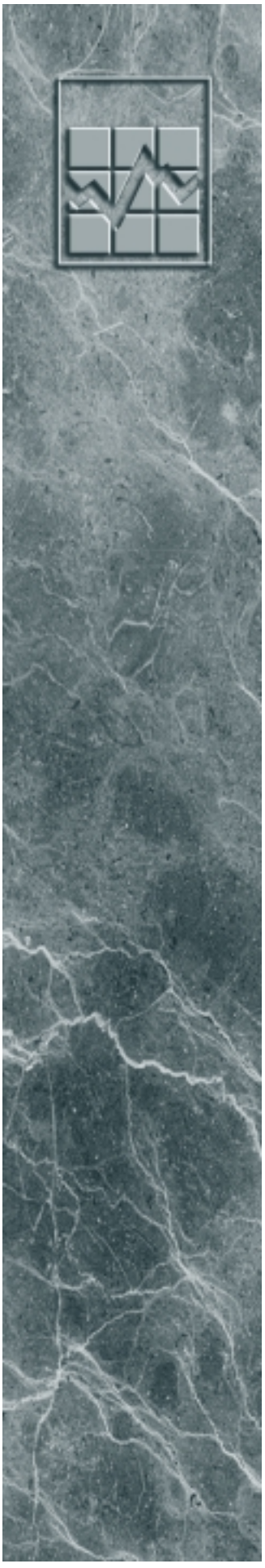


Income Statistics Division

75F0002MIE - 00008

Sources of Differences in Provincial Earnings in Canada

Prepared by:
Kamal K. Sharan

December 2000

Statistics Canada Statistique Canada

Canada

Data in many forms

Statistics Canada disseminates data in a variety of forms. In addition to publications, both standard and special tabulations are offered. Data are available on the Internet, compact disc, diskette, computer printouts, microfiche and microfilm, and magnetic tape. Maps and other geographic reference materials are available for some types of data. Direct online access to aggregated information is possible through CANSIM, Statistics Canada's machine-readable database and retrieval system.

How to obtain more information

Inquiries about this product and related statistics or services should be directed to: Client Services Income Statistics Division Canada, Ottawa, Ontario, K1A 0T6 ((613) 951-7355; (888) 297-7355; income@statcan.ca) or to the Statistics Canada Regional Reference Centre in:

Halifax	(902) 426-5331	Regina	(306) 780-5405
Montréal	(514) 283-5725	Edmonton	(403) 495-3027
Ottawa	(613) 951-8116	Calgary	(403) 292-6717
Toronto	(416) 973-6586	Vancouver	(604) 666-3691
Winnipeg	(204) 983-4020		

You can also visit our World Wide Web site: http://www.statcan.ca

Toll-free access is provided **for all users who reside outside the local dialing area** of any of the Regional Reference Centres.

National enquiries line	**1 800 263-1136**
National telecommunications device for the hearing impaired	**1 800 363-7629**
Order-only line (Canada and United States)	**1 800 267-6677**

Ordering/Subscription information

All prices exclude sales tax

Catalogue no. 75F0002MIE-00008, is available on internet for free. Users can obtain single issues at http://www.statcan.ca/cgi-bin/downpub/research.cgi.

Standards of service to the public

Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner and in the official language of their choice. To this end, the agency has developed standards of service which its employees observe in serving its clients. To obtain a copy of these service standards, please contact your nearest Statistics Canada Regional Reference Centre.

Statistics Canada
Income Statistics Division

Sources of Differences in Provincial Earnings in Canada

Published by authority of the Minister responsible for Statistics Canada

December 2000

Catalogue no. 75F0002MIE - 00008
ISSN 0000-0000

Catalogue no. 75F0002MPE - 00008
ISSN 0000-0000

Frequency: Irr.

Ottawa

La version française de cette publication est disponible sur demande

---

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and goodwill.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

ABSTRACT

The presence of economic disparities in Canada is well documented and widely discussed subject. There have been several empirical studies trying to explain this disparity and searching for the reasons causing the economic disparity.

This paper is an attempt to quantify the magnitude of economic disparities among Canadian provinces. Average annual earning of a province is used as an indicator of economic well being of that province. Average annual earning of a province is defined as a product of three components; (a) average hourly wage rate, (b) average weekly hours, and (c) average weeks worked in a year.

The study chooses Ontario as a benchmark province to which all other provinces are compared. In this sense the difference between the average annual earnings of Ontario and the average annual earnings of any other province quantifies the magnitude of economic disparity between that province and Ontario. The study presents a pair-wise measure of economic disparity of Ontario with all other provinces one at a time.

Once the economic disparity is quantified the paper then decomposes the difference in average annual earnings (of any two province) into three components of average annual earnings. This means that once an economic disparity is quantified then it is possible to make statement such as given a measure of economic disparity (e.g., $2,000), x% is due to higher wage rate in Ontario, y% is due to the fact that Ontarians work more hours in a week, and z% is due to the fact that Ontarians work more weeks in a year than the province it is being compared to.

The paper uses a decomposition technique to make such statements. The results are summarized in different pair-wise tables. The pair-wise results are also compared for Canadian national average with Ontario.

The results of this paper should be interpreted with caution. This is the first study of its kind. Secondly only one year, 1998 has been considered. The study does not consider other factors such as industrial structure, occupational structure, education level, and age structure of the provinces, which might alter the findings of this study. A more detailed analysis in this area is required, especially one that can control for these factors.

Key Words: Decomposition, standardization, economic disparity, provincial earnings, hourly wage rate, weekly hours, weeks per year, average annual earnings, earnings differences.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

TABLE OF CONTENTS


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

DECOMPOSITION OF PROVINCIAL EARNINGS DISPARITIES[1]

Introduction:

The presence of economic disparities among the Canadian provinces is well documented.[2] Several recent studies have tried to explain provincial economic disparities in Canada, such as Day (1997), Coulombe (1997, 1993), Doiron and Barrett (1997) and Sharan (2000)[3]. Several static and dynamic theories have proposed explanations for the provincial disparities but none have provided a complete set of reasons why provincial disparities exist.

Imperfect labour-capital mobility, government induced policies, differences in industrial structure, differences in labour demand functions and even language differences are offered for possible reasons of provincial disparities in Canada.[4]

There could be several sources of economic disparity between any two provinces, such as difference in fiscal, taxation and economic policies of provinces, difference in industrial and occupational structure of provinces, difference in endowment of natural resources between provinces and difference in endowment of labour-capital between provinces.

However, this paper is not an attempt to investigate the reasons behind economic disparities between provinces. Rather, it focuses on the measurement and sources of a given economic disparity between any two provinces.

The economic disparity between provinces can be measured in a number of ways such as, difference in per capita income of two provinces or difference in average income of two provinces or difference in Gross Domestic Product (GDP) of two provinces.

However, this paper chooses difference in annual average earnings of two provinces as a measure of economic disparity. The choice of average annual earnings as a measure of disparity was made for two reasons. First, availability of this data series and, second this was one data series for which the components of the series were also available. The nature of the paper required seeking such a measure of earnings for which the components were also available. At the same

[1] Author specially wants to thank Bryan van Tol of Investment and Captial Stock Division (ICSD), Statistics Canada for editing and proofreading of the paper.

[2] See McInnis (1968), Economic Council of Canada (1977) and Mansell and Capithrone (1986), Sharan (2000).

[3] Sharan (2000), used a different calculation of earnings and its components as ***an average of rates*** for each province. In this paper the calculation is as ***average rate for the provinces***. This leads to a very small discrepancy in the numbers. For details see Appendix A.

[4] Some of the studies explaining Canadian provincial disparities are Johnson and Kneebone (1987), Prichard (1983), Dooley, Frankel and Matheson (1987), Courchene (1970), Shaw (1986) and Vanderkamp (1973).

time it was also important to choose such a measure of earnings which is an accurate and universal definition. Average annual earnings may be used as a proxy for ***"well being of the people"*** on an average. Using the economic disparity based on average annual earnings one may say that, generally speaking people are well off in one province compared to the other province.

