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Unemployment and Labour Force Participation

The Canadian Experience

Robert Swidinsky

In an analysis of the short-run sensitivity of the Canadian labour force time series regression results appear inconclusive whereas cross-section regression results suggest a strong negative response to unemployment. Generally, the findings from the cross-section are comparable neither qualitatively nor quantitatively with those from the time series.

In the short-run, according to the standard income-leisure approach to the supply of labour, participation in the labour force is governed by the wage rate and by other income. The positive influence of wages on participation rates, defined as the percent of a relevant population in the labour force, is commonly called the discouraged-worker effect whereas the negative influence of other incomes is commonly called the added-worker effect. Since both wages and other incomes are related negatively to unemployment, the impact of unemployment on labour force participation rates cannot be determined a priori. It becomes not a matter of deciding which effect is true but which is stronger. In the past decade, a number of empirical studies have been directed at the task of determining the net cyclical response of the labour force.¹ While the quantitative results of these studies differ somewhat the evidence is overwhelmingly in favour of the discouraged-worker effect.² This conclusion holds not only for the aggregate labour force but for the various sociodemographic groups as well.

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The current interest in the short-run behaviour of labour force participation rates stems largely from the implications for general economic policy. It is quite obvious that changes in the participation rate during periods of changing employment have a direct bearing on the magnitude of the unemployment rate and on the impact of public policies designed to bring about full employment. Likewise, the ability of the labour force to curb inflationary pressures arising from excess aggregate demand depends not only on the direction of the labour force response to lower levels of unemployment but also on the size and nature of this response.

The urgent problem of poverty adds another dimension to these policy implications. Conceivable, poverty can be reduced by economic policies designed to maintain a high and stable level of employment if more of the poor can be attracted into the labour force by ample employment opportunities. This is particularly true if secondary workers, especially wives, are so attracted, for the probability that multiple earner households will remain in poverty is lowered considerably. Conversely, if secondary workers in the poverty areas are more inclined to depart from the labour force as employment opportunities improve, a prolonged

¹ These studies are largely of the U.S. labour force. See for example A. J. TELLA, « The Relation of Labour Force to Employment, » *Industrial and Labor Relations Review*, Ithaca, Vol. 17, no. 3, April 1964, pp. 454-469 and « Labor Force Sensitivity to Employment by Age, Sex, » *Industrial Relations*, Berkeley, Vol. 4, no. 2, February 1965, pp. 69-83. Jacob MINCER, « Labor Force Participation and Unemployment, » *Aspects of Labor Economics*, Princeton, Universities-National Bureau Committee for Economic Research, Princeton University Press, 1962, pp. 63-105. W. G. BOWEN and T. A. FINEGAN, « Labor Force Participation and Unemployment, » *Employment Policy and the Labor Market*, ed. A. M. ROSS, Berkeley, University of California Press, 1965, pp. 115-161. T. DERNBURG and K. STRAND, « Hidden Unemployment 1953-62: A Quantitative Analysis by Age and Sex, » *American Economic Review*, Nashville, Vol. LVI, no. 1, March 1965, pp. 71-95. For Canadian studies see Pierre-Paul PROULX, « La variabilité cyclique du taux de participation à la main-d'œuvre au Canada, » *Canadian Journal of Economics*, Toronto, Vol. II, no. 2, May 1969, pp. 268-277. Lawrence H. OFFICER and Peter R. ANDERSON, « Labour-Force Participation in Canada, » *Canadian Journal of Economics*, Toronto, Vol. II, no. 2, May 1969, pp. 278-287.

² Defining full employment as a 4 per cent rate of unemployment, Tella estimates from time series coefficients a net withdrawal from the labour force of 760 thousand workers in 1964 when the unemployment rate average 5.2 per cent. See TELLA, « Labor Force Sensitivity to Employment by Age, Sex, » Table 2, p. 76. Using the same definition of full employment, Bowen and Finegan estimate from cross-section coefficients a net outflow of 718 thousand in 1960 when the unemployment rate averaged 5.6 per cent. See BOWEN and FINEGAN, p. 155.

period of high employment will have a smaller impact on the incidence of poverty. Full employment policies must then be more fully supplemented by policy measures which border on direct transfer payments to the poverty population.

Since evidence of net discouraged-worker behavior is gathered largely from U.S. studies, Canadian findings being somewhat inconsistent, the net discouraged-worker effect need not apply to Canada. Several factors, in fact, suggest differential behavior. One such factor may be the higher level of income, wealth and economic security in the U.S. If family income in the U.S. is less sensitive to unemployment the result may be a weakening of the added-worker effect.³ An equally important factor may be the lower labour force participation rates of some socio-demographic groups in Canada. A comparison of participation rates for fourteen sociodemographic population groups in Canada and the U.S. given in Table I shows that participation is lower in Canada among the very cyclically sensitive married female group. The implication of these factors is that it may be exceedingly inappropriate to formulate Canadian economic policy affecting the labour force on the basis of the U.S. findings. Thus the purpose of this study is to submit the discouraged-worker hypothesis to additional testing using Canadian data.

The U.S. estimates of labour force sensitivity to employment changes have been derived from both time series and cross-section data. Mincer points out that the cross-section studies appear to overestimate the degree of labour force sensitivity as measured from the time series, and he attributes this difference to the fact that the cross-section measures not only short-run labour force responses to unemployment but also longer-run adjustments to persistent unemployment.⁴ Mincer's evidence of this alleged tendency to overestimate is not entirely convincing, but, clearly, the issue he raises is of crucial importance. Consequently, to test further the assertion that time series parameters measure short-run responses whereas cross-section parameters measure long-run responses, both time series and cross-section regression analyses will be undertaken.

