Provincial Unemployment Rate Disparities: A Case of No Concern?

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Comparisons of incomes per capita and unemployment rates have been widely employed as indicators of regional disparities. Unemployment rate disparities may be more fundamental, however, since they not only reflect differences in productive employment opportunities (which cause differences in incomes), but also partly explain income per capita differences. Over the past twenty years, for example, income per employed individual in the Atlantic provinces has been 15 per cent below the national average, whereas income per capita has been 30 per cent below.

This paper focuses exclusively on unemployment rate disparities, and addresses itself to the following issues: are provincial unemployment rate disparities getting worse over time? what are the causes of the disparities among provinces? have regional development assistance programs alleviated unemployment disparities? is there evidence suggestive of the need for a regionalised stabilisation policy? if so, how might this policy be conducted?

Clearly, these are important issues for regional development policy. They are at the heart of the controversy over how much of the regional problem is self-induced and how much is exacerbated by the current system of federal government transfer payments to the provinces. (For different views on transfer dependence, see Anderson and Bonsor (1986) and Courchene

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(1986)).

We begin by considering the recent history of provincial unemployment rate (UR) disparities in Canada. We then develop models for both provincial URs and provincial UR disparities and empirically test the models.

Unemployment Rate Disparities

Figure 1 presents a summary measure of provincial UR disparities.[1] It uses annual data from 1966 to 1990, and labour force shares are used as weights.[2]

It is apparent from Figure 1 that there was an upward trend in provincial unemployment rate disparities between 1971 and 1985. However, since 1985 the upward trend seems to have been reversed. These "stylised facts" are suggestive of a number of underlying causal factors. First, the upward trend dates from the increase in the generosity of the unemployment insurance compensation (UIC) scheme. Second, the recent turnaround in the trend of unemployment disparities occurs at the same time that the exchange rate underwent a massive appreciation. This occurred after the first quarter of 1986, but was particularly rapid in the early part of 1988. (Between 1986 and the middle of 1989 the exchange rate went from being undervalued by about 12% to being overvalued by about 10%). Third, disparities across the country seem to be systematically influenced by the business cycle. The business cycle exerts a positive influence on disparities in the sense that disparities rise in booms and moderate in recessions. The period begins with the strong economic growth in the late 1960s, which terminated in the 1970-1 recession. The recovery in 1974 faltered briefly in 1975, before giving way to a large and sustained boom in the latter half of the 1970s. This boom, concentrated as it was in the industrial heartland, increased unemployment disparities. The change to a restrictive monetary policy in 1981 contributed to the recession of 1982-3, during which measured disparities noticeably fell.

1. There are various measures which could be used to measure UR disparities. One possibility is the "disparity index" – the ratio of the highest provincial unemployment rate to that of the lowest. However, this index focuses on only a tiny fraction of the population (around 6%), and it explodes when the denominator becomes very small. Nevertheless, both Savoie (1986b) and Melvin (1987) rely on this "disparity index" in concluding that UR disparities have moderated since 1961.
2. An alternative to the weighted standard deviation would be the coefficient of variation. The choice between these two statistics hinges on whether disparities are better measured in an absolute or relative sense. Whereas the standard deviation will rise whenever provincial unemployment rates increase by x% across the board, the coefficient of variation will not. The value judgement in this paper is that disparities have worsened if UR^j increases from 10% to 20% while UR increases from 2% to 4%. Moreover, efficiency considerations suggest that absolute disparities are more relevant than relative ones.

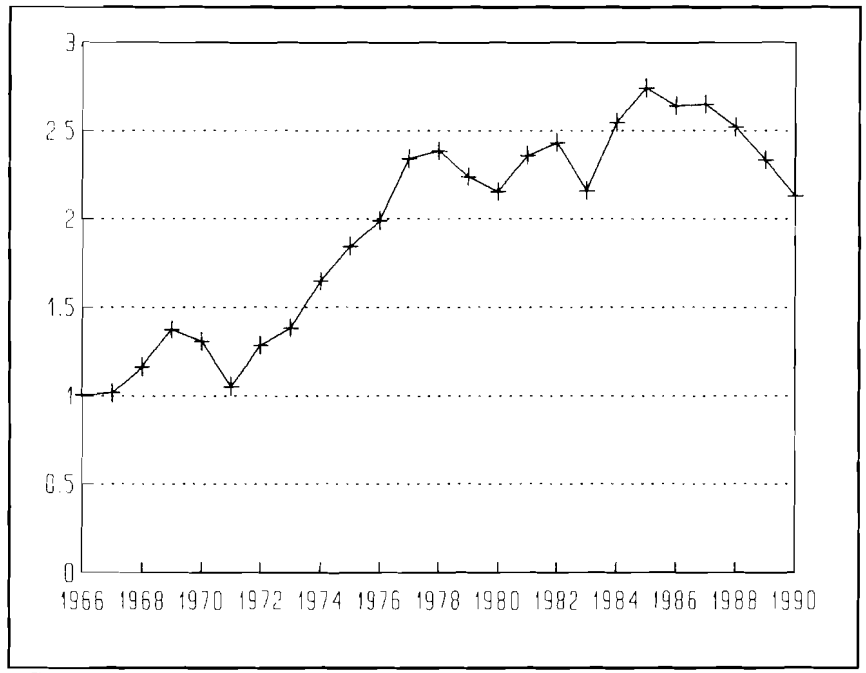

FIGURE 1 The Standard Deviation of Provincial URs in Canada

The Explanatory Variables

The use of provincially disaggregated data allows for a more precise identification and quantification of the factors influencing UR differentials. An aggregated approach implicitly constrains the coefficients to be the same across provinces. The importance of this issue is highlighted by the fact that few aggregated studies have found significant UIC effects (on unemployment) in Canada.[3] However, the drawback with using provincially disaggregated data is that we can expect to encounter more data problems.

