Analysis of the Growth and Shift in Sectoral Part-time Employment in Canada 1987-1999

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Aggregate employment data mask some profound trends in the performance of the economy. The overall performance of the national economy is the result of overall economic performance of the sub-national economies. Therefore, a thorough understanding of the changing pattern of industrial activity at the provincial level, and hence the changing composition of employment, vis-a-vis part-time employment across the provinces is vitally important.

Consequently in this study we endeavor to analyze and delineate the changes in part-time employment pattern of the provincial economies in the past decade. A modified version of the Shift-Share model, as developed by Stilwell [1969], is used for an in-depth analysis of recently available 15 sectoral classification of employment data which include some sectors of the knowledge based economy.

The first section describes the methodology, aims and shortcomings of the Shift-Share technique. The second section specifies the modified version of the model. The results are presented in the third section and finally the conclusions of the study are presented.

Methodology[1]

Employment is not distributed evenly across the country. The patterns of its distribution are often ambiguous and require strenuous interpretation. To understand the changes in employment dimensions at the provincial level requires some descriptive and analytical approaches. The measurement of changes in employment pattern and evaluation of such changes requires that some

[1]This section draws heavily from one of the co-authors' earlier studies [9, 10].

A. C. E. A. Papers and Proceedings, Volume 30, 2001. University of New Brunswick, Fredericton, N. B., September 28-30, 2001. Atlantic Canada Economics Association.

standards be defined. For example, what is a favourable or unfavourable industrial mix and how is it measured? These and many other questions pose methodological challenges. Thus, what measure is to be used as a standard becomes an important question. In this study the national economy is always the reference standard against which the performance of each province is measured in term of employment growth..

One method of comparing changes against some standard is "Shift-Share" analysis. The Shift-Share analysis, first used by Creamer (1942) which became the basis of classical works by Dunn [1960] and Perloff, Dunn *et al.* [1960], is a descriptive technique which segregates regional variables such as employment, output, population into three components; regional shift, the proportionately shift, and differential shift [Dunn, 1960]. The first component reflects a national rate of change in employment, output or population. In other words, the regional share is the expected growth of employment, output, population in the region if these variables in the region were to grow at the same rate as the national average over the reference period. The second and the third components reveal industrial structure (mix), and locational advantages or disadvantages of a region's economy respectively. Therefore, the latter two components have been also termed as the composition and competitive effects, respectively.

The difference between actual employment in the region and the expected employment (regional share) is captured by what is called 'total shift'. Total shift indicates the net gain or loss to the region over the reference period. The total shift is divided into proportionality shift and differential shift. The positive (negative) proportionality shift indicates that the region has favourable (unfavourable) distribution of fast-growing industries. The differential shift is positive (negative) if the region's industries grow faster (slower) than similar industries in other areas of the nation. The proportionality shift (industrial mix)component reflects the effect of a region's initial industrial structure on its employment growth while the differential shift component reflects the competitiveness of its industries vis-a-vis the rest of the nation during the period.

The Shift-Share analysis has been widely used in regional development studies [1, 2, 3, 6, 7,9]. This technique has also been heavily criticized because the results are sensitive to the level of aggregation of the variables.

The Modified Shift-Share Model

In general, there is not a great deal of controversy surrounding the interpretation of the proportionality shift. If it is positive (negative) then the region's growth (loss) of employment can be attributed to the region's favourable (unfavourable) industrial commotion. The proportionality shift does not explain, as a bona fide growth theory would, what gave the region its initial industrial mix. Furthermore, it does not give any indication of the future prospects to the region in its standard form. Herein lies the importance of the differential shift. The differential shift can be considered as an indicator of the future prospects of a region because it essentially indicates the response of a region's industrial mix to demand and supply conditions over time at both the regional as well as national level. It illustrates that some regions gain an advantage in relation to other region's in their access to markets and to inputs for one or more specific activities. In other words, embedded in the differential shift are all the important demand and supply, input-output, and location theory considerations that affect the competitive position of the region's industries over the reference period.

However, the proportionality shift, which purports to measure the contribution of the region's industrial mix to the region's growth, and the differential shift, which reflects factors affecting regional growth other than the industrial mix, such as comparative advantage, population migration, or government policy, are interdependent because of inter-industry linkages and multiplier effects that occur within and between regions. This phenomenon will cause the proportionality shift to be understated [MacKay, 1968]. The problem is resolved, however, by regarding the proportionality shift as a minimum estimate of the effect of the industrial mix on the employment growth [Stilwell, 1970].

The Modified Shift-Share model attempts to resolve the fundamental problem, which is the

loss of applicability in identifying the industrial mix's full impact in determining the overall regional growth rate relative to the national average. In arriving at the modified version of the shift-Share model, the technique is to subtract the employment growth expected in the region, given it industrial mix at the beginning of the period, from the employment growth expected, given the industrial mix at the end of the period. It represents a reversing of the standardization procedure, in that the final period employment weight rather than the base period employment weight is used in the calculation of the expected growth. By performing this operation on equation 5 (see pages 4 and 5) the reverse proportionality shift (equation 9) is generated. Furthermore, if the reverse proportionality shift (RPS) is subtracted from the proportionality shift (PS), the result adds another shift component, the proportionality modification shift (PMS), to the analysis. The PMS may be visualized as representing the shift in employment which comes about form the modification of the region's industrial mix over the reference period. If the PMS is positive (negative), it would indicate that the region has a more favourable (less favourable) industrial mix at the end of the period than it had at the start of the period.

The Shift-Share model along with its modified version is presented below.

Shift-Share Basic Model:

The following notations are used in the equations. E_n represents employment in all the industries in the reference area (nation). The rates of growth in the *i*th industry in region *j* and in all regions are represented by g_{ij} and g_{in} respectively. The rate of growth of all industry in the nation (reference area) is g_n. The other notations used are as follows:

E_{ijt} = Employment in the *i*th industry in province *j* at time *t*.

E_{ij0} = Employment in the *i*th industry in province *j* at time *0*.

$\sum_{i=1}^{r} E_{ijt}$ = Total employment in province *j* at time *t*.

$\sum_{j=1}^{m} E_{ijt}$ = Total employment in industry *i* in Canada at time *t*.

$\sum_{i=1}^{r}\sum_{j=1}^{m} E_{yt}$ = Total employment in all provinces and in all industries at time *t*. (Total employment in Canada

G_j = Actual total growth in employment in province *j*.

N_j = Potential growth of employment in province *j*.

TS_j = Total Shift in employment in province *j*.

PS_j = Proportionality Shift in employment in province *j*.

DS_j = Differential Shift in employment in province *j*.

RPS_j = Reverse Proportionality Shift in employment in province *j*.

PMS_j = Proportionality Modification Shift in employment in province *j*.

RDS_j = Residual Differential Shift in employment in province *j*.

