THE USE OF UNEMPLOYMENT INSURANCE RECORDS TO DERIVE AN UNEMPLOYMENT INDICATOR

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INTRODUCTION

The unemployment rate is probably the best known measure of labour market conditions. It is a frequently published and cited measure of economic activity.

In Canada, unemployment data are derived from three sources: censuses, surveys, and administrative records. Censuses provide small area unemployment data, but not frequently: the census data are only available every five years. The Labour Force Survey (LFS) is the national survey that produces monthly unemployment data. Although the LFS produces timely data, the data are only available at aggregated geographical levels because of the sample size.

Because census data are infrequently available and because of the limitations of geographical disaggregations from the LFS sample, timely unemployment data are not currently available for small areas, such as counties. Given the many differences that can exist in the rates of unemployment for sub-provincial areas, there is considerable interest in the availability of small area data on unemployment.

A third source of data on unemployment is the administrative records of the unemployment insurance (UI) system. In Canada, this system is a national system with the potential of providing monthly small area data on the number and characteristics of UI claimants and beneficiaries.

Although administrative data hold much potential, the concepts and definitions underlying these data differ from traditional census and survey data. Therefore, a first step in the development of small area unemployment indicators from administrative data seemed to necessitate a comparison with the existing LFS data for known area systems. Only with some understanding of the relationships between the LFS unemployment rate and the UI unemployment indicators would it be possible to establish a sound and empirical foundation before deriving sub-provincial estimates. This paper, then, represents a report on the first step in the developmental process -- a report on a broad comparison of monthly survey data to monthly administrative data on the unemployed for Canada and the ten Canadian provinces.

THE USE OF UNEMPLOYMENT INSURANCE RECORDS

The estimation of unemployment rates for small areas, such as counties, has aroused considerable interest for some time, not only in Canada but also in the United States. Because the unemployment rate is frequently used in the allocation of funds and the administration of social programs, the demand for more detailed statistics has grown. Efforts have been made to use unemployment insurance records to obtain small area estimates of unemployment, using either regression techniques or "synthetic" methods in which the unemployment rate of a small area is predicted from other characteristics of its population.

Ziegler(1) described the unemployment insurance data base in the United States and outlined the use of the UI data in the 70-step Handbook Method used by the Bureau of Labor Statistics to estimate small area unemployment rates. Gonzalez and Hoza(2) obtained estimates of unemployment for U.S. standard metropolitan statistical areas using a regression model to relate the unemployment rate of a larger area to a smaller one. The independent variables of this model included insured unemployment as a percentage of total unemployment.

An important consideration when using UI data is that the data reflect the regulations and requirements of the program. These may vary over time and may impact differently on subpopulations. For instance, Korsching and Sapp (3) have noted that many rural residents are ineligible for UI benefits because they are self-employed, and this affects unemployment estimates based on UI records. The same authors have pointed out that unemployment in rural areas tends to be of longer duration, benefits become exhausted and the number of unemployed is undercounted. Similarly, although in Western countries(4) the unemployed, age 15-24, are a far larger proportion of total unemployed than the labor force 15-24 is of total labor force, members of this age group are often excluded from the UI program, since new entrants to the labour force are not eligible for benefits. Also, in Canada, the period of work required to be eligible for benefits, as well as the duration of benefits, varies between provinces and between regions of the same province. Finally, the regulations governing the UI program change quite frequently and the relationship between the number of UI beneficiaries and the number of unemployed, as measured by surveys, may not be constant over time.

In spite of the known and obvious shortcomings of UI data, and in spite of the inherent pitfalls arising from the use of UI data for statistical purposes, a research project was initiated in Statistics Canada to explore the potential of using UI data as an independent indicator of small area unemployment.