Real GDP Data and The Business Cycle

Statistics Canada does not publish provincial real GDP – only nominal GDP.

3. One exception is Grubel et al. (1975). Aggregated studies which find no significant effect of UIC on unemployment are Denton et al. (1975), Samson (1985), Landon (1987) and Burns (1988a). Regionally disaggregated studies which do find significant UIC effects are Maki (1975), Miller (1987) and Burns (1988b). Fortin (1989) uses a demographically disaggregated approach and finds significant UIC effects. Recently, Coe (1989) found significant UIC effects in a fully aggregated framework.

The best measure of provincial real output published by Statistics Canada is provincial final domestic demand, which omits interprovincial trade and inventories. Moreover, these data are only available from 1971. Yet, it is crucial to have pre-1971 data in order to evaluate the impact of the 1971 UIC revisions.

Many researchers have resorted to the provincial real GDP figures published by the Conference Board of Canada. However, these series are inconsistent in that the generating methodologies have undergone two changes (in 1980 and 1985) but no revisions of the original estimates have taken place. In addition, employment shares are used (for four out of twelve sectors) to allocate national value added among the provinces.[4] As a result of this procedure, measured real GDP would be spuriously correlated with employment (and hence unemployment). In sum, the Conference Board describe their estimation techniques as far more rudimentary than those used by Statistics Canada.

The alternative to the Conference Board data is to use Canada-wide real GDP figures, and to use a national measure of the business cycle. This procedure will work well providing variables which capture the regional specific impact of the national business cycle can be found. In fact, the exchange rate gap (the difference between the exchange rate and its purchasing power parity level) and the real rate of interest have region specific effects.

Besides the avoidance of inconsistent and rudimentary data, there are other appealing features of this approach. First, the national business cycle is more obviously exogenous to any individual province; and second, the approach lends itself more easily to suggesting ways in which a regionalised stabilisation policy might operate.

Other Variables

There is no shortage of explanations for rising unemployment rates, though not all of them are plausible as determinants of regional UR differentials. For example, it is well established that the demographic effects of the baby boom were to increase equilibrium unemployment rates throughout the 1960s and the first half of the 1970s; however, it is unlikely that the baby boom in Ontario was significantly different from that in Manitoba.

As previously mentioned, it is apparent from Figure 1 that UR disparities

4. The four sectors are: transportation, storage and communication; finance, insurance and real estate; other services; and public administration. For a discussion of the Conference Board's procedures see "The Provincial Economies 1961-1979 Data – A Supplement of the Quarterly Provincial Forecast" 1980 edition, pages 14 and 15. I am indebted to an anonymous referee for drawing my attention to these data problems.

began their upward drift in 1971, the same year that the generosity of the UIC system was dramatically increased. A measure of the generosity of UIC has been developed by Fortin (1984). This measure takes into account the replacement ratio, the minimum work required for a claim, and the maximum duration of benefits. The methodology for generating provincial estimates of this UIC generosity measure is outlined in Coe (1989).

Another possibly important determinant of UR disparities is differences in provincial minimum wage rates relative to manufacturing sector wage rates. This variable has been emphasized by Courchene (1986) in arguing that much of the UR disparity problem has been self-induced.

Structural change has been an important variable for the new classical economists in making a case that actual URs have closely tracked natural rates. Lilien (1982) measured structural change by the weighted standard deviation of growth rates between industries (denoted by SIG), and Samson (1985) showed that this variable was also important in the Canadian context. The work of Abraham and Katz (1986) showed that SIG could inadvertently be picking up the influence of the business cycle, which suggests orthogonalising SIG on the output gap. The construction of SIG requires data on employment by industry at the provincial level. Statistics Canada has these data, but the problem of confidentiality precluded construction of this variable for P.E.I. As a result, P.E.I. was dropped from the analysis.

The work of Burns (1988a;1988b) emphasized the importance of real energy prices in both the national and regional contexts. The inclusion of this variable could be justified on various grounds. For example, it could be included as a specific determinant of changes in industrial structure (SIG). A related justification focuses on the link between wage stickiness and productivity changes. The rise in the relative price of energy has been suggested as one cause of the recent world-wide productivity slow-down (see Lindbeck (1983)). As Bruno (1986) and Bruno and Sachs (1985) emphasize, if workers fail to perceive changes in their productivity, they may demand an inappropriately high real wage, thereby generating "classical" unemployment.

Recently, Keil and Symons (1990) have emphasized the importance of changes in the wedge between the real product wage paid by the firm and the real consumption wage received by workers. This wedge is influenced by changes in both direct and indirect taxes, changes in worker and firm contributions to pensions, unemployment insurance, and workman's compensation schemes, and changes in the terms of trade with the rest of the world. Most of the data required to build provincial measures of this wedge are readily available from Statistics Canada. However, price indices are a problem at the provincial level since, before 1971, Statistics Canada only published the CPI for the CMAs in each province. For provincial GDP deflators there may be nothing better than the Conference Board's data.