Earnings of provinces have been used by other researchers as a measure of economic disparity. For example, Mansell and Capithorne (1986, p32), in Canadian context concluded that ***"it is not the provincial differences in industrial structure per se which account for most of the earnings disparities; rather, it is that an individual working in a given industry in, say the Atlantic region earns considerably less than one working in other regions".***

Once it is decided that the economic disparity between two provinces is measured as a difference between their annual average earnings, it is imperative to rank different provinces of Canada based on average annual earnings in a descending order. Table 1 displays such a ranking for years 1997 and 1998. The table also shows the annual growth rate of average annual earnings for these provinces between 1997 and 1998. This ranking is based on 1997 data. The only difference between 1997 and 1998 ranking is that Nova Scotia has switched positions with Saskatchewan in 1998.

Table 1
Average Annual Earnings : 1997-1998

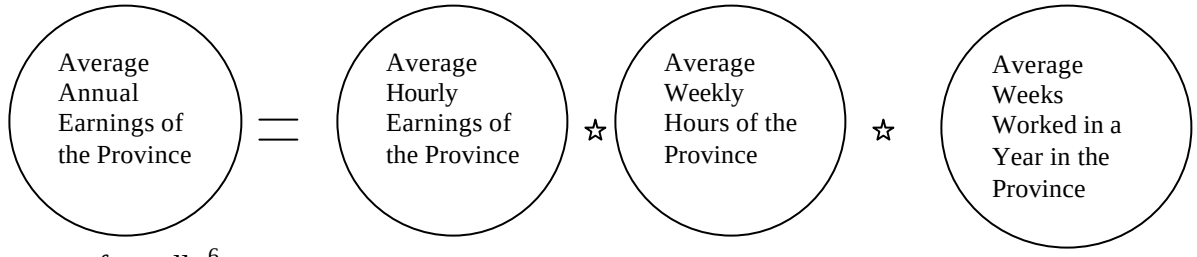
Provinces	1997	1998	Growth in Average Annual Earnings in 1997-1998
Canada (average)	**27,434**	**28,539**	4.0
Ontario	29,831	31,137	4.4
British Columbia	28,752	30,006	4.4
Alberta	27,412	28,402	3.6
Quebec	25,790	26,645	3.3
Manitoba	23,301	25,334	4.3
Saskatchewan	23,242	24,059	5.8
Nova Scotia	22,887	24,210	3.5
New Brunswick	21,912	22,428	2.4
Newfoundland	20,402	20,440	0.2
PEI	18,868	20,010	6.1

Source: Survey of Labour and Income Dynamics, Statistics Canada (SLID) 1997, 1998

Annual earnings at the provincial level are defined as a product of three components in this study;

(i) hourly wage rate at the provincial level,
(ii) hours worked in a week at the provincial level, and
(iii) number of weeks worked in a year at the provincial level.

In other words[5]:



Or more formally[6];

$$\left(\sum_{i}^{n} \text{Wage}\right) = \left(\frac{\sum_{i}^{n} \text{Wage}}{\sum_{i}^{n} \text{Hour}}\right) * \left(\frac{\sum_{i}^{n} \text{Hour}}{\sum_{i}^{n} \text{Week}}\right) * \left(\sum_{i}^{n} \text{Week}\right)$$

Where, $\sum_{i}^{n} = 1,2,....,n..\text{persons}$ in each province. The calculations were repeated for all of the ten provinces for reference year 1998, separately, one province at a time.

Table 2 shows the average annual earnings and its components for national average and Canadian provinces for the year 1998.

[5] For a more formal expression see Appendix A.

[6] Coulombe (1997, p12, equation (7)) uses a similar model to explain provincial disparities. He decomposes per capita earnings (Y/P) into worker productivity (Y/W), the employment rate (W/A) and Participation rate (A/P), i.e.,
$\left[\frac{Y}{P}\right] = \left[\frac{Y}{W}\right] * \left[\frac{W}{A}\right] * \left[\frac{A}{P}\right]$

Table 2
Average Annual Earnings and its Components: 1998

Provinces	Average Annual Earnings	Average Wage/ Hour	Average Hours/ Week	Average Weeks/ Year
Canada (average)	28,539	17.23	37.06	44.70
Ontario	31,137	18.26	37.11	45.94
British Columbia	30,006	18.38	36.18	45.13
Alberta	28,402	16.73	38.34	44.27
Quebec	26,645	16.61	36.43	44.04
Manitoba	25,334	15.16	37.00	45.17
Nova Scotia	24,210	14.75	38.09	43.09
Saskatchewan	24,059	14.81	37.82	42.94
New Brunswick	22,428	13.96	38.64	41.57
Newfoundland	20,440	14.32	38.13	37.44
PEI	20,010	13.19	39.46	38.45

Source: Survey of Labour and Income Dynamics, 1998

Based on Table 2 we can rank provinces of Canada for highest and lowest values of average annual earnings and its components for year 1998. In 1998 only two provinces Ontario and British Columbia had their average annual earnings above national average and all other provinces were below national average. However, even though Ontario had the highest average annual earnings it was not the province to have highest data points with respect to all of the three components of the average annual earnings. Table 3 shows the relative ranking of the provinces with respect to average annual earnings and its components.

Table 3
Relative Ranking of Provinces: 1998

Ranking of Provinces	Highest	Lowest
Average Annual Earnings	Ontario	PEI
Average Wage/Hour	British Columbia	PEI
Average Hours/Week	PEI	British Columbia
Average Weeks/Year	Ontario	Newfoundland

Source: Survey of Labour and Income Dynamics, 1998

When average annual earnings is formulated as a product of three components it gives rise to price and volume concepts. There is one price component (average hourly earnings) and two volume components (average weekly hours and average weeks in a year). Decomposing earnings in this way identifies the source of disparity as price-related or volume-related.

After defining the measure of economic disparity the focus of the paper shifts to investigate the sources of these differences. One way to do this is to decompose the average annual earnings into two or more components so that a certain proportion of the earnings difference can be attributed to each of these components.

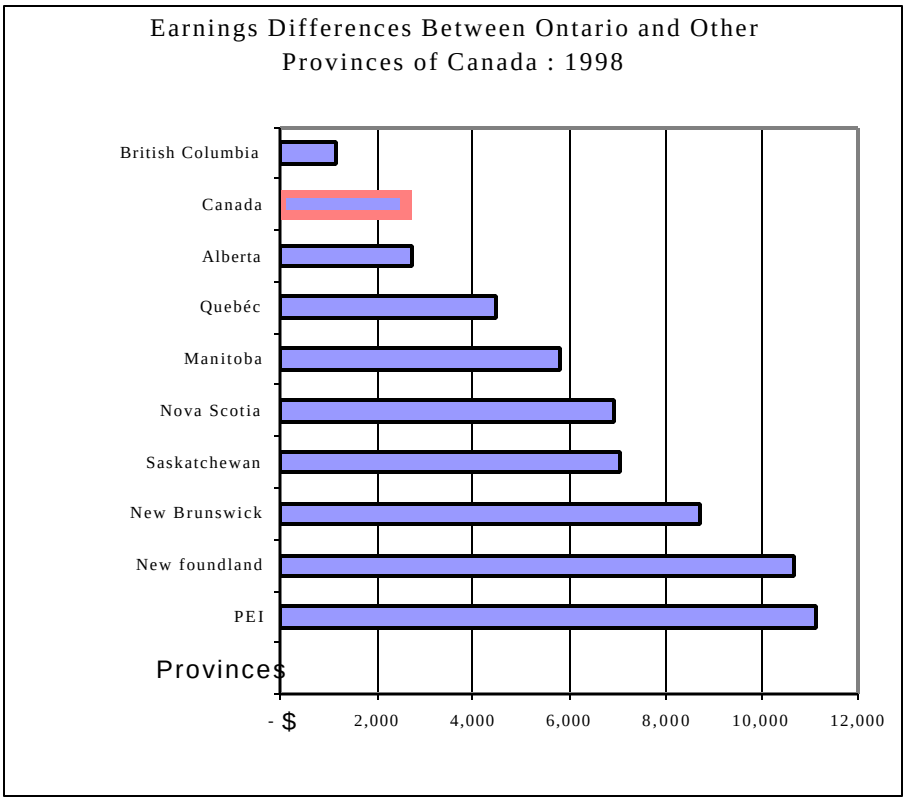
In an economic analysis price and quantity are two of the most important components of concern. Following this logic we decomposed average annual earnings into a price component and two quantity components. By doing so, it becomes easy to make statements such as given a difference in average annual earnings between two provinces, x% is due to price component and y% is due to quantity component. Further, since there are two quantity components in the analysis a y% can be further broken down into a y_1% and y_2%[7].

