, stem from the urban-rural composition of provinces. More recent work by the Institute for Competitiveness and Prosperity (2004) has identified the level of urbanization of Ontario relative to its state and provincial peers as an underlying cause of its relatively poor productivity performance. Finally, Glaeser and Maré (2001) show that in the U.S. there is a greater gap in incomes (36%) between families in metropolitan areas of over a million and those that live outside of these areas than the earnings gap across races or between union and non-union members.

- First, per capita incomes may be lower in smaller cities and rural areas if a smaller proportion of their population is working relative to large urban areas. For instance, this may result from lower employment rates in rural areas.
- Second, workers in rural areas and smaller cities may be paid less, on average, than workers in larger urban areas.
 - In part, this may be because workers in larger urban areas work in occupations that pay more—an occupational composition effect.
 - It may also be that employers are able to pay higher wages in larger urban areas because these higher wages are matched by higher levels of productivity.² At the margin, if the amount of revenue generated by each additional worker (their productivity) does not match their wage level, firms would either “...leave [the city] or hire fewer workers.”³

The remainder of the paper is organised as follows. Section 2 describes the data used in the analysis and how we classify rural and urban areas. Section 3 describes the distribution of the population of Canada and its provinces across urban and rural areas. Income disparities across provinces and the urban-rural continuum are discussed in Section 4. If urban-rural income disparities are large, part of the reason why some provinces have lower incomes could be because a larger proportion of their populations is found in smaller urban or rural areas. Therefore, Section 5 seeks to determine whether provincial differences are due, in part, to their urban-rural composition. Section 6 looks at how labour market and demographic characteristics of rural and urban areas contribute to disparities in incomes. Section 7 concludes the paper.

2. Data

This analysis relies on data derived from the 2001 Census. The Census provides extensive information on the levels and the sources of income of Canadians. The Census also provides information on where Canadians live, including their province and whether they live in a city or a rural area within each province.

We defined urban areas using Census Metropolitan Areas (CMAs) and Census Agglomerations (CAs). These are further subdivided into four size classes. The largest includes cities that have a population greater than or equal to 1,500,000—i.e., Toronto, Montreal and Vancouver (Tor-Mtl-Van). Large Urban areas are those with a population of 500,000 to 1,499,999 (e.g., Quebec City). Medium Urban areas have a population between 100,000 and 499,999 (e.g., Kingston) and Small Urban areas have a population between 10,000 and 99,999 (e.g., Red Deer). All other parts of Canada are classified as rural, which we subdivide into two types. The first is rural areas that

2. There is strong evidence that this is the case. Baldwin and Brown (2001) show that in Canada’s manufacturing sector, after controlling for industrial structure, there is a strong positive productivity gradient from rural areas to urban areas.

3. See Glaeser and Maré (2001: 318).

Table 1. Definitions of urban and rural classifications

	Rural-urban classification	Definition
URBAN	Tor-Mtl-Van	Census metropolitan areas (CMAs) with a population of 1,500,000 or greater. These are Toronto, Montreal and Vancouver
	Large urban	CMAs with a population between 500,000 and 1,499,999
	Medium urban	CMAs and Census agglomerations (CAs) with a population between 100,000 and 499,999
	Small urban	CAs with a population between 10,000 and 99,999
RURAL	Urban shadow	Rural census subdivisions that have commuting flows with a CMA or CA
	Remote rural	Rural census subdivision with no commuting flows to a CMA or CA

interact with urban regions (CMAs or CAs) through commuting flows, what we call rural areas in the Urban Shadow. The remaining rural areas are those that do not have any interaction with cities through commuting flows. We refer to these as Remote Rural (see Table 1).

We measure income levels across provinces and urban-rural classifications in terms of employment income per capita. In more precise terms, it is the total employment income of employed workers for a province or urban-rural class divided by their population. Employment income per capita, therefore, provides us with a measure of the ability of regional economies to provide jobs and the quality of these jobs as measured by the level of earnings. It does not, however, provide us with a measure of the entire scope of income sources available to individuals. This measure excludes income from transfers (e.g., Canada Pension income or income from Employment Insurance) as well as employment income of workers who were not employed when the Census was taken.

3. Provincial urban-rural distribution of population

In 2001, Canada's population was overwhelmingly urban. The urban categories combined for almost 80 percent of Canada's population. A further 19 percent lived within commuting distance of an urban area with a population of at least 10,000—the Urban Shadow (see Table 2). The remainder of the population (1.2%) lives in rural areas that have no interaction with urban regions with a population greater than 10,000 (Remote Rural). Rural populations that are isolated from urban areas are relatively small. Yet, for some provinces these populations are important. Ten percent of Saskatchewan's population is rural, as is 5% of Newfoundland and Labrador's.