One unique feature of the present study is the attempt to incorporate into the analysis the federal government's regional development initiatives.

Directly tracking the activities of the myriad agencies involved in this work over the last 35 years would be a monumental task – beyond the scope of the present paper. However, data on the federal government's expenditures and receipts are available by province and, therefore, various measures could be developed. The measure used here is gross federal spending on transfers to business, federal investment in capital and inventory, and federal government spending on goods and services, expressed in real dollars per capita.

Annual data are used throughout the period of analysis, 1966 to 1990. Precise definitions and data sources are given in the data appendix. Referring first to the national variables, YGAP denotes the proportional output gap (negative values of this variable indicate recession); ERGAP is the proportional difference between the exchange rate and its purchasing power parity value (positive values indicating that the Canadian dollar is overvalued); REALR denotes the real interest rate; and DENER represents the proportional rate of change of real energy prices. Turning to the regional variables, UIC^j is Fortin's measure of UIC generosity; $WMIN^j$ is the ratio of provincial minimum wage rates to average hourly earnings in manufacturing; SIG^j is Lilien's measure of structural change; $DFED^j$ is the change in the federal government's gross spending on development assistance measured in real dollars per capita; $DWEDG^j$ is the change in the Keil - Symons wedge between the real wage received by workers and that paid by firms; and, finally, LUR^j is the lagged value of the dependent variable.

Modelling Provincial UR Disparities

We begin by modelling provincial unemployment rates, using a reduced-form approach. The equation to be estimated, for province j, can be represented as:

$$UR^j = a_j + \sum_{i=1}^{n} b_i^j X_i + \sum_{i=1}^{m} c_i^j Y_i^j + \epsilon^j \qquad (1)$$

where there are n national variables (X_i) in each equation, m regional variables (Y_i^j) and ϵ^j is a random disturbance term for province j. If equation (1) were applied to Canada as a whole we would have:

$$UR = a + \sum_{i=1}^{n} b_i X_i + \sum_{i=1}^{m} c_i Y_i + \epsilon \qquad (2)$$

where Y_i denotes the average Canadian values of the regionally specific variables Y_i^j and ϵ is the national random disturbance term. Subtracting (2) from (1) we obtain:

$$UR^j - UR = (a^j - a) + \sum_{i=1}^{n} (b_i^j - b_i) X_i + \sum_{i=1}^{m} c_i (Y_i^j - Y_i)$$

$$+ \sum_{i=1}^{m} (c_i^j - c_i) Y_i^j + (\epsilon^j - \epsilon) \qquad (3)$$

The third and fourth terms on the right hand side of equation (3) are obtained by adding and subtracting $\Sigma c_i Y_i^j$. This allows us to decompose the influence of the regionally specific variables into two parts: that part due to different "endowments" ($Y_i^j - Y_i$), and that part due to different "sensitivities" ($c_i^j - c_i$). We will subsequently denote differences between provincial and national "endowments" by $DY_i^j = Y_i^j - Y_i$. The influence of the national variables can only be felt through different provincial "sensitivities" ($b_i^j - b_i$).[5]

We estimate both equations (1) and (3) in order to exploit all the information in the data set. The latter system may, however, enjoy some statistical advantages over the former. In the strong form of the hysteresis hypothesis the notion of unique natural rates of unemployment is abandoned in favour of multiple equilibria (see, Blanchard and Summers (1988) and Milbourne, Purvis and Scoones (1991)). Modelling provincial URs may be frustrated if no unique equilibrium rate exists. However, it may be that equilibrium UR disparities exist even though the overall level of average unemployment may have many possible equilibria.

The Empirical Results

The system of nine provincial UR equations was estimated using Zellner's system of seemingly unrelated regressions (SUR) which results in efficiency gains where there is contemporaneous correlation of the disturbances. The main feature of this estimation was the poor performance of the $DWEDG^j$ variable. It had the wrong sign on six occasions, and was insignificant on seven occasions; only on one occasion was it significant with the correct sign. In view of these difficulties, and the fact that this variable involved the use of the rudimentary Conference Board data on provincial GDP deflators, the decision was taken to drop it from the analysis (although the full results are available from the author). The results of estimating the system without $DWEDG^j$ are presented in Table 1 below, which shows t-statistics in parentheses.

The results of this estimation are very encouraging. The system weighted R^2 is high (0.98). The Durbin h-statistic shows no evidence of serially correlated errors, and the system passes Ramsey's Reset test (for example, see Kmenta (1986)) with an F-value of 1.33. Of 63 cells about which we have clear *a priori* predictions, there are only 3 incorrect signs. (A useful yardstick

5. Equation (3) could alternatively be normalised on a particular province–Ontario for example. However, this would not give us the national coefficients.