To facilitate our disparity analysis we choose one province, Ontario as a benchmark that is compared to all other provinces. The earnings disparity[8] of all of the provinces compared to Ontario is displayed in figure 1.

[7] Where, $y_1\% + y_2\% = y\%$.

[8] The average annual earning of Ontario ***minus*** the average annual earning of the province that is being compared.

Figure 1
Earnings Disparities of Provinces Compared to Ontario



Source: Survey of Labour and Income Dynamics, 1998

Figure 1 shows that British Columbia has minimum economic disparity with Ontario and PEI has the maximum. Also, except for British Columbia all other provinces have higher economic disparity compared to the national average (Canada in figure 1).

Why Decompose?

Decomposition identifies the relative importance of the price and volume components of economic disparity across provinces.

Some empirical studies have identified a list of causes of provincial economic disparities such as, imperfect labour capital mobility, government induced policies, difference in industrial structure and varying labour demand function among provinces. These reasons gradually lead to a wage rate differential among provinces that may be a principal cause of economic disparities. In other words, of price and quantity, it may be the price that is the principal cause of economic disparity.

Decomposition Methodology[9]:

To attribute a certain share of earnings differences to its components a standardization and decomposition technique has been used. This method is very straightforward and that is the strength of this methodology.

Standardization issues:

Standardization is an extension of the ***ceteris paribus*** assumption of economic analysis. In the ceteris paribus assumption, we study the effect of change in one variable on the economic phenomena while all other variables are held constant.

The standardization is a two-population extension of the ceteris paribus assumption. In the standardization procedure, only one and the same variable is allowed to be different between two populations and all other variables are assumed to be identical. Then the object of the analysis is to see the effects of one variable being different when all other variables were identical in both populations. This means that standardizing the two populations in the variables that were held identical to study the effect of one and the same variable being different in the two populations.

For example, there will be three different sets of standardized average annual earnings since there are three components of average annual earnings. The sum of all of the standardized disparities is equal to the unstandardized disparity.

For example, we let the hourly wage rate be different in two provinces and assume the number of hours worked over a week and the number of weeks worked in a year remian identical in both provinces. The resulting average annual earnings will be called hours of work and weeks of year standardized average annual earnings because these are the two components that are set to be identical in the two provinces. This standardization will study the effect of wage rate being different in two provinces.

Decomposition issues:

Decomposition identifies the proportional share of each of the components in the difference between the two populations. For example, the decomposition will tell us, that given an earnings difference (the measure of disparity) between any two provinces a certain percentage is due to a difference in hourly wage rate when the other two components were held identical between the provinces and another percentage is due to difference in hours of work per week and so on.

Box 1 describes decomposition and standardization in algebraic form. It also shows that unstandardized disparity is a sum of three standardized disparities.

[9] This technique is borrowed from Gupta (1993). For a formal derivation of the decomposition methodology see Appendix B.

Box 1

Standardization and Decomposition Methodology:

To express the standardisation and decomposition issues it is assumed that the average annual earnings of the benchmark province is (y) and the average annual earning of the other province is (Y). Also assume that both y and Y are products of three components, representing average annual hourly wage rate (a and A), average annual number of hours (b and B) and average annual number of weeks worked in a year (c and C). Thus,

$$y = a*b*c$$
$$Y = A*B*C$$

The disparity between two average annual earnings (y-Y) is decomposed into three effects steaming from the three components defining average annual earnings (See Appendix B for the details of decomposition technique).

(y-Y) = wage/hour effect + hours/week effect + weeks/year effect

Wage/hour effect is standardized average annual earnings in hours/week and week/year.

Hours/week effect is standardized average annual earnings in wage/hour and week/year.

Weeks/year effect is standardized average annual earnings in wage/hour and hours/week.

The unstandardized difference in average annual earnings (y-Y) is equal to the sum of the three standardized earnings differences. A typical decomposition equation would look like:

$$y - Y = \begin{pmatrix} \left[\left(\left[\frac{bc + BC}{3}\right] + \left[\frac{bC + Bc}{6}\right]\right) * [a - A]\right] + \\ \left[\left(\left[\frac{ac + AC}{3}\right] + \left[\frac{aC + Ac}{6}\right]\right) * [b - B]\right] + \\ \left[\left(\left[\frac{ab + AB}{3}\right] + \left[\frac{aB + Ab}{6}\right]\right) * [c - C]\right] \end{pmatrix} = \begin{pmatrix} \text{wage/hour} - \text{effect} + \\ \text{hours/week} - \text{effect} + \\ \text{weeks/year} - \text{efffect} \end{pmatrix}$$

Data sources and definitions:

The data for this analysis are from the Survey of Labour and Income Dynamics (SLID), a longitudinal household survey that began in 1993. Every three years

some 15,000 households enter the survey and remain for six years. Each year, two detailed questionnaires (one in January covering labour market activities in the previous year and second in May on income) are completed for household members aged 16 and over. Data used in the cross section analysis is for 1998.

SLID database provides the choice of average annual earnings based on main job or all jobs. The study uses the data from all jobs in the reference period. However, the data from either choice did not make any change in the quality of data.

Because the study uses all paid jobs (up to six) held by a person during the year, data are aggregated for people who had more than one job in any given year. Data variables are described in Box 2.

Box 2:
Data Variables and Definitions

Total earnings are obtained directly from the SLID database. Earnings are the sum of wages and salaries from all paid jobs in the year. The SLID variables used for this variable is totear1 (total earnings Job Reference year).

TOTEAR1: Total earnings from this job in reference year. The amount includes tips, bonuses and commissions. Total earnings is calculated using SLID variables IMPHWE1 and TOTHRP1 (also IMPHWS1 if there was a wage change in the month in which it occurred is known). Where required, TOTEAR1 may be imputed using annual wages and salaries, provided only one paid worker job was reported.

Hourly earnings are computed as the ratio of two existing series; the total earnings and total hours paid. Total hours paid in the reference year, **TOTHRP1,** is equal to the total hours scheduled minus scheduled hours during any unpaid absences. If it is not known whether an absence is paid, it is assumed it is unpaid. If a value is missing, it is imputed based on mean value of all jobs with the same value for number of months in which work was done (MTWKRD1).

Hourly earnings = **TOTEAR1/TOTHRP1**

Weekly hours are derived from average weekly hours in a given month. Twelve sub-series provided information for each month of the year. To calculate the average number of hours worked in a week over the year, only those months with more than zero hours are considered. In other words, months with zero hours worked are dropped and the average is calculated over the remaining months. Weekly hours are derived from monthly hours **HPW01V5- HPW12V5.** Usual paid hours in weeks when some work was done at this job (usual hours worked for non-paid workers jobs). There are 12 variables involved for twelve months of the year.

Annual weeks are derived by dividing total earnings by weekly earnings (which are product of hourly earnings and weekly hours).

Annual weeks = **TOTEAR1/(TOTHRP1*average of HPW01V5- HPW12V5)**.

Standardization and Decomposition of Economic Disparity between Canadian Provinces:

Now we can look at the pair-wise earnings disparity of Canadian provinces with Ontario chosen as the benchmark province, to which all other provinces are compared.

The standardization will show that if only one component of annual average earnings was allowed to be different and other two components were to be identical in both provinces then what would have been the earnings disparity. There are three sets of standardized average annual earnings, one for each component of average annual earnings. The decomposition analysis will show the share of the three components of average annual earnings in the existing disparity.