There is considerable variation in the distribution of provincial populations across the six urban and rural classifications. None of the Atlantic Provinces or Saskatchewan have cities with a population greater than 500,000. These are also regions with large rural populations. Remote Rural and the Urban Shadow account for well over forty percent of the populations of Saskatchewan and each of the Atlantic Provinces, with the exception of Nova Scotia, which

Table 2. Provincial and urban-rural population, 2001

Panel A: Population							
	Tor-Mtl-Van	Large urban	Medium urban	Small urban	Urban shadow	Remote rural	Provincial total
N.L.	-	-	172,900	65,600	250,000	24,400	512,900
P.E.I.	-	-	-	74,600	60,100	700	135,300
N.S.	-	-	468,500	106,200	328,700	4,600	908,000
N.B.	-	-	240,400	140,800	331,800	16,600	729,500
Que. ^a	3,426,400	940,300	446,300	868,600	1,509,000	46,900	7,237,500
Ont. ^a	4,682,900	1,468,500	2,728,300	1,046,300	1,456,000	28,100	11,410,000
Man.	-	671,300	-	74,900	332,700	40,700	1,119,600
Sask.	-	-	418,700	146,500	320,700	93,000	978,900
Alta.	-	1,889,200	-	355,100	687,500	42,900	2,974,800
B.C.	1,987,000	-	607,000	775,000	496,800	41,900	3,907,700
<i>Canada</i>	<i>10,096,200</i>	<i>4,969,300</i>	<i>5,082,200</i>	<i>3,691,500</i>	<i>5,813,200</i>	<i>354,700</i>	<i>30,007,100</i>

Panel B: Shares (percent)							
	Tor-Mtl-Van	Large urban	Medium urban	Small urban	Urban shadow	Remote rural	Provincial total
N.L.	-	-	33.7	12.8	48.7	4.8	100.0
P.E.I.	-	-	-	55.1	44.4	0.5	100.0
N.S.	-	-	51.6	11.7	36.2	0.5	100.0
N.B.	-	-	33.0	19.3	45.5	2.3	100.0
Que. ^a	47.3	13.0	6.2	12.0	20.8	0.6	100.0
Ont. ^a	41.0	12.9	23.9	9.2	12.8	0.2	100.0
Man.	-	60.0	-	6.7	29.7	3.6	100.0
Sask.	-	-	42.8	15.0	32.8	9.5	100.0
Alta.	-	63.5	-	11.9	23.1	1.4	100.0
B.C.	50.8	-	15.5	19.8	12.7	1.1	100.0
<i>Canada</i>	<i>33.6</i>	<i>16.6</i>	<i>16.9</i>	<i>12.3</i>	<i>19.4</i>	<i>1.2</i>	<i>100.0</i>

^aThe Ottawa–Gatineau CMA has been split into its Ontario and Quebec parts.

Note: Urban-rural population totals and shares for Canada include the Territories.

Source: Special Tabulation, Census (2001).

nevertheless has a large rural population. This compares to a 21% share for Canada as a whole (see Table 2).

The remaining provinces have one or more cities that fall into the Tor-Mtl-Van or Large Urban classifications. These are the most important components of their populations. For instance, Winnipeg accounts for 60% of Manitoba's population and Vancouver accounts for just over 50% of British Columbia's.

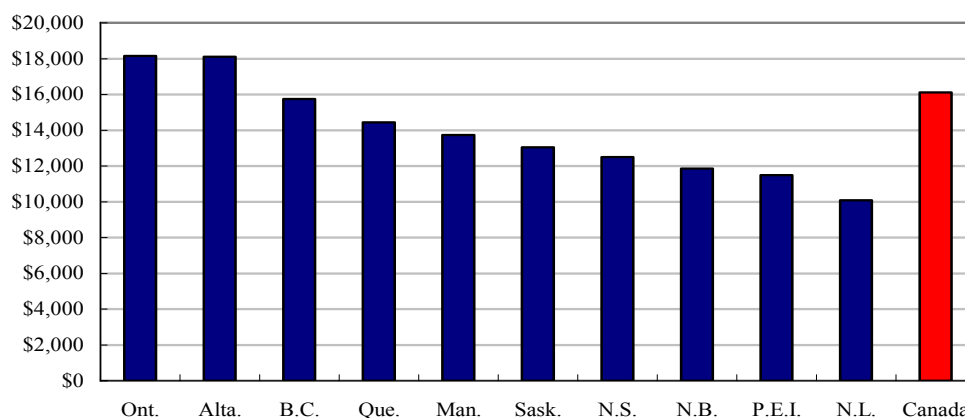
In effect, Canada is made up of two types of provinces, those that are endowed with larger urban regions and those that are more rural in character. If incomes vary systematically across the urban-rural continuum, then part of the reason why we observe provincial income disparities may be because of their differing composition of urban and rural areas.

4. *Per capita income disparities across provinces and urban and rural areas*

One of the consistent themes of regional economic research in Canada has been that of provincial income disparities. Relatively less attention has been paid to income disparities across rural and urban areas.⁴ Per capita employment incomes for provinces and the urban-rural continuum are displayed in Figures 1 and 2, respectively.

As Figure 1 illustrates, the emphasis placed on provincial disparities in regional research is not misplaced. In 2001, considerable income disparities persisted across provinces. Per capita incomes were highest in Ontario (\$18,100) and lowest in Newfoundland and Labrador (\$10,100). Yet, across the urban-rural continuum, per capita incomes were even larger. Per capita incomes were highest in Large Urban areas (\$18,500) and lowest in Remote Rural (\$8,600). The \$10,000 spread between larger urban areas and remote rural areas is greater than the \$8,000 per capita income spread across provinces.