Levesque(5) has compared the counts of unemployed with counts of regular beneficiaries without income and has tried to refine the comparison by focussing on paid workers. The main finding from this comparison was that the relationship between the two series differed across provinces. In the Atlantic provinces, the UI counts were generally higher than the counts of LFS unemployed, while in the Western provinces the opposite was true. Clearly, any attempt to use the UI data will have to account for these regional differences.

Despite these regional differences, the UI data may be useful as an indicator of unemployment for a given area, or perhaps it might be useful as a relative indicator within a region.

Although it would be desirable to relate UI beneficiaries to some measure of the insured population or perhaps the labour force, such data are not available at a small area level. However, the working age population (15-64) can more easily be obtained for small areas, and therefore, an unemployment insurance beneficiaries to population (UIP) indicator was formulated as:

$$(1)\ UIP = \frac{\text{Number of regular UI beneficiaries without earnings}}{\text{Population age 15-64}} \times 100$$

This indicator has the principal advantage that it is relatively easy to calculate each month for a variety of area systems.

Since the UIP indicator reflects the incidence of unemployment in a given month, subject to the limitations noted earlier, it seems appropriate to consider the relationship between this indicator and the unemployment rate as measured by the LFS. Initially, this comparison was done at the provincial level. The time period chosen for the comparison was April 1978 to December 1981. The comparison was restricted to this period since April 1978 was the first month that the postal code, the key to sub-provincial geographic coding, was included on the monthly UI record.

The relationship between the UIP and unemployment rate was investigated by first directly comparing the two series and then by using a simple linear regression model over time to estimate the unemployment rate from the UIP indicator. It was thought that an analysis of the predicted values would provide an insight into the relationship between the two series and in particular the stability of the relationship over time.

The linear regression model used to estimate the unemployment rate from the UIP indicator was

$$U_{it} = \alpha + \beta\ UIP_{it} + u_{it}$$

Where U_{it} is the LFS unemployment rate in area i at time t, UIP_{it} is the unemployment insurance to population indicator for area i at time t, and u_{it} is the random error term. The parameters of the simple regression model are α and β where α is the intercept and β is the slope of UIP_{it}.

RESULTS

The parameters for equation (1) were calculated and are reported in Table 1. As can be noted in Table 1, there is a reasonably high association between the two indicators of unemployment at the provincial level and the Canadian level. The coefficients of determination (R^2) range from 0.53 to 0.86. These values suggest that in most cases the two variables, U_{it} and UIP_{it}, are strongly related. In all cases the coefficients were statistically significant (i.e., different from zero).

Plots of the two series and the fitted series are included in Figure 1. It can be noted that the UIP indicators are lower than the LFS unemployment rates. This is to be expected given the differences between the definitions of beneficiaries and unemployed and also because of the difference between the population and labour force used in the denominators. The east-west differences noted earlier are also evident from the graphs (note the different scale sizes). It is somewhat surprising that there is no apparent lag in the UIP indicator. The UI reporting system could be expected to show an administrative lag because of the waiting period to collect benefits.

SUMMARY AND DISCUSSION

The preliminary findings reported in this paper indicate a clear relationship between the UIP indicator and the LFS unemployment rate. It is, however, apparent that the relationship differs from region to region and that much additional work is required to assess and explain these differences. Furthermore, additional work is required to document and evaluate the discrepancies between the two data series to identify other variables that might be useful in subsequent modelling.

Overall the two series are highly correlated over time despite the many idiosyncracies of the UI regulations. It will be interesting to see to what extent the relationship holds up in 1982 as unemployment rates have been rising towards record highs.

Once the analysis is completed for Canada and the provinces, the next phase in the analysis will begin -- the calculation and evaluation of the UIP for smaller areas. Unfortunately it will not be possible to make comparisons to the LFS unemployment rates although results from the 1981 Census should prove useful in the evaluation.