Ontario – British Columbia Disparities

The first pair chosen for decomposition analysis is Ontario and British Columbia (table 4). The unstandardized difference in average annual earnings of the two provinces is $1,131 in 1998. If we look at Table 2 we realize that although British Columbia has higher hourly wage rate than Ontario, the overall average annual earnings in British Columbia is lower than in Ontario.

However, if we standardized the average annual earnings in hours/week and weeks/hour for British Columbia and Ontario, then the average annual earnings in British Columbia is virtually the same as Ontario ($197). This is a perfect example of standardization technique. On the whole the average annual earnings of British Columbia is lower than that of Ontario. But if we look at this on component by component basis then the results do change. If hours of week and weeks of year were held identical in the two provinces the average annual earnings of British Columbia will be almost identical to that of Ontario. The results are summarized in Table 4.

Table 4
Ontario-British Columbia Disparities

Measures	Standardization		Decomposition	
	Ontario	British Columbia	Difference ($)	Percent Distribution
wage/hour effect	30,473	30,670	(197)	(18)
hour/week effect	30,959	30,181	778	69
weeks/year effect	30,844	30,295	549	49
Unstandardized Average Annual Earnings	31,137	30,006	1,131	100

Source: Survey of Labour and Income Dynamics 1998

Where,
wage/hour effect = hours/week and weeks/year are made identical in two provinces and only wage per hour is allowed to differ in the two provinces.

hours/week effect = wage/hour, weeks/year are made identical in two provinces and only hours per week is allowed to differ in the two provinces.

weeks/year effect = wage/hour and hours/week are made identical in two provinces and only hours per week is allowed to differ in the two provinces.

Table 4 shows that total unstandardized disparity of $1,131. Of this amount $778 or 69% is due to higher hours/week in Ontario and $549 or 49% is due to higher weeks/year in Ontario. But this does not add up to original disparity of $1,131 because in British Columbia hourly wage rate is higher than in Ontario resulting in $197 (–18% of total disparity) as a negative entry in the decomposition statistics. It can be concluded that the volume related disparity in Ontario are strong enough to compensate for higher price related disparity of British Columbia. As a result overall average annual earnings are higher in Ontario than in British Columbia.

In this example it is clear that the average annual earnings of British Columbia is lower only because of volume or quantity related disparity (i.e., lower hours/week and lower weeks/year). If the volume of work were the same in both provinces then the average annual income of British Columbia would have been higher than that of Ontario. Thus standardization and decomposition exercise effectively point out at the sources of earnings disparity between two provinces.

Ontario - Alberta Disparities

Alberta is another interesting province where once again we witness a situation where just looking at average annual earnings, the average annual earnings of Ontario is higher than that of Alberta. But this is not true in all scenarios. If we standardize the wage/hour and weeks/year then the average annual earnings of Alberta is higher than that of Ontario by $1,129 (-44% of total disparity); this is because hours/week is higher in Alberta than that in Ontario. This implies that on an average basis, workers in Alberta put in more hours per week than their counterparts in Ontario. But this is only one component of average annual earnings. The other two components, wage/hour and weeks/year is higher in Ontario than those in Alberta. The effects of these two components are strong enough in Ontario to compensate for higher hours/week effects in Alberta. As a result overall average annual earnings is higher in Ontario than in Alberta. The results are summarized in table 5.

Table 5
Ontario-Alberta Disparities

Measures	Standardization		Decomposition	
	Ontario	Alberta	Difference ($)	Percent Distribution
wage/hour effect	31,074	28,472	2,602	95
Hours/week effect	29,297	30,270	(973)	(35)
weeks/year effect	30,321	29,216	1,105	40
Unstandardized Average Annual Earnings	31,137	28,402	2,734	100

Source: Survey of Labour and Income Dynamics 1998

The total disparity between Ontario and Alberta is $2,734. Of which $2,602 (95% of total disparity) is due to price effect, i.e., wage/hour effect. The second component of average annual earnings is hours/week where Alberta is ahead of Ontario resulting in $-973 (-35%) more average annual earnings than Ontario if this was the only component of average annual earnings (or, if the other two components were identical in both provinces). But the effect of the other two components, wage/hours and weeks/year ($2,602 (95%), and $1,105 (40%) respectively), are strong enough in Ontario to compensate for higher hours/week effect in Alberta and still end up in having higher overall average annual earnings in Ontario than in Alberta.

Ontario – Quebec Disparities

The average annual earnings disparity between Ontario and Quebec is $4,492. The comparison here, is relatively simple in the sense that each of the three components of average annual earnings have lower values for Quebec compared to Ontario. So there is no compensatory mechanism at work in this comparison. Of the total disparity of $4,492, 61% or $2,734 is because of higher wage/hour in Ontario than in Quebec. $534 or 12% is due to higher hours/week in Ontario than in Quebec and $1,223 or 27% due to higher weeks/year in Ontario than in Quebec. The results are summarized in Table 6. This disparity is an example where, even if the comparison was on a component-by-component basis, the average annual earnings in Ontario would always be higher than in Quebec. While in the previous two comparisons there was at least one component in each case (wage/hour in British Columbia and hours/week in Alberta) where average annual earnings were lower in Ontario than the province it was being compared to. However, the decomposition analysis highlights that almost 60% of the earnings disparity are due to lower wage/hour in Quebec than in Ontario.

Table 6
Ontario-Quebec Disparities

Measures	Standardization		Decomposition	
	Ontario	Quebec	Difference ($)	Percent Distribution
wage/hour effect	30,213	27,478	2,734	61
hours/week effect	29,120	28,586	534	12
weeks/year effect	29,459	28,236	1,223	27
Unstandardized Average Annual Earnings	31,137	26,645	4,492	100

Source: Survey of Labour and Income Dynamics, 1998

Ontario – Manitoba Disparities

The earnings disparity between Ontario and Manitoba is $5,803. This comparison is also very simple since in each of the components of average annual earnings in Manitoba have lower values than that in Ontario. Of the total disparity $5,241, or 90% is due to higher wage/hour in Ontario than in Manitoba, $83 (2%) is due to higher values hours/week in Ontario and $479 or 8% due to higher value for weeks/year in Ontario than in Manitoba. However, the decomposition analysis highlights that 84% of the earnings disparity is due to higher wage/hour in Ontario compared to Manitoba. The results are summarized in Table 7. The analysis also suggests that no matter how we standardize the average annual earnings they will always be lower in Manitoba compared to Ontario.

Table 7
Ontario-Manitoba Disparities

Measures	Standardization		Decomposition	
	Ontario	Manitoba	Difference ($)	Percent Distribution
wage/hour effect	30,829	25,589	5,241	90
hour/week effect	28,258	28,175	83	2
weeks/year effect	28,449	27,971	479	8
Unstandardized Average Annual Earnings	31,137	25,334	5,803	100

Source: Survey of Labour and Income Dynamics, 1998

Ontario – Saskatchewan Disparities

Ontario – Saskatchewan earnings disparity analysis takes us back to the disparity comparisons with Ontario - British Columbia and Ontario - Alberta comparisons where we saw some compensating mechanism at work. The results are summarized in Table 8.