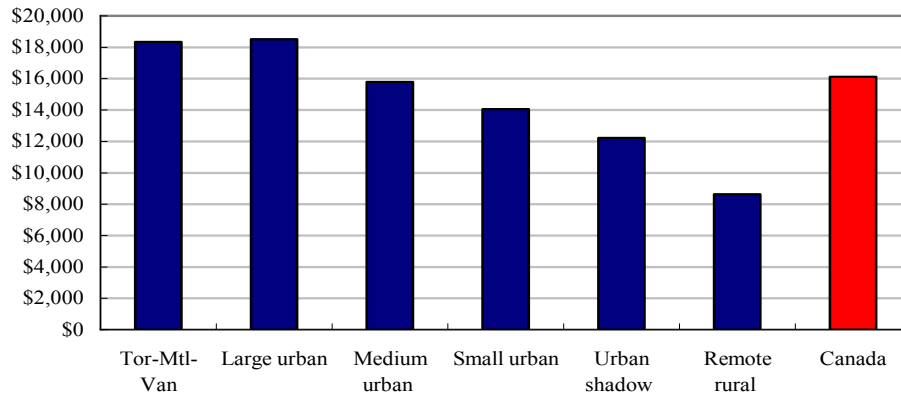
Figure 1. Provincial employment income per capita, 2001



The final point to be drawn from Figure 2 is that incomes rise systematically with urban size and between urban and rural areas. As we have noted in the introduction, and we will explore further in Section 6, this suggests a smaller proportion of the population in small urban and rural areas are working compared to larger urban areas and/or employment income levels are lower.

4. Notable exceptions include Alasia and Rothwell (2003) and Singh (2004). Alasia and Rothwell's analysis focused on trends in income disparities across sub-provincial units (Census Divisions) between 1992 and 1999. They find increasing disparities within provinces, while disparities across provinces have been falling. Among other things, Singh's analysis shows rural incomes are consistently lower than in urban regions. This paper differs from both analyses because of our focus on differences in incomes across urban areas and between urban and rural areas, as well as our focus on the effect of urban-rural composition of provinces on provincial income disparities.

Figure 2. Urban-rural employment income per capita, 2001



5. *Provincial disparities and urban endowments*

As noted above, provinces differ considerably in their urban-rural composition. Combined with the large variation in per capita incomes that we observe across the urban-rural continuum, this implies provincial income disparities may stem, in part, from how their populations are distributed across urban and rural areas. Some provinces may have relatively low per capita incomes because their populations are more heavily concentrated in smaller urban areas and in rural areas.

In more precise logical terms, part of provincial per capita income differences will be explained by their urban-rural composition when:

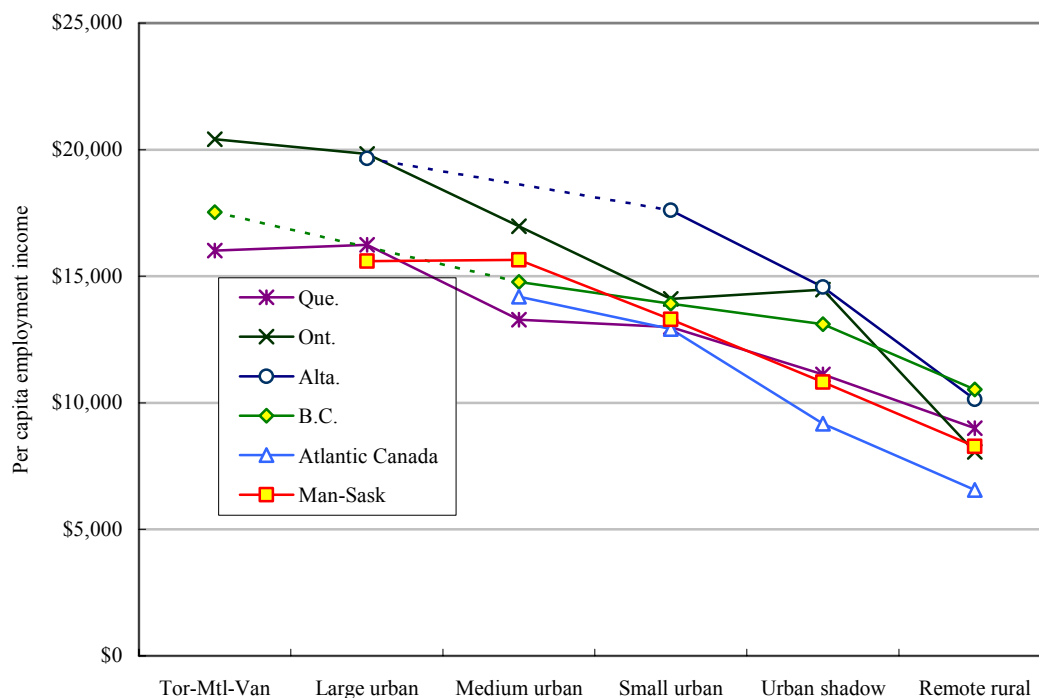
- there are differences in the urban-rural composition of provinces; and
- employment income per capita differs significantly across urban and rural areas within each province.

Figure 3 illustrates this latter point. It plots the levels of employment income per capita across all six urban and rural classifications for several provinces and two larger regions—Atlantic Canada and Manitoba and Saskatchewan (Man-Sask).⁵

The first point to be drawn from Figure 3 is that for almost all provinces/regions per capita incomes fall moving from larger to smaller cities, between cities and rural areas, and from rural regions in the shadow of urban centres to more remote rural regions. The negative gradient we observe nationally is replicated across all provinces (see also Table 3).

5. Aggregates are created for the Atlantic Provinces and for Manitoba and Saskatchewan in order to make Figure 3 less visually complicated. For the interested reader, urban-rural income levels for each of the four Atlantic Provinces and Saskatchewan and Manitoba are reported separately in Table 3.