TABLE I Provincial Unemployment Rates – Excluding DWEDG[j]

	BC	AB	SK	MB	ON	PQ	NB	NS	NF
Constant	2.29	3.04	-1.11	3.33	2.57	-1.57	2.72	-0.99	2.39
	(1.1)	(2.1)	(0.5)	(1.3)	(1.6)	(0.8)	(1.2)	(0.5)	(0.8)
YGAP	- 42.7	-36.9	-11.0	-18.7	-31.4	- 22.6	-12.4	- 21.1	-13.4
	(5.3)	(6.7)	(1.8)	(2.1)	(3.6)	(3.6)	(1.7)	(3.5)	(1.0)
REALR	0.17	0.06	0.14	0.14	0.14	0.21	0.21	0.10	0.18
	(2.9)	(2.1)	(3.9)	(2.6)	(2.6)	(4.8)	(4.0)	(2.7)	(2.2)
ERGAP	-9.94	- 4.68	-1.69	- 6.65	-5.60	-5.81	-10.8	-1.00	-9.07
	(2.3)	(2.1)	(0.6)	(1.7)	(1.3)	(1.9)	(2.4)	(0.4)	(1.7)
UIC[j]	1.27	0.30	0.36	1.03	1.11	1.02	1.82	0.65	1.21
	(3.3)	(1.3)	(1.2)	(2.7)	(2.2)	(3.8)	(4.8)	(2.0)	(2.4)
WMIN[j]	3.01	-2.60	4.52	-1.17	0.36	8.60	2.21	4.19	0.59
	(0.6)	(0.9)	(1.1)	(0.3)	(0.1)	(2.6)	(0.5)	(1.5)	(0.1)
DENER	-1.70	- 2.48	- 2.73	- 0.87	4.32	0.74	- 0.56	3.62	0.07
	(0.9)	(2.2)	(1.8)	(0.5)	(2.2)	(0.4)	(0.3)	(2.3)	(0.1)
SIG[j]	14.28	21.64	8.64	2.01	23.5	29.2	-15.7	16.88	1.75
	(1.7)	(3.6)	(2.0)	(0.4)	(2.2)	(2.2)	(1.5)	(3.4)	(0.2)
DFED[j]	4.17	1.73	- 0.44	- 4.21	- 6.67	-1.33	- 0.70	- 2.65	3.22
	(1.1)	(2.5)	(0.7)	(2.4)	(2.7)	(1.5)	(1.1)	(2.8)	(2.0)
LUR[j]	0.41	0.63	0.75	0.36	0.32	0.52	0.33	0.77	0.63
	(3.5)	(8.2)	(7.2)	(2.7)	(2.1)	(5.8)	(2.6)	(6.2)	(5.0)
R^2: 0.98									

is that a significance level of approximately 5% for a one-tailed test translates into a t-value of around 1.7.) The business cycle variables seem to work well: YGAP is everywhere negative, and is insignificant only in Newfoundland; REALR is everywhere significantly positive; and ERGAP is everywhere negative, but is insignificant on three occasions. Fortin's measure of UIC generosity is everywhere positive, and only insignificant for Saskatchewan and Alberta. SIG[j] is significantly positive on six occasions, positive but insignificant for Manitoba and Newfoundland, and negative but insignificant for New Brunswick. Finally, the change in real energy prices enters in a plausible fashion; it has a significantly negative effect on unemployment in Alberta and Saskatchewan, and a significantly positive effect on unemployment in Ontario, but is insignificant elsewhere.

On the other hand, minimum wage ratios and the change in gross federal development expenditures perform poorly. The minimum wage ratios are only significantly positive for Alberta; in the other provinces they enter insignificantly. Federal development expenditures have the correct sign (negative) on six occasions, but of these only three are significant. Of the remaining three occasions where DFED[j] has the wrong sign, two are significant. Thus, the evidence in favour of the benefits of development assistance spending is mixed.

The results suggest that unemployment in British Columbia is most sensitive to the output gap, and that Saskatchewan is least sensitive. Similar results were reported by Swan (1972). In addition, there seems to be support for the view that UR disparities are, to some extent, self-induced and worsened by federal to provincial transfer payments. For example, most of the economies with above average URs are also more sensitive to changes in UIC. This applies especially to New Brunswick, B.C., and Newfoundland.

Given the encouraging nature of these results, it is worth pursuing this data set further, by using it in the estimation of equation (3). This will also tell us whether the results are robust to an alternative normalisation. The system is estimated using SUR while imposing the constraints implied by the presence of the aggregate (c_i) coefficients in each equation. These results are presented in Table 2.

Table 2 confirms and sharpens our previous results.[6] The significantly negative sign on YGAP for British Columbia and Ontario indicates that a recession increases their URs relative to the national average; on the other hand, the significantly positive sign on YGAP for Saskatchewan, Manitoba, New Brunswick, Nova Scotia, and Newfoundland indicates that a recession reduces disparities in these provinces.

With regard to the variables which capture the regionally-specific impact of the business cycle, REALR and ERGAP, there seems to be a systematic difference between their impact on Ontario and the rest of the country. Whereas high real interest rates have a significantly negative impact on the UR disparity (between the province and the national average) in Ontario (and Alberta), they have a positive impact elsewhere. Similarly, whereas an overvalued exchange rate has a significantly positive effect on the UR disparity in Ontario, it has a negative effect elsewhere (although it is insignificant on four occasions). Thus, it does seem as if the industrial heartland is more sensitive to the exchange rate than the periphery, whereas the periphery is more sensitive to the real interest rate than the industrial heartland. This result contrasts with the speculation of Howitt (1990) that the burden of high interest rates might disproportionately fall on the durable goods industries of Ontario (and Quebec) and grain producers on the Prairies.