Table 8
Ontario-Saskatchewan Disparities

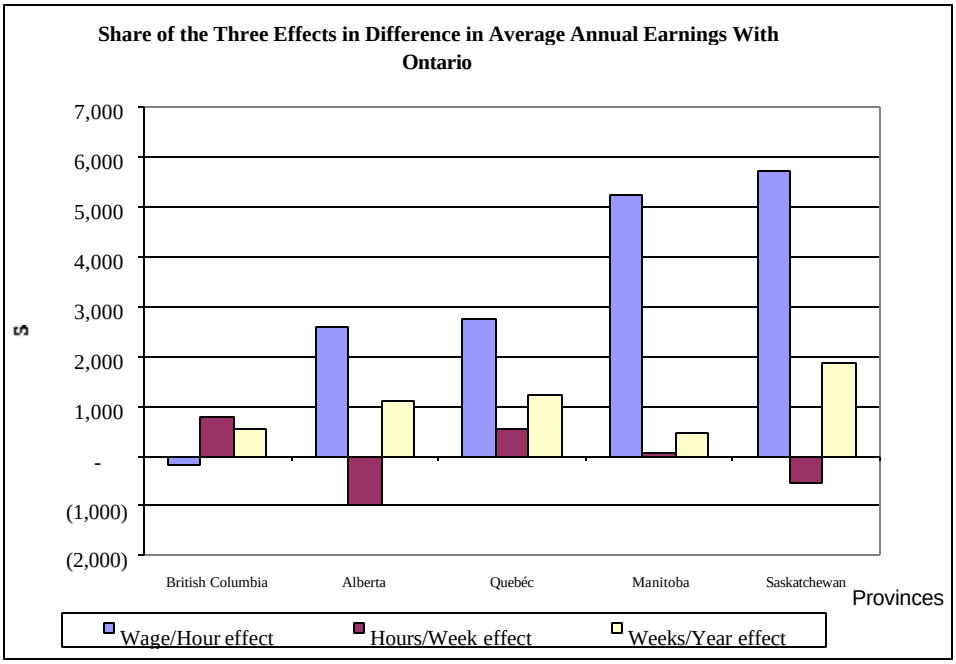
Measures	Standardization		Decomposition	
	Ontario	Saskatchewan	Difference ($)	Percent Distribution
wage/hour effect	30.404	24,664	5,740	81
hour/week effect	27,308	27,830	(522)	(7)
weeks/year effect	28,458	26,597	1,861	26
Unstandardized Average Annual Earnings	31,137	24,059	7,078	100

Source: Survey of Labour and Income Dynamics, 1998

In this comparison once again hours/week in Saskatchewan is higher than that in Ontario. The unstandardized earnings disparity between the two provinces is $7,078 of which $5,740 (or 81%) is due to higher value of wage/hour in Ontario compared to Saskatchewan. Weeks per year effect $1,861 (or 26%) is due to higher weeks/year values in Ontario compared to Saskatchewan. However, they don't add up to 100% of disparity because of higher hours/week values in Saskatchewan compared to Ontario. This results into $522 (-7%) higher average annual earnings in Saskatchewan compared to Ontario if we standardized in wage/hour and weeks/year. But the effects of wage/hour and week/year in Ontario are so strong that they compensate for higher hours/week values in Saskatchewan and as a result overall average annual earnings are higher in Ontario compared to Saskatchewan.

The paper just finished comparing Ontario to the provinces west of Quebec, including Quebec. A graphical representation of the shares of the three components of average annual earnings and their impact on average annual earnings is displayed in figure 2.

Figure 2



Source: Survey of Labour and Income Dynamics 1998

Figure 2 shows the effect and magnitude of the three components of average annual disparities of different provinces compared to Ontario. There are no negative values for any of the components for Quebec and Manitoba because in each of the components the values in Ontario were higher than these provinces. However, there is a negative value for wage/hour for British Columbia signifying that wage/hour values were higher in British Columbia compared to Ontario. Similarly for Alberta and Saskatchewan there are negative values for hours/week signifying that these values were higher in these provinces compared to Ontario. The magnitude of compensating mechanism is also evident from figure 2.

Now we will compare earnings disparities of the provinces east of Quebec to Ontario.

Ontario-New Brunswick Disparities

The comparison of average annual earnings of New Brunswick and Ontario also displays some compensation mechanism. Once again hours/week in New Brunswick is higher than that of Ontario. But stronger wage/hour and weeks/year effects, in Ontario compensates for higher hours/week in New Brunswick so much so that the overall annual average earnings in Ontario ends up being higher than that of New Brunswick. The results are displayed in Table 9. The decomposition analysis shows that price component is stronger than the volume component of earnings disparity between the two provinces. The overall average

annual earnings disparity is $8,708 of which major source is higher wage/hour in Ontario.

Table 9
Ontario-New Brunswick Disparities

Measures	Standardization		Decomposition	
	Ontario	New Brunswick	Difference ($)	Percent Distribution
wage/hour effect	30,254	23,135	7,120	82
hour/week effect	26.222	27,303	(1,081)	(12)
week/year effect	28,014	25,344	2,670	30
Unstandardized Average Annual Earnings	31,137	22,428	8,708	100

Source: Survey of Labour and Income Dynamics, 1998

Ontario-Nova Scotia Disparities

The disparity comparison analysis of Ontario and Nova Scotia runs along the same line as Ontario and New Brunswick, British Columbia, Saskatchewan and Alberta. Once again the hours/week in Nova Scotia is higher than, those in Ontario. The overall earnings disparity between the two provinces is $6,926 of which 85% is due to higher wage/hour in Ontario. Although the value of hours/week is higher in Nova Scotia, the wage/hour and weeks/year effects are so strong in Ontario that they compensate for higher hours/week values in Nova Scotia. As a result of this the overall average annual earnings is higher in Ontario. The results are summarized in Table 10.

Table 10
Ontario-Nova Scotia Disparities

Measures	Standardization		Decomposition	
	Ontario	Nova Scotia	Difference ($)	Percent Distribution
wage/hour effect	30,564	24,687	5,877	85
hour/week effect	27,302	28,019	(718)	(10)
week/year effect	28,500	26,733	1,768	26
Unstandardized Average Annual Earnings	31,137	24,210	6,926	100

Source: Survey of Labour and Income Dynamics, 1998

Ontario-Newfoundland Disparities

Ontario – Newfoundland earnings disparities also repeat the same story as with most of the other provinces. Once again Newfoundland has higher values in hours/week than Ontario but stronger wage/hour and weeks/year effect in Ontario lead to higher overall average annual earnings in Ontario compared to Newfoundland. The overall earning disparities between the two provinces is $10,696 of which the major source of disparity is wage/hour of the magnitude of 58%. The results are summarized in Table 11.

Table 11
Ontario-Newfoundland Disparities

Measures	Standardization		Decomposition	
	Ontario	Newfoundland	Difference (effects in $)	Percent Distribution of effects
wage/hour effect	28,631	22,446	6,185	58
hour/week effect	25,307	26,004	(697)	(7)
week/year effect	28,140	22,933	5,208	49
Unstandardized Average Annual Earnings	31,137	20,440	10,696	100

Source: Survey of Labour and Income Dynamics, 1998

Ontario-PEI Disparities

Ontario – PEI earnings disparity also repeats the same story. PEI has higher values for hours/week. This should be noted here that the hours/week in PEI are highest in Canada and still the average annual earnings in PEI are lowest in Canada. This is because wage/hour is lowest in PEI. Since the average annual earnings is lowest in PEI the earnings disparity with Ontario is highest with PEI. The overall earnings disparity between the two provinces is $11,127 of which the major source $8,190 is wage/hour disparity, equal to 74% of the overall disparity. The results are summarized in Table 12.

Table 12
Ontario-PEI Disparities

Measures	Standardization		Decomposition	
	Ontario	PEI	Difference ($)	Percent Distribution
wage/hour effect	29,476	21,287	8,190	74
hour/week effect	24,743	26,309	(1,567)	(14)
weeks/year effect	27,614	23,111	4,503	40
Unstandardized Average Annual Earnings	31,137	20,010	11,127	100

Source: Survey of Labour and Income Dynamics, 1998

Ontario-Canada (National Average) Disparities

It would be a good exercise to compare the earnings disparity of Ontario with the Canadian national average. But in the national average Ontario is also included pushing the national average quite high. So much so that the average annual earnings of only two provinces Ontario and British Columbia is higher than that of Canadian national average. However, if a comparison was made then Ontario's average annual earnings will be $2,598 higher than that of national average. Majority of which, $1,740 (or 67%) are due to higher wage/hour values in Ontario. It is interesting to note that most of the provinces had higher hours/week than Ontario but in a national average comparison the share of hours/week in the total disparity is only 2%. On the other hand weeks/year where Ontario's values were always higher contribute 31% in the overall disparity. The results are summarized in Table 13.