Figure 3. Regional per capita employment incomes across the urban-rural continuum, 2001



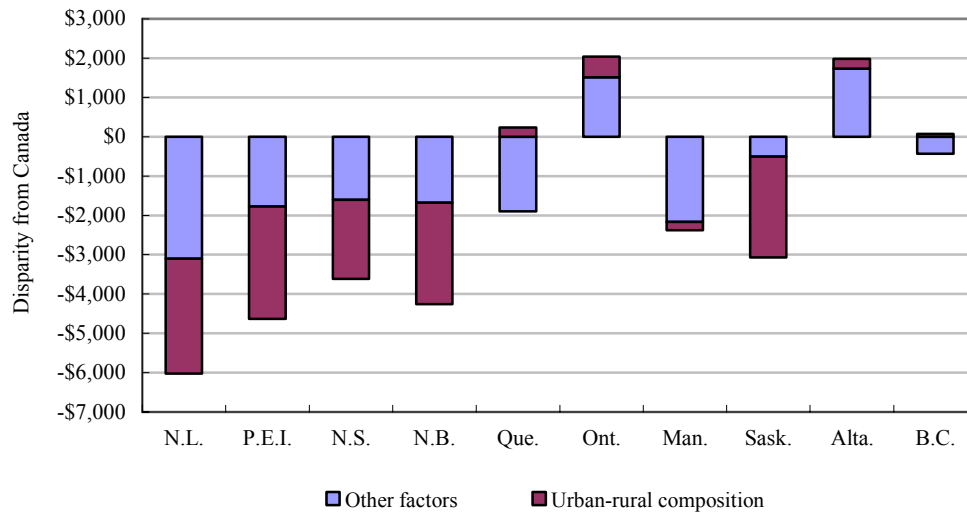
The second point to be drawn from Figure 3 is that the degree of variation we observe in each urban-rural category across provinces is always smaller than the amount of variation in per capita income within each province across urban-rural classes. Per capita incomes in Medium Urban areas, for instance, range from \$17,000 in Ontario to \$14,000 in New Brunswick (see Table 3), while in Ontario, for example, per capita employment income ranges from \$20,400 in Toronto to \$8,100 in Remote Rural areas. The examples of Medium Urban areas and Ontario are not unique. In all cases, there is a higher standard deviation in per capita income across urban-rural classes within a province than there is within each urban-rural class across provinces (see Table 3).

Table 3. Provincial per capita employment incomes across the urban-rural continuum, 2001

	Tor-Mtl-Van	Large urban	Medium urban	Small urban	Urban shadow	Remote rural	Standard deviation
N.L.			\$14,303	\$12,790	\$6,917	\$5,490	\$4,324
P.E.I.				\$13,140	\$9,470	\$7,483	\$2,870
N.S.			\$14,262	\$11,687	\$10,324	\$6,543	\$3,219
N.B.			\$13,960	\$13,783	\$9,690	\$8,082	\$2,953
Que.	\$16,014	\$16,245	\$13,278	\$12,995	\$11,121	\$8,998	\$2,799
Ont.	\$20,408	\$19,836	\$16,977	\$14,109	\$14,477	\$8,065	\$4,543
Man.		\$15,999		\$13,736	\$10,918	\$6,033	\$4,295
Sask.			\$15,642	\$13,067	\$10,725	\$9,269	\$2,791
Alta.		\$19,652		\$17,607	\$14,572	\$10,133	\$4,137
B.C.	\$17,535		\$14,775	\$13,913	\$13,109	\$10,522	\$2,549
<i>Canada</i>	<i>\$18,352</i>	<i>\$18,514</i>	<i>\$15,795</i>	<i>\$14,061</i>	<i>\$12,208</i>	<i>\$8,624</i>	<i>\$3,809</i>
Standard deviation	\$1,831	\$2,095	\$1,224	\$1,548	\$2,367	\$1,701	

Source: Census (2001).

Figure 4. Decomposition of provincial disparities, 2001



The descriptive analysis provided by Figure 3 and Table 3 suggests that part of the reason why we observe provincial disparities in per capita incomes is the difference in the urban and rural composition of each province. But we cannot tell from these data the degree to which urban-rural composition matters and for which provinces it matters most. To address this issue, we need to decompose the differences in provincial per capita incomes (from the Canadian average) into a component that is due to ‘urban-rural composition’ and a residual component attributable to ‘other factors’. The results of this decomposition are presented in Figure 4 and Table 4 and a description of the methodology is provided in Appendix A.

For the decomposition, the ‘urban-rural composition’ component captures the influence of the urban-rural composition of provinces on their deviation from the national average, while controlling for differences in employment incomes within each rural urban classification across provinces. Provinces whose populations are concentrated in small urban and rural areas will tend to have a negative urban-rural endowment effect, while provinces that have a relatively high proportion of their population in large cities will tend to have a positive effect.

The ‘other factors’ component measures the residual deviation in provincial per capita income levels that is not accounted for by the province’s urban-rural composition. It might be related to province-wide labour market conditions or forces that are specific to particular classes of urban or rural areas within a province. Manitoba’s negative deviation is an example of the latter. Manitoba’s relatively low per capita income levels largely stem from Winnipeg’s low per capita income compared to its peer group of cities and because Winnipeg accounts for a higher proportion of Manitoba’s population compared to its peer group of cities (see Table B1, Appendix B).