The aggregate coefficients (c_i) on UIC and WMIN are both of the correct sign and are significant at the 1% level. To calculate the contribution of each of these variables to UR disparities, the long-run coefficients must be recovered by finding the national weighted average value of the coefficient of the lagged dependent variable (where labour force shares are weights). Denoting this coefficient as α, we find α=0.414, and $1/(1-\alpha)$ as 1.7. Our

6. This system was also subjected to Ramsey's Reset test. The resulting F value does not reject the null hypothesis that there are no major specification errors. In addition, there was no evidence of first order serial correlation in any of the provincial equations.

TABLE 2 Provincial UR Disparities–excluding DWEDG [j]

	BC	AB	SK	MB	ON	PQ	NB	NS	NF
Constant	-3.04	0.32	2.30	-1.74	0.32	-0.41	3.84	2.37	4.32
	(1.9)	(0.3)	(1.5)	(1.1)	(0.5)	(0.4)	(3.5)	(2.1)	(2.7)
YGAP	-19.1	-3.69	20.8	11.0	-6.32	4.20	18.99	16.35	19.8
	(3.0)	(0.8)	(3.9)	(2.3)	(2.2)	(1.3)	(4.2)	(3.4)	(2.2)
REALR	0.10	-0.04	0.03	0.001	-0.05	0.03	0.03	0.01	0.11
	(2.3)	(1.7)	(0.8)	(0.6)	(2.8)	(1.7)	(1.7)	(0.1)	(2.1)
ERGAP	-6.46	-5.61	-0.39	-0.92	2.68	0.24	-2.11	-1.28	-8.55
	(2.1)	(3.1)	(0.2)	(0.3)	(2.6)	(0.2)	(1.2)	(0.7)	(2.8)
DUIC [j]	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
	(4.9)	(4.9)	(4.9)	(4.9)	(4.9)	(4.9)	(4.9)	(4.9)	(4.9)
UIC [j]	0.47	0.25	0.27	-0.05	-0.42	0.03	0.62	0.35	0.81
	(2.2)	(1.7)	(1.4)	(0.2)	(4.2)	(0.3)	(4.9)	(2.3)	(3.2)
DWMIN [j]	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45
	(3.6)	(3.6)	(3.6)	(3.6)	(3.6)	(3.6)	(3.6)	(3.6)	(3.6)
WMIN [j]	10.52	-1.36	-8.31	1.88	-1.13	1.17	-6.77	-3.63	-5.8
	(2.5)	(0.6)	(2.3)	(0.6)	(0.8)	(0.7)	(2.9)	(1.9)	(1.8)
DENER	-3.36	-1.72	-2.37	-2.23	3.27	-0.09	-0.75	0.78	-2.3
	(1.9)	(1.4)	(1.7)	(1.9)	(4.6)	(0.1)	(0.7)	(0.7)	(1.1)
DSIG [j]	6.46	6.46	6.46	6.46	6.46	6.46	6.46	6.46	6.46
	(2.3)	(2.3)	(2.3)	(2.3)	(2.3)	(2.3)	(2.3)	(2.3)	(2.3)
SIG [j]	-10.9	-2.57	-4.57	-3.18	1.50	7.42	-32.2	7.11	-2.7
	(1.5)	(0.4)	(0.9)	(0.7)	(0.3)	(1.2)	(7.4)	(1.8)	(0.5)
DDFED [j]	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38
	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)
DFED [j]	-0.52	2.06	0.39	-1.80	-3.61	0.17	-0.15	-1.81	3.13
	(0.2)	(3.3)	(0.5)	(1.7)	(4.2)	(0.4)	(0.3)	(2.5)	(2.8)
LDUR [j]	0.31	0.66	0.41	0.36	0.37	0.53	0.13	0.03	0.35
	(2.2)	(8.8)	(4.7)	(3.1)	(4.2)	(4.4)	(1.7)	(0.3)	(3.6)
R^2: 0.98									

results suggest that the 1971 revisions to UIC increased the national UR by over 3½ percentage points.[7] With the exception of Quebec, the provinces with above average URs (B.C., New Brunswick, Nova Scotia, and Newfoundland) are all more sensitive to UIC than the national average, and those with below average URs are all less sensitive. The province showing the most sensitivity to UIC is Newfoundland (it has the highest "sensitivity" coefficient of 0.81). In addition, because of regionally extended benefits, UIC is most generous in this province. These facts combine to produce the highest UR response. Newfoundland's UIC coefficient is 1.85 (1.04 plus 0.81), and the coefficient on LUR^{NF} is 0.35, which implies a long-run UIC^{NF} coefficient of 2.85. Its measure of UIC generosity was 3.3 at its most generous in 1976, compared to a value of 0.14 in 1970. This translates into a 9 percentage point increase in the UR in Newfoundland as a result of the 1971 revisions. The effect of the UIC revisions is least in Ontario, where both "sensitivity" and benefits were least, and it produced about a 1.8 percentage point increase in the Ontario UR. Thus, the 1971 revisions appear to have opened up a 7 percentage point differential between Newfoundland and Ontario. This is close to Riddell's (1980) estimate of a 5 to 6 percentage point differential.[8]

The long-run national coefficient of 7.56 on WMIN suggests that when minimum wages were at their peak in 1976, they accounted for about 3½ percentage points of unemployment. Since then, minimum wage ratios have been on a downward trend; by 1990 they accounted for only 2½ percentage points of unemployment in Canada as a whole.[9]

As noted above, SIG^j is significant with the correct *a priori* sign. However, its econometric significance does not carry over into quantitative significance. It has a long-run coefficient of 10.98, but the largest shock is 0.039 which occurs in 1976. Hence, at its largest, it accounts for less than half a percentage point of aggregate unemployment. This is in stark contrast to the result of Samson (1985) who finds that SIG is almost entirely responsible for the natural rate tracking the actual rate.