TABLE 1: Regression Results

Geographic Area	Parameters		t-values		R^2	F-Ratio	Durbin-Watson	Sum of Squared Residuals
	α	β	α	β				
CANADA	4.05	1.02	17.62*	15.89*	.8545	252.44	1.65	4.06
NEWFOUNDLAND	7.11	0.80	9.71*	10.79*	.7303	116.45	0.57	64.13
PRINCE EDWARD ISLAND	3.28	0.99	4.66*	11.28*	.7474	127.24	1.07	77.54
NOVA SCOTIA	4.81	1.03	10.35*	11.65*	.7595	135.81	1.75	16.95
NEW BRUNSWICK	6.08	0.71	11.85*	10.89*	.7339	118.58	0.90	30.95
QUEBEC	4.96	0.98	10.18*	10.61*	.7236	112.56	1.11	12.64
ONTARIO	3.95	1.15	13.84*	9.95*	.6971	98.98	1.43	6.55
MANITOBA	3.24	1.14	12.60*	10.11*	.7038	102.19	1.63	10.27
SASKATCHEWAN	2.38	1.36	17.78*	16.51*	.8637	272.58	1.22	5.39
ALBERTA	2.34	1.62	9.92*	7.00*	.5327	49.01	1.16	7.98
BRITISH COLUMBIA	3.54	1.17	9.87*	10.61*	.7235	112.52	0.88	15.12

* indicates significance at the α = 0.01 level.

ACKNOWLEDGMENTS

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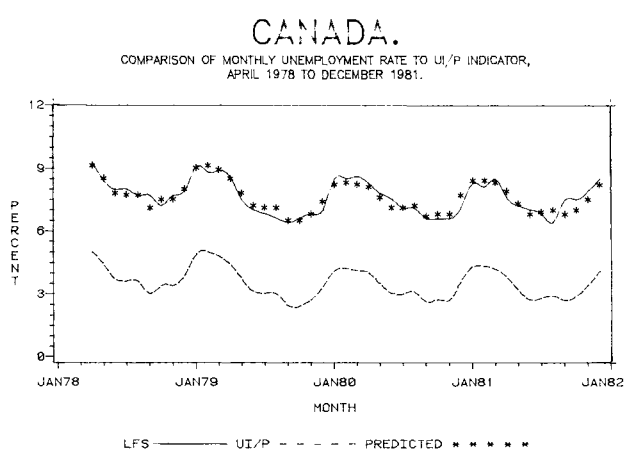
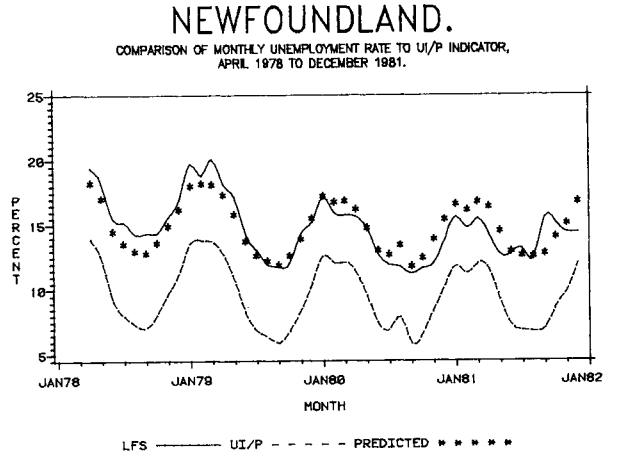
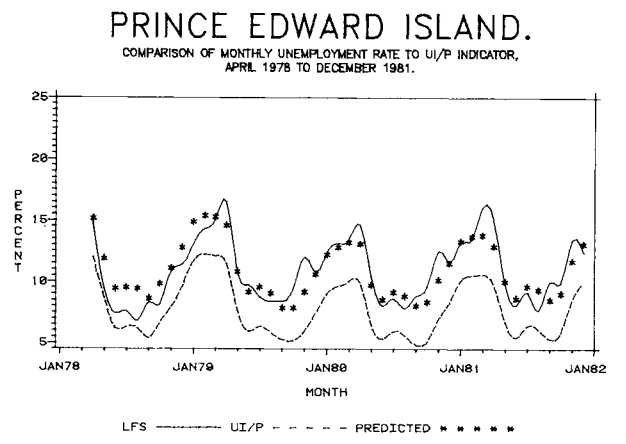
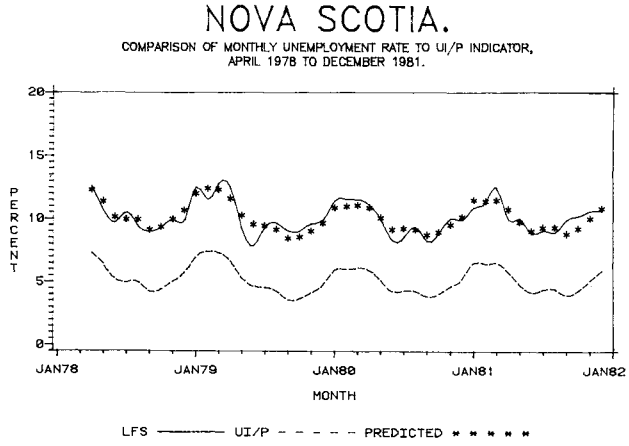
FIGURE 1