Urban-rural endowments accounted for a significant proportion of the income disparities experienced by the four Atlantic Provinces and Saskatchewan. The case of Nova Scotia is illustrative. Per capita earned incomes in Nova Scotia are \$3,616 below the national level. Of this disparity, \$2,007 is due to its urban-rural composition and \$1,609 is due to other factors (see Figure 4 and Table 4). Where urban-rural composition matters, provincial populations are

concentrated in relatively small cities and rural areas (see Table 2). However, urban-rural endowments are not an important determinant of income disparities for all provinces.

For Quebec, Ontario and Manitoba, it is the performance of their large cities that matters. On the one hand, Ontario's relative strength resulted mostly from above average incomes in Toronto, Ottawa and Hamilton compared to their peer groups of cities (see Table B1, Panel B, Appendix B). On the other hand, Quebec and Manitoba's relatively low employment incomes result from low incomes in Montreal and Winnipeg compared to their respective peer cities. The variation in the performance of these cities may be due to many factors, including their underlying industrial structure.

Table 4. Decomposition of provincial disparities

	Urban-rural composition	Other factors	Total deviation
	[1]	[2]	[1] + [2]
N.L.	-\$2,919	-\$3,103	-\$6,022
P.E.I.	-\$2,851	-\$1,779	-\$4,630
N.S.	-\$2,007	-\$1,609	-\$3,616
N.B.	-\$2,586	-\$1,676	-\$4,262
Que.	\$231	-\$1,896	-\$1,665
Ont.	\$525	\$1,512	\$2,037
Man.	-\$208	-\$2,169	-\$2,377
Sask.	-\$2,567	-\$505	-\$3,072
Alta.	\$255	\$1,729	\$1,984
B.C.	\$71	-\$434	-\$363

Source: See Appendix B, Table B1.

Alberta's strong performance results from relatively high per capita incomes across all of its rural and urban classifications compared to their peer groups (see Table B1, Appendix B). It also results from the relatively high concentration of Alberta's population in its Large Urban centres (Calgary and Edmonton) that, again, outperform their peer group in terms of per capita incomes.

In summary, provincial disparities are closely tied to how their populations are distributed across urban and rural areas, and to the relative prosperities of their larger urban economies.

6. Labour market and demographic conditions

The previous section illustrated how the distribution of a province's population across urban and rural areas can influence its overall level of per capita incomes. It would be natural to ask what underlies the strong negative gradient we observe in per capita incomes from the largest urban areas to the most isolated rural regions. One possibility is that the lower per capita incomes in smaller cities and rural areas are not a reflection of lower incomes earned by workers in these places, but rather of a small proportion of people in these areas being employed because of labour market and/or demographic factors.

Per capita employment income in a particular geographic unit depends on several factors. They most obviously depend on the level of incomes earned by those employed. However, per capita employment incomes depend on two other factors that primarily relate to a region's demographic and labour market conditions. First, per capita incomes depend on the proportion of the population that can be employed—the working age population, which is defined here as those residents who are fifteen years and older.⁶ Those regions with a higher proportion of children, *ceteris paribus*, will have lower per capita incomes. Hence, demographic conditions help to determine per capita incomes.

The second factor that affects per capita incomes is the proportion of the working age population that is employed—the employment rate. The employment rate depends both on labour market conditions facing workers and on other factors that influence the decisions of workers to enter the labour market (e.g., the trade-off workers make between work and leisure). The lower the employment rate, *ceteris paribus*, the lower the per capita income.

Together these factors—employment income of workers, the proportion of the population that is of working age, and the employment rate—can be related mathematically to per capita income levels using a simple identity:

$$\underbrace{\frac{\text{Income}}{\text{Pop}}}_{\text{Per capita income}} \equiv \underbrace{\frac{\text{Income}}{\text{Employment}}}_{\text{Employment income per worker}} \times \underbrace{\frac{\text{Employment}}{\text{Pop}^{15+}}}_{\text{Employment rate}} \times \underbrace{\frac{\text{Pop}^{15+}}{\text{Pop}}}_{\text{Working age to population ratio}} \quad (1.1)$$

where:

Income = Employment income of employed workers
 Employment = Number of persons employed
 Pop¹⁵⁺ = Working age population (15 years and over)
 Pop = Total population

Each of the three terms on the right-hand side of the equation captures the contribution of different factors to employment income per capita. The first term measures the average level of income per employed worker. The second term measures the employment rate and the final term measures the proportion of the population that is of working age.

The values for each of these three terms, as well as per capita income, are given in Table 5 for each of the urban and rural classes. The second row gives the level of employment income per worker. Employment income per worker falls consistently from larger to smaller cities and between urban and rural areas. Employment incomes are lowest in Remote Rural regions. There is also a tendency for employment rates to decline with city size, although Large Urban areas have a higher employment rate than Tor-Mtl-Van. Remote Rural areas have the lowest employment rates of all. The working age to population ratio varies little across urban and rural classes. It is only in Remote Rural areas where this ratio is appreciably lower; that is, it is only in these areas where demographic conditions matter.

6. Typically the working age population is defined as those people between the ages of 15 and 65, inclusive. We utilize the less restrictive population that is fifteen years and over.