Actual growth of employment G_j is:

$$G_j = \sum_{i=1}^{r} E_{yt} - \sum_{i=1}^{r} E_{y0} \qquad 1$$

Potential growth rate (an overall rate of employment change in Canada) is given by:

$$g_n = \frac{\sum_{i=1}^{r}\sum_{j=1}^{m} E_{yt}}{\sum_{i=1}^{r}\sum_{j=1}^{m} E_{y0}} - 1 \qquad 2$$

Hence, potential employment growth of industry *i* in a region *j* is given by:

$$N_j = \sum_{i=1}^{r} E_{y0}\, g_n \qquad 3$$

The potential growth in employment is the rate of growth in that would have occurred had the industry in the region grown at the national rate of change in employment.

Total shift is the difference between actual growth and the potential growth of employment, i.e.,

$$TS_j = \sum_{i=1}^{r} E_{yt} - \sum_{i=1}^{r} E_{y0}(1 + g_n) \qquad 4$$

Total shift consists of two components, i.e., proportionality shift (PS) and differential shift (DS). Proportionality shift is defined as:

$$PS_j = \sum_{i=1}^{r} E_{iy0}(g_{in} - g_n) \qquad 5$$

Differential shift is defined as:

$$DS_j = \sum_{i=1}^{r} E_{iy_t} - \sum_{i=1}^{r} E_{iy0}(1 + g_{in}) \qquad 6$$

Equation 1 is equal to the sum of equations (3), (4), and (5). That is:

$$G_j = N_j + PS_j + DS_j \qquad 7$$

Modified Shift-share Model

The RPS for province *j* is given by:

$$RPS_j = \sum_{i=1}^{r} E_{ijt}\left(\frac{g_{in} - g_n}{(1+g_n)(1+g_{in})}\right) \qquad 8$$

The PMS for province *j* is given by difference between equations (8) and (5), i.e., :

$$PMS_j = RPS_j - PS_j = \sum_{i=1}^{r} E_{ijt}\left(\frac{g_{in} - g_n}{(1+g_n)(1+g_{in})}\right) - \sum_{i=1}^{r} E_{ij0}(g_{in} - g_n) \qquad 9$$

The RDS for province *j* is given by:

$$RDS_j = \sum_{i=1}^{r} E_{ijt}\left(\frac{1 + g_n(2 + g_{in})}{(1+g_n)(1+g_{in})}\right) - \sum_{i=1}^{r} E_{ij0}(1 + g_n) \qquad 10$$

The full range of possibilities (or outcomes) to be generated by the modified model and the classification of provinces based on two-shift (i.e., PS and DS) and three-shift (i.e., PS, PMS, and RDS) analyses are presented in Tables 1 and 2. These grouping schemes were developed by Boudevill [1966] and Stilwell [1969] respectively.

The two-shift method allows a sixfold classification of provinces, as indicated in Table 1. This classification is useful for the identification of the type of regional policy needed in different areas. Provinces under grouping 1, 2, and 3, are those growing faster that the national average, while provinces falling under groupings 4, 5, and 6, are growing slower that the national average. However, while the slow growth in grouping 4 would be due to its relatively unfavourable industrial mix, the slow growth of provinces in grouping 5 would result from "disadvantageous factors' other that the initial industrial composition. Hence, one might suggest that regional policies relevant to areas of latter type involve general improvements in infrastructure, while the areas of the former type simply need injections of growth industries to compensate for their above average share of static and declining industries.

The three-shift analysis allows for a fourteen-fold classification of provinces as show in Table 2. Referring to the classification of provinces based on three-shift analysis, we can determine the likelihood of future changes in employment shares given the alteration of a province's industrial mix as explained above. This classification is more useful that the two-shift model because it helps to identify areas that have suffered declining employment shares in the past but are likely to improve in the future (groupings 4, 8, and 12). Provinces not yet suffering from declining employment shares, but perhaps likely to do so in the future, would fall under groupings 5, 9, and 13. Attention in the form of development area policy, including financial inducements designed to improve the industrial mix of provinces, should be focused on provinces falling under groupings 2, 6, 10, and 14. Finally, provinces falling under groupings 1, 3, 7, and 11 performed well in terms of employment growth in the past and are expected to continue to do so in the future.[2]

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[2]The standard interpretation of these shift, such as favorable or unfavourable in term of industrial mix is the favorable mix implies improvement in the potential for growth etc. however, given the context of part-time employment, these shift should d be interpreted with caution. Favourable industrial mix in term of creating part-time employment will indicate an emerging trend in the economy in the future. How will this impact the economic growth is beyond the scop of this paper.

Table 1
Classification of the Two-Shift Analysis

Grouping (or Outcomes)
1. Both PS and DS positive
2. Positive PS outweighs negative DS
3. Positive DS outweighs negative PS
4. Positive DS outweighed by negative PS
5. Positive PS outweighed by negative DS
6. Both PS and DS negative

*PS = Proportionality Shift; DS = Differential Shift

Table 2
Classification of the Three-Shift Analysis

Grouping (or outcomes)
1. All three effects positive
2. All three effects negative
3. PS and PMS positive and outweigh negative RDS
4. PS and PMS positive but outweighed by negative RDS
5. PS and RDS positive and outweigh negative PMS
6. PS and RDS positive but outweighed by negative PS
7. PMS and RDS positive and outweigh negative PS
8. PMS and RDS positive but outweighed by negative PS
9. PS positive and outweighs negative RDS and PMS
10. PS positive but outweighed by negative RDS and PMS
11. PMS positive and outweighs negative RDS and PS
12. PMS positive but outweighed by negative RDS and PS
13. RDS positive and outweighs negative PS and PMS
14. RDS positive but outweighed by negative PS and PMS

*PS = Proportionality shift; PMS = Proportionality Modification Shift;
RDS = Residual Differential Shift.

Empirical Results

The results of the Modified Shift-Share model and its classification schemes to analyze and delineate changes in part-time employment dimensions of the provinces are presented below. The data base consists of sixteen sectoral classifications of part-time employment.[3] However, first we provide an overview of spatial distribution of part-time employment growth in various provinces followed by the results of the Modified Shift-Share model.

Spatial Distribution of Employment Growth

Table 3 presents the changes in part-time employment patterns of the Canadian provinces during the past decades. With the exception of Saskatchewan, all provinces experienced a faster rate of growth in part time employment compared with full-time employment. For example, Alberta experienced 42.46 percent growth in part-time employment compared with 28.10 percent growth in full-time employment, while British Columbia experienced the highest rate of growth, i.,e 55.67 percent compared with 34.63 percent in full-time employment. Graphs 1, 2, and 3 show the share of part-time employment in Atlantic, Central, and Western Canada respectively.