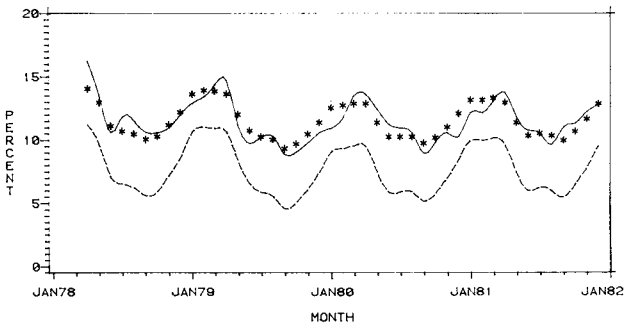






NEW BRUNSWICK.

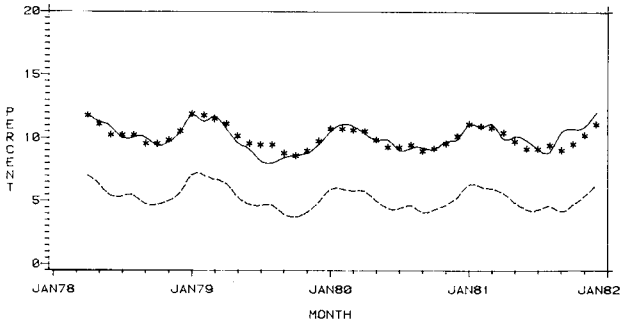
COMPARISON OF MONTHLY UNEMPLOYMENT RATE TO UI/P INDICATOR, APRIL 1978 TO DECEMBER 1981.



LFS ——— UI/P - - - - - PREDICTED * * * * *

QUEBEC.

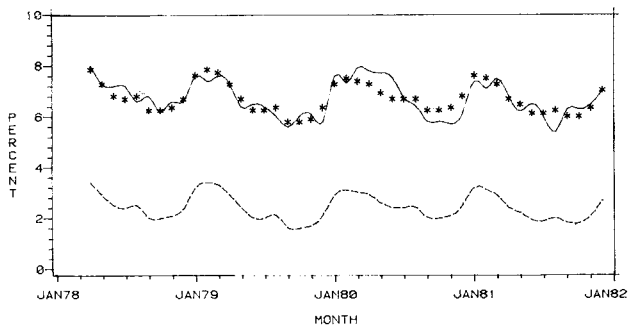
COMPARISON OF MONTHLY UNEMPLOYMENT RATE TO UI/P INDICATOR, APRIL 1978 TO DECEMBER 1981.



LFS ——— UI/P - - - - - PREDICTED * * * * *

ONTARIO.