Table 5. Income, labour force and demographic characteristics of urban and rural areas

	Tor-Mtl-Van	Large urban	Medium urban	Small urban	Urban shadow	Remote rural
Per capita income	\$18,352	\$18,514	\$15,795	\$14,061	\$12,208	\$8,624
Employment income per worker	\$36,421	\$35,105	\$32,414	\$29,995	\$26,822	\$23,173
Employment rate	61%	65%	60%	57%	57%	50%
Working age to population ratio	81%	81%	81%	81%	80%	74%
<i>Employment to population ratio</i>	<i>50%</i>	<i>53%</i>	<i>49%</i>	<i>46%</i>	<i>46%</i>	<i>37%</i>

Source: Census (2001).

The results presented in Table 5 suggest both variations in employment incomes per worker and labour market and demographic conditions contribute to disparities in incomes across the urban-rural continuum. Remaining to be answered is the relative contribution of these to disparities.

To simplify the analysis, we multiply the employment rate and the working age to population ratio in equation (1.1) together to give us the employment to population ratio (see Table 5). As such, this measure combines both labour market and demographic effects. Since there is little variation in the demographic conditions across urban areas and between urban areas and the Urban Shadow, this term largely captures the effect of varying labour market conditions. Only in Remote Rural regions will demographic and labour market conditions both contribute to its difference from other urban-rural classifications.

Figure 5 decomposes deviations in employment income per capita into two components across urban-rural classifications.⁷ The first is the *employment to population ratio*. This term captures the effect of deviations in the employment to population ratio from the national level on per capita incomes in each urban-rural class, while controlling for the effect of employment income per worker. The second term is *employment income per worker*. It captures the effect of deviations in employment income per worker from the national level on per capita incomes in each urban-rural class, while controlling for the effect of the employment to population ratio.⁸

Employment income varies across urban and rural areas in Canada because workers in rural areas earn lower incomes than those in urban areas and because a smaller proportion of the population in rural areas is employed. In Tor-Mtl-Van and Large Urban areas, favourable labour market conditions raise per capita incomes. This is particularly true of Large Urban areas where just over half of their positive deviation is due to favourable labour market conditions. In contrast, labour market conditions in Small Urban areas and the Urban Shadow tend to reduce per capita incomes. Finally, in Remote Rural regions, the employment to population ratio accounts for almost half of their negative deviation. Part of this is due to unfavourable labour market conditions and part is due to demographic conditions that result in a smaller than average working age population.

7. See Appendix C for a more detailed explanation of this decomposition.

8. Note that there is also a third covariance-like term that captures the interaction between the employment to population ratio and employment income per worker. Its contribution to the total deviation was small and had no qualitative influence on the results. Therefore, for ease of exposition, the covariance term was divided between the two components, with half being added to the 'employment income per worker' component and the other half to the 'employment to population ratio' component.

The conclusion to be drawn from Table 5 and Figure 5 is that the variation we observe in per capita incomes are exacerbated by the labour market and demographic conditions that tend to favour larger cities and disfavour smaller cities and rural areas, particularly more remote rural regions.

Figure 5. Per capita income decomposition



7. Conclusion

Provincial income disparities have, and continue to be, a subject of public debate. Often this debate has taken place without full consideration of the underlying structures of provincial economies and, in particular, their urban-rural composition. This paper demonstrates that urban-rural structure does matter. The Atlantic Provinces and Saskatchewan have below average per capita incomes to a significant extent because their populations are concentrated in smaller urban and rural areas. However, this is not true of all provinces.

Ontario's relatively strong performance and Quebec and Manitoba's weak performances do not stem, by and large, from a favourable or unfavourable urban-rural composition, but how incomes in their largest cities compare to their peers. Specifically, Ontario's high per capita incomes can be traced to Toronto's relatively high incomes, while Quebec and Manitoba's lower per capita incomes are linked to Montreal and Winnipeg's low incomes relative to their peers. In short, our understanding of the performance of these provincial economies depends on what underlies the relative performance of their larger cities.

How then do we interpret the strong negative income gradient from larger to small cities and between cities and rural areas? In part, this negative per capita income gradient results from relatively poor labour market conditions in smaller cities and rural areas compared to larger cities. However, this negative gradient still remains after controlling for labour market (and demographic) conditions; on average, employed workers in larger cities are paid more than those in smaller cities and rural areas.

Underlying the income gradient of employed workers are many factors, but two are probably most important. First, occupations that are higher paying may be overrepresented in larger cities compared to smaller cities and rural areas. Second, it may be that higher wages in large cities are matched by higher levels of productivity on the part of urban workers.

There are many factors that might explain the productivity advantage of locating in larger cities, which include the benefits of access to large pools of skilled labour and locating in a center with a larger number of industries. Economies that are inherent to larger cities may be very difficult to replicate in smaller cities and rural areas. Hence, part of the provincial disparities we observe may in fact be structural.

Appendix A: Provincial per capita income decomposition methodology

Provincial per capita incomes differ because (1) the urban-rural composition of provinces differ and/or (2) because per capita incomes within each urban-rural classification differs from their respective national per capita income levels.

To determine whether the urban-rural composition of provinces matters more or less than within classification differences, it is necessary to control for one or the other. That is, either we hold urban-rural per capita incomes across provinces constant to their respective national levels and allow the urban-rural composition of provinces to vary (*condition 1*) or we hold the urban-rural composition of provinces constant to the national level and allow per capita incomes to vary within each urban-rural classification (*condition 2*).