³ See Jacob MINCER, « Labor-Force Participation and Unemployment : A Review of Recent Evidence, » in *Prosperity and Unemployment*, ed. R. A. Gordon and M. S. Gordon, New York, John Wiley and Sons, 1966, pp. 105-106.

⁴ MINCER, « Labor-Force Participation and Unemployment : A Review of Recent Evidence, » pp. 79-81.

TABLE I
LABOUR FORCE PARTICIPATION RATES BY AGE, SEX AND MARITAL STATUS
IN CANADA AND THE UNITED STATES IN 1961

<i>Age Group and Marital Status</i>	<i>Male</i>		<i>Female</i>	
	<i>Canada</i>	<i>U.S.</i>	<i>Canada</i>	<i>U.S.</i>
14-19 years	40.3	44.6	32.3	29.9
20-24 years	90.6	89.8	48.7	51.1
25-44 years	97.7	97.7	29.2	40.4
45-64 years	92.1	92.1	28.5	44.8
65+ years	29.4	31.7	5.9	10.7
Married	86.7	89.3	22.0	32.7
Single	62.5	55.6	54.9	44.4
Total	79.8	80.3	28.7	36.9

Sources : *Manpower Report of the President*, U.S. Department of Labor, Washington, 1964. *Seasonally Adjusted Labour Force Statistics, January 1953-December 1966*, Dominion Bureau of Statistics, Ottawa, 1966. *1961 Census of Canada*, Vol. VII, Dominion Bureau of Statistics, Ottawa, 1961.

TIME SERIES ANALYSIS

The basic formulation of the time series model is a multiple linear regression of the following nature :

$$\left(\frac{L}{P} \right)_{it} = a + b \left(\frac{E}{P} \right)_{t-1} + dT$$

where

$\left(\frac{L}{P} \right)_{it}$ = the i^{th} labour force group as a percent of the i^{th} population group in period t .

$\left(\frac{E}{P} \right)_{t-1}$ = aggregate employment as a percent of the population 14 years and over in period $t-1$

T = a linear trend term taking on the value of 1 in period 1, 2 in period 2, etc.

The aggregate E/P ratio may be regarded as an indicator of economic conditions.⁵ Evidence of a net discouraged-worker effect will

be demonstrated by a significantly positive E/P coefficient whereas a significantly negative coefficient will indicate the dominance of the added-worker effect. The overall E/P ratio, rather than that pertaining to the i^{th} population group, is used in order to avoid a spurious relationship that may exist between $(L/P)_i$ and $(E/P)_i$, and also because the concern here is the impact of a generally tight or loose labour market on the various age-sex groups. The one period lag in E/P not only makes better conceptual sense, it also avoids to some extent the problem of a common sampling error, thus reducing the bias in the R^2 and the regression coefficient of the E/P ratio. The trend variable may be regarded as a proxy for attitudinal, industrial and population changes that occur over time.

The results are based on seasonally adjusted quarterly labour force and employment statistics covering the period 1953(1) to 1966 (4).⁶ These statistics, obtained through a monthly sample survey of 35 thousand households, represent all persons in the population 14 years of age and over with the exception of Native Canadians living on reserves, inmates of institutions and members of the armed forces. The labour force data is disaggregated into five age groups by sex. The regression results are given in Table II.

Ignoring the problem of severe autocorrelation, the most striking feature of these results is the presence of both added and discouraged-worker effects. The added-worker effect dominates for males 20-24 and 25-44 years whereas the discouraged-worker effect dominates for males 14-19 and 65+ years. The negative coefficient for males 20-24 years is explicable in terms of formal schooling and job training. Although the opportunity cost of additional schooling rises with improved economic conditions, the resources required for such investment are more readily available so that young males can better afford to undertake additional schooling and training. The negative coefficient for males 25-44 years is more difficult to explain, especially since these males

⁵ E/P may be regarded as a proxy variable for transitory changes in the wage rate and other income. See MINCER, «Labor-Force Participation of Married Women.»

⁶ *Seasonally Adjusted Labour Force Statistics, January 1953-December 1966*, Dominion Bureau of Statistics, Special Surveys Division, No. 71-201, Ottawa, April, 1967. The 1947-52 period can not be included since the surveys were conducted at roughly quarterly intervals. The analysis is restricted to this period in order to allow a comparison with earlier studies.

are generally heads of households with family responsibilities. In the aggregate male participation rates are insensitive to employment changes. Unemployment has an impact on the composition of the male labour force but not on its size.