However, further examination of the possible causes of the regional variation in part-time employment growth over the past decade (1987-99) by isolating the national share and the shift components can give us a better perspective on whether favourable (unfavourable) growth was due to the provinces more (less) favourable industrial mix or whether it was due to other reasons such as reflected in a favourable (unfavourable) competitive position compared with similar sectors in other

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[3]The following sectoral data is used in the analysis: Agriculture; Forestry, Fishing, Mining, Oil and Gas; Utilities; Construction; Manufacturing; Trade; Transportation and Warehousing; Finance, Insurance, Real Estate and Leasing ; Professional, Scientific and Technical Services ; Management of Companies and Administrative and Other Support Services ; Educational Services ; Health Care and Social Assistance ; Information, Culture and Recreation ; Accommodation and Food Services ; Other Services ; Public Administration ;

provinces.[4]

Total Shift in Part-time Employment

Table 4 reveals that all the provinces except Alberta and British Columbia experienced a negative total shifts in part-time employment. This means the part-time employment growth rate in the provinces of Alberta and British Columbia was above the national growth rate while in the rest of the provinces part-time employment growth rate was below the national growth rate during the period under consideration. The most interesting information in Table 4 is found in the composition of total shift in terms of two components (i) proportionality shift and (ii) the differential shift which shed further light on the reasons for the positive or negative total shift. The proportionality shift is negative for all the provinces except Newfoundland, Quebec, Ontario, and British Columbia. This means that except for these four provinces all the other provinces had a relatively large share of slow growth sector thus not hiring many part-time employees. However, Quebec and Ontario's favourable industrial mix as suggested by proportionality shift was outweighed by the differential shift which gave the provinces an overall negative total shift. Therefore, as far as the aggregate part-time employment performance is concerned, Quebec and Ontario had the predominance of the "leading" sectors[5] in their economies, but had experienced a 'competitive disadvantage" during 1987-99 period. Alberta's negative proportionality shift (suggesting heavy reliance on lagging sectors) during the same period, on the other hand, was more than offset by a very favourable differential shift. It appears that Alberta's industries, though not favourable to employment growth, were extremely competitive compared with their national counterpart, and thus, the province was able to overcome any initial disadvantage of its industrial mix. Newfoundland and British Columbia were the only provinces which

[4]Favourable industrial mix in this context means the industrial mix that promotes the growth of part-time employment and unfavourable industrial mix implies the mix that leads to less part-time employment.

[5]A sector is a leading sector if its employment growth rate is above the national average growth rate for all the sectors.

Table 3

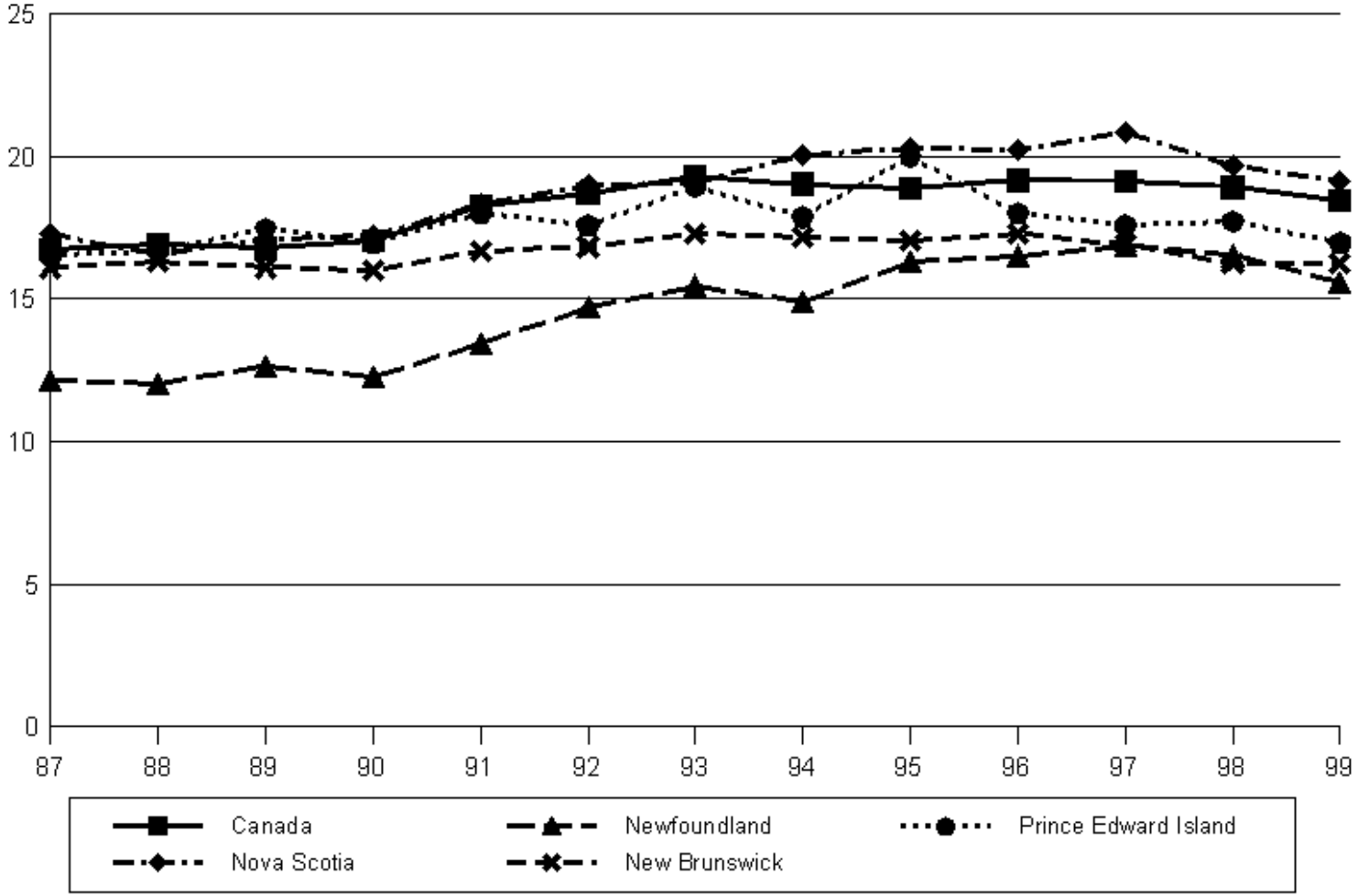
Growth of Employment by Provinces and Canada