In order to decompose provincial per capita income disparities, several pieces of information are required. The per capita income levels of each urban-rural class i within each province j (w_{ij}), and the per capita income of each province ($w_{\cdot j}$) and the nation as a whole ($w_{\cdot\cdot}$). Note that the dot (\cdot) indicates the variable has been aggregated across that dimension. Similarly, we require the population shares of each urban-rural class within each province (s_{ij}) and within Canada ($s_{i\cdot}$).

Mathematically, provincial disparities are a weighted average of the difference between the per capita income of each urban/rural area in each province and the national per capita income, where the weights are the population shares of each urban/rural classification within each province:

$$w_{\cdot j} - w_{\cdot\cdot} \equiv \sum_i s_{ij} (w_{ij} - w_{\cdot\cdot}) \quad (1.2)$$

If all of the deviation in the per capita income between a province j and Canada were due to their endowment of urban and rural areas then the following condition would hold:

$$w_{\cdot j} - w_{\cdot\cdot} \equiv \underbrace{\sum_i s_{ij} (w_{i\cdot} - w_{\cdot\cdot})}_{\text{Urban-rural composition effect}} \quad (1.3)$$

In other words, if province j had the same urban-rural composition as the country as a whole, its per capita incomes would match those of the nation as a whole.

Alternatively, provincial deviations may be due to variation in incomes within urban-rural classes. We control for the effect of the difference in urban-rural composition by forcing provincial shares to equal the national share for each urban-rural classification ($s_{ij} = s_{i\cdot}$). The effect of within urban-rural classification variation is further isolated by differencing the within

urban-rural classification per capita income (w_{ij}) from the national per capita income level of each urban-rural class ($w_{i.}$), rather than the national per capita income level ($w_{..}$). If all of the provincial deviation in provincial incomes were due to the within-classification differences, then

$$w_{.j} - w_{..} \equiv \underbrace{\sum_i s_{i.} (w_{ij} - w_{i.})}_{\text{Region effect}} \quad (1.4)$$

In other words, equation (1.4) implies that if province j 's urban-rural areas had the same per capita incomes as their national counterparts, then its per capita income would match the national level. The term is referred to as the 'region effect' because it captures other aspects of regional economies on their within classification differences—for instance, differences in the industrial structure of rural areas across provinces.

Note that for several provinces there are urban classes that are not present. In these cases, there is no observed difference between the provincial per capita income for the class and the national level. Operationally, the provincial effect for these observations is set to zero.

Of course, provinces vary both in terms of their composition of urban and rural areas and their levels of incomes within each classification. Therefore, to account for the deviation in per capita incomes equations (1.3) and (1.4) should be added together. Yet this does not completely exhaust the deviation. It is only exhausted when a covariance-like term is added:

$$w_{.j} - w_{..} \equiv \underbrace{\sum_i s_{ij} (w_{i.} - w_{..})}_{\text{Urban-rural composition effect}} + \underbrace{\sum_i s_{i.} (w_{ij} - w_{i.})}_{\text{Region effect}} + \underbrace{\sum_i (s_{ij} - s_{i.}) (w_{ij} - w_{i.})}_{\text{Covariance effect}} \quad (1.5)$$

The covariance term combines two effects. It combines the effect of an endowment of urban and rural areas that deviates from the national endowment with the effect of deviations in per capita incomes within each urban-rural classification from their respective national levels.

Appendix B: Provincial per capita income decomposition components

Table B1 describes the contribution of each of the urban and rural classifications for the ten provinces to their overall deviation from the national per capita income level. Panel A corresponds to the first term, Panel B the second term, and Panel C the third term in equation (1.5) in Appendix A. Each row is summed for each province to provide a measure of the total contribution of each component. Figure 3 and Table 3 present the contribution of the Urban Endowment Effect and the sum of the Region Effect and the Covariance Term. For example, Newfoundland and Labrador's total deviation from Canada is -\$6,022, which is equal to the province's Urban Composition Effect (-\$2,919) plus Other Factors (-\$3,103). The Other Factors component is equal to the Region Effect (-\$1,359) plus the Covariance Effect (-\$1,744) (see Table B1).

We should also note that the decomposition is based on a more detailed breakdown of urban and rural areas than is presented in Table B1. Specifically, small urban areas are divided into those with populations between 10,000 and 49,999 and from 50,000 to 99,999. In addition, rural areas classified to the Urban Shadow are divided into three categories based on their interaction with CMAs and CAs through commuting flows. The purpose of this finer grained breakdown of urban and rural regions is to better represent the composition of provincial economies and therein improve the accuracy of the decomposition. These categories are not presented in order to simplify the presentation of results. The urban endowment, regional, and covariance effects for Small Urban and rural areas in the Urban Shadow are simply sums of their disaggregated components.