TABLE II

ESTIMATES OF THE TIME SERIES REGRESSIONS BY AGE AND SEX, 1953(1) - 1966(4)

<i>Age and Sex</i>	<i>Coefficients *</i>				
	<i>Constant</i>	$(E/P)_{t-1}$	<i>T</i>	<i>R</i> ²	<i>DW</i>
<i>Males</i>					
Total	82.102	+0.026 (0.32)	-0.109 (25.42)	.934	.23
14-19 years	- 8.456	+1.183 (8.40)	-0.299 (40.93)	.970	.68
20-24 years	110.410	-0.339 (2.23)	-0.100 (16.58)	.877	.98
25-44 years	101.225	-0.072 (2.23)	+0.004 (2.47)	.138	.91
45-64 years	94.940	-0.057 (0.82)	-0.001 (0.00)	.016	.51
65+ years	14.221	+0.418 (2.54)	-0.188 (21.83)	.908	.32
<i>Females</i>					
Total	8.367	+0.280 (5.18)	+0.173 (61.93)	.989	.56
14-19 years	19.993	+0.278 (1.94)	-0.080 (10.60)	.692	.72
20-24 years	- 20.374	+1.288 (6.75)	+0.125 (12.58)	.853	.52
25-44 years	5.683	+0.320 (4.64)	+0.217 (58.78)	.988	.75
45-64 years	25.908	-0.186 (2.05)	+0.338 (71.96)	.991	.86
65+ years	12.354	-0.169 (2.64)	+0.053 (15.97)	.833	.73

* The t-values are entered in parentheses.

As expected, female participation rates are more sensitive to employment changes. A one percent decline in E/P is associated with a .28 percent decline in aggregate female labour force participation. However, only females 20-24 and 25-44 years withdraw from the labour force as employment falls. Females 45-64 and 65+ years enter the labour force in response to falling employment. Unemployment has an impact on both the composition and size of the female labour force.

For females 20-24 and 25-44 years, the presence of young children implies substantial actual and opportunity costs of employment. To attract females in this age group into the labour market requires ideal employment conditions in terms of location, hours and wages, and such conditions are more likely to exist in periods of generally high employment. Moreover, males 25-44 years are generally subjected to smaller cyclical fluctuations in employment so that the income effect is largely absent for married females in this age group. On the contrary not only does the absence of young children reduce the actual and opportunity costs of employment for females 45+ years, but the relatively high incidence of cyclical unemployment among males 45+ years necessitates increased participation in the labour market for these married females during declining general employment. Predictably, there exists a close negative correlation between the participation rate of females 45+ years and the employment rate of males 45+ years.

The aggregate male participation rate has been declining by .11 percent per quarter whereas the aggregate female rate has been rising by .17 percent per quarter. For males the decline can be attributed to the 14-19, 20-24 and 65+ age groups. All female age groups, with the exception of the 14-19 age group, demonstrate a strong positive trend in their participation rates. The rate for females 14-19 years has been declining slowly with time. The R^2 's are highest for those age-sex groups possessing the strongest trends and displaying the greatest sensitivity to changes in employment conditions. The two variables, E/P and T, explain very little of the fluctuations in labour force participation rates of males 25-44 and 45-64 years. These population groups contain the primary wage earners whose attachment to the labour force is relatively permanent and independent of the level of economic activity.

As in all preceding time series studies of labour force participation there is an assumption that the standard tests of significance are in fact reliable. Given the level of autocorrelation as indicated by the Durbin-

Watson statistics such clearly is not the case. In fact, the significance of most of the E/P coefficients is doubtful for clearly they cannot withstand the normal adjustment process for autocorrelation. Likewise, the regression results when the dependent variable is respecified as a percentage change, although free of autocorrelation do not support either the discouraged or added-worker hypothesis. The E/P coefficients vary in sign but they are highly insignificant. On the basis of these results one must regard evidence of the cyclical sensitivity of the Canadian labour force with considerable skepticism.

CROSS-SECTION ANALYSIS

The basic form of the multiple linear regression equation is

$$\left(\frac{L}{P}\right)_{ij} = a + bU_i + (\text{control variables})$$

where $(L/P)_{ij}$ is the i^{th} area labour force participation rate of the j^{th} population group and U_i is the i^{th} area aggregate unemployment rate. The control variables may be classified as income, industrial, and others. While the influences of the control variables on area labour force participation rates have many interesting and important aspects, space considerations will not allow a lengthy discussion.

The income variables are male and female earnings. Male earnings serve as a proxy for male wage rates and for female other incomes. Female earnings are a proxy for female wage rates. The industrial variables are the percent of the labour force engaged in manufacturing, services, and trade. These variables indicate the long-run job opportunities for females and younger males. The other control variables are the percent of the population that is married, the percent of the working age population having a minimum of five years of secondary schooling, area population size, percent of families with dependent children under 6 years of age, and the ethnic composition of the area population. The last variable refers to the percent of the population that is of English and French origin. This variable is included because it has been noted that French and English-Canadians tend to participate in the labour force to a lesser degree than Canadians of other origins.⁷

⁷ For example, the participation rate for English and French-Canadian males is roughly 77.0 percent compared with 85.0 percent for Italian-Canadian males. The rate for English and French-Canadian females is roughly 28.5 percent compared with 36.5 percent for Ukrainian-Canadian females. See *1961 Census of Canada*, Vol. VII, Dominion Bureau of Statistics, Ottawa, 1961.