1987-1999

1 Province	2 Absolute Increase in Employment (thousands)			3 Percentage increase in Employment			4 Percentage of National Employment						5 Percentage of National Increase in Employment		
	Part-time	Full-time	Total	Part-time	Full-time	Total	Part-time		Full-time		Total		Part-time	Full-time	Total
							1987	1999	1987	1999	1987	1999			
NFLD.	8.90	6.70	15.60	38.70	4.03	8.24	1.11	1.19	1.62	1.46	1.54	1.41	1.44	0.42	0.71
P.E.I.	1.60	6.50	8.10	18.18	14.64	15.23	0.43	0.39	0.43	0.43	0.43	0.42	0.26	0.41	0.37
N.S.	16.40	34.10	50.50	26.54	11.51	14.10	2.99	2.92	2.89	2.79	2.92	2.81	2.66	2.14	2.28
N.B.	8.40	40.50	48.90	18.67	17.27	17.50	2.18	1.99	2.29	2.32	2.27	2.26	1.36	2.54	2.21
QUE.	112.80	229.10	341.90	24.90	8.94	11.34	21.94	21.10	24.99	23.56	24.47	23.10	18.29	14.38	15.47
ONT.	224.80	570.90	795.60	28.12	13.95	16.26	38.71	38.19	39.91	39.36	39.71	39.14	36.45	35.82	36.00
MAN.	8.60	27.80	36.40	8.75	6.81	7.19	4.76	3.99	3.98	3.68	4.11	3.73	1.39	1.74	1.65
SASK.	-1.60	18.90	17.30	-1.60	5.21	3.74	4.85	3.68	3.54	3.22	3.75	3.30	-0.26	1.19	0.78
ALTA.	89.60	274.80	364.60	42.46	28.10	30.67	10.22	11.21	9.53	10.57	9.64	10.69	14.53	17.24	16.49
B.C.	147.30	384.40	531.80	55.67	34.63	38.69	12.81	15.36	10.82	12.61	11.16	13.12	23.88	24.12	24.06
CANADA	616.80	1593.60	2210.50	29.87	15.54	17.94	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