Table B1. Provincial urban-rural endowment decomposition**Panel A: Urban-rural composition effect**

	Tor-Mtl- Van	Large urban	Medium urban	Small urban	Urban shadow	Rural	Total
N.L.			-107	-271	-2,184	-356	-2,919
P.E.I.				-1,100	-1,714	-37	-2,851
N.S.			-164	-248	-1,557	-38	-2,007
N.B.			-105	-391	-1,920	-170	-2,586
Que.	1,060	312	-20	-248	-825	-49	231
Ont.	919	309	-76	-186	-423	-18	525
Man.		1,440		-142	-1,234	-272	-208
Sask.			-136	-317	-1,403	-711	-2,567
Alta.		1,525		-243	-920	-108	255
B.C.	1,138		-49	-405	-533	-80	71

Panel B: Region effect

	Tor-Mtl- Van	Large urban	Medium urban	Small urban	Urban shadow	Rural	Total
N.L.			-253	-85	-984	-37	-1,359
P.E.I.				-189	-590	-13	-793
N.S.			-260	-163	-270	-25	-717
N.B.			-311	-103	-473	-6	-893
Que.	-786	-376	-426	-130	-219	4	-1,933
Ont.	692	219	200	10	340	-7	1,454
Man.		-483		-18	-148	-31	-680
Sask.			-26	-65	-234	8	-317
Alta.		188		505	474	18	1,186
B.C.	-275		-173	-23	158	22	-290

Panel C: Covariance effect

	Tor-Mtl- Van	Large urban	Medium urban	Small urban	Urban shadow	Rural	Total
N.L.			-250	-69	-1,312	-112	-1,744
P.E.I.				-349	-645	8	-986
N.S.			-531	-107	-268	14	-893
N.B.			-294	45	-528	-6	-783
Que.	-320	81	271	5	2	-2	37
Ont.	152	-49	82	-7	-126	5	58
Man.		-1,265		1	-161	-63	-1,489
Sask.			-40	-73	-129	54	-188
Alta.		534		-84	90	4	543
B.C.	-140		14	-9	-7	-2	-144

Source: Census (2001).

Appendix C: Urban-rural per capita income decomposition methodology

The decomposition of the deviation in per capita income (PCI) of each urban-rural classification i from the national per capita income level takes on a similar form to that described in Appendix A. The decomposition is described mathematically as follows:

$$PCI_i - PCI = \underbrace{EP(I_i - I)}_{\text{Employment income effect}} + \underbrace{I(EP_i - EP)}_{\substack{\text{Employment to population} \\ \text{ratio effect}}} + \underbrace{(I_i - I)(EP_i - EP)}_{\text{Covariance effect}} \quad (1.6)$$

where EP is the employment to population ratio and I is the average income of the employed. Note that when a variable is not indexed by i it represents the national level measure. The *Employment Income Effect* measures the contribution of the deviation of employment income of the urban-rural class from the national level using the national employment to population ratio. The *Employment to Population Ratio Effect* measures the contribution of variation in the employment to population ratio for each urban-rural class from the national level using the national employment income per worker. Finally, the *Covariance Effect* measures the contribution of any correlation between the deviations in employment income per worker and employment to population ratio of each urban-rural class from the national level.

Table C1 presents the deviation from the national per capita income level and its three components described by equation (1.6) for each of the urban-rural classifications. Note that the covariance term is relatively small compared to the two other categories. Hence, for exposition purposes, the covariance term has been divided in two, with one half added to the employment income effect and the other half to the employment to population ratio effect (see Table C2). This has little qualitative effect on the results.

Table C1. Per capita income decomposition

	Deviation	Components		
		Employment income	Employment to population ratio	Covariance
Tor-Mtl-Van	\$2,239	\$1,724	\$465	\$50
Large urban	\$2,402	\$1,079	\$1,240	\$83
Medium urban	-\$317	-\$239	-\$80	\$1
Small urban	-\$2,052	-\$1,443	-\$669	\$60
Urban shadow	-\$3,904	-\$2,977	-\$1,137	\$210
Remote rural	-\$7,489	-\$4,764	-\$3,868	\$1,144

Source: Census (2001).

Table C2. Per capita income decomposition
with reallocated covariance term

	Deviation	Components	
		Employment income	Employment to population ratio
Tor-Mtl-Van	\$2,239	\$1,749	\$490
Large urban	\$2,402	\$1,120	\$1,281
Medium urban	-\$317	-\$238	-\$79
Small urban	-\$2,052	-\$1,413	-\$639
Urban shadow	-\$3,904	-\$2,872	-\$1,032
Remote rural	-\$7,489	-\$4,192	-\$3,297

Source: Census (2001).

References

Alasia, A. and N. Rothwell. 2003. *The Rural/Urban Divide is not Changing: Income Disparities Persist*. Rural and Small Town Canada Analysis Bulletin, Catalogue no. 21-006-XIE, Vol. 4, No. 4. Ottawa: Statistics Canada.

Baldwin, J.R. and W.M. Brown. 2001. *Dynamics of the Canadian Manufacturing Sector in Metropolitan and Rural Regions*. Analytical Studies Research Paper Series, Catalogue no. 11F0019MIE2001169. Analytical Studies Branch. Ottawa: Statistics Canada.

Economic Council of Canada. 1977. *Living Together: A Study of Regional Disparities*. Ottawa: Supply and Services Canada.

Glaeser, E.L. and D.C. Maré. 2001. "Cities and Skills." *Journal of Labour Economics*, 19, 2: 316-342.

Savoie, D.J. 1992. *Regional Economic Development: Canada's Search for Solutions*. Toronto: University of Toronto Press.

Singh, V. 2004. *The Rural-Urban Income Gap within Provinces: An Update to 2000*. Rural and Small Town Canada Analysis Bulletin, Catalogue no. 21-006-XIE, Vol. 5, No. 7. Ottawa: Statistics Canada.

The Institute for Competitiveness and Prosperity. 2004. *Realizing our Prosperity Potential, Third Annual Report*, November 2004. Toronto: The Institute for Competitiveness and Prosperity.