One serious limitation of this model is the use of the unemployment rate as the independent variable reflecting area labour market conditions. The correlations between unemployment and labour force participation rates may be spurious because of the way in which the rates are defined and measured. Since autonomous changes in L produce concurrent changes in U, it is obvious that the U coefficient may be biased. The direction of the bias depends on the pattern of labour force movements, that is, whether the movement is between « not in the labour force » and employed or « not in the labour force » and unemployed. Conceivably, these movements may cancel each other out so that the bias is eliminated. Other serious limitations of the model arise because in using cross-sectional data the seasonal component of the unemployment rate must essentially be ignored and the time patterns of adjustments in labour force to changes in unemployment are incompletely analysed.⁸

The cross-section results are based on information contained in the 1961 Census reports. The Census labour force includes all persons 15 years of age and over, who were employed either part-time or full-time, or were reported as looking for work during the week prior to enumeration. Only inmates in institutions were excluded. The labour force is disaggregated into seven age groups by sex, into marital status by sex, and into level of education by sex. All cities with a population of 30 thousand or more in 1961 were included in this study. In some cases the distance between cities is so short that the individual cities cannot be regarded as distinct labour market areas. Accordingly, cities lying within 20 miles of each other were arbitrarily assumed to fall into the same labour market area and to have a common rate of unemployment. As a result, there are 56 cities comprising 44 distinct labour market areas.

Table III presents the regression results for males by age. All the U coefficients are negative, thus giving support to the discouraged-worker hypothesis. Only the U Coefficients for males 35-44 and 45-54 years are not significant at the 5 percent level. The degree of response is surprisingly large. For example, for every one percent increase in the unemployment rate, the participation rate for males 15-19 years declines by 1.86 percent. The response coefficients form a U pattern, with the

⁸ A number of alternate measures of labour market conditions were used in the regression equations. These included, among others, the male unemployment rate, the female unemployment rate, and the male employment-population ratio. The results were basically unchanged in most cases.

youngest and oldest groups being most sensitive and the prime age groups being least sensitive to employment conditions. The influences of the other variables are both interesting and important but, because of space considerations and because the prime concern here is the influence of unemployment, these influences will not be discussed.

TABLE III

ESTIMATES OF THE CROSS-SECTION REGRESSIONS FOR MALES BY AGE

<i>Variable</i>	<i>Age Group</i>						
	<i>15-19 years</i>	<i>20-24 years</i>	<i>25-34 years</i>	<i>35-44 years</i>	<i>45-54 years</i>	<i>55-64 years</i>	<i>65+ years</i>
Unemployment	-1.856* (3.16)	-1.232* (3.74)	-0.294* (2.11)	-0.294 (1.58)	-0.268 (1.50)	-0.565* (2.10)	-1.050* (2.09)
Manufacturing	-0.130 (1.37)	-0.063 (1.13)	-0.000 (0.03)	0.025 (0.83)	-0.013 (0.43)	0.062 (1.43)	0.015 (0.19)
Trade	0.124 (0.32)	0.086 (0.37)	0.153 (1.02)	0.172 (1.37)	0.062 (0.49)	0.051 (0.41)	-0.181 (0.54)
Services	-0.587* (2.15)	-0.304 (1.88)	-0.262 (2.49)	-0.184* (2.10)	-0.134 (1.51)	-0.137 (1.10)	-0.151 (0.64)
Male Earnings	-0.685 (2.19)	-0.018 (0.99)	-0.097 (0.81)	0.028 (0.28)	0.137 (1.35)	0.278 (1.95)	-0.384 (1.42)
City Size	0.065 (1.30)	0.052 (1.77)	0.000 (0.00)	-0.014 (0.91)	-0.025 (1.53)	-0.038 (1.69)	-0.022 (0.52)
Education	0.192 (0.69)	-0.242 (1.49)	0.124 (1.21)	0.082 (0.93)	0.028 (0.31)	-0.083 (0.66)	0.601* (2.52)
Population Composition	-0.109 (1.80)	-0.045 (1.28)	-0.027 (1.17)	-0.026 (1.38)	-0.040* (2.08)	-0.050 (1.83)	-0.049 (0.98)
Marital Status	0.042 (0.17)	0.321* (2.14)	0.248* (2.53)	0.105 (1.29)	0.059 (0.72)	-0.187 (1.62)	-0.221 (1.01)
Constant	87.697	83.234	85.996	89.110	91.674	93.782	62.148
R ²	0.426	0.582	0.543	0.493	0.501	0.418	0.293
S _y	6.203	3.659	2.388	1.993	2.023	2.822	5.361

* The t-values are given in parentheses. The coefficients significant by the criterion of a t-value greater than 1.96 are marked with an asterisk.

Female participation rates are generally less responsive to unemployment than male rates. Again, the discouraged-worker effect is dominant in every age group. However, Table IV shows that while all the coefficients are negative, only those for females 15-19, 20-24, 35-44 and 45-54 years are significant at the 5 percent level. Table V gives the response coefficients by marital status and sex. Again the U coefficients are negative, and all are significant at the 5 percent level. Single males and females are most responsive to unemployment changes whereas married males are least responsive. Widows are less responsive than married females. This is an interesting and important result since poverty among the widow group is generally high and the effect of unemployment on this group's labour force participation rate is important in the context of public policies dealing with the problem of poverty.

An analysis of the labour force by years of schooling completed yields interesting and informative results. The labour force and population 15 years and over but not attending school are classified by elementary (0-7 years), secondary (8-12 years) and university education completed. For both males and females, labour force participation rates are lowest for the group having an elementary education and highest for the group having an university education. The regression results appear in Table VI. All the U coefficients for males are negative but highly insignificant at the 5 percent level. The seeming inconsistency of this result with the results of Tables III and V is easily resolved since males 15 years and over attending school are excluded and each educational group is dominated by prime age males.