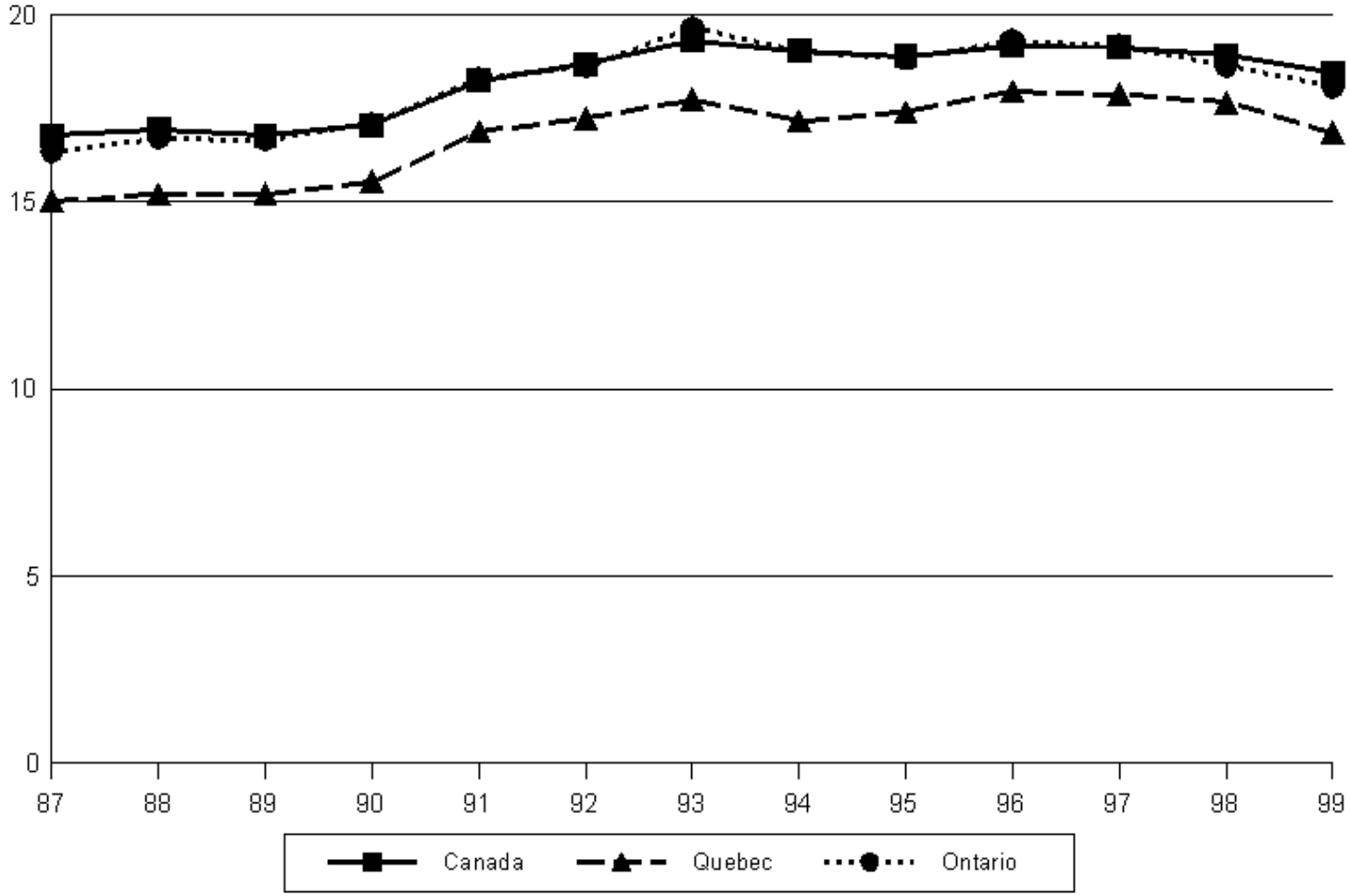
Graph 1

Share of Part-time Employment, All Industries--Atlantic Canada



Graph 2

Share of Part-time Employment, All Industries--Central Canada



Graph 3

Share of Part-time Employment, All Industries--Western Canada

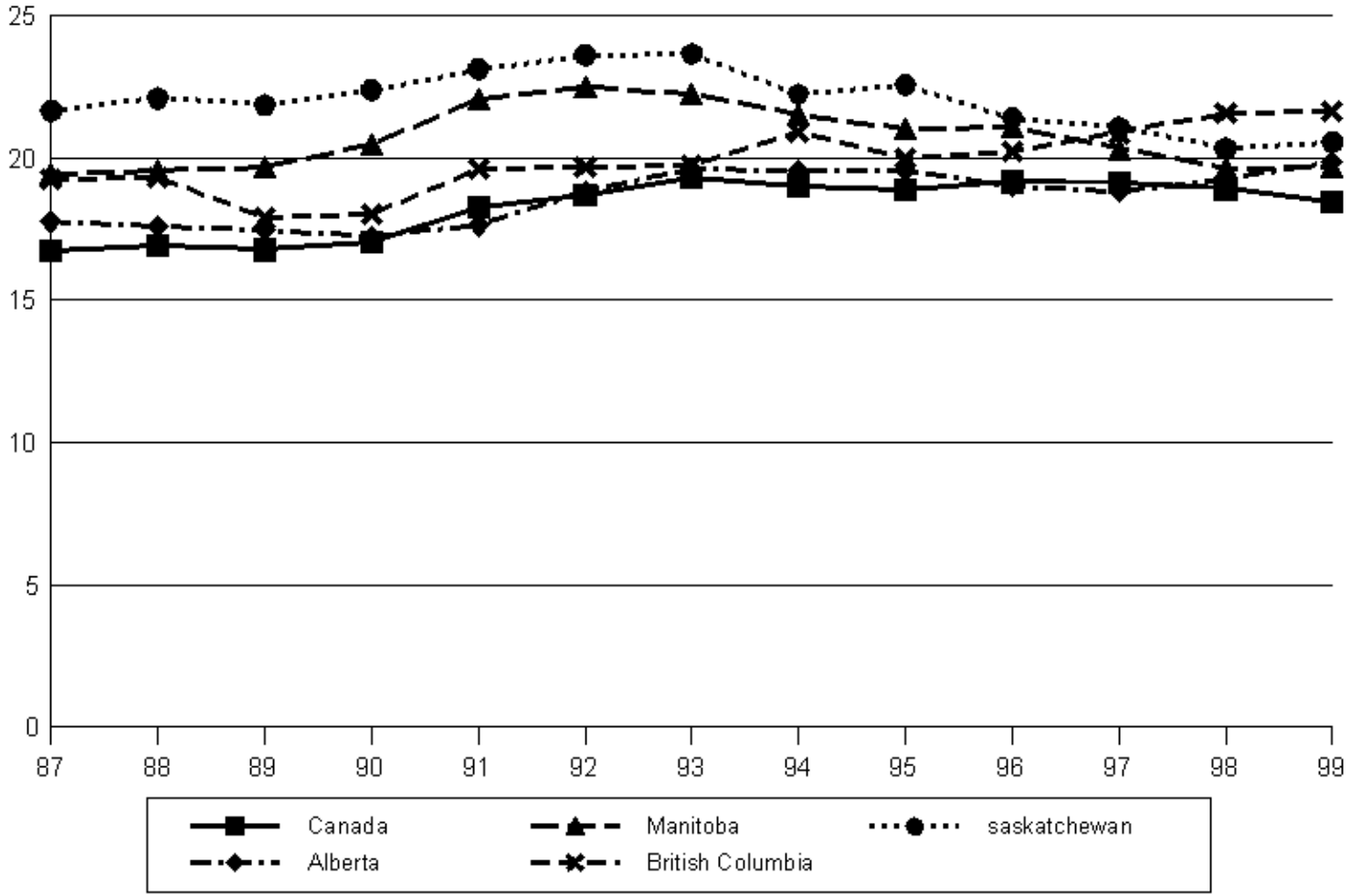


Table 4
Analysis of Provincial Pattern of Part-time Employment Growth
1987-1999

Provinces	National Share**	Total Shift ('000) TS	Total Shift as Percentage of Part-time Employment*	Proportion-ality Shift ('000) PS	Proportion-ality Shift as Percentage of Part-time Employment*	Differen-tial Shift ('000) DS	Differential Shift as Percentage of Employment*	Proportion-ality Modi-fication Shift ('000) PMS	Proportion-ality Modification Shift as Percentage of Employment*	Residual Differn-tial Shift ('000) RDS	Residual differential Shift as Per-centage of Employ-ment*
NFLD.	29.87	2.17	9.43	0.11	0.47	2.06	8.96	- 0.06	0.26	2.12	9.22
P.E.I	11.43	- 1.26	- 14.31	- 0.23	- 2.61	-1.02	- 11.59	0.01	0.11	- 1.03	-11.70
N.S.	80.26	- 2.16	- 3.50	- 0.06	- 0.10	-2.09	- 3.38	- 0.02	-0.03	- 2.07	-3.35
N.B	58.44	- 4.96	- 11.02	- 0.07	- 0.16	- 4.89	-10.87	- 0.24	- 0.53	- 4.65	-10.33
QUE.	588.31	- 21.57	- 4.76	1.17	0.26	- 22.74	- 5.02	1.67	0.37	-24.41	-5.39
ONT.	1038.31	- 115.47	- 14.44	9.41	1.18	-124.88	-15.62	- 14.51	-1.81	-110.37	- 3.80
MAN.	127.66	- 20.87	- 21.23	- 3.15	- 3.20	- 17.72	-18.03	1.15	1.17	-18.87	-19.20
SASK.	130.13	- 31.61	- 31.54	- 11.49	- 11.47	- 20.12	-20.08	6.55	6.54	-26.67	-26.62
ALTA.	274.03	26.80	12.70	- 0.96	- 0.45	27.76	13.16	- 3.00	-1.42	30.76	14.58
B.C.	343.64	68.55	25.91	6.23	2.35	62.32	23.55	0.99	0.37	61.34	23.18
CANADA	2681.9	0	0	0		0					

*1987 as a Base.

**It reflects the change in part-time employment which would have taken place had the provinces grown at the national rate of growth in part-time employment. The national part-time employment grew by 29.87 percent during the period 1987-1999.

Total in the last row of the table many not add up to zero because of the rounding error.

had a favourable industrial mix as well as competitive advantage to experience part-time employment growth faster than the national average.

To understand the causes behind these shifts, one has to look at the sectoral composition of the economy in each province. The sectoral breakdowns of total shift, proportionality shift, and differential shift along with proportionality modification shaft and residual differential shift are shown in Table 5, which provide us with a better understanding of the part-time employment picture in Canada.

When examining the figures of proportionality shift, it should be kept in mind that the sectoral aggregate of proportionality shift figure suggest whether, in the aggregate, the mix of employment in the province under consideration is a favourable or unfavourable one based on the national (or reference area) standard of a "fast" or "slow" growth sector as defined above. Therefore, the plus (minus) sign in front of a sector's proportionality shift would indicate that a sector is a fast (slow) growing sector. As can be seen from Table 5, Goods Producing Sector[6] is decisively a slow growth sector in almost every province indicating less hiring on part-time basis.

The Service Sector[7], on the other hand, generally reflects favourable disposition to growth in part-time employment in every province. The only exception in majority of the provinces is the Health Care and social assistance.

Sectoral performance of employment can be evaluated by using differential shift and

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[6]The Goods Producing Sector consists of Agriculture; Forestry, Fishing, Mining, Oil and Gas; Utilities; Construction ; and Manufacturing.

[7]The Service Sector includes: Trade; Transportation and Warehousing; Finance, Insurance, Real Estate and Leasing; Professional, Scientific and Technical Services; Management of companies and Administrative and Other Support Services; Educational services; Health Care and Social Assistance; Information, Culture and Recreation; Accommodation and Food Service; Other service; and Public Administration.