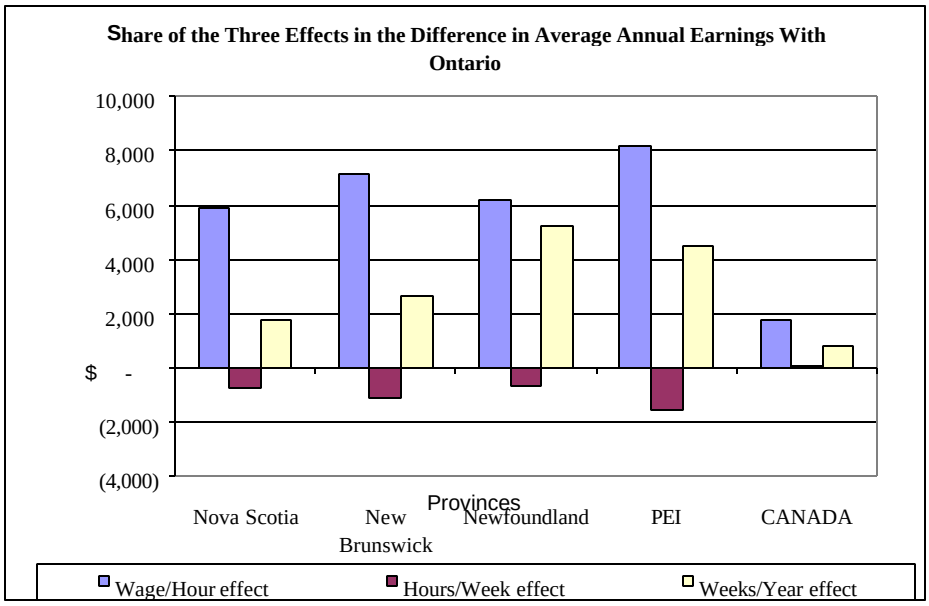
Table 13
Ontario-Canada (National Average) Disparities

Measures	Standardization		Decomposition	
	Ontario	Canada (National Average)	Difference ($)	Percent Distribution
wage/hour effect	30,695	28,955	1,740	67
hour/week effect	29,849	29,809	40	2
weeks/year effect	30,234	29,416	817	31
Unstandardized Average Annual Earnings	31,137	28,539	2,598	100

Source: Survey of Labour and Income Dynamics, 1998

Figure 3 displays the effect and magnitude of the three components of average annual earnings disparity compared to Ontario.

Figure 3



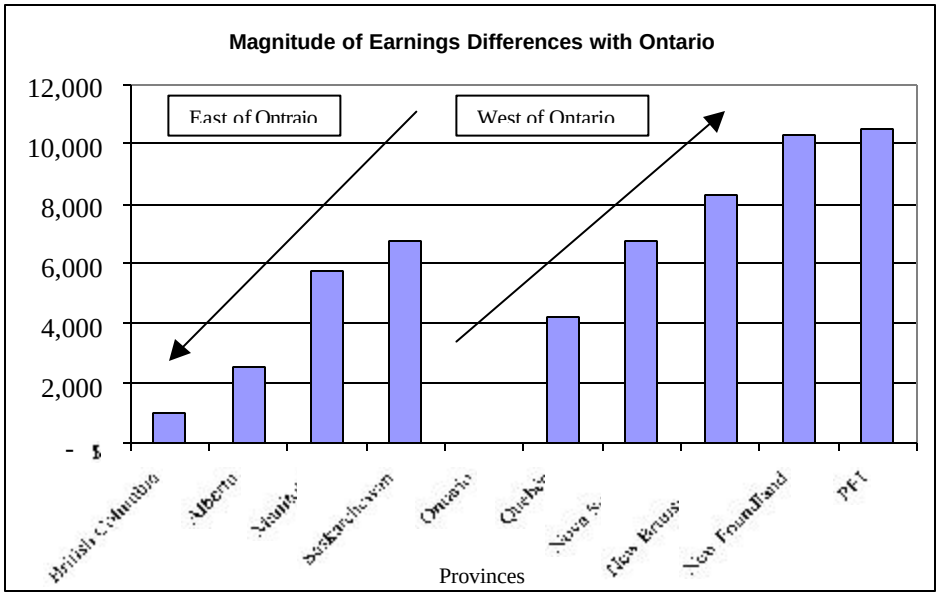
Source: Survey of Labour and Income Dynamics, 1998

It is interesting to note that in all provinces east of Quebec have higher hours/week values as being shown in the negative values in figure 3.

Another interesting observation that comes out of this analysis is that as one goes west of Ontario the disparity of earnings generally keeps diminishing, and as one

goes east of Ontario the disparity of earnings generally keeps increasing. This is displayed in Figure 4.

Figure 4
Magnitude of Earnings Differences from Ontario



Source: Survey of Labour and Income Dynamics, 1998

Some of the major observations of this study for 1998 are:

- Ontario is the province with highest annual average earnings,
- PEI is the province with lowest annual average earnings,
- Average annual wage/hour is highest in British Columbia,
- Average annual wage/hour is lowest in PEI,
- Average annual hours/week is highest in PEI,
- Average annual hours/week is lowest in British Columbia,
- Average annual weeks/year is highest in Ontario,
- Average annual weeks/year is lowest in Newfoundland,
- As you move east of Ontario the earnings disparity generally increases,

- As you move west of Ontario earnings disparity generally decreases,

- In provinces east of Quebec hours/week are always higher than that of Ontario,

- In some cases average annual earnings were lower in Ontario when components were standardized in one of the components. But other components were so strong in Ontario that overall average annual earnings were highest in Ontario when all three components were considered.

- Ontario and Quebec and Ontario and Manitoba, were only comparisons where Ontario's values were consistently higher in every single component and also in average annual earnings.

The findings of this paper are based only on one year (1998) comparison. In future when data for more years are considered the analysis could be repeated to test the robustness of these findings. There may be some other reasons, e.g., difference in distribution of skill levels of workers that might be causing the disparity in Average Annual Earnings. This analysis decomposes Average Annual Earnings into three simple components. A fourth component may be added as an interaction term of the three components. Further, when extending the analysis into different dimensions such as industry, it is recommended that the industry components should be broken down, e.g., automotive industry, textile industry, goods manufacturing and services producing industries, to make a fair comparison between provinces.

Further, provinces also differ in terms of their occupational category such as management, teaching, medicine and health, the analysis should be extended to these dimensions too. This paper is a snapshot of decomposition comparison based on very limited details.

Provincial earnings also differ in terms of human capital of workers and productivity levels of firms. These factors are difficult to control in a simple decomposition method. A regression analysis is capable of controlling these factors to assess the provincial earnings disparities. This paper is just an attempt to explore the issues and sources of earnings disparities. This opens up the agenda for future research in this area.

For a full understanding of the dynamics of provincial economic disparity more in-depth research is required.

Appendix A

Average Annual Earnings	=	Average Hourly Earnings	x	Average Weekly Hours	x	Average Number of Weeks Worked in a year

More formally,

$$\sum_{i}^{n} \text{Wage} = \frac{\sum_{i}^{n} \text{Wage}}{\sum_{i}^{n} \text{Hour}} * \frac{\sum_{i}^{n} \text{Hour}}{\sum_{i}^{n} \text{Week}} * \sum_{i}^{n} \text{Week}$$

Where,

$$\sum_{i}^{n} .. = ..1..\text{to}..n..\text{persons}..\text{in}..\text{ each}..\text{province}$$

$$\sum_{i}^{n} \text{Wage} = \text{Annual...Earnings..at..the..Provincial..Level.in.1998}$$

$$\frac{\sum_{i}^{n} \text{Wage}}{\sum_{i}^{n} \text{Hour}} = \text{Hourly..Wage..Rate...at..the..Provincial..Level}$$

$$\frac{\sum_{i}^{n} \text{Hour}}{\sum_{i}^{n} \text{Week}} = \text{Hours..Worked..Per..Week..at..the..Provincial..Level}$$

$$\sum_{i}^{n} \text{Week} = \text{Number..of..Weeks..Worked..in..1998}$$

Sharan (2000) used a slightly different method to calculate the average numbers for the analysis. In that paper first rates were calculated, such as, hourly wage rate, hours per week and earnings per year at the province level. Then an average was taken of each of these rates at the province level. This meant using the following formula for calculations:

Average Annual	=	Average Hourly	x	Average Weekly	x	Average Number of Weeks Worked

Earnings Earnings Hours in a year

More formally,

$$\frac{\sum_{i}^{N} Ei}{N} = \frac{\sum_{i}^{N} Ri}{N} * \frac{\sum_{i}^{N} Hi}{N} * \frac{\sum_{i}^{N} Ei / N}{\sum_{i}^{N} Ri / N * \sum_{i}^{N} Hi / N;}$$

Where, N = Total Population, Ei = Earnings of individual i, Ri = wage/hour of individual i, Hi= hours/week worked by individual i.

$$\frac{\sum_{i}^{N} Ei}{N} = Average...Annual....Earnings$$

$$\frac{\sum_{i}^{N} Ri}{N} = Average...Hourly....Wage....Rate$$

$$\sum_{i}^{N} \mathrm{Ri} = .. \left(\frac{\sum_{i}^{N} \mathrm{W_i}}{\sum_{i}^{N} \mathrm{Hi}} \right) \mathrm{Average...Hourly....Wage....Rate}$$

$$\frac{\sum_{i}^{N} Hi}{N} = Ave\mathrm{arg}e...Hours....Worked...in...a...Week$$

$$\sum_{i}^{N} \mathrm{Hi} = .. \left(\frac{\sum_{i}^{N} \mathrm{H_i}}{\sum_{i}^{N} \mathrm{Wi}} \right) \mathrm{Average...Hours..per..Week}$$

$$\frac{\sum_{i}^{N} Ei / N}{\sum_{i}^{N} Ri / N * \sum_{i}^{N} Hi / N;} = Average...number...of...Weeks...Worked...in...a...Year$$

APPENDIX B

Standardization and Decomposition Technique:[10]

To perform the decomposition of the disparity of Average Annual Earnings between any two pairs of selected provinces we have to first standardize the Average Annual Earnings of any pair of two provinces by using the following method. Assume,

$$\mathbf{Y} = a\,b\,g \qquad \text{(I)}$$

Using our example:

Y = Average Annual Earnings
α = average hourly wage rate
β = average hours worked in a week
γ = average number of weeks worked in a year

When Average Annual Earnings of two provinces are to be compared the above expression can be written as:

$$Y = ABC$$
$$y = abc \qquad \text{(II)}$$

For the above mentioned two average annual earnings, Y and y, standardization and decomposition issues are tied together by some ***consistency conditions***, i.e., decomposition can not be arrived at without dealing with standardization issues.

Standardization Issues:

Standardization issue deals with the situation when there is a difference between two average annual earnings (Y-y) and the difference in both average annual earnings is emerging from the changes in one component (same component in both average annual earnings) by holding other two components constant. For the present example this can be expressed as:

1. What should be Average Annual Earnings in the two Average Annual Earnings (Y and y) if α (both A and a) changed the way it did and other two factors, β and γ were identical? These conditional Average Annual Earnings, Y

[10] This technique is borrowed from Gupta, Prithwis Das, 1993, Standardisation and Decomposition of Rates: A Users Manual, U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, Washington, USA.

and y, are then standardized annual average earnings controlled (or adjusted) for the later two factors, β and γ.

2. What should be Average Annual Earnings in the two average annual earnings (Y and y) if β (both B and b) changed the way it did and other two factors, α and γ were identical? These conditional Average Annual Earnings, Y and y, are then standardized annual average earnings controlled (or adjusted) for the later two factors, α and γ.

3. What should be Average Annual Earnings in the two average annual earnings (Y and y) if γ (both C and c) changed the way it did and other two factors, α and β were identical? These conditional Average Annual Earnings, Y and y, are then standardized annual average earnings controlled (or adjusted) for the later two factors,α and β.

Decomposition Issues: Decomposition issue deals with the situation where one wants to know the proportional-share of each of the components when there is a difference in the two average annual earnings, Y and y. In our example this can be expressed as:

4. How much of the difference between two average annual earnings (y-Y) can be attributed to the difference in α (a - A)? This amount of difference is called α-effect.

5. How much of the difference between two average annual earnings (y-Y) can be attributed to the difference in β (b - B)? This amount of difference is called β-effect.

6. How much of the difference between two average annual earnings (y-Y) can be attributed to the difference in γ (c - C)? This amount of difference is called γ effect.

Consistency Conditions:

4. Consistency conditions are the condition that ties together standardization and decomposition issues. Once these condition are applied questions 1-6 above will be answered.

I. The difference between the standardized rates in (1) would give answer to question (4). This is called α-effect.

II. The difference between the standardized rates in (2) would give answer to question (5). This is called.β-effect.

III. The difference between the standardized rates in (3) would give answer to question (6). This is called.γ-effect.

IV. The answers to questions (4)-(6), i.e., I-III, should add up to give provide the difference between the two Average Annual Earnings y-Y.

The difference y-Y can be written as

$$y\text{-}Y = (abc) - (ABC) \qquad \text{(III)}$$

An elementary calculation shows that this difference is the sum of the three terms:

$$y-Y=\begin{bmatrix}(a-A)BC+(a-A)\left(\frac{b-B}{2}\right)C+(a-A)\left(\frac{c-C}{2}\right)B+\left(\frac{(a-A)(b-B)(c-C)}{3}\right)+\\(b-B)AC+(b-B)\left(\frac{a-A}{2}\right)C+(b-B)\left(\frac{c-C}{2}\right)A+\left(\frac{(a-A)(b-B)(c-C)}{3}\right)+\\(c-C)AB+(c-C)\left(\frac{b-B}{2}\right)A+(c-C)\left(\frac{a-A}{2}\right)B+\left(\frac{(a-A)(b-B)(c-C)}{3}\right)+\end{bmatrix} \qquad \text{(IV)}$$

In the above equation there are three rows, each with four components. The first term is the main effect of decomposition and the next two terms are the cross effect of two terms and the last term is the cross effect of all of the three terms. Now collecting the similar terms and simplifying we have:

$$y-Y=\begin{bmatrix}(a-A)\left[BC+\left(\frac{bC-BC}{2}\right)+\left(\frac{Bc-BC}{2}\right)+\left(\frac{(b-B)(c-C)}{3}\right)\right]+\\(b-B)\left[AC+\left(\frac{aC-AC}{2}\right)+\left(\frac{Ac-AC}{2}\right)+\left(\frac{(a-A)(c-C)}{3}\right)\right]+\\(c-C)\left[AB+\left(\frac{Ab-AB}{2}\right)+\left(\frac{aB-AB}{2}\right)+\left(\frac{(b-B)(a-A)}{3}\right)\right]+\end{bmatrix} \qquad \text{(V)}$$

Now, further collecting the similar terms and simplifying:

$$y-Y=\begin{bmatrix}(a-A)\left[BC\left(1-\frac{1}{2}-\frac{1}{2}+\frac{1}{3}\right)+bc\left(\frac{1}{3}\right)+bC\left(\frac{1}{2}-\frac{1}{3}\right)+Bc\left(\frac{1}{2}-\frac{1}{3}\right)\right]+\\(b-B)\left[AC\left(1-\frac{1}{2}-\frac{1}{2}+\frac{1}{3}\right)+ac\left(\frac{1}{3}\right)+aC\left(\frac{1}{2}-\frac{1}{3}\right)+Ac\left(\frac{1}{2}-\frac{1}{3}\right)\right]+\\(c-C)\left[AB\left(1-\frac{1}{2}-\frac{1}{2}+\frac{1}{3}\right)+ab\left(\frac{1}{3}\right)+aB\left(\frac{1}{2}-\frac{1}{3}\right)+Ab\left(\frac{1}{2}-\frac{1}{3}\right)\right]\end{bmatrix} \qquad \text{(VI)}$$

$$y-Y=\begin{bmatrix}\left[\left[\left(\frac{bc+BC}{3}\right)+\left(\frac{bC+Bc}{6}\right)\right](a-A)+\right.\\ \left[\left(\frac{ac+AC}{3}\right)+\left(\frac{aC+Ac}{6}\right)\right](b-B)+\\ \left.\left[\left(\frac{ab+AB}{3}\right)+\left(\frac{aB+Ab}{6}\right)\right](c-C)\right]\end{bmatrix}=\begin{bmatrix}a-effect+\\ b-effect+\\ g-effect+\end{bmatrix}\ldots\ldots\ldots\ldots\ldots\ldots(VII)$$