The results of estimating the system in UR disparity form emphasizes the tentativeness of the evidence in favour of development assistance spending. The aggregate coefficient, while negative, is insignificant. Of the provincial "special sensitivity" coefficients, Manitoba, Nova Scotia and Ontario are significantly negative, while Alberta and Newfoundland are significantly positive. In addition to the weak econometric significance, the size of the coefficients would imply a very small quantitative impact.

7. The pre-1971 value of UIC was approximately 0.12. After the 1971 revisions it increased to its highest value of 2.2. Thus, the change in the value (2.08) times the long-run coefficient (1.78) equals 3.69.

8. Our larger estimate is likely because Riddell did not have the benefit of data from the 1980s. Since 1982, Newfoundland's UR disparity has continued to increase despite reductions in both absolute and relative UIC generosity in Newfoundland.

9. The reasonable aggregate results for the minimum wage ratio are marred by less appealing province effects; specifically the total (short-run) coefficient for B.C. is overly large (14.9), while that for Newfoundland is overly small (-1.3).

Regionalised Stabilisation Policy?

Suppose a technically feasible regionalised stabilisation policy could be devised–would one be needed? There would certainly be a strong case for a regional stabilisation policy if an uneven diffusion of aggregate demand were getting worse over time, and hence was responsible for some of the trend increase of UR disparities. However, even if there were merely cyclical dependence there still might be a case. According to Lipsey's aggregation theorem (Lipsey 1960), an increase in the dispersion of regional unemployment rates may cause an upward shift in the aggregate Phillips curve. Thus, overall macroeconomic performance may be improved by eliminating a systematic relationship between the business cycle and UR disparities.

However, it is not clear that a correlation between UR disparities and the business cycle constitutes evidence that an uneven diffusion of aggregate demand is the root cause. For example, a real business cycle theorist might conjecture that supply-side shocks are simultaneously driving unemployment rates and the business cycle; or, even in the case of a genuine demand-side recession (such as in 1981-82) there may be systematic structural factors at work causing changes in provincial UR disparities (such as factor is Canada's UIC system).

It seems that what is necessary is a systematic attempt to disentangle the total UR differential and that part which is due to structural factors. Using the residual provincial UR differentials, we can then construct an adjusted summary disparity measure to determine whether there still exists a positive upward trend in absolute disparities and any remaining sensitivity to the business cycle.[10]

The Adjusted Disparity Measure

Predicted "natural" disparities can be generated from the estimates in Table 2, by setting the business cycle variables (YGAP, ERGAP and REALR) equal to their long run trend values. However, since there is a lagged dependent variable in this system. The actual value of $DUR^j(-1)$ is used to generate the first prediction, after which the lagged predicted value is used. For example, denoting the natural UR disparity by $DURN^j$, for Alberta we

10. Lazar (1977) concluded that there was no need for a regionalised stabilisation policy since most of the unemployment rate differences among regions were explained by frictional and structural factors. More recently, Miller (1987) addressed the same issue, and found that in 1983 the proportion of unemployment due to demand deficiency varied from 0.1 in Ontario to 0.3 in the Atlantic region. While this result would seem to indicate the need for a regionalised stabilisation policy, Miller concludes the opposite on the grounds that typically more unemployment is due to structural factors than demand deficiency.

have:

$$\begin{aligned} DURN^{AB} = {} & \alpha_0 + \alpha_1 DUIC^{AB} + \alpha_2 UIC^{AB} + \alpha_3 DWMIN^{AB} \\ & + \alpha_4 WMIN^{AB} + \alpha_5 DENER + \alpha_6 DSIG^{AB} \\ & + \alpha_7 SIG^{AB} + \alpha_8 DDFED^{AB} + \alpha_9 DFED^{AB} \\ & + \alpha_{10} DURN^{AB}(-1) \end{aligned} \tag{4}$$

As noted by Samson (1985), the fact that the actual value of $DUR^j(-1)$ was used initially will bias the results, but its impact will decrease rapidly, and it is safe to suppose that only the first few observations will be affected seriously. Once the "natural" UR differentials are recovered, the residuals are simply $RDUR^j = DUR^j - DURN^j$. The standard deviation of the "adjusted" (or residual) UR disparities is then:

$$RSTD = \left[\sum_{j=1}^{9} b^j (RDUR^j)^2 \right]^{1/2} \tag{5}$$

where b^j denotes the labour force share of province j. Figure 2 plots the residual (or adjusted) summary UR disparity measure. For ease of comparison, the measure of actual UR disparities is also redrawn.