Females with elementary education demonstrate a strong negative response to unemployment. The U coefficient for females with secondary education is also negative, but it is of lower magnitude and insignificant at the 5 percent level. The U coefficient for females with university education is positive but insignificant. However, when the male employment-population ratio is taken as the indicator of area labour market conditions all female response coefficients become significant at the 5 percent level. The respective male employment-population coefficients and t-values are +0.816 (7.22), + 0.396 (2.83), and -0.527 (2.14). This suggests that the additional worker is more likely to be the better educated high-income individual.⁹

⁹ This contradicts Mincer's assertion that the additional worker is more likely to be a low-income individual. See MINCER, « Labor Force Participation and Unemployment : A Review of Recent Evidence » p. 95.

TABLE IV
ESTIMATES OF THE CROSS-SECTION REGRESSIONS FOR FEMALES BY AGE

<i>Variable</i>	<i>Age Group</i>						
	<i>15-19</i> <i>years</i>	<i>20-24</i> <i>years</i>	<i>25-34</i> <i>years</i>	<i>35-44</i> <i>years</i>	<i>45-54</i> <i>years</i>	<i>55-64</i> <i>years</i>	<i>65+</i> <i>years</i>
Unemployment	-1.838* (3.74)	-0.792* (2.17)	-0.588 (1.58)	-1.005* (2.23)	-1.125* (2.24)	-0.905 (1.95)	-0.389 (1.66)
Male Earnings	-0.812* (2.85)	0.266 (1.25)	-0.556* (2.58)	-0.574* (2.17)	-0.319 (1.08)	-0.073 (0.27)	0.137 (1.00)
Female Earnings	0.007 (0.02)	0.614 (1.64)	1.105* (2.92)	1.079* (2.31)	1.160* (2.23)	0.412 (0.85)	-0.236 (0.98)
Manufacturing	-0.098 (1.12)	0.143* (2.19)	0.027 (0.42)	0.013 (0.16)	-0.071 (0.78)	-0.108 (1.28)	-0.015 (0.36)
Trade	0.456 (1.40)	0.542 (2.25)	0.117 (0.48)	0.180 (0.60)	0.211 (0.63)	-0.173 (0.56)	-0.256 (1.64)
Services	-0.709* (2.29)	0.326 (1.42)	0.272 (1.17)	0.513 (1.78)	0.586 (1.82)	0.236 (0.80)	-0.027 (0.19)
Marital Status	-0.267 (1.36)	-1.021* (7.02)	-0.547* (3.70)	-0.100 (0.55)	-0.002 (0.01)	-0.235 (1.26)	-0.322* (3.42)
Education	0.464 (1.51)	-0.251 (1.10)	0.250 (1.08)	0.044 (0.15)	-0.095 (0.02)	0.000 (0.00)	0.148 (1.00)
Population Composition	-0.025 (0.43)	-0.148* (3.41)	-0.230* (5.20)	-0.244* (4.49)	-0.191* (3.16)	-0.135* (2.41)	-0.016 (0.58)
City Size	0.042 (0.91)	0.006 (0.19)	0.036 (1.05)	0.048 (1.14)	0.039 (0.84)	0.034 (0.79)	-0.001 (0.05)
Constant	102.106	96.523	76.003	46.850	28.912	48.790	34.282
R ²	0.493	0.808	0.798	0.688	0.630	0.472	0.483
S _y	5.256	3.907	3.967	4.879	5.443	5.020	2.528

* The t-values are given in parentheses. The coefficients significant by the criterion of a t-value greater than 1.96 are marked with an asterisk.

COMPARING THE RESULTS

Generally, the findings from the cross-section are comparable neither qualitatively nor quantitatively with those from the time series. In the aggregate, the time series implies no net response for the male labour force whereas the cross-section implies a sizable net withdrawal of males

from the labour force as unemployment rises. For the aggregate female labour force the cross-section implies a much stronger negative relationship with unemployment than does the time series.

The magnitudes of these differences become clearer when presented in terms of hidden unemployment. Estimates of hidden unemployment for a particular period indicate the number of additional persons that would have been in the labour force had the rate of unemployment been lower, for example 4 percent, rather than what it actually was. According to time series estimates hidden unemployment in June, 1961 when the unemployment rate was 7.5 percent amounted to roughly 18 thousand females. According to cross-section estimates, hidden unemployment amounted to 131 thousand males and 140 thousand females, a total of 271 thousand. The adjusted rates of unemployment (hidden plus countable) would have been 7.7 percent and 11.2 percent, respectively.¹⁰

These differences may be attributed to bias in the U coefficients or to the fact that the cross-section parameters measure more than short-run responses to unemployment.¹¹ When unemployment strikes in any one region, workers have the alternatives of remaining in the regional labour force, withdrawing altogether, or migrating to regions with better job opportunities. The cross-section response parameters measure not only labour force withdrawal but also labour force migration. Since the migrants are generally firmly attached to the labour force this migration tends to lower participation rates in the out-migration areas and to raise them in the in-migration areas, thus giving an upward bias to the cross-section estimates.

The quantitative impact of area migration on cross-section regression coefficients may be estimated by comparing the U coefficients before and after a migration variable is included in the regression model. How best to formulate the migration variable is not clear, but in this exploratory test it is the change in area population between 1951 and 1961 as a

¹⁰ It may not be correct to add the hidden and countable unemployed since they are not strictly comparable in terms of social welfare loss. See MINCER, « Labor-Force Participation and Unemployment : A Review of Recent Evidence, » pp. 100-105.