Equation (VII) can be further simplified as:

$$y-Y=\begin{bmatrix}\left[\left[\left(\frac{bc+BC}{3}\right)+\left(\frac{bC+Bc}{6}\right)\right](a)-\left[\left(\frac{bc+BC}{3}\right)+\left(\frac{bC+Bc}{6}\right)\right](A)+\right.\\ \left[\left(\frac{ac+AC}{3}\right)+\left(\frac{aC+Ac}{6}\right)\right](b)-\left[\left(\frac{ac+AC}{3}\right)+\left(\frac{aC+Ac}{6}\right)\right](B)+\\ \left.\left[\left(\frac{ab+AB}{3}\right)+\left(\frac{aB+Ab}{6}\right)\right](c)-\left[\left(\frac{ab+AB}{3}\right)+\left(\frac{aB+Ab}{6}\right)\right](C)\right]\end{bmatrix}=\begin{bmatrix}\alpha-effect+\\ \beta-effect+\\ \gamma-effect+\end{bmatrix}.....(VIII)$$

Using equation (VIII) the standardized rates can be written as:

$\beta\gamma$ Standardized rates in Y

$$\left(\left[\frac{bc+BC}{3}\right]+\left[\frac{bC+Bc}{6}\right]\right)*A$$

$\beta\gamma$ Standardized rates in y

$$\left(\left[\frac{bc+BC}{3}\right]+\left[\frac{bC+Bc}{6}\right]\right)*a$$

$\alpha\gamma$ standardized rates in Y

$$\left(\left[\frac{ac+AC}{3}\right]+\left[\frac{aC+Ac}{6}\right]\right)*B$$

$\alpha\gamma$ standardized rates in y

$$\left(\left[\frac{ac+AC}{3}\right]+\left[\frac{aC+Ac}{6}\right]\right)*b$$

$\alpha\beta$ standardized rates in Y

$$\left(\left[\frac{ab+AB}{3}\right]+\left[\frac{aB+Ab}{6}\right]\right)*C$$

$\alpha\beta$ standardized rates in y

$$\left(\left[\frac{ab+AB}{3}\right]+\left[\frac{aB+Ab}{6}\right]\right)*c$$

The standardized rates can be re-grouped together in a set of three effects as:

$$\alpha-\text{effect}=\left[\left(\frac{bc+BC}{3}\right)+\left(\frac{bC+Bc}{6}\right)\right]*(a-A)$$

$$\beta-\text{effect}=\left[\left(\frac{ac+AC}{3}\right)+\left(\frac{aC+Ac}{6}\right)\right]*(b-B)$$

$$\gamma-\text{effect}=\left[\left(\frac{ab+AB}{3}\right)+\left(\frac{aB+Ab}{6}\right)\right]*(c-C)$$

Now the difference between y and Y, . (y-Y), can be written as:

y - Y = α effect + β effect + γ effect, (See equation (VII)).

REFERENCES

Auer, Ludwig, 1979, *Provincial disparities of Growth and Productivity in Canada.* A Study prepared for the Economic Council of Canada. Hull, Quebec: Supply and Services, Canada.

Capithorne, Lawrence, 1979, "Natural Resources and Provincial Disparities" A Study prepared for the Economic Council of Canada" Hull, Quebec: Supply and Services Canada.

Coulombe Serge, 1997, " Provincial Disparities in Canada: Characterisation, Trends and Lessons For Economic Policy", Working Paper no. 18, Industry Canada, Ottawa.

Coulombe Serge, and Lee, Frank C. 1993, "Provincial Economic Disparities in Canada", Working Paper no. 9317E, Department of Economics, University of Ottawa, Ottawa.

Courchene, Thomas J., 1978, "Interprovincial Migration and Economic Adjustment" Canadian Journal of Economics III (1978): Reprinted in Provincial Economic Policy: The Canadian Experience, ed. N. H. Lithwick, Toronto-McGraw Hill Ryerson Limited

Courchene, and J. Whalley, 3-50, Toronto: Toronto University Press (For the Ontario Economic Council).

Dooley, Michael, Frankel Jeffery and Mathieson, Donald J., 1987, "International Capital Mobility: What do Saving-Investment Correlation tell Us?" IMF Staff Papers.

Day, Kathleen, 19979, "Provincial Disparities in Wage and Unemployment Rates in Canada: A Review of Some Issues" Technical Report no. 51, Bank of Canada, Ottawa.

Doiron, Denise J. and Barrett, 1992, Garry F, " The Role of Hours and Wages", Discussion Paper no. 92-36, Center for Research on Economic and Social Policy, University of British Columbia, Vancouver.

Economic Council of Canada, 1977, " Living Together: A Study of Provincial Disparities", Ottawa: Supply and Services Canada.

Gupta, Prithwis Das, 1993, Standardization and Decomposition of rates: A Users Manual, U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, Washington, USA.

Harris J. and Todaro, M., 1970, "Migration Unemployment and Development: A Two Sector Analysis" American Economic Review.

Johnson, J. A., and Kneeborne, R. D., 1987, " A Quarterly Econometric Model of Provincial Labour Demand", Research Report no. 87110, Department of Economics, Wilfred Laurier University.

Lazar, Fred, 1977, "Provincial Unemployment Rate Disparities in Canada: Some Possible explanations", Canadian Journal of Economics.

Mansell, Robert L., and Capithorne, Lawrence, 1986, "Canadian Provincial Economic Disparities: A Survey" in *Disparities and Interprovincial Adjustment,* ed., Kenneth Norrie, 1-51. Collected Research Studies of the Royal Commission on the Economic Union and Development Prospects for Canada, vol. 64, Toronto: Toronto University Press.

McInnis, M. 1968, "The Trend of Provincial Earnings Differentials in Canada", Canadian Journal of Economics XVIII, 237-257.

Miller, F. C. 1987, "The Natural Rate of Unemployment: Provincial Estimates and Policy Implications" Canadian Journal of Provincial Science, X, 63-76.
Postner, Harry H, 1980, *A New Approach to Frictional Unemployment: An Application to Newfoundland and Canada.* A Study prepared for the Economic Council of Canada, Hull, Quebec: Supply and Services Canada.

Prichard, J. Robert S. (with Jamie Benedickson) " Securing the Canadian Economic Union: Federalism International Barriers to Trade" in *Federalism and the Canadian Economic Union,* ed., M.J. Trebilcock, J. R. S. Prichard, T.J.

Raynauld, Jaques, 1988, "Canadian Provincial Cycles: The Quebec-Ontario Case Revisited", Canadian Journal of Economics XX1, 115-128.

Riddell, W. Craig. 1980, "Unanticipated Inflation and Unemployment in Canada, Ontario and Newfoundland" Discussion Paper no. 182, Economic Council of Canada.

Sharan, Kamal K., 2000, " Provincial Earnings Differences", Perspectives on Labour and Income, Summer 2000, Catalogue no. 75-001-XPE, Statistics Canada.

Shaw, R. Paul, 1986, " Fiscal versus Traditional Market Variables in Canadian Migration", Journal of Political Economy, 94, 648-666.

Vanderkamp, John, 1973, *Mobility Behavior in Canadian Labour Force*, A Study Prepared for the Economic Council of Canada, Ottawa: Information Canada,

Wilson, J. F. 1981, "Seasonal Unemployment in Newfoundland: Trends and Determinants" Discussion Paper no. 186, Economic Council of Canada. (References will be provided in the main paper).