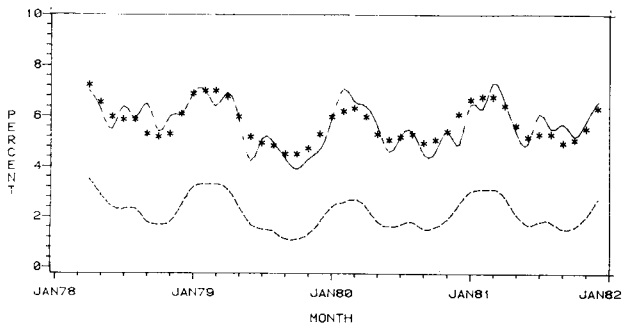
COMPARISON OF MONTHLY UNEMPLOYMENT RATE TO UI/P INDICATOR, APRIL 1978 TO DECEMBER 1981.



LFS ——— UI/P - - - - - PREDICTED * * * * *

MANITOBA.

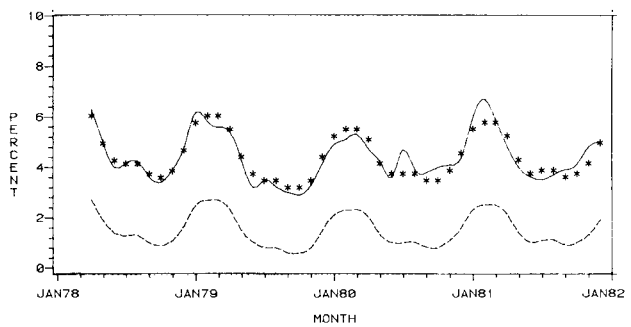
COMPARISON OF MONTHLY UNEMPLOYMENT RATE TO UI/P INDICATOR, APRIL 1978 TO DECEMBER 1981.



LFS ——— UI/P - - - - - PREDICTED * * * * *

SASKATCHEWAN.

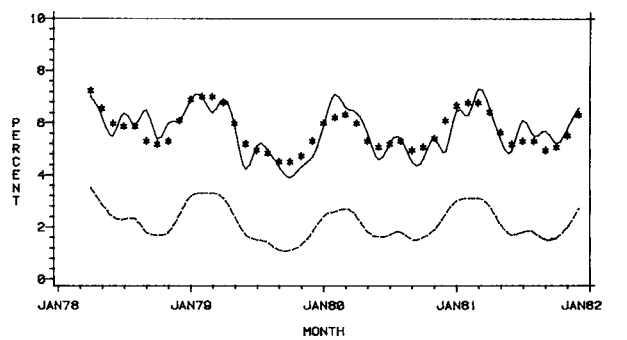
COMPARISON OF MONTHLY UNEMPLOYMENT RATE TO UI/P INDICATOR, APRIL 1978 TO DECEMBER 1981.



LFS ——— UI/P - - - - - PREDICTED * * * * *

ALBERTA.

COMPARISON OF MONTHLY UNEMPLOYMENT RATE TO UI/P INDICATOR, APRIL 1978 TO DECEMBER 1981.



LFS ——— UI/P - - - - - PREDICTED * * * * *

BRITISH COLUMBIA.

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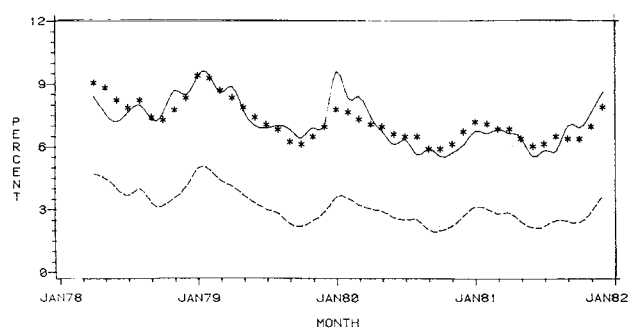

LFS ——— UI/P - - - - - PREDICTED * * * * *