¹¹ CAIN, however, finds that « the magnitudes of the effect of unemployment appear to be only slightly overstated by spuriousness in the correlation of the two ratios-participation rates and unemployment rates ». See Glen G. CAIN, « Unemployment and the Labor-Force Participation of Secondary Workers, » *Industrial and Labor Relations Review*, Ithaca, Vol. 20, no. 1, January 1967, pp. 292.

TABLE V

ESTIMATES OF THE CROSS-SECTION REGRESSIONS BY MARITAL STATUS AND SEX

<i>Variable</i>	<i>Population Group</i> *				
	<i>Female</i>			<i>Male</i>	
	<i>Married</i>	<i>Widow</i>	<i>Single</i>	<i>Married</i>	<i>Single</i>
Unemployment	-0.967* (2.14)	-0.771* (2.18)	-1.371* (3.59)	-0.488* (2.41)	-1.643* (4.50)
Children/Family	-0.274 (1.95)	-0.216 (1.92)	—	—	—
Male Earnings	-0.168 (0.69)	-0.013 (0.07)	-0.797* (3.85)	0.167 (1.50)	-0.530* (2.66)
Female Earnings	0.390 (0.76)	0.134 (0.33)	0.819 (1.89)	—	—
Manufacturing	-0.069 (0.79)	-0.199* (2.87)	-0.009 (0.13)	-0.092* (2.41)	-0.107 (1.57)
Trade	-0.043 (0.05)	-0.223 (0.93)	0.591* (2.33)	-0.300* (2.18)	0.031 (1.29)
Education	-0.106 (0.37)	0.068 (0.30)	0.266 (1.10)	0.041 (0.32)	0.256 (1.10)
Population Composition	-0.239* (5.17)	-0.157* (4.29)	0.030 (0.77)	-0.000 (0.00)	-0.143* (3.74)
City Size	0.018 (0.42)	0.020 (0.60)	0.064 (1.81)	-0.021 (1.18)	0.086 (2.62)
Services	-0.030 (0.11)	-0.317 (1.44)	-0.018 (0.08)	-0.426* (3.92)	-0.612* (3.14)
Constant	58.269	59.291	65.931	100.314	111.563
R ²	0.618	0.583	0.582	0.593	0.595
S _y	4.862	3.891	4.117	2.282	4.099

* The t-values are given in parentheses. The coefficients significant by the criterion of a t-value greater than 1.96 are marked with an asterisk.

TABLE VI
ESTIMATES OF THE CROSS-SECTION REGRESSIONS BY YEARS OF
SCHOOLING COMPLETED AND SEX

Variable	Sex and Years of Schooling Completed *					
	Males			Females		
	Elemen- tary	Secon- dary	Uni- versity	Elemen- tary	Secon- dary	Uni- versity
Unemployment	-0.427 (0.68)	-0.584 (0.86)	-0.481 (0.74)	-2.018* (3.36)	-0.978 (1.63)	1.033 (1.00)
Proportion of Population 65+	0.436 (0.84)	1.503* (2.68)	1.819* (3.37)	0.105 (0.49)	0.481* (2.27)	-0.862* (2.38)
Male Earnings	0.307 (0.16)	0.483 (0.23)	0.452 (0.23)	-0.211 (1.26)	-0.418* (2.51)	-1.008* (3.50)
Female Earnings	—	—	—	0.074 (0.20)	0.145 (0.40)	0.932 (1.44)
Manufacturing	-0.032 (0.19)	0.1142 (0.61)	-0.118 (0.70)	0.040 (0.61)	-0.081 (1.24)	-0.156 (1.45)
Trade	-0.439 (0.60)	-0.695 (0.89)	-0.544 (0.73)	0.121 (0.51)	-0.222 (1.00)	-0.100 (0.25)
Services	-1.334* (2.83)	-1.150* (2.26)	-1.309* (2.68)	-0.083 (0.35)	-0.052 (0.23)	-0.190 (0.51)
Marital Status	-0.311 (0.70)	-0.036 (0.08)	-0.479 (1.06)	-0.262 (1.83)	-0.204 (1.44)	-0.903* (3.75)
Population Composition	0.021 (0.20)	0.083 (0.69)	0.098 (0.91)	-0.160* (4.00)	-0.123* (2.86)	0.035 (0.43)
Constant	130.014	113.629	145.817	63.719	81.421	149.108
R ²	0.213	0.179	0.229	0.556	0.638	0.678
S _y	11.046	11.875	11.376	3.764	3.750	6.470

* The t-values are given in parentheses. Coefficients significant by the criterion of t-values greater than 1.96 are marked with an asterisk.

percent of the area 1961 population.¹² Because there were changes in the boundaries of some cities in this ten year period, only 44 cities are comparable between 1951 and 1961. The U coefficients are compared in Table VII. The introduction of the migration variable reduces the U coefficients and corresponding t-values for all male age groups, but the

¹² This approach was suggested by Bowen and Finegan. See W. G. BOWEN and T. A. FINEGAN, « Discussion, » in Prosperity and Unemployment, pp. 115-117.

amount by which they are reduced is very small, ranging from .62 to 4.76 percent. The U coefficients and t-values are slightly reduced for females 15-19 and 65+ years when migration is included but they are increased for all other female groups. The increases range from 4.82 to 6.86 percent. This result suggests that when a family moves from a depressed area and the male head of the household finds employment his wife may withdraw from the labour force, thus lowering the area female participation rate.