It is apparent from Figure 2 that, after adjusting for structural factors, there is no longer an upward trend to UR disparities. There is, however, a noticeable bulge in the adjusted disparity measure which coincides with the dramatic easing of UI generosity in 1971 and its subsequent tightening in 1979. According to Keil and Symons (1990), it also coincides with a period of very favourable terms of trade for Canada. Their wedge measure falls continuously between 1971 and 1980. Indeed, their major conclusion is that the effects of the 1971 UIC revisions really did not show up until after 1980, because prior to that time changes in the tax and import price wedge offset those changes. These observations suggest testing for the influence of UI and the wedge, as well as aggregate demand, on the adjusted disparity measure. The results of this exercise are presented in Table 3.

Column 1 shows the regression of the adjusted disparity measure (RSTD) purely on the business cycle variables and its own lagged value. None of the business cycle variables are significant. When both UIC and WEDGE are included, the business cycle variables remain insignificant, although the two new variables enter strongly. Column 3 drops the business cycle variables from the regression leaving UIC with a significantly positive, and WEDGE with a significantly negative effect.

These results suggest a number of things. First, just because UR disparities moved systematically with the business cycle does not mean that the business cycle was the root cause. In fact, after adjusting for structural factors (apart from the business cycle) it appears that the business cycle is unable to explain the residual changes in UR disparities. Second, it appears that the full effect of UIC generosity was not picked up in the estimation of

TABLE 3 The Determinants of RSTD

	(1)	(2)	(3)
Constant	0.25	0.59	0.59
	(2.0)	(1.7)	(2.3)
YGAP	-2.21	1.53	—
	(0.9)	(0.6)	
REALR	-0.01	0.001	—
	(0.9)	(0.2)	
ERGAP	0.75	0.11	—
	(0.9)	(0.2)	
UIC	—	0.30	0.27
		(3.0)	(3.7)
WEDGE	—	-1.35	-1.33
		(1.4)	(2.1)
RSTD (-1)	0.72	0.34	0.40
	(5.3)	(2.0)	(2.1)
R^2	0.696	0.811	0.805

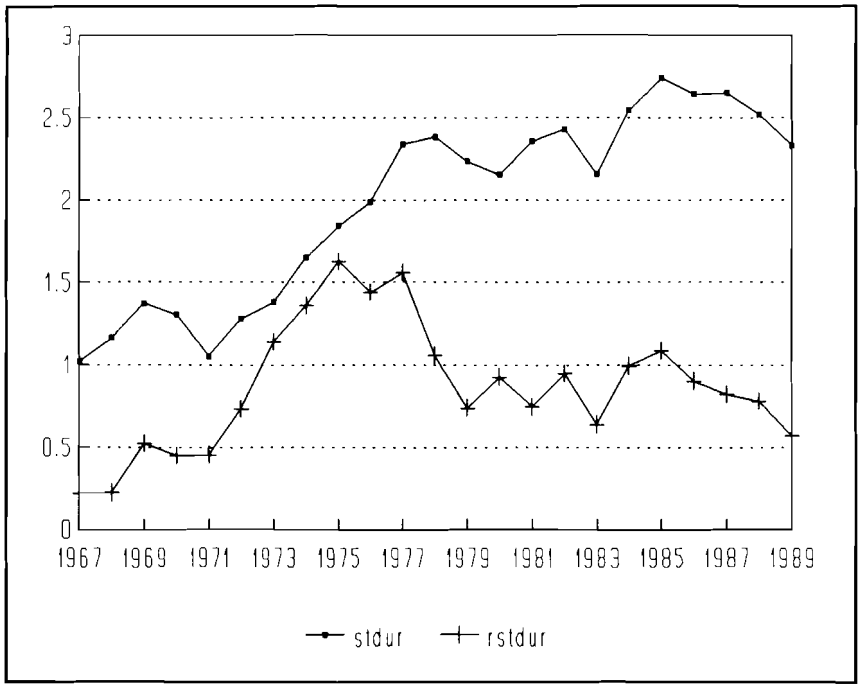

Figure 2: Actual and Residual UR Disparities

the structural equations (Tables 1 and 2). This could be because part of its influence is being appropriated by the cyclical variables; or, more likely it is

because the structural models are lacking the interaction between UIC and WEDGE. This points out the importance of the data problems discussed above and, in particular, that the provincial measures of the wedge which used the Conference Board's data did not perform well. Finally, the fact that the average Canadian wedge has a negative effect on the residual measure of UR disparities should be no surprise. It reflects, once again, the relative importance of the terms of trade to the low unemployment provinces.

Conclusion

We began this journey with various questions concerning the trend of provincial UR disparities in Canada, their causes and possible remedies. On the descriptive side, a measure of absolute UR disparities shows an upward trend after 1971 (the date of a major overhaul of the UIC system), and appears to move with the business cycle. A central problem in measurement is the lack of good provincial data on real GDP (and GDP deflators). This makes it problematic to obtain good province-specific measures of both the business cycle and the wedge. The first problem was dealt with by using a national measure of the business cycle, plus two variables intended to capture the regionally specific effects. This method seemed to work well, and showed that the periphery is relatively more adversely affected by high real interest rates, while the industrial heartland is relatively more adversely affected by an overvalued exchange rate. However, no remedy was found for the lack of good provincial data on the wedge. When the only available data were used, the variable performed poorly (even perversely), and was dropped from the structural model. There seems to be evidence to suggest that this lack of data may be a source of bias.

The analytics proceeded by modelling both provincial URs and provincial UR disparities. The nice feature of the latter is the ability to decompose a province's UR disparity into an "endowment" term and a "sensitivity" term. Moreover, its legitimacy does not depend on the existence of "natural" unemployment rates.