Table 5
Sectoral Contribution to the Total Shift and its Components in Part-time Employment
1987-1999

Sector	NFLD					PEI					NS					NB				
	TS	PS	DS	PMS	RDS	TS	PS	DS	PMS	RDS	TS	PS	DS	PMS	RDS	TS	PS	DS	PMS	RDS
AG	0.00	0.00	0.00	0.00	0.00	-0.57	-0.45	-0.11	0.16	-0.27	-0.88	-0.81	-0.07	0.22	-0.29	-0.76	-0.61	-0.15	0.21	-0.37
FFMOS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.11	-0.11	0.00	0.02	-0.03	0.00	0.00	0.00	-0.06	0.06
UT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONS	-0.05	-0.01	-0.04	0.00	-0.04	-0.06	0.00	-0.06	0.00	-0.06	-0.54	-0.03	-0.50	0.01	-0.52	-0.13	-0.02	-0.11	0.01	-0.11
MANU	-1.33	-0.25	-1.08	0.14	-1.22	-0.19	-0.04	-0.15	0.02	-0.17	-0.26	-0.26	0.00	0.06	-0.06	-0.38	-0.19	-0.19	0.06	-0.25
TR	-0.21	-0.70	0.49	0.13	0.36	0.19	-0.19	0.38	0.02	0.36	-2.91	-1.98	-0.92	0.52	-1.44	-1.86	-0.38	-0.48	0.35	-0.83
TW	-0.17	0.09	-0.26	-0.03	-0.22	-0.09	0.03	-0.12	-0.01	-0.11	0.12	0.16	-0.03	-0.04	0.00	-0.94	1.18	-1.11	-0.10	-1.01
FIREL	-0.04	0.04	-0.08	-0.01	-0.07	-0.32	0.02	-0.34	-0.02	-0.33	0.02	0.15	-0.12	-0.04	-0.08	-0.08	0.09	-0.17	-0.03	-0.14
PSTS	0.00	0.00	0.00	0.13	-0.13	0.04	0.13	-0.09	-0.05	-0.04	0.71	0.84	-0.13	-0.23	0.10	0.33	0.58	-0.25	-0.20	-0.05
MCAS	-0.17	0.60	-0.77	-0.34	-0.43	0.14	0.13	0.01	-0.03	0.04	0.87	1.40	-0.53	-0.46	-0.07	0.78	0.94	-0.15	-0.26	0.10
ES	0.28	0.58	-0.29	-0.17	-0.13	0.09	0.17	-0.08	-0.05	-0.03	-0.22	1.23	-1.45	-0.46	-0.99	-0.14	0.67	-0.81	-0.25	-0.56
HCSA	1.12	-0.17	1.30	-0.01	1.31	-0.51	-0.11	-0.39	0.04	-0.44	-0.04	-0.57	0.53	-0.11	0.42	-0.10	-0.45	0.34	0.09	0.26
ICR	1.02	0.08	0.95	0.05	0.90	-0.15	0.06	-0.21	-0.03	-0.18	0.19	0.34	-0.15	-0.09	-0.06	0.78	0.18	0.61	0.00	0.61
AFS	1.31	0.31	1.00	0.00	1.00	0.00	0.13	-0.13	-0.04	-0.09	2.34	0.79	1.54	-0.07	1.62	-1.23	0.78	-2.01	-0.32	-1.69
OS	0.89	-0.21	1.10	-0.04	1.14	0.12	-0.07	0.19	0.00	0.19	0.22	-0.64	0.86	0.08	0.78	-0.52	-0.50	-0.03	0.12	-0.14
PA	-0.50	-0.25	-0.25	0.10	-0.35	0.04	-0.05	0.09	0.00	0.09	-1.69	-0.57	-1.12	0.33	-1.45	-0.72	-0.35	-0.37	0.15	-0.52

TS = PS + DS = PS + PMS + RDS. ; TS =Total Shift; DS = Differential Shift; PS = Proportionality Shift; PMS = Proportionality Modification Shift; RDS = Residual Differential Shift.
The sum of the shift values is given in Table 2.

Sectoral abbreviations:

AG = Agriculture;
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UT = Utilities ;
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MCAS = Management of Companies and Administrative and Other Support Services ;
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PA = Public Administration ;

Table 5---Continued
Sectoral Contribution to the Total Shift and its Components in Part-time Employment
1987-1999

Sector	QUE					ONT.					MAN.					SASK				
	TS	PS	DS	PMS	RDS	TS	PS	DS	PMS	RDS	TS	PS	DS	PMS	RDS	TS	PS	DS	PMS	RDS
AG	-10.78	-8.59	-2.19	3.05	-5.24	-7.79	-13.34	5.55	0.35	5.20	-5.78	-5.20	-0.57	1.48	-2.05	-21.39	-13.34	-8.05	7.01	-15.06
FFMOS	0.00	0.00	0.00	-0.17	0.17	-2.34	-0.28	-2.06	0.28	-2.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.05	0.05
UT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONS	-0.42	-0.15	-0.27	0.04	-0.31	0.81	-0.31	1.12	0.06	1.06	-0.85	-0.05	-0.80	0.02	-0.82	-0.93	-0.04	-0.89	0.02	-0.91
MANU	1.18	-1.88	3.06	0.20	2.87	-7.88	-3.62	-4.26	1.17	-5.42	-0.42	-0.29	-0.13	0.08	-0.21	-0.06	-0.14	0.08	0.03	0.06
TR	-11.90	-11.19	-0.71	2.62	-3.33	-25.94	-24.45	-1.49	5.72	- 7.21	-7.21	-2.50	-4.71	-0.91	-5.62	-3.79	-2.05	-1.74	0.59	-2.33
TW	1.61	1.34	0.26	-0.29	0.56	1.14	2.38	-1.24	-0.61	-0.63	0.17	0.21	-0.03	-0.05	0.02	-0.42	0.24	-0.65	-0.09	-0.56
FIREL	-2.01	-1.16	-3.17	-0.37	-2.81	-2.05	2.18	-4.23	-0.64	-3.59	-0.81	0.25	-1.06	-0.09	-0.97	-0.22	0.19	-0.41	-0.06	-0.35
PSTS	4.09	8.49	-4.40	-3.08	-1.32	15.51	14.52	0.99	-3.09	4.08	0.90	1.30	-0.15	-0.40	0.01	0.68	0.91	-0.23	-0.27	0.04
MCAS	8.19	8.76	-0.57	-3.20	1.59	20.43	17.39	3.05	-0.70	6.25	1.10	2.01	-0.95	-0.70	-0.20	1.19	1.81	-0.61	-0.58	-0.04
ES	13.98	8.87	5.11	-5.08	6.54	-0.92	14.18	-15.10	-0.40	-10.02	1.47	1.63	-1.48	-0.40	0.23	1.01	1.44	-0.43	0.38	-0.05
HCSA	-24.53	-5.82	-18.72	1.19	-20.84	4.66	-7.29	11.95	0.37	10.76	-3.68	-1.13	-10.75	0.37	-2.91	-5.21	-0.94	-4.27	0.39	-4.67
ICR	2.65	2.37	0.28	-1.32	0.81	3.80	5.30	-1.51	-0.14	-0.18	-0.08	0.45	-4.90	-0.14	-0.39	0.58	0.43	0.16	0.09	0.24
AFS	11.68	6.63	5.05	-11.68	6.24	-102.87	14.07	-116.95	-0.58	-105.26	-1.28	1.61	-3.08	-0.58	-2.32	-0.53	1.32	-1.84	-0.44	-1.41
OS	-8.05	-4.48	-3.57	1.31	-4.88	-10.29	-6.57	-3.72	1.80	-5.52	-2.91	-0.78	-4.28	0.35	-2.48	-1.40	-0.69	-0.71	0.21	-0.93
PA	-7.26	-4.35	-2.90	1.53	-4.43	-1.76	-4.77	3.01	0.53	2.46	-1.51	-0.67	-2.12	0.31	-1.14	-1.15	-0.62	-0.53	0.24	-0.77