The above measure of area migration is probably highly unsatisfactory. There appears to be no relationship between area population growth between 1951 and 1961 and area unemployment in 1961. The assumption here is that the area unemployment rate pattern in 1961 is representative of the long-run unemployment rate pattern. Not only may this assumption not be justifiable, but the issue of area population growth is complicated by the alternatives available to rural migrants and to those seeking retirement homes. An urban center serving a large rural area may be the natural destination of all migrants regardless of the degree of unemployment. Moreover, the area unemployment rate may be low because of a slow rate of population growth.

A COMPARISON OF U.S. AND CANADIAN FINDINGS

Tella's time series and Bowen and Finegan's cross-section studies are most suitable for this task.¹³ There are numerous difficulties, notably with methodology, time periods and population groups, but a meaningful comparison can be made in a number of instances.¹⁴ As apparent from Table VIII, the U.S. time series estimates support only the discouraged-worker behavior whereas the Canadian estimates provide convincing evidence of both discouraged and added-worker behavior. Where the signs of the employment-population coefficients agree no systematic pattern is apparent. The positive response coefficients for Canadian males 14-19 years and females 20-24 years are roughly three times those for the respective U.S. groups. By contrast, the U.S. response coefficients for males 65+ years and females 14-19 years are roughly twice the Canadian coefficients. The most striking difference is found for males

¹³ TELLA, « Labor Force Sensitivity to Employment by Age, Sex ». BOWEN and FINEGAN, « Labor Force Participation and Unemployment. »

¹⁴ For example, Tella's E/P variable includes the armed forces, the time period investigated is 1947(4) to 1964(2), and the age grouping is more detailed.

20-24 years. A one percent increase in E/P is associated with a .36 percent decline in this age group's participation rate in Canada but with a .46 percent increase in the U.S.

The differences in the unemployment rate coefficients derived from cross-section regressions are relatively insignificant. Moreover these differences are quantitative rather than qualitative. The implication is that long-run labour force adjustments to unemployment, unlike short-run adjustments, follow a similar pattern in Canada and the U.S.

Those participation rates differing significantly between the two countries during the period under investigation are converging rapidly. In particular, the slope of the trend line for the Canadian aggregate female participation rate is considerably larger than the corresponding U.S. slope. The absolute U.S.-Canadian female participation rate dif-

TABLE VII

A COMPARISON OF THE UNEMPLOYMENT COEFFICIENTS DERIVED FROM CROSS-SECTION REGRESSIONS INCLUDING AND EXCLUDING THE MIGRATION VARIABLE

<i>Age Group</i>	<i>Unemployment Coefficients *</i>			
	<i>Males</i>		<i>Females</i>	
	<i>Without Migration</i>	<i>With Migration</i>	<i>Without Migration</i>	<i>With Migration</i>
15-19 years	-1.939 (2.67)	-1.905 (2.61)	-1.833 (3.06)	-1.826 (3.00)
20-24 years	-1.265 (3.45)	-1.244 (3.38)	-0.831 (2.36)	-0.867 (2.47)
25-34 years	-0.531 (1.98)	-0.524 (1.92)	-0.893 (2.38)	-0.952 (2.67)
35-44 years	-0.373 (1.64)	-0.362 (1.58)	-1.291 (2.83)	-1.367 (3.18)
45-54 years	-0.415 (1.87)	-0.400 (1.80)	-1.337 (2.62)	-1.414 (2.89)
55-64 years	-0.800 (2.51)	-0.769 (2.46)	-1.020 (2.10)	-1.086 (2.31)
65+ years	-1.605 (2.90)	-1.599 (2.84)	-0.208 (1.70)	-0.327 (1.61)

* The t-values are given in parentheses.

TABLE VIII
A COMPARISON OF U.S. AND CANADIAN ESTIMATES OF LABOUR FORCE
SENSITIVITY TO EMPLOYMENT CONDITIONS

Group	<i>Employment-Population and Unemployment Coefficients*</i>			
	Males		Females	
	Canadian	U.S.	Canadian	U.S.
<i>Time Series</i>				
14-19 years	+1.183 (8.40)	+0.358 (5.87)	+0.278 (1.94)	+0.401 (3.97)
20-24 years	-0.339 (2.96)	+0.464 (11.90)	+1.288 (6.75)	+0.445 (3.90)
25-34 years	—	+0.202 (6.31)	—	+0.517 (5.87)
35-44 years	—	+0.071 (2.03)	—	+0.512 (7.11)
25-44 years	-0.072 (2.23)	+0.135** —	+0.320 (4.64)	+0.514** —
45-54 years	—	+0.144 (3.51)	—	+0.688 (7.16)
55-64 years	—	+0.463 (9.85)	—	+0.627 (6.67)
45-64 years	-0.057 (0.82)	+0.278** —	-0.186 (2.05)	+0.662** —
65+ years	+0.418 (2.54)	+0.742 (9.86)	-0.169 (2.64)	+0.700 (8.04)
<i>Cross-Section</i>				
14-19 years	-1.86 (3.15)	-1.94 (7.02)	-1.84 (3.76)	-0.73 (3.02)
20-24 years	-1.23 (3.73)	+0.30 (1.76)	—	—
55-64 years	-0.57 (2.11)	-0.66 (3.30)	-0.91 (1.98)	-1.02 (1.73)
65+ years	-1.05 (2.10)	-1.62*** (6.78)	—	—
Married	—	—	-0.97 (2.16)	-0.76 (4.28)
Widowed	—	—	-0.77 (2.20)	-0.86 (7.17)

* The t-values, where available, are given in parentheses.