It seems that real energy prices do have plausible effects–negative effects on URs in Alberta and Saskatchewan, and positive in Ontario. The structural change variable, SIG enters with the correct sign, but while it is econometrically significant it is not quantitatively important. Our attempt to find a beneficial effect from federal regional development assistance was unsuccessful. However, it should be emphasized that this result is by no means

definitive.[11] One of the main features of the results is the strong effect of UIC. Not only is its aggregate coefficient significantly positive but, in addition, high UR provinces seem to be more sensitive to it. Moreover, these strong results may even be underestimating the true impact of UIC. This suspicion arises as a result of investigating the role of uneven dispersion of aggregate demand on UR disparities.

To investigate this question an adjusted summary UR disparity measure was calculated which removed the effect of the structural variables (including UIC). This residual measure had no long run trend, but did exhibit a pronounced bulge between 1971 and 1979. These dates not only correspond to the times of major UIC revisions, but also to a period where the change in the aggregate wedge for Canada as a whole (for which good data are available) was particularly favourable. These suspicions are borne out by regressing the adjusted summary disparity measure on aggregate demand variables, UIC and WEDGE. Of these, UIC was significantly positive and WEDGE significantly negative. Thus, it would seem that the omission of the provincial wedge measures obscures some of the impact that UIC is having. Indeed, this is precisely what Keil and Symons (1990) conclude.

Finally, with regard to a regionalised stabilisation policy, this paper concludes that it is possible to devise such a policy by exploiting the systematically different effects on the regions of interest rates and the exchange rate. However, it would seem that there is not a strong case for the necessity of doing so. After removing structural factors, uneven diffusion of aggregate demand seems to have insignificant effects on provincial UR disparities.

Appendix: Definition of Variables

YGAP The proportional gap between actual output and potential output, where potential output is measured by regressing the logarithm of real GDP on a constant, trend, a dummy variable equal to zero before 1974 and unity afterwards, and an interaction between the dummy and trend variables.

11. The definition of DFED attempts to focus exclusively on development assistance. The appendix alludes to some of the thorny definitional problems here. In addition, the careful reader will note that DFED includes G3, even though it is a subsidy. The rationale here is that subsidies to business are supposed to create jobs, rather than simply pay people not to work. These subsidies may affect the wedge between the real product and real consumption wage if they are given at the margin and are explicitly geared to the number of workers hired. Subsidies of the lump sum kind, or in the form of loan guarantees, would not affect the wedge. Another difficulty is that the multipliers associated with any of the G1 to G10 items may differ from any other.

ERGAP The exchange rate gap is $(e^* - e)/e^*$, where e^* denotes the purchasing power parity value of the exchange rate and e is the actual exchange rate, both expressed as the number of Canadian dollars per US dollar. If the Canadian dollar were at its purchasing power parity value, then the average level of Canadian prices (P^d) would equal eP^f, where P^f denotes the US price level. The purchasing power parity value of the exchange rate is the ratio of domestic prices to US prices (P^d/P^f). Since prices are measured as index numbers, we also make use of the Statistics Canada study (Dryden et al.(1987)) which calculated that, in the third quarter of 1985, the ratio of Canadian prices to US prices was 1.255. Indexing P^d and P^f to 100 in the third quarter of 1985 a series for e^* is found by multiplying the ratio of P^d to P^f by 1.255. The price indexes used are the GNP deflator for the US, and the GDP deflator for Canada.

REALR The real interest rate measured as the annual average nominal 91-day T-bill rate (Cansim B1401) minus the actual annual inflation rate (calculated from the GDP deflator).

DENER The change in real energy prices. The measure of energy prices used is that for petroleum and coal found by splicing the 1985 Cansim D544000 with the 1991 Cansim D693417. This nominal price index was then deflated by the GDP deflator, and expressed as a percentage change.

UIC^j Fortin's (1984) measure of UIC generosity calculated for the provinces as suggested by Coe (1989).

$WMIN^j$ The ratio of the minimum hourly wage rate (from Employment and Immigration Canada) to average hourly earnings in manufacturing (from Statistics Canada, 72-002), by province.

SIG^j Lilien's (1982) dispersion index by province using a 9 sector aggregation. The sectors are: agriculture; other primary; manufacturing; construction; transportation; trade; finance, insurance and real estate; services; public sector.

$DFED^j$ The change in federal development spending per capita, in real terms. The components of this measure are federal transfers to business, federal government investment in fixed capital and inventories, and federal government expenditure on goods and services per person over 15 years of age. It is deflated by the Canadian GDP deflator. Specifically, federal government spending is broken down into ten categories: G1, unemployment insurance benefits; G2, other federal government transfers to persons; G3, federal transfers to business; G4, payments under the Canada Assistance Plan; G5, taxation agreements; G6, contributions to hospitals, insurance and diagnostic services; G7,

other not elsewhere specified; G8, interest on the public debt; G9, federal government investment in fixed capital and inventories; G10, federal expenditure on goods and services. The widest possible measure is simply total federal spending (G1 to G10 inclusive) minus total federal receipts–representing the net dollar injection into the province by the federal government. An alternative approach is to use a gross spending measure comprising G3, G9, and G10.

DWEDGE The wedge is computed in the same way as described in the data appendix to Keil and Symons (1990).

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