TS = PS + DS = PS + PMS + RDS. ; TS =Total Shift; DS = Differential Shift; PS = Proportionality Shift; PMS = Proportionality Modification Shift; RDS = Residual Differential Shift.
The sum of the shift values is given in Table 2.

Sectoral abbreviations:

AG = Agriculture;
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OS = Other Services ;
PA = Public Administration ;

Table 5---Continued
Sectoral Contribution to the Total Shift and its Components in Part-time Employment
1987-1999

Sector	ALTA. TS	PS	DS	PMS	RDS	B.C. TS	PS	DS	PMS	RDS
AG	-4.47	-9.60	5.12	-0.30	5.43	-3.46	-3.99	0.53	0.66	-0.13
FFMOS	0.95	-0.39	1.34	-0.05	1.39	-1.52	-0.63	-0.89	0.24	-1.13
UT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONS	-0.21	-0.12	-0.09	0.03	-0.12	1.60	- 0.20	1.80	0.02	1.78
MANU	1.27	-0.45	1.72	-0.03	1.75	-0.33	-1.17	0.84	0.20	0.64
TR	-7.01	-5.76	-1.25	1.41	-2.66	3.82	- 6.71	10.53	0.79	9.73
TW	0.69	0.63	0.06	-0.14	0.20	3.83	0.84	2.99	-0.03	3.02
FIREL	2.74	0.50	2.24	-0.04	2.29	8.04	0.70	7.33	0.07	7.26
PSTS	2.69	5.44	-2.75	-1.96	-0.79	12.62	5.38	7.24	0.62	6.62
MCAS	4.63	5.08	-0.45	-1.29	0.84	8.00	7.16	0.85	-1.42	2.27
ES	5.81	4.01	1.80	-0.71	2.51	15.73	4.16	11.58	0.43	11.14
HCSA	8.48	-1.70	10.18	-0.03	10.21	-0.86	-2.51	1.65	0.51	1.14
ICR	2.51	1.38	1.13	-0.24	1.37	1.29	2.02	-0.73	-0.51	-0.22
AFS	9.97	2.98	6.99	-0.18	7.17	14.08	4.69	9.38	-0.40	9.79
OS	-0.22	-1.79	1.57	0.29	1.29	4.24	-2.34	6.57	0.02	6.56
PA	-1.03	-1.19	0.15	0.25	-0.09	1.47	-1.19	2.65	-0.21	2.86

TS =PS + DS = PS + PMS + RDS. ; TS =Total Shift; DS = Differential Shift ; PS = Proportionality Shift; PMS = Proportionality Modification Shift; RDS = Residual Differential Shift.
The sum of the shift values is given in Table 2.

Sectoral abbreviations:

AG = Agriculture;
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proportionality modification shift.[8] As mentioned above, differential shift reflects competitive (noncompetitive) position of a particular sector which could be due to locational factors or due to particular government policy for that sector or a host of other factors. These factors can be isolated to some degree by decomposing differential shift into proportionality modification shift and residual differential shift. The proportionality modification shift reflects industrial mix at the end of the study period which might have improved (deteriorated) as indicated by a positive (negative) sign of the shift. This change will reflect the influence of government policy or lack there of or the realization of location advantages. The other influences that might impact the employment situation in a particular sector in a particular province not captured by proportionality modification shift would be reflected in residual differential shift. Table 5 lists differential shift, proportionality modification shift, and residual differential shift by sectors for all the provinces.

For goods producing sector, the proportionality modification shift indicates an improvement in relative position in every province, The service sector, on the other hand reflects an unfavourable position for some of the sectors for all the provinces compared to the beginning of the study period. Given the fact that goods producing sector is a declining sector nationally, the positive signs for proportionality modification shift does not mean that this is a growth sector in terms of generating either full-time or part-time employment but only that the position of this sector had stabilized or the decline had slowed down.[9]

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[8]The PMS at the sectoral level indicates a change in sectoral employment performance between base year and the terminal year of the time period under consideration. If the PMS of a given sector is positive (negative), it implies that the employment performance is relatively more favourable (unfavourable) in the terminal year that in the base year. After adding up all sectoral

PMS for a given province, we can say that the industrial mix is relatively favourable (unfavourable) at the terminal year that in the base year if the aggregate PMS is positive (negative). The sectoral Differential Shift (DS) in a given province indicates the growth (loss) of employment if the sectoral employment growth is higher (lower) than the sectoral employment growth at the national level. Therefore, sectoral DS implies “competitive advantage” (disadvantage) of a given sector in a given province. A summation of all sectoral DS for a particular province would suggest whether the province under consideration has an overall “competitive advantage”.

Sectoral Classification

Table 6 shows the classifications of the provinces during 1987-1999. The classification is based on two-shift (PS and DS), and three-shift (PS, PMS, and RDS) analysis. Based on the two-shift analysis we can interpret the result according to these groups. Groupings 1, 2, and 3 indicate employment growth at a faster rate than national average. In other words, these groups represent sectors which will employ more part-time workers in the short-run. Thus, rising total employment in these sectors could largely be due to rapidly rising part-time employment rather than full-time employment. However, the reasons for faster growth are different for each grouping. In case of grouping 1, the faster growth was due to the industrial mix that favored part-time employment as well as had competitive advantage. In case of grouping 2, a province would suffer from relative competitive disadvantage, but it would be outweighed by favourable industrial mix consisting of leading sectors, thus giving the province a positive total shift. Grouping 3 reflects the opposite of grouping 2, that is, despite the dominance of lagging industries, the competitive advantage would outweigh the unfavourable industrial mix, thus giving the region faster growth than the nation average.

Groupings 4, 5, and 6 under the two-shift analysis, on the other hand, reflect employment growth slower than the national average, representing slow growth sectors. Again the reasons for this can be found by looking at the components of the two-shift analysis, i.e., industrial mix and the competitive advantage. For grouping 4 the dominance of lagging sector outweighs any competitive advantage the province might have while in case of grouping 5 it is the competitive disadvantage that would outweigh the dominance of leading sector, thus giving the province a negative total shift. In case of grouping 6 unfavourable industrial mix is combined with competitive disadvantage.