** Weighted average of the coefficients for the individual groups, the population of each group serving as its weight.

*** Estimate taken from Cain, « Unemployment and the Labor-Force Participation of Secondary Workers », Table 1, p. 295.

ferential in 1953 of 9.2 percent declined to 8.2 percent in 1961 and to 6.3 percent in 1966. The sharp decrease in this differential during the 1960's is due to an acceleration in the Canadian trend. If the current U.S. and Canadian trends in female participation rates continue, the present differentials should be eliminated by 1980.

This converging pattern can be detected for every female age group. In at least one case, females age 20-24 years, the Canadian participation rate has exceeded the U.S. rate. The aggregate male participation rates in the two countries have been declining at roughly the same rate, with the result that the absolute differential has remained basically constant over time. This is also true for the component age groups. This suggests that the U.S. participation rates may be used with reasonable accuracy in predicting the future size and composition of the Canadian labour force.

CONCLUSIONS

The objective of this study is to test the relevancy of the discouraged-worker hypothesis to the Canadian labour force. Cross-section regression results provide virtually unqualified support for the hypothesis, but the results of the time series regressions are far from conclusive. Apart from the unreliability of the significance test, the hypothesis, holds for the aggregate labour force, but it fails for many of its age-sex subsets. The cross-section sensitivity parameters appear to overstate labour force response to unemployment as measured from the time series. An attempt to reconcile the differences by including a migration variable in the cross-section regressions proved unsuccessful.

These findings raise many important issues, among which the admissibility of cross-section analysis for short-run behaviour is most obvious. If time series analysis provides the only valid estimate of short-run labour force responsiveness to employment changes, the conclusion must be that in the aggregate the Canadian labour force is not very responsive nor is the direction of its response readily predictable. For policy decisions concerning unemployment, secondary worker movements need not be of prime concern although they can prove bothersome. Neither can the secondary work force be relied upon during inflationary periods. Likewise, continuous high employment will be less effective in eliminating poverty, for such conditions may not draw many additional workers into the labour force.

The Canadian labour force is much less responsive to employment conditions than the U.S. labour force. This fact may explain why the

U.S. reported rates of unemployment during recent recessions have been generally lower than the Canadian rates. Generally, the participation rates in the two countries appear to be converging. One implication of this convergence may be that as the Canadian labour force approaches an age-sex composition similar to that of the U.S. it may also exhibit increasingly stronger discouraged-worker behavior. Also, as Canadian per capita income rises and income security programs take effect, the relative importance of the income effect may decrease and the relative importance of the wage effect increased, thereby making the discouraged-worker tendency more pronounced.

L'EMPLOI ET LE TAUX D'ACTIVITÉ : UNE EXPÉRIENCE CANADIENNE

Au cours des derniers dix ans, les enquêtes qui furent effectuées sur le comportement des travailleurs semblent indiquer qu'un marché du travail à la baisse nuit à la participation à l'activité économique. Cet article vise à éprouver la valeur de cette affirmation au moyen d'une analyse de régression utilisant à la fois les séries chronologiques et les données d'une coupe instantanée de la main-d'oeuvre canadienne. Le modèle de base des séries chronologiques consiste dans une régression multilinéaire mettant en relation les taux d'activité avec le rapport entre l'emploi global décalé de la population totale et une fonction de tendance linéaire. Le modèle de base de la coupe instantanée consiste dans une régression multilinéaire du taux d'activité par rapport aux taux de chômage global et un ensemble de variables utilisées comme éléments de contrôle. Dans les séries chronologiques, les données sont décomposées en cinq groupes d'âges par sexe et, dans la coupe instantanée, en sept groupes d'âges, en tenant compte de l'état civil et du degré d'instruction tant des hommes que des femmes.

Les résultats de la régression des séries chronologiques reflètent tant l'effet de stimulation que l'effet de découragement chez les travailleurs. Dans l'ensemble, c'est l'effet de découragement qui l'emporte. Cependant, le degré d'autocorrélation est tel qu'on ne peut guère avoir confiance dans les résultats. Les résultats établis par la coupe instantanée confirment l'hypothèse de découragement. La tendance à se retirer du marché du travail à mesure que le chômage s'accroît apparaît plus prononcée chez les hommes des groupes d'âges 15-19, 20-24 et 65 ans et plus et, chez les femmes, dans les groupes d'âges 15-19, 35-44 et 45-54 ans. La seule exception au comportement d'effet de découragement se produit chez les femmes qui ont fréquenté l'université. Mais la preuve n'est pas ici concluante.

Les paramètres de régression dans le cas de la coupe instantanée semblent exagérer la sensibilité de la main-d'oeuvre au chômage telle que mesurée dans les paramètres des séries chronologiques. On a tenté de reconcilier les deux méthodes par un facteur de migration dans les équations de régression pour ce qui est de la coupe instantanée, mais la tentative s'est avérée infructueuse. Si l'on considère ces résultats contradictoires, l'orientation et l'ampleur de la sensibilité à court terme de la main-d'oeuvre canadienne peuvent être fortement mises en doute.