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[9] It is possible to have competitive advantage (disadvantage) in a sector (i.e., employment in a province in that sector expands at a higher (lower) rate than for the nation as a whole) and at the same time, a negative (positive) PMS for that sector. Such a situation indicates that the sectoral employment performance, based on the national standards, is relatively more (less) unfavourable at the end of the period than at the beginning of the period.

Table 6

A summary of Shift Analysis on Two-Shift and Three-Shift Classification

1987-1999.

Province	PS*	DS*	TS*	PMS*	RDS*	Net Effect	C3^	C2^
NFLD.	+	+	+	-	+	PS +RDS > PMS	5	1
P.E.I.	-	-	-	+	-	PS + RDS > PMS	12	6
N.S.	-	-	-	-	-	PS 0 RDS 0 PMS	2	6
N.B.	-	-	-	-	-	PS 0 RDS 0 PMS	2	6
QUE.	+	-	-	+	-	PS + RMS < RDS	4	5
ONT.	+	-	-	-	-	PMS+ RDS > PS	10	5
MAN.	-	-	-	+	-	PS + RDS > PMS	12	6
SASK	-	-	-	+	-	PS + RDS > PMS	12	6
ALTA.	-	+	+	-	+	PS + PMS < RDS	13	3
B.C.	+	+	+	+	+		1	1

*Positive or Negative only #All shifts are positive (negative)
^C2 = Classification of Province Based on 2-shift Analysis, &
C3 = Classification of Province Based on 3-shift Analysis.
(For detailed interpretation of these classifications, see tables 1, and 2).

The analysis based on three-shift scenario is more revealing in terms of likely impact of economic activities over time. There are 14 groupings under three-shift analysis. Under this analysis DS is further broken down into PMS and RDS. Various combinations in these groupings as described in Table 2 can be read from Table 5 for each sector and the aggregated results are given in Table 6. The results based on Tables 2, 5 and 6 are summarized in Table 7, which mentions the possible scenarios for each province regarding each of the sectors included in the study.[10]

Sectors falling under the classifications 4, 8, and 12 are likely to generate more part-time employment in the future despite experiencing a declining employment share in the past. Sectors falling under the classifications 5, 9, and 13, on the other hand, are likely to suffer a decline in part-time employment in the future despite their favourable employment share in the past. Classifications 1, 3, 7, and 11 indicate that sectors that have performed well in terms of employment in the past are likely to continue to do so in the future. Classifications 2, 6, 10, and 14 point to the sectors that have suffered declining employment shares in the past and the trend is likely to continue in the future.

Summary and Conclusion

National employment growth has direct bearing on national economic performance. However, national total employment consists of both part-time and full-time employment and the relative share of part-time employment in the total might have bearings on the income of a region. Moreover, the national employment growth is based on regional employment growth which in turn depends upon the industrial makeup of these regions and the relative competitive advantage and disadvantage of these provinces in terms of location, market forces or government policies. Such factors determine the make-up of total employment in terms of full or part time employment. Government policies do influence the industrial mix and employment mix, thus changing the growth rate and the structure of employment affecting the overall regional growth.

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[10]The inclusion of a sector in a particular classification depends primarily on the positive or negative sign of PMS and whether it is outweighed by other shifts, or it outweighs the other shifts.

Table 7
Classification of Sectors

Province	Sectors that have experienced declining employment shares in the past but are likely to improve in the future. (Classification # 4, 8, and 12)	Sectors not yet suffering from declining employment shares, but perhaps are likely to do so in the future. (Classification # 5, 9, and 13)	Sectors that have performed well in terms of employment growth in the past and are expected to continue to do so in the future. (Classification # 1, 3, 7, and 11).	Sectors that have suffered declining employment shares in the past and the trend is likely to continue in the future. (Classification # 2, 6, 10, and 14)
NFLD*.	CONS; MANU; TR; PA	ES; HCSA; OS.	ICR; AFS.	TW; FIREL; MCAS.
P.E.I.	AG; CONS; MANU; HCSA;	PSTS; AS; ES.	TR; OS; PA.	TW; FIREL; ICR; AFS.
N.S.	AG; FFMOS;CONS; MANU; TR; PA.	TW; FIREL; PSTS; MCAS;ICR; AFS..	OS.	ES; HCSA.
N.B.	AG; CONS; MANU; TR; HCSA; OS; PA.	FFMOS; PSTS; MCAS.	ICR;	TW; FIREL; ES; AFS.
QUE.	AG; CONS; TR; HCSA; OS; PA.	TW; PSTS; MCAS; ICR; AFS.	MANU.	FIREL.
ONT.	AG; FFMOS; MANU; TR; OS; PA.	TW; PSTS; MCAS; ICR.	CONS; HCSA.	FIREL; AFS.
MAN.	AG; CONS; MANU; HCSA; OS; PA.	TW; PSTS; MCAS; ES.	----	TR; FIREL; ICR; AFS.
SASK.	AG; CONS; MANU; TR; HCSA; OS; PA.	PSTS; MCAS.	ES; ICR.	TW; FIREL; AFS.
ALTA.	CONS; TR; OS; PA.	FFMOS; MANU; TW; FIREL; PSTS; MCAS; HCSA; ICR; AFS.	----	AG.
B.C.	AG; FFMOS; MANU;HCSA.	TW; MCSA;ICR; AFS; PA.	CONS; TR; FIREL; PSTS; ES; OS.	-----

For explanation of the sectoral abbreviations, see Table 5.

The PMS is the key indicator to evaluate the overall improvement (deterioration) in a province's industrial structure. The PMS can be thought of as representing the shift in employment which come about from the modification of the province's industrial mix over the study period. A positive PMS, in the context of part-time employment, indicates that a province's industrial mix has changed over the sturdy period in a way which will promote the creation of more part-time employment, while the negative PMS indicates the opposite. However, the exact cause of the change is not explicitly indicated by this statistics. It could be influenced by all sort of autonomous as well as discretionary factors. The working of the market forces will have an impact on the industrial structure of a region and the sectoral rates of growth may be influenced by national and international supply and demand situation.

The empirical results of the study suggest that Construction, manufacturing, and transportation & warehousing in Goods Producing Sector had an experienced less growth in part-time employment at the beginning of the study period as indicated by negative PS for almost all of the provinces, while most of the sectors in the Service Sector generally created more part-time employment as indicated by positive PS. However, over time the Goods Producing Sector increased its relative share of part-time employment while the Service Sector showed an overall slow down in part-time employment due to decline in overall employment situation due to government cut back in most of the government supported sectors, such as Health Care, Education, and Public Administration during the late eighties and early nineties.

Through classification analysis we were able to identify various sectors that had created more part-time jobs in the past but are likely to experience a decline in the future and those sectors that did not experience rapid growth in part-time employment in the past but are likely to experience part-growth in part-time employment in